ISSN 2395 -2113 (Print)

Indian Journal of Community & Family Medicine

Volume 4, Issue 2, Jul - Dec, 2018

www.aiimsbhubaneswar.edu.in/otherpublication/ijcfm

Editorial Office

Department of Community and Family Medicine

All India Institute of Medical Sciences, Bhubaneswar, Odisha-751019

Under The Aegis of

Ministry of Health & Family Welfare

Government of India

Submit your articles for consideration of publication to:

ijcfm2015@gmail.com

Design & Printed by: Siva Prasad Patra (Bindu Creative, 09438668784, 7008575985)

Indian Journal of Community & Family Medicine

Volume 4, Issue 2, Jul-Dec, 2018

IJCFM is now Indexed in

Index Medicus for South East Asia Region (WHO)

IMSEAR
Index Medicus for South-East Asia Region

J-Gate

J-Gate

International Scientific Indexing

INTERNATIONAL
Scientific Indexing

Scientific Indexing Services

SIS
Scientific Indexing Services

CNKI

cnki中国知网
www.cnki.net
中国知识基础设施工程

Indian Science Abstracts

निस्केयर
NISCAIR

Indian Citation Index

KNOWLEDGE
Foundation

CONTENT

Developing the underdeveloped: Aspirational Districts Program from Public Health Point of View

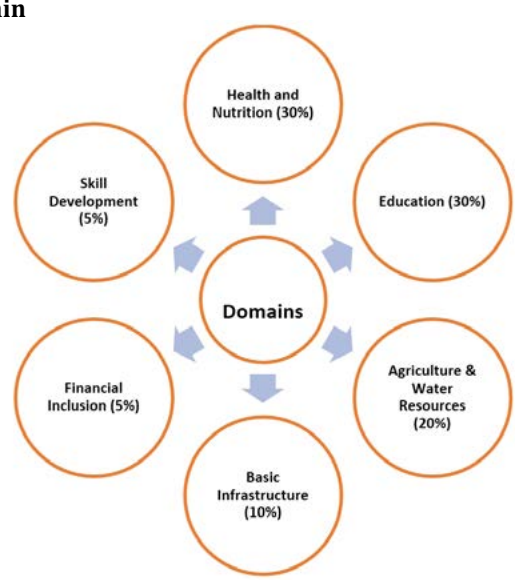
Vikas Bhatia[1], Rama Shankar Rath[2], Arvind Kumar Singh[3]

[1]Editor in Chief, IJCFM, Dean, Professor and HOD, [2]Assistant Professor, Department of Community and Family Medicine, [3]Public Health Specialist, Aspirational Districts Support Program, AIIMS, Bhubaneswar

Under National Health Mission (NHM) each district has become the planning programming and financial unit on which the health program of the district depends. So, it depends up on the district leadership and functionaries how well the plan to improve the status of the district. Since inception of NHM in 2005 although the districts worked as the special entity but the focus was at the state level.[1] Thus, the states with maximum poor performing districts were named as "Empowered Action Group" (EAG) although few districts in these states are more well performing than the well performing districts of well performing states. In 2018, Govt. of India planned to dig dipper in to the causes and to do focused activity in these poor performing districts so as to include them in to the main stream thus Aspirational Districts Program was lunched.[2]

Each Aspirational district are being monitored in six basic domains including Health and Nutrition, Education, Agriculture & Water Resources, Basic Infrastructure, Financial inclusion and Skill Development by 49 core indicators and 81 data points on a monthly basis. [Figure-1] All these domains are linked to the Human Development Index of the districts. Health receives the highest priority along with education followed by Agriculture and water resources. In health the major components include the maternal and child health component with health infrastructure and tuberculosis. A dash board named "Champions of Change" is also prepared to monitor the district progress round the clock is functional and districts also can monitor their progress in various domains.[3]

Figure-1: Key domains of Aspirational Districts Program along with weightage provided to each domain



Aspirational District program under the basic principles of **Convergence** (State and National Government), **Collaboration** (between citizens and officials) and Creation of healthy **Competitive** environment between the districts where all can move forward.[2] Here the state will act as the main drive for improving the district after identifying the core strengths and weaknesses of the district so that the district can become nations one of the best districts. So, the poor performing districts which are aspiring to become the best districts of the nation are called as the Aspirational Districts. Initially, the poorest performing 117 districts were included under this program based on their performance in various national surveys and other published district wise data for various programs. For health and nutrition indicators the surveys used was fourth round of National Family Health Survey (NFHS).[4] A higher score indicates more backward district. Monitoring of progress of the districts are done by key core indicators. The source of all monitoring related data is the routine reporting from the districts in various programs. Thus, the quality of data collected and reported by districts in various programs should be of high quality.

Key indicators related to Health are listed in Table-1. Indicators mainly targeted towards monitoring the maternal, child health, tuberculosis component in order to decrease the basic indicators of national importance i.e. Maternal Mortality Rate (MMR), Infant Mortality Rate

Address for Correspondence: *Dr. Vikas Bhatia, Dean, Professor and HOD, Department of Community and Family Medicine, All India Institute of Medical Sciences, BBSR 751019, Odisha,* **Email:** bhatiaaiims@gmail.com

Table-1: Domains and indicators related to health in Aspirational Districts Program

Sl. No	Sub-Domain	Indicator
1.	**Pre and Post Natal**	1. Percentage of pregnant women receiving 4 or more antenatal care check-ups to the total no. of pregnant women registered for antenatal care
		2. Percentage of ANC registered within the first trimester against Total ANC Registration
		3. Percentage of pregnant women (PWs) registered for ANCs to total estimated pregnancies
		4. Percentage of pregnant women regularly taking Supplementary Nutrition under the ICDS programme
		5. Percentage of Pregnant women having severe anaemia treated, against PW having severe anaemia tested cases
		6. Percentage of pregnant women tested for Haemoglobin 4 or more times in respective ANCs to total ANC registration
		7. Percentage of institutional deliveries to total estimated deliveries
		8. Percentage of deliveries at home attended by an SBA (Skilled Birth Attendance) trained health worker to total home deliveries
		9. Percentage of First Referral Units (FRU) with labour rooms and obstetrics OT NQAS certified (meet LaQShya guidelines)
2.	**Gender and Social Equity**	1. Sex Ratio at Birth
3.	**Infant Health**	1. Percentage of new borns breastfed within one hour of birth
		2. Percentage of low birth weight babies (less than 2500g)
		3. Percentage of live babies weighed at birth
		4. Percentage of children fully immunized (9-11 months) (BCG+ DPT3 + OPV3 + Measles1)
4.	**Child Health**	1. Percentage of underweight children under 6 years
		2. Percentage of stunted children under 6 years
		3. Percentage of Severe Acute Malnutrition (SAM)
		4. Percentage of Moderate Acute Malnutrition (MAM)
		5. Percentage of Breastfeeding children receiving adequate diet (6-23 months)
		6. Non-breastfeeding children receiving adequate diet (6-23 months)
		7. Percentage of children under 5 years with diarrhoea treated with ORS
		8. Percentage of children under 5 years with diarrhoea treated with Zinc
		9. Percentage of children under 5 years with ARI taken to the health facility in last 2 weeks
5.	**Tuberculosis**	1. Tuberculosis notification rate as against the estimated cases
		2. Tuberculosis treatment success rate
6.	**Health Infrastructure**	1. Proportion of Sub centres/ PHCs converted into Health & Wellness Centres (HWCs)
		2. Proportion of Primary Health Centres compliant to Indian Public Health Standards
		3. Proportion of functional FRUs (First referral units) against the norm of 1 per 5,00,000 population (1 per 3,00,000 for hilly terrain)
		4. Proportion of specialist services available in District hospitals against 10 core specialist services
		5. Percentage of Anganwadi centres/urban PHCs reported to have conducted at least one village health sanitation and nutrition day (VHSND) respectively in the last one month
		6. Proportion of Anganwadi's with own buildings

(IMR), Under Five Mortality Rate (U-5MR) and tuberculosis incidence listed in Sustainable Development Goals (SDG).[5] Similarly, the fourth domain i.e. health infrastructure will be helpful in achieving Universal Health Coverage (UHC).[4]

Based on these core indicators district has to identify a thrust activity and the related programs to it and also identify the loop holes, cross cutting issues and fix them. Many of the activities are linked with each other like Health is linked to basic infrastructure and financial inclusion. So integrated approach to address the issues remains the key to the success of the program. To perform these activities smoothly and to coordinate the activities between state and center NITI Aayog has identified Joint Secretory or Additional Secretory to serve as Guardians of the districts. Various partner agencies have been identified by the central government for helping the districts in various domains.[2] The role of the partner agencies will be to do independent evaluation of the program. Funding for all these activities has to be channelized from the funds provided for the program implementation plan only. Additional funds have to be pooled from state funds and innovative methods like Corporate Social Responsibility (CSR), Dist. Mineral Fund etc.

In this programme, the focus is more inclined at the district level than being centralized, which is indeed a positive sign. Similarly, coordination between state and center on a mutually agreeable point of development is also a positive sign. Few hurdles that the program may face at the outset is non-reporting or poor reporting when we are planning for real time monitoring of the districts progress. Before jumping in to the program per se the district has to identify such inactive reporting units and start reporting to get the actual baseline data. Second point will be the resources. Many health centers in state lack the appropriate manpower including basic field level workers like ANM and MPWs.[6] Districts with these problems may take longer time than the other districts as getting adequately trained man power is a time-consuming procedure. At this point hand holding and mentoring by Public Health Institutions specifically at the state level and national level may provide additional boost in training the manpower and monitoring the progress. Similarly, financial constrains related to recruitment and training will become critical in districts facing human resource issues. Another problem the districts may face is the lack of skilled manpower do multitasking at each level as multiple activities will be going on simultaneously for many thrust activities. Here the role of quality program managers becomes important. This can be handled by fine tuning the human resource allocation and appropriation. When we analyze from the health specific point of view majority of the maternal health indicators are well included in the program but the neonatal care component is not appropriately covered. Home Based Post-Natal Care is one such critical link missed in the indicator list. Majority of the neonatal deaths and maternal deaths occur when they are discharged from the hospital due to infections in this era of institutional deliveries.[7-8] In such cases improving the quality of the home-based care is critical to improve the maternal and child health. Such home based care is also more important in home deliveries. Universal Health Coverage (UHC) is an important public health concept in recent times. Many of the indicators for UHC are covered under aspirational district program but the indicators related to Non-Communicable Diseases, HIV and financial protection were not included.

From public health point of view health cannot be a stand-alone agenda. It is always linked to other non-health domains like education, financial inclusion and basic infrastructure. Thus, the program well addresses the health & its related domains and may provide a long-lasting impact on the health indicators.

References:

1. Framework for Implementation National Health Mission, Govt. of India. Available at: http://nhm.gov.in/images/pdf/NHM/NHM_Framework_for_Implementation__08-01-2014_.pdf [Last Accessed on: 02/01/2019]
2. Deep Dive, Insights from Champions of Change Dashboard, Available at: http://niti.gov.in/writereaddata/files/FirstDeltaRanking-May2018-AspirationalRanking.pdf [Last Accessed on: 02/01/2019]
3. Champions of Change available at www.championsofchange.gov.in [Last Accessed on: 02/01/2019]
4. Aspirational Districts: Unlocking Potentials, available at: http://niti.gov.in/writereaddata/files/AspirationalDistricts-Book.pdf [Last Accessed on: 02/01/2019]
5. SDG Health and Health Related Targets, World Health Organization https://www.who.int/gho/publications/world_health_statistics/2016/EN_WHS2016_Chapter6.pdf [Last Accessed on: 02/01/2019]
6. Rural health Statistics -2017, available at: https://data.gov.in/catalog/rural-health-statistics-2017 [Last accessed on: 02/01/2019]
7. Million Death Study Collaborators: Nationally Representative Mortality Survey, Causes of Neonatal and Child Mortality in India, Lancet. 2010; 376 (9755)
8. Montgomery AL, Ram U, Kumar R, Jha P, for The Million Death Study Collaborators (2014) Maternal Mortality in India: Causes and Healthcare Service Use Based on a Nationally Representative Survey. PLoS ONE 9(1): e83331. doi:10.1371/journal.pone.0083331

REVIEW ARTICLE

Adapting the Stepped Care Approach for Providing Comprehensive Mental Health Services in Rural India: Tapping the Untapped Potential

Priyamadhaba Behera[1], Senthil Amudhan R[2], Rishab Gupta[3], Anindo Majumdar[4], Arun M Kokane[4], Mohan Bairwa[5]

[1]Department of Community & Family Medicine, AIIMS, Bhubaneswar, Odisha, India [2]Department of Epidemiology, NIMHANS, Bangalore, India, [3]Department of Psychiatry, AIIMS, New Delhi, India, [4]Department of Community & Family Medicine, AIIMS, Bhopal, Madhya Pradesh, India, [5]Department of Public Health & Epidemiology, IIHMR University, Jaipur, India

Abstract

Recent National Mental Health Survey (2015-16) reported a prevalence of 13.7% for any mental disorders excluding tobacco use disorders in India. Translating it into real numbers, nearly 150 million people need active mental health interventions, disproportionately more in rural areas. Major challenges in delivering comprehensive mental health services in rural India are: a) lack of a well-defined strategy; and b) lack of trained mental health manpower. To fill this gap, the global mental health community has increasingly realized the importance of Community Health Workers (CHWs) and role of stepped care approach in mental health service delivery. We propose a model of stepped care approach to fulfil the need of rural India, utilizing the existing health system components for improving mental health knowledge, reducing social stigma for mental disorders, screening for priority mental disorders at community level, ensuring compliance to treatment, timely follow-up, and community-based rehabilitation by mobilising community support for diagnosed cases. This stepped care approach will integrate mental health into Ayushman Bharat's Health and Wellness Centres (HWCs) for the provision of comprehensive primary health care. Integration of new age technologies such as telepsychiatry, e-health, and mHealth into the proposed model will make it feasible and cost-efficient for inaccessible parts of the country.

Key Words: Community Health Workers (CHWs), Stepped care approach, Priority mental disorders, Rural India

Introduction

Mental disorders are the leading causes of disability globally. One in four people in the world are affected by mental or neurological disorders at some point in their lives.[1] The high incidence of mental illness and substance abuse disorders in low- and lower-middle-income countries can lead to an economic trap of disease burden and social decline. The term, "mental disorders" is often used synonymously with mental morbidity, mental health conditions, mental illness, and mental health issues. In India, the recent National Mental Health Survey (NMHS) 2015-16 revealed a prevalence of 13.7% for any mental disorders excluding tobacco use disorders related to tobacco use.[2] Earlier epidemiological studies documented that the prevalence of various mental disorders varies from 9.5 to 370 per 1000 population in India.[3] India is also regarded as home to an estimated 57 million people (18% of the global estimate) affected by depression.[4] Translating the magnitude of mental disorders into real numbers, nearly 150 million Indians are in need of active mental health interventions.[2]

In order to achieve universal health coverage (UHC), India has launched its ambitious Ayushman Bharat (Healthy India) programme in the alignment with its National Health Policy 2017.[5]Ayushman Bharat has two components; health and wellness centres, and national health insurance protection scheme. In the charter of health and wellness centres, a list of 12 services are identified including mental health services which have been neglected in the past. This becomes important at this juncture of time as the burden of mental disorders are rising although provision for mental health services are not improving. Not only the burden of mental disorders is high, but their impact on individuals and society is also widespread and greater than many

Address for Correspondence: *Dr. Anindo Majumdar, Assistant Professor,Department of Community & Family Medicine, AIIMS, Bhopal – 462020, Madhya Pradesh, India,* **Email***:* anindo.cfm@aiimsbhopal.edu.in

Received:*11/11/2018****, Accepted:*** *23/11/2018*

major medical conditions.[6] For instance, India accounted for 16.4% of global disability-adjusted life years (DALYs) attributable to mental and substance use disorders (28 million DALYs).[7] Due to the prevailing stigma, mental disorders often are hidden by the society, and consequently, persons with mental disorder live with a poor quality of life.[2] With significant disability and functional impairment, the economic burden associated with mental disorders is expected to be high, mainly due to loss of productivity. Therefore, we proposed a cost-effective model of stepped care approach based on existing cadres of the community health workers, which may help the country to achieve the goals of NHP 2017 and sustainable development goals (SDGs) through universalization of comprehensive mental health care.

Treatment gap for mental disorders remains very high

Globally, 76% to 85% of people with severe mental disorders in low and middle-income countries receive no treatment for their mental disorders.[8] A similar gap is reflected in India as well. Although several cost-effective interventions demonstrated a significant decrease in the burden of mental disorders, associated treatment gap remains very high due to reasons ranging from non-availability of services to prevailing stigma. Recent NMHS findings reported an overall treatment gap of 83% for any mental disorders.[2] Only about 10% of people with mental disorders are thought to receive evidence-based treatments in India.[2]

Mental health is still a low priority despite its global implications

Mental disorders have received poor attention in the health programmes in India. In addition, limited reach and slow expansion of mental health programmes and services also existed due to inequitable distribution and inefficient use of resources for mental health care.[2] Addressing the mental health care needs of India's vast population with limited resources will have global implications towards the achievement of mental health-related sustainable development goals. This calls for scale-up mental health services in India, by adapting successful models and developing and integrating innovative, cost-effective and self-sustainable interventions within these models in the Indian context.

Human resource gap: a critical challenge

The severe deficit of mental health workforce remains a major challenge in delivering comprehensive mental health services in rural India. For instance, there is fewer than one psychiatrist (0.3) for 100,000 population.[9] Whereas the average national deficit of psychiatrists is estimated to be 77%, it is more than 90% for one-third of the country's population.[10] This clearly implies that the huge burden and treatment gap associated with mental disorders would not be easy to tackle by currently existing psychiatrists alone.[11] At the same time, the insufficient training (1.4% of the total lecture time) of psychiatry during the undergraduate medical curriculum renders non-psychiatrist physicians unprepared to competently deal with mental disorders.[12] Studies from India have reported that primary health-care professionals are often inadequately trained, and reluctant or unable to detect, diagnose, or manage common mental disorders .[2] In addition, there is a great disparity in the distribution of psychiatrists among cities and villages in India. This leads to inadequate treatment services, continued suffering and premature deaths, stigmatization, and poor investment in mental health. This warrants for a rational redistribution of mental health services, known as task-sharing, from mental health specialists including psychiatrists, psychologists, and psychiatric nurses to non-specialist health workers in primary care and community settings through the integration of mental health into primary care.[13]

Even though India was the first country in the world to attempt to integrate mental health services at the primary care level through National Mental Health Programme (NMHP and District Mental Health Program (DMHP), its endeavor to bridge the treatment gap and decrease the deficits in human resources failed to gain the desired momentum.[3] Community-based participatory research to address mental health has been tried in various studies in different countries. In these studies, community health workers (CHWs) educated up to 10 years of schooling were trained to provide non-pharmacological interventions in patients with both severe as well as common mental disorders.[12,14] Such interventions are effective in improving the clinical outcome as compared to those receiving 'care as usual'.

Human resources availability in primary health care

Since the launch of National Rural Health Mission, now known as National Health Mission (NHM) in 2005, trained manpower [Accredited Social Health Activists (ASHAs), Multipurpose workers (MPWs), Doctors, etc.] has increased enormously.[15] Under the NHM, around 0.9 million ASHAs have been selected so far.[16] By 2016, there were 2,12,185 female MPWs, 55,657 male MPWs, 12,646 male Health Assistant (HA) and 13,372 female HAs working in Primary Health Centres (PHCs) in India.[17] ASHA is a voluntary community health worker who is selected from the village itself and accountable to it, she is trained to work as an interface between the community and the health care delivery system.[18]Both male and female MPWs work at sub-centre which is the lowest level of the health care delivery system. The minimum qualification for MPW (Male) is 12 years of schooling with biology or science as a subject, and for MPW (female) is 2 years Auxiliary Nurse-midwifery (ANM) course following 10-12 years of schooling.[19] These courses focus predominantly on

Figure 1: Stepped care approach for comprehensive mental health services in rural India

Steps	What are the focus domains?	Who are the persons/ resourcesresponsible?	What are the proposed activities?
Step 1 **Well population**	Mental health promotion Stigma reduction	ASHAs Mass communication media (TV, Radio, Mobile and Newspaper) Social media (Twitter, Facebook, WhatsApp etc.)	Improve mental health literacy and generate community awareness through IEC activities, interpersonal communications and through relevant audio-visual messages through mobile and other mass media Provide support system to link person, family and community to health system for management of mental disorder
Step 2 **At risk groups**	Early identification for priority mental disorders Basic mental health care for priority mental disorders	Non-professional peripheral healthcare providers [MPWs (male and female)/ANMs]	Screening and assessment for priority mentaldisorders Active monitoring and referral for further assessment Low-intense psychosocial intervention/ Lay counseling/mental health first aid
Step 3 **Mild mental disorders**	Standardised mental health care for priority mental disorders	PHC medical officers Medical officers- Taluka Hospital/ CHCs DMHP-team (Psychiatrists, Psychiatric Social workers, Clinical Psychologists)	Medication Treatment and monitoring Facilitate referral to specialists Encourage self-monitoring Collaborative care and attention to overall well-being Counselling Psychological interventions Flexible and accessible mental health services
Step 4 **Moderate mental illness/ Severe mental disorders**	Specialised mental health care involving coordinated multi-sectoral and inter-departmental services (risk to life; severe self-neglect, treatment-resistant, recurrent, atypical cases, non-priority mental disorders)	Psychiatrist at tertiary/ advanced care facilities (psychiatrist at district hospitals, medical colleges etc.)	Medication, Treatment and monitoring Inpatient care Severe and complex intervention (e.g., crisis service,emergency care, ECT etc) Combined treatments and Multi-professional care(High-intensity psychological interventions,Counselling, Psycho-education etc.)
Step 5 **After care**	Continuity of mental healthcare Community based rehabilitation	ASHAs Technology based applications MPWs (male and female) / ANMs	Ensure compliance to treatment for the diagnosed cases Timely follow-up for diagnosed cases Support community-based rehabilitation by mobilising and providing family/social support

* Cross-cutting issues
Functional PHCs providing integrated mental health care can be critical at each step for successful implementation of this comprehensive mental health services model.
Technology in various forms can be used to support resources at each step

maternal and child health (midwifery) and communicable diseases with a minimal focus on mental health. Under the supervision of the Medical Officer-in-charge of a primary health centre (PHC), ASHA at the village level, MPWs at the sub-centre level, and HAs at PHC level provide promotive, preventive and curative services as appropriate for that level. However, there is no specific training as far as mental health issues are concerned.

Stepped care approach for providing comprehensive mental health services in rural areas

There is an urgent need to address the large gap in human resources in mental health. In addition, improving the knowledge about mental health and elimination of social stigma and discrimination associated with mental

disorders is another major challenge to address the mental health needs. The early identification of major mental disorders with appropriate linkage to evidence-informed management and timely follow-up remains the key to improved mental health care. The stepped care approach is a successfully tested model that can be adapted and integrated with primary health care in rural settings in India, with appropriate modifications (Table -1).[20,22] A stepped care approach improves the coverage of mental health services, making the best use of available local workforce and technologies for a better match with individual and population needs. Subsequently, increased community engagement acts as a mean of advancing inclusion and opportunities for community participation. It thus provides an appropriate mechanism for people to avail mental health services at their doorstep with affordable cost compared to the conventional clinic-based approach. Community health workers i.e. CHWs (ASHAs, MPWs, and ANMs) have a very important role in the stepped care approach. Next section summarizes how these CHWs can fit into the stepped care approach playing unique roles.

ASHAs: Given their vast numbers and immense penetration into the community health affairs, ASHAs can make a significant impact on the mental health care. They, if appropriately trained in handling mental health issues, may be able to provide the ideal linkage between the community and the mental health services at the PHCs (now Health and Wellness Centres), and further referrals to specialty psychiatry clinics. ASHAs can work in tandem with MPWs (both male and female) to improve knowledge about mental disorders (mental health literacy) and reduce social stigma and discrimination associated with mental disorders.

ASHAs are cognizant of the socio-cultural milieu of the community (which is vital for identifying mental disorders with varied cultural interpretations and understanding the precise psychological phenomenon) and have help-seeking dynamics and regular contact with the families to ensure compliance with the treatments administered. ASHAs, being a part of the mental health workforce, do not need to spend additional time on the potential psychiatric patients, since they are already engaged with the entire community. A support system can be developed to help ASHAs ensure that already diagnosed patients reach PHCs and are timely followed-up subsequently. Medical officer, in the PHCs, diagnose the disorders and initiate proper management. They may further refer only those cases which require the attention of a trained psychiatrist (at the district hospitals) and thereafter receive them back in their own care.

MPWs: There are unique advantages for training of MPWs in mental health. MPWs (male and female) are the suitable workers for the screening due to their community penetration and educational background. Trained MPWs would carry out the responsibilities assigned to them- a scope to identify people with mental disorders. The screening for the priority mental disorders in the community by trained MPWs and establishing appropriate linkage between persons identified with mental disorders and the doctors at the PHCs and the psychiatrist at the district level -a critical step to strengthen mental health services in the rural areas of India. This new role can be integrated with duties assigned under the non-communicable diseases program, i.e. the National Program for Prevention and Control of Cancer, Diabetes, cardiovascular diseases, and Stroke (NPCDCS) making it cost-effective. One cost-effective strategy would be testing and developing a validated intervention package for India, based on the WHO mhGAP intervention guide.[23]

The potential role of HAs as a health counselor in mental service has been already explored in Indian settings.[12] HAs (male and female) if trained, can act as counselors for priority mental disorders (depression, anxiety etc.) at PHC level. Thus, the involvement of ASHA at the village level, MPWs at the sub-centre level, HAs and doctors at PHC level and psychiatrist (psychiatric clinics) at district level along with their appropriate linkage will be able to provide comprehensive mental health services in rural India. This may be integrated with currently ongoing health sector reforms in India under Ayushman Bharat specifically invented health and wellness centres.

Catalysing the role of CHWs using emerging technology

Cutting-edge technologies can play a pivotal role in bridging the "mental health gap" in rural India. Mass communication media (TV, Radio, Newspaper etc.), social media (Twitter, Facebook, WhatsApp etc.) and relevant audio-visual messages through mobile phones can be used to spread community awareness to improve mental health literacy and reduce stigma. Telepsychiatry, tele-mental health, e-psychiatry approach and mobile mental health support approach have been already explored and found to be successful and cost-effective in India.[24,25,26,27,28] These technologies can cross-cut at various steps of the stepped care approach for integration of mental health into primary care and take it to the doorstep of patients in the community, especially in remote and inaccessible areas.

Telepsychiatry is a useful technique for direct patient care (diagnosis and management), consultation, training, education, and mental health promotion. It reduces out of pocket expenditure (time and cost of transport cost, wage loss.) for patients. Telepsychiatry is an economical model mental health service delivery connecting tertiary centre and a primary health-care centre compared to traditional psychiatric clinics.[28] While using telepsychiatry it is required that the pharmacological treatment should be prescribed only by the trained doctor, and non-pharmacological treatment can be provided by the CHWs

whenever recommended. In the context of increasing use of smartphone use, mobile mental health support with appropriate app integrated with telepsychiatry will be useful and cost-effective interventions for mental health promotion, training of community health workers (ASHAs, MPWs, and HAs), screening for priority mental disorders, to improve the treatment compliance along with referral, and timely follow-up of diagnosed cases. The appropriate mobile app will be handy for CHWs to fulfill the community level tasks "what to do", "when to do" and "how to do".

Incorporating the stepped care approach within mental health policy framework

The Government of India has recently unveiled the Mental Health Policy with an accompanying mental health action plan. It has an ambitious proposal for expanding the District Mental Health Program to more than 300 districts in a phased manner.[21]In the existing health systems, ASHAs and other health workers are an important link for delivery of services, but their roles and responsibilities for mental health care has not been delineated. Recently, the Ministry of Health and Family Welfare, Government of India has brought out a training module on essential psychiatry to impart standardized short-term training to medical officers at peripheral centres. Thus, prioritizing the mental disorders, delineating the roles and responsibilities of ASHAs, MPWs and HAs as per their skills and competencies, and training them in line with the training of medical officers at peripheral centres through strategic framework and model becomes critical. This will not only keep the momentum gained for mental health in India in recent years but also will align with the stepped care approach for successful integration of mental health into Ayushman Bharat's Health and Wellness Centres (HWCs) for the provision of comprehensive primary health care. Fortunately, mental health has been able to secure a birth in the package of HWCs, although, there is a long way to go.

Conclusion

Although the burden of mental disorders is high, the trained mental health workforce is critically deficient in rural India. Stepped care approach is a cost-effective and time-tested strategy which can be adapted and integrated within the framework of Ayushman Bharat's health and wellness centres to provide comprehensive primary health care. Community Health Workers (CHWs) are a potentially useful and large pool of unqualified but trainable that utilized into the stepped care approach. As we make striking progress towards the unfinished agenda of communicable diseases and reproductive and child health, tapping their potentials appropriately to deliver mental health services will ensure achievement of health-related Sustainable Development Goals (SDGs).

References

1. World Health Report. World Health Organisation. Available from:
2. http://www.who.int/whr/2001/media_centre/press_release/en/.(Last Accessed on 11 feb 2018)
3. National Mental Health Survey of India. Ministry of Health and Family Welfare Government of India 2015-16. Available from:
4. http://indianmhs.nimhans.ac.in/Docs/Summary.pdf. (Last Accessed on 11 feb 2018)
5. Math SB, Chandrashekar CR, Bhugra D. Psychiatric epidemiology in India. Indian J Med Res. 2007 Sep;126(3):183–92.
6. National Commission on Macroeconomics and Health, Government of India. NCMH_Burden of disease. Available from:http://www.who.int/macrohealth/action/Report%20of%20the%20National%20Commission.pdf . (Last Accessed on 11 feb 2018)
7. Patralekha Chatterjee. India launches Ayushman Bharat's secondary care component. Lancet. 2018 Sep. 22; 392(10152):997.
8. Depression in India Let's Talk. World Health Organisation. [cited 2018 Feb 11]. Available from: http://www.searo.who.int/india/depression_in_india.pdf.
9. GBD Results Tool | GHDx. Available from: http://ghdx.healthdata.org/gbd-results-tool. (Last Accessed on 17 feb 2018)
10. Global burden of mental disorders and the need for a comprehensive, coordinated response from health and social sectors at the country level. World Health Organisation. Available from: http://apps.who.int/gb/ebwha/pdf_files/EB130/B130_9-en.pdf. (Last Accessed on 11 feb 2018)
11. Mental health in India,World Health Organisation. Available from: http://www.searo.who.int/india/topics/mental_health/about_mentalhealth/en/.(Last Accessed on 11 feb 2018)
12. Thirunavukarasu M, Thirunavukarasu P. Training and National deficit of psychiatrists in India - A critical analysis. Indian J Psychiatry. 2010 Jan;52(Suppl 1):583-88.
13. WHO World Mental Health Survey Consortium. Prevalence, severity, and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. Journal of the American Medical Association 2004;291:2581–2590.
14. Patel V, Weiss HA, Chowdhary N, Naik S, Pednekar S, Chatterjee S, et al. Effectiveness of an intervention led by lay health counsellors for depressive and anxiety disorders in primary care in Goa, India (MANAS): a cluster randomised controlled trial. Lancet. 2010 Dec 18;376(9758):2086–95.
15. Mendenhall E, De Silva MJ, Hanlon C, Petersen I, Shidhaye R, Jordans M, et al. Acceptability and feasibility of using non-specialist health workers to deliver mental health care: Stakeholder perceptions from the PRIME district sites in Ethiopia, India, Nepal, South Africa, and Uganda. Soc Sci Med 2014 Oct;118:33–42.
16. Chatterjee S, Patel V, Chatterjee A, Weiss HA. Evaluation of a community-based rehabilitation model for chronic schizophrenia in rural India. Br J Psychiatry J Ment Sci. 2003 Jan;182:57–62.
17. NRHM - Governnment of India. Available from: http://nhm.gov.in/nhm/nrhm.html (Last Accessed on 11 feb 2018)
18. Update-on-ASHA-Programme-January-2015.pdf.Available from: http://ashavani.org/images/docs/Update-on-ASHA-Programme-January-2015.pdf. (Last Accessed on 11 feb 2018)

19. Government of India Ministry of Health and Family Welfare Statistics Division. Rural Health Statistics 2014-15. Available from:http://wcd.nic.in/sites/default/files/RHS_1.pdf. (Last Accessed on 11 feb 2018)
20. About ASHA - Governnment of India.Available from: http://nhm.gov.in/communitisation/asha/about-asha.html. (Last Accessed on 11 feb 2018)
21. MPHW-M-2010-Guideline.pdf. Available from: http://www.health.mp.gov.in/fw/2015/MPHW-M-2010-Guideline.pdf. (Last Accessed on 11 feb 2018)
22. WHO | Policy options on mental health: a WHO-Gulbenkian Mental Health Platform collaboration WHO.Available from: http://www.who.int/mental_health/evidence/policy_options_gulbenkian_paper/en/. (Last Accessed on 11 feb 2018)
23. Bower P, Gilbody S. Stepped care in psychological therapies: access, effectiveness and efficiency. Narrative literature review. Br J Psychiatry. 2005 Jan;186:11-7.
24. Van Straten A, Tiemens B, Hakkaart L, Nolen WA, Donker MC. Stepped care vs.matched care for mood and anxiety disorders: a randomized trial in routine practice. Acta Psychiatr Scand. 2006 Jun;113(6):468-76.
25. mhGAP Intervention Guide Mental Health Gap Action Programme Version 2.0 for mental, neurological and substance use disorders in non-specialized health settings. World Health Organisation. Available from: http://apps.who.int/iris/bitstream/10665/250239/1/9789241549790-eng.pdf?ua=1. (Last Accessed on 11 feb 2018)
26. Moirangthem S, Rao S, Kumar CN, Narayana M, Raviprakash N, Math SB. Telepsychiatry as an Economically Better Model for Reaching the Unreached: A Retrospective Report from South India. Indian J Psychol Med. 2017 May-Jun;39(3):271-275.
27. Maulik PK, Tewari A, Devarapalli S, Kallakuri S, Patel A. The Systematic Medical Appraisal, Referral and Treatment (SMART) Mental Health Project: Development and Testing of Electronic Decision Support System and Formative Research to Understand Perceptions about Mental Health in Rural India. PLoS One.2016 Oct 12;11(10):e0164404.
28. Yellowlees P, Chan S. Mobile mental health care-an opportunity for India. Indian J Med Res. 2015 Oct;142(4):359-61.
29. Wang J, Lam RW, Ho K, Attridge M, Lashewicz BM, Patten SB et al. Preferred Features of E Mental Health Programs for Prevention of Major Depression in Male Workers: Results From a Canadian National Survey. J Med Internet Res. 2016 Jun 6;18(6):132.
30. Malhotra S, Chakrabarti S, Shah R, Sharma M, Sharma KP, Malhotra A et al. Telepsychiatry clinical decision support system used by non-psychiatrists in remote areas: Validity & reliability of diagnostic module. Indian J Med Res. 2017 Aug;146(2):196-204.

Acute Osteomyelitis

R.B. Kalia

Additional Professor, Dept. of Orthopaedics, All India Institute of Medical Sciences, Rishikesh

Abstract

Acute osteomyelitis requires careful clinical evaluation, a high index of suspicion as it is an uncommon but devastating disease that affects largely previously healthy children. Management of osteomyelitis is a formidable challenge as success of antibiotics in soft tissues has not been replicated in bony tissue due to peculiar anatomy and physiology of the bone. Illness, malnutrition and decreased immunity predispose children to develop acute osteomyelitis. Absence of phagocytic cells in the metaphysis may explain predilection in children. Recently the trend in treatment strategy includes a rapid transition from intravenous to oral antimicrobial therapy and a shortened overall course of therapy. Many new therapeutic options are on the horizon that will likely impact the management of this and other childhood bacterial infections. This review will focus on recent advances in the management of acute hematogenous osteomyelitis in children.

Key Words: Osteomyelitis, Antimicrobial therapy, Hematogenous

Introduction

Acute osteomyelitis is the inflammation of bone caused by pyogenic organisms typically the duration of symptoms is less than two weeks. Haematogenous spread is the most common source of infection in children typically affecting the metaphysis of long bones where blood flow is rich but sluggish. Other sources of infection are tracking from adjacent foci of infection and direct inoculation from trauma or surgery. The femur and tibia are most commonly affected (27% and 26%)[1]. In long bones where the metaphysis is intracapsular the shoulder, ankle, hip, and elbow, in decreasing order of incidence the infective foci may extend into the joint space, resulting in concurrent septic arthritis.[2] In paediatric patients under 18 months of age, anatomical transphyseal vessels facilitate translocation of bacteria from the metaphysis to infect the epiphysis and adjacent joint, increasing the risk of concurrent septic arthritis.

Over the last decade, our understanding of the etiology of this infection has changed, with increased recognition of Kingella kingae and the dramatic increase in community-associated Methicillin-resistant Staphylococcus aureus (MRSA) infections. There is a need for the optimization of diagnostic strategies, such as MRI and serum inflammatory markers.[3] Acute osteomyelitis is problem in the paediatric population, affecting approximately 5/10,000 children each year and accounting for approximately 1% of all paediatric hospitalizations.[4] In high-income countries, acute osteomyelitis occurs in about 8 of 100,000 children per year, but it is considerably more common in low-income countries. Boys are affected with acute osteomyelitis twice as often as girls.[5]Acute hematogenous osteomyelitis is particularly common in young children, typically in metaphyseal ends of long bones, due to the highly vascular nature of the growing bone. Less common aetiologies of osteomyelitis include trauma, surgical complications, or extension from adjacent soft tissue.[6]

Etiology

Staphylococcus aureus is the most frequently causative pathogen in patients with acute osteomyelitis being cultured in 70-90% of culture positive cases[7].Other causative pathogens include Streptococcus pyogenes, Streptococcus pneumoniae, and Kingella kingae. Salmonella especially the non-typical serotypes (S typhimurium, S enteriditis, S choleraesius) can be an important causative pathogen in children with sickle cell disease.[8] Patients with sickle cell disease and suspected osteomyelitis require a completely different antibiotic regimen, and infectious disease advice should be sought. It has been suggested that tiny infarctions in the gastrointestinal tract lead to salmonella bacteraemia and ultimately to osteomyelitis.[9] Resistant strains emerging with changing pattern of causative organisms over the past few decades are a matter of concern.

Address for Correspondence: *Dr.R.B. Kalia, Additional Professor, Dept. of Orthopaedics, All India Institute of Medical Sciences, Virbhadra Marg, Rishikesh,Uttarakhand-249203.***E-mail:** roopkalia2003@yahoo.com*

Received: *20/03/2018,* ***Accepted:*** *12/07/2018*

Previously the most common Gram-negative organism in paediatric osteomyelitis was Haemophilus influenzae has now become rare because of the vaccination programmes.[10] The incidence of community acquired MRSA is increasing in many parts of the world.[11] MRSA is a causative agent in 9-30% of children with osteomyelitis and needs altered antibiotic treatment regimens as the severity of disease is different.[12] MRSA osteomyelitis can cause a more aggressive and complicated infection, with higher fever and an increased likelihood for repeated surgical debridement, prolonged hospital stays compared with other pathogens, associated with many complications, including multiorgan failure, deep vein thrombosis (10%), septic pulmonary emboli, multifocal infection, subperiosteal abscesses, fractures (20%), and progression to chronic osteomyelitis.[13] Cases of osteomyelitis have been documented of PVL-MRSA (Panton-Valentine Leukocidin Methicillin Resistant Staphylococcus Aureus), an extremely virulent strain.[14]

Primary deficiencies of cell mediated immunity are rare. Secondary causes like steroid use, malnutrition, SLE, lymphoma and autoimmunity deficiency syndrome can sometimes be responsible for osteomyelitis. Children with malnourishment, diabetes, malignancy, HIV, on prolonged steroid therapy are immunocompromised which makes them susceptible to infections like osteomyelitis. Hospitalized premature infants are predisposed to osteomyelitis owing to their immature immune systems and exposure to repeated invasive intravenous or intraarterial procedures providing a portal for haematogenous spread. The systemic signs of infection may be subtle, however pronounced leucocytosis is typically seen.[15] In the clinical setting of patients with Diabetes, hematological malignancies, cytotoxic drugs organisms like Staphylococcus aureus, aspergillus, gram negative and candida infections are common. In patients with Hypogammaglobulinemias and post splenectomy patients- Hemophilus, streptococcus pneumoniae and Niesseria infections are common.

Osteomyelitis caused by atypical organisms are often termed atypical osteomyelitis. Microvascular obstruction by the sickled red blood cells in patients with sickle cell disease result in tissue ischaemia and infarction. This, in combination with impaired immune function and splenic dysfunction, leads to an increased risk of osteomyelitis, with Salmonella the most common causative organism. Salmonella is commonly considered in the differential diagnosis of osteomyelitis in children with sickle cell anemia but Salmonella osteomyelitis and septic arthritis are rare in immunocompetent children who do not have sickle cell disease or trait.[16] Salmonella is an encapsulated, motile, facultative anaerobic bacillus, gram negative, coliform group bacteria belonging to the family of enterobacteraciae. The reported incidence of Salmonella osteomyelitis is 0.45% in normal population and it is 70% in children with sickle cell disease.[17]

The coincidence of large tribal populations with the 'sickle cell belt' of Central India and northern Kerala and Tamil Nadu has given rise to the assumption that tribal people are more prone to the Hbs gene although this seems widely distributed among tribal and non-tribal people.[18] Sometimes striking differences have been reported, a tribal population in Valsad having milder disease than a non-tribal population in Nagpur. Little is known about many other aspects of sickle cell disease in India, including which infections are important, and the role of antibiotic prophylaxis.[19,20]It is difficult to differentiate a vaso-occlusive crisis-which is far more common from osteomyelitis in children with sickle cell anemia as both often present with fever and a painful, swollen limb with restricted joint motion.

Diagnosis

The classical clinical picture of an unwell, febrile child unable to walk due to limb pain with a high white cell count is increasingly uncommon.[21]The onset of osteomyelitis can be insidious, the clinical presentation variable, and the physical findings non-specific. No single test can confirm or rule out acute osteomyelitis. A combination of careful history and examination, accompanied by a high index of clinical suspicion, and followed by laboratory and imaging studies are key to an early diagnosis.

The commonest presenting features are pain, swelling and erythema, fever, reduced joint movement or pseudo-paralysis, and reduced weight bearing or a limp. Fever in immunocompromised group is not a major symptom, and the infection, particularly in premature infants, may be multifocal. Multifocal disease is rare but presents as multiple acute foci of infection, affecting mainly the femur and tibia, or the tibia and humerus simultaneously.[22]

Traditionally erythrocyte sedimentation rate (ESR) and leukocyte cell count have been used, whereas C-reactive protein (CRP) has gained in popularity. CRP normalizes faster than ESR, providing a clear advantage in monitoring recovery.[23] Declining levels of CRP usually suggest a favourable response to treatment even if the fever continues. Acute osteomyelitis due to MRSA causes greater elevations in the CRP level, ESR and white-cell count.[24] Procalcitonin levels are sensitive as diagnostic tests but measurements of procalcitonin are more expensive and rarely outperform CRP and is used infrequently.

A systematic review found that only 36% of children will have a raised white cell count on presentation, 91% an increased erythrocyte sedimentation rate, and 81% an increased C reactive protein value.[25] The sensitivity is highest when both the erythrocyte sedimentation rate and C reactive protein are increased (98%). C reactive protein values >100 mg/L are particularly significant for concomitant septic arthritis and are also the best predictor of a complicated course and the need for prolonged

intravenous antibiotics.

Pathology

Acute hematogenous osteomyelitis most commonly affects long bones which account for about ¾ th of cases of osteomyelitis. Lower extremity bones femur (23-29%), tibia (19-26%), and fibula (4-10%)—slightly more commonly involved than the upper extremity locations—humerus (5-13%), radius (1-4%), and ulna (1-2%).Other bone infections occur with a reported incidence are- pelvic osteomyelitis (3-14%), calcaneal osteomyelitis (4-11%), hand involvement (1-2%), and vertebral spondylodiscitis (1-4%).[25,26,27] The predisposing factors for osteomyelitis are mentioned in Table 1.

Most commonly by hematogenous spread bacteria proliferate after getting lodged in the metaphysis and induce an acute inflammatory reaction. In the neonate the metaphyseal vessels penetrate the growth plate, resulting in frequent infection of the metaphysis, epiphysis, or both. In children, localization of microorganisms in the metaphysis is typical. After growth plate closure, the metaphyseal vessels reunite with their epiphyseal counterparts and provide a route for the bacteria to seed the epiphyses and subchondral regions in the adult.

Bone is a closed tube and the bacteria and inflammation spread within the shaft of the bone. If infection continues purulent material works its way through Haversian system and Volkmann's canals to reach the periosteum. The entrapped bone undergoes varying degrees of necrosis within the first 48 hours. In children the periosteum is thick and acts as a barrier to further spread of the purulent material into the soft tissues. However, the periosteum is loosely attached to the cortex and sizable sub periosteal abscesses may form that can track for long distances along the bone surface. Lifting of the periosteum further impairs the blood supply to the affected region, and both the suppurative and the ischemic injury may cause segmental bone necrosis; the dead piece of bone is known as a sequestrum. Rupture of the periosteum leads to a soft-tissue abscess and the eventual formation of a draining sinus. Sometimes the sequestrum crumbles and forms small fragments that pass through the sinus tract classical of chronic osteomyelitis.

After the first week chronic inflammatory cells become more numerous and their release of cytokines stimulates osteoclastic bone resorption, ingrowth of fibrous tissue, and the deposition of reactive bone in the periphery by the periosteum. When the newly deposited bone forms a sleeve of living tissue around the segment of devitalized infected bone, it is known as an involucrum.

In neonates, epiphyseal infection can spread through the articular surface or along capsular, tendinous and ligamentous insertions into a joint, producing septic or suppurative arthritis, which can cause destruction of the articular cartilage and permanent disability. A similar process involves the vertebrae, in which the infection destroys the hyaline cartilage end plate and intervertebral disc and spreads into adjacent vertebrae producing spondylodiscitis.

Table 1- Systemic or Local Factors predisposing to Osteomyelitis.

Systemic	Local
Malnutrition	Chronic lymphedema
Renal, hepatic failure	Venous stasis
Diabetes mellitus	Major vessel compromise
Chronic hypoxia	Arteritis
Malignancy	Radiation fibrosis
Extremes of age	Small vessel disease
Immune deficiency	Neuropathy
Asplenia/Sickle cell disease	Extensive scarring
HIV	
Ethanol and/or tobacco abuse	

Microbiogical and Pathological Investigations

Samples for blood cultures should be taken before antibiotics are started as it may be the only positive source of identification of the pathogen. Blood cultures may be positive in only 50% of cases. If positive, cultures should be repeated daily until two consecutive cultures are reported negative. Aspirates from soft tissue, sub periosteal or joints can have a higher yield (70%) and can be obtained even after antibiotics have been administered.

Positive culture yields can be improved if specimens can be obtained guided by ultrasound, computed tomography or surgery; and should be sent for urgent Gram stain and culture in commercially available blood culture bottles. Special culture media especially in immune-compromised settings, patients with suspicion of penetrating inoculation or failed primary treatment may be necessary for the isolation of mycobacteria, fungi, and less common anaerobic pathogens.[28] In some cases, histopathologic examination of biopsy specimens may be the only way to make a diagnosis.

Plain Radiographs

High-quality plain radiographs in two orthogonal planes should be obtained in all cases to evaluate for deep soft tissue swelling, joint effusions, and skeletal lesions. Plain x rays often show soft tissue swelling but are unremarkable otherwise.[29] In some instances, joint space widening is discernable due to fluid accumulation in the joint. For bony

destruction to be discernable on x-rays requires persistent infection for 2-3 weeks as bony matrix must be destroyed at least 30-50% for bony destruction to be visible. A normal radiograph on admission to the hospital by no means rules out acute osteomyelitis, but it can be helpful in ruling out a fracture or detecting Ewing's sarcoma or another type of malignant condition.

Radionuclide Imaging

In 95% of cases, the technetium radionuclide scan using 99mTc diphosphonate is positive within 24 h of the onset of symptoms. Radionuclide scanning is useful when X-rays and CT scan are normal. Technetium 99 is the most commonly used radioisotope for acute osteomyelitis. The uptake in different phases of the bone scan allows a distinction to be made as to the cause of the increased uptake. Falsely negative scans usually indicate obstruction of blood flow to the bone. Because the uptake of technetium reflects osteoblastic activity and skeletal vascularity, the bone scan cannot differentiate osteomyelitis from fractures, tumors, infarction, or neuropathic osteopathy.

Gallium citrate scan is more specific for infection as it is directly taken up by leucocytes and allows a clearer differentiation to be made if both technetium and Gallium scans are done. In patients with acute osteomyelitis- Gallium uptake is greater than Technetium uptake. The disadvantage is the slow clearance by the tissues and it may take 24 hours to get the scan results which may be too late for acute infections.

Indium 111- labelled leucocyte scan is sensitive for acute osteomyelitis and for differentiating trauma and infections. 67Ga citrate- and 111In-labeled leukocyte or immunoglobulin scans, which have greater specificity for inflammation, may help distinguish infectious from noninfectious processes and indicate inflammatory changes within bones.

Imaging

Ultrasound can be used to diagnose osteomyelitis by the detection of sub-periosteal fluid collections, soft tissue abscesses adjacent to bone, and periosteal thickening and elevation.[30] Both CT scans and ultrasound are useful for guiding percutaneous aspiration of sub-periosteal and soft tissue fluid collections.

CT scanning although excellent for defining bony pathology has a limited application in the diagnosis and management of osteomyelitis. Major disadvantages of CT scanning are limited visualization of the anatomic and spatial extent of tissue inflammation due to infection and radiation exposure. CT scans have a sensitivity of 66% and a specificity of 97% for osteomyelitis in experimental animals.[31]

CT scans have a role in monitoring disease progression after initial MRI scanning. MRI is as sensitive as the bone scan for the diagnosis of acute osteomyelitis because it can detect changes in the water content of marrow and offers improved sensitivity and specificity than CT scanning. Contrast-enhanced MRI does increase reader confidence in the diagnosis of osteomyelitis and its complications in cases in which bone or soft-tissue edema is found on unenhanced images. In the clear absence of edema on unenhanced images, however, contrast enhancement is not needed.[32]

MRI yields better anatomic resolution of epidural abscesses and other soft tissue processes than CT and is currently the imaging technique of choice for vertebral osteomyelitis. MRI provides detailed information about the activity and the anatomic extent of infection but does not always distinguish osteomyelitis from healing fractures and tumors. MRI is particularly useful in distinguishing cellulitis from osteomyelitis in the diabetic foot; however, no imaging modality consistently distinguishes infection from neuropathic osteopathy. A multidisciplinary approach of continuation from MRI scanning to the OR as a single anaesthetic event can be safely performed and leads to rapid recovery and decreased hospital stay.[33]

Classification

Classification systems are important in documenting but need reproducibility and are clinically useful if they guide treatment or are helpful in prognostication. Cierny and colleagues proposed a classification system for chronic osteomyelitis based on host factors and anatomical criteria.[34]

This system is however for adults and has not been validated for children with normal immunity at the time of infection.

A classification system has been proposed to assess the severity of illness using clinical, radiological and laboratory parameters. This simple scoring system guides treatment, prognosticate risk of complications and is easy to use (Table 2).[35]

The other system of classification which is useful is to classify according to patient characteristics. This is useful in guiding treatment and reduce variability of care. Patients are classified according to age into your groups – Infantile (2-18 months), early childhood (18 months-3 years), childhood (3-12 years) and adolescent (12-18 years) and either nosocomial orcommunity acquired.

Treatment

The treatment of patients with acute osteomyelitis is multidisciplinary involving paediatrics, infectious diseases, orthopaedics, microbiology and radiology to ensure early

Table 2- Modified severity of illness scoring system for Acute hematogenous osteomyelitis.

Scoring Parameter	Criteria	Points
Initial CRP(mg/dl)	>15	*2*
	10-15	*1*
	<10	*0*
CRP hospital day 2-3 (mg/dl)	>10	*2*
	5-10	*1*
	<5	*0*
CRP hospital day 4-5 (mg/dl)	>10	*2*
	5-10	*1*
	<5	*0*
Band percentage of WBC's	>1.5%	*1*
	<1.5%	*0*
Febrile days on antibiotics	2 or>2	*1*
	< 2	*0*
ICU admission	*Yes*	*1*
	No	*0*
Disseminated disease*	*Yes*	*1*
	No	*0*

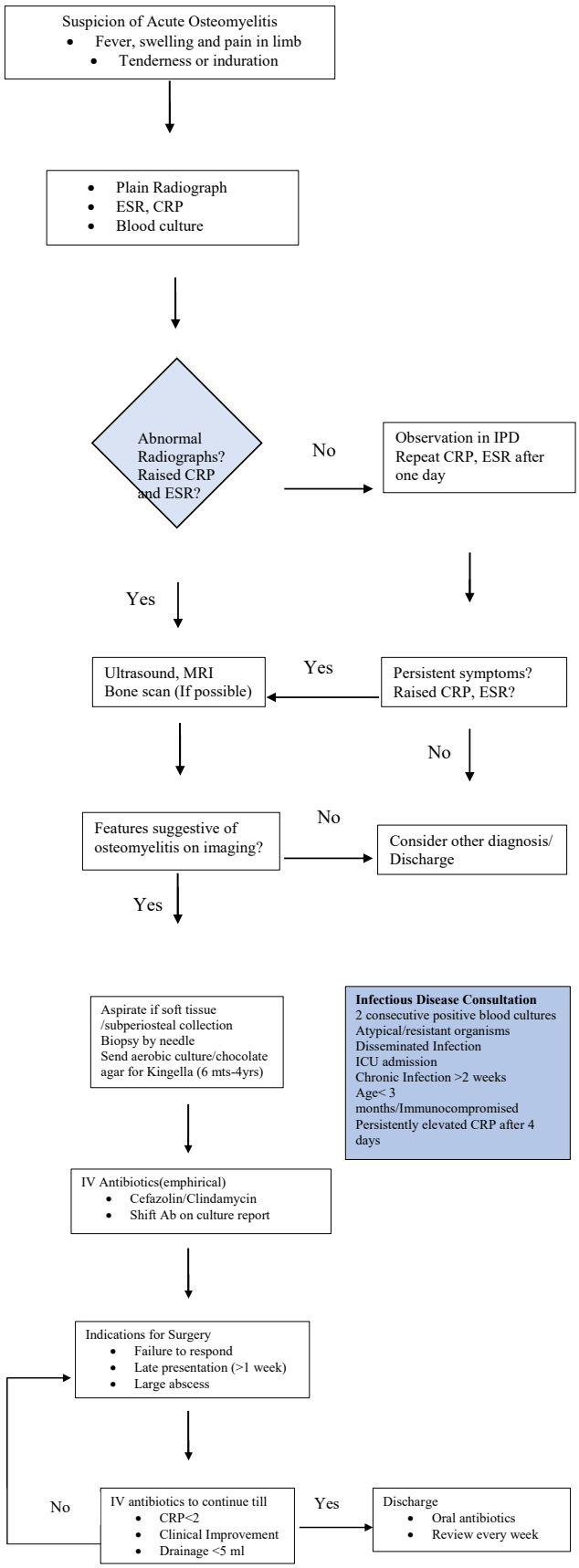
Grades: Mild 0-3, Moderate 4-7 and severe 8-10.

*Disseminated disease include-DVT, pulmonary embolism, pneumonia, endocarditis and multifocal osteomyelitis

diagnosis and effective management (Figure 1). Initial treatment of acute osteomyelitis is instituted empirically before the causative agent and its resistance pattern are known in 2-3 days. Antibiotics in sufficient doses to eradicate the infection are given intravenously. The most relevant antibiotics must have an acceptable side-effect profile when administered orally because the doses are large.[36] The antibiotics chosen should have satisfactory absorption and penetration into the bony structure. Clindamycin and first-generation cephalosporins are the obvious choices as they fulfil these criteria. Among the first-generation cephalosporins- Cephalothin and cefazolin are administered intravenously, cephalexin and cefadroxil are administered orally. If no parenteral first-generation agent is available, cefuroxime can be used for parenteral administration. The advantage of cefuroxime is that it is available in parenteral and oral preparations.

As soon as the culture results are available antibiotic choice is guided by the susceptibility pattern of the identified organism and local microbiology advice sought wherever possible to facilitate a more appropriate therapeutic regimen. Most MRSA strains are susceptible to clindamycin and it is drill holes to decompress the intramedullary component of acute osteomyelitis of the femur (a) developed a pathological fracture due to trivial trauma 6 weeks later (b). She was treated by traction for 3

Figure 1: Management of acute osteomyelitis



weeks followed by hip spica which resulted in uneventful healing at 6 weeks(c).

Clindamycin is indicated if prevalence of MRSA in community is more than 10% and prevalence of clindamycin resistant S. aureus is less than 10%. Clindamycin use can cause sometimes skin rash and very rarely causes diarrhoea in children.[37]

Beta-lactam antibiotics are the drugs of choice for cases of osteomyelitis due to K. kingae, S. pyogenes or S. pneumoniae.[38] The rare cases caused by H. influenzae type b usually respond to ampicillin or amoxicillin, if the strain is beta-lactamase–negative, or to a second- or third-generation cephalosporin, if the strain is beta-lactamase–positive. Osteomyelitis due to salmonella usually is susceptible to a third-generation cephalosporin, such as cefotaxime or ceftriaxone, or a fluoroquinolone.[39]

For patients in unstable condition an infectious disease consultation is essential and in areas where resistance to clindamycin is prevalent, vancomycin should be chosen as a first-line agent whereas linezolid is reserved for patients who do not have a response to vancomycin therapy. [40]

There are no sufficiently powered prospective clinical trials to assess the important issue regarding the duration of parenteral antibiotics and the appropriate time to switch to oral medications. Various trials have showed no change in outcomes when the intravenous phase was shorter than a week.[41,42]

Shortened regimens of primarily oral antibiotics simplify the treatment as they reduce the cost of treatment, hospital stay, and the risk of adverse events; in addition, the risk of bacterial resistance is reduced. Prolonged parenteral antibiotics have a high complication rate of adverse drug reactions in 25-38% and catheter related complications in 50% patients.[43]

Currently the treatment of uncomplicated acute hematogenous osteomyelitis involves sequential parenteral to oral antibiotic therapy for 4 weeks with a demonstrated similar efficacy to longer regimens.[44] Neonates, immunocompromised, malnourished, and patients with sickle cell disease are a group of patients who probably need a longer course of medication.[45]

Role of surgery

The surgical indications and specific technique of surgery are not clearly defined. Conservative treatment is effective in up to 90% of cases of acute osteomyelitis if it is diagnosed early. In a series of 68 patients who underwent aggressive primary surgery, 17% of the patients had chronic osteomyelitis after the procedure.[46] Problem peculiar to our nation is that antibiotics are often given without adequate workup and creates altered clinical signs and difficulties in diagnosis and treatment.

Patients with large abscesses or having failure of antibiotic therapy within 48-72 hours are candidates for surgery. The surgical procedure may range from needle biopsy of bone and aspiration of subperiosteal abscess to creation of a cortical window and debridement of metaphyseal cancellous bone. Appropriate cultures and samples for histo-pathological examination are obtained during surgery. Data from prospective trials are required to explore these issues further and provide clarity.

Rarely more than one procedure may be required to decrease the burden of infection if adequate response is not obtained. After surgery splints are provided for several weeks to prevent pathological fractures.

Complications

Complications occur in approximately 6% patients with acute osteomyelitis – Recurrent infections, chronic osteomyelitis, avascular necrosis, pathological fractures, sepsis, growth plate injuries and deep vein thrombosis.[47]

Recurrent infections occur in approximately 6% patients with an average time of relapse of 5.8 months. Pathologic fractures can occur in the long bones of the lower limb, in which there was significant disruption of the bony architecture secondary to the infection (Figure 1).If there is no recurrence of infection, most pathological fracture do not require reinstitution of antibiotics or surgery and can be treated conservatively. Growth disturbance can lead to limb length discrepancy, angular deformities or synostosis rarely.[47] Clinically significant DVT occurs in 0.4-6% of children especially in patients with MRSA infection.[47,48]

Discussion

The challenges in treatment of acute osteomyelitis lie with early diagnosis, appropriate antibiotic use and judicious use of surgery. Hospital admission that is delayed for 5 days or more is a probable risk factor for slow recovery and a poor outcome.[27] Effective care of patients with osteomyelitis is a collaborative and multidisciplinary effort which needs to be evidence-based protocol driven. A lack of consensus in the Institution makes coordination of care difficult and can lead to an adverse clinical outcome. Careful monitoring of epidemiological trends of microbiology trends is imperative to formulate an antibiotic policy for acute osteomyelitis for effective treatment.

Acknowledgement – The article was written with encouragement from Prof Shobha S. Arora, Head of the Department of Orthopaedics, AIIMS Rishikesh who also approved of the final manuscript in its current form.

Conflict of interest: Nil

References

1. Dartnell J, Ramachandran M, Katchburian M. Haematogenous acute and subacute
2. paediatric osteomyelitis: a systematic review of the literature. J Bone Joint Surg Br 2012;94:584-95. 2 Montgomery CO, Siegel E, Blasier RD, Suva LJ. Concurrent septic arthritis and osteomyelitis in children. J Pediatr Orthop 2013;33:464-7.
3. Thomsen, I. & Creech, C.B. Curr Infect Dis Rep (2011) 13: 451.
4. Vazquez M. Osteomyelitis in children. Curr Opin Pediatr. 2002;14(1):112–5.
5. Grammatico-Guillon L, Maakaroun Vermesse Z, Baron S, Gettner S, Rusch E, Bernard L. Paediatric bone and joint infections are more common in boys and toddlers: a national epidemiology study. Acta Paediatr 2013;102(3):120-125.
6. Long SS, Pickering LK, Prober CG. Principles and practice of paediatric infectious diseases. 3rd rev. ed. Philadelphia: Churchill Livingstone/Elsevier; 2008, 1618 p.
7. Howard-Jones AR, Isaacs D. Systematic review of duration and choice of systemic antibiotics therapy for acute haematogenous bacterial osteomyelitis in children. J Paediatr Child Health 2013;49:760-8.
8. Chambers JB, Forsythe DA, Bertrand SL, et al. Retrospective review of osteoarticular infections in a pediatric sickle cell age group. J Pediatr Orthop. 2000;20(5):682–5.
9. Hernigou P, Daltro G, Flouzat-Lachaniette CH, Roussignol X, Poignard A. Septic arthritis in adults with sickle cell disease often is associated with osteomyelitis or osteonecrosis. Clin Orthop Relat Res 2010;468:1676-81.
10. Dodwell ER. Osteomyelitis and septic arthritis in children: current concepts. Curr Opin Pediatr 2013;25:58-63.
11. Hawkshead JJ, Patel NB, Steele RW, Heinrich SD. Comparative severity of pediatric osteomyelitis attributable to methicillin-resistant versus methicillin-sensitive Staphylococcus aureus . J Pediatr Orthop 2009; 29:85-90.
12. Martinez-Aguilar G, Avalos-Mishaan A, Hulten K, Hammerman W, Mason EO Jr, Kaplan SL, et al. Community-acquired, methicillin-resistant and methicillin-susceptible Staphylococcus aureus musculoskeletal infections in children. Pediatr Infect Dis J 2004; 23:701-6.
13. Belthur MV, Birchansky SB, Verdugo AA, Mason EO Jr, Hulten KG, Kaplan SL, et al. Pathologic fractures in children with acute Staphylococcus aureus osteomyelitis. J Bone Joint Surg Am 2012; 94:34-42
14. Bocchini CE, Hulten KG, Mason EO Jr, Gonzalez BE, Hammerman WA, Kaplan SL. Panton- Valentine leukocidin genes are associated with enhanced inflammatory response and local disease in acute hematogenous Staphylococcus aureus osteomyelitis in children. Pediatrics 2006; 117:433-40.
15. Williamson JB, Galasko CS, Robinson MJ. Outcome after acute osteomyelitis in preterm infants. Arch Dis Child 1990; 65:1060-2.
16. Adeyokunnu AA, Hendrickse RG. Salmonella osteomyelitis in childhood. A report of 63 cases seen in Nigerian children of whom 57 had sickle cell anaemia Arch Dis Child 1980;55 :175– 184.
17. Thanni L. Bacterial osteomyelitis in major sickling haemoglobinopathies: geographic difference in pathogen prevalence Afr Health Sci 2006;6 :236–239
18. Mukherjee MB, Lu CY, Ducrocq R, Gangakhedkar RR, Colah RB, Kadam MD, et al. Effect of á-thalassemia on sickle-cell anemia linked to the Arab-Indian haplotype in India. Am J Hematol. 1997;55:104–9.
19. Patra PK, Khodiar PK, Hambleton IR, Serjeant GR. The Chhattisgarh state screening programme for the sickle cell gene: a cost-effective approach to a public health problem. J Community Genet. 2015;6:361–8.
20. Jain D, Warthe V, Dayama P, Sarate D, Colah R, Mehta P, et al. Sickle cell disease in Central India: A potentially severe syndrome. Indian J Pediatr. 2016;83: 1071–6
21. Goergens ED, McEvoy A, Watson M, Barrett IR. Acute osteomyelitis and septic arthritis in children. J Paediatr Child Health 2005:41:59-62.
22. Sreenivas T, Nataraj AR, Menon J, Patro DK. Acute multifocal haematogenous osteomyelitis in children. J Child Orthop 2011;5:231-5.
23. Pääkkönen M, Kallio MJ, Kallio PE, Peltola H. Sensitivity of erythrocyte sedimentation rate and C-reactive protein in childhood bone and joint infections. Clin Orthop Relat Res 2010; 468:861-6.
24. Ju KL, Zurakowski D, Kocher MS. Differentiating between methicillin-resistant and methicillin-sensitive Staphylococcus aureus osteomyelitis in children: an evidence based clinical prediction algorithm. J Bone Joint Surg Am 2011;93:1693-701.
25. Dartnell J, Ramachandran M, Katchburian M. Haematogenous acute and subacute paediatric osteomyelitis: a systematic review of the literature. J Bone Joint Surg Br 2012;94:584-95.
26. Gillespie WJ, Mayo KM. The management of acute haematogenous osteomyelitis in the antibiotic era: a study of the outcome. J Bone Joint Surg Br 1981;63-B:126-31.
27. Peltola H, Pääkkönen M, Kallio P, Kallio MJ. Short- versus long-term antimicrobial treatment for acute hematogenous osteomyelitis of childhood: prospective, randomized trial on 131 culture-positive cases. Pediatr Infect Dis J 2010; 29:1123-8.
28. Section J, Gibbons S D, Greenberg DE, Jo CH, Copley LA. Microbiological culture methods for pediatric musculoskeletal infection: a guideline for optimal use. J Bone Joint Surg Am. 2015 Mar 18;97(6):441-9.
29. Lazzarini L, Mader J T, Calhoun J H-Osteomyelitis in long bones: J Bone Joint Surg Am. 2004;86(10):2305-18.
30. Mah E T, Lequesne G W, Gent R J-Ultrasonic features of acute osteomyelitis in children. J Bone Joint Surg Br 1994;76(6): 969-74.
31. Chandnani VP, Beltran J, Morris CS et al-Acute experimental osteomyelitis and abscesses- detection with MR imaging versus CT; Radiology. 1990 Jan;174(1):233-6.
32. Averill LW, Hernandez A, Gonzalez L, Peña AH, Jaramillo
33. D.Diagnosis of osteomyelitis in children: utility of fat-suppressed contrast-enhanced MRI; Am J Roentgenol. 2009 May;192(5):1232-8. doi: 10.2214/AJR.07.3400. Copley LA, Kinsler MA, Gheen T, Shar A, Sun D, Browne R. The impact of evidence-based clinical practice guidelines applied by a multidisciplinary team for the care of children with osteomyelitis; J Bone Joint Surg Am. 2013 Apr 17;95(8):686-93. doi: 10.2106/JBJS.L.00037
34. Cierny G, Mader JT, Penninck JJ. A clinical staging system for adult osteomyelitis; Clin Orthop Relat Res. 2003 Sep;(414):7-24.
35. Roine I, Arguedas A, Faingezicht I, Rodriguez F. Early detection of sequela- prone osteomyelitis in children with use of simple clinical and laboratory criteria. Clin Infect Dis. 1997 May;24(5):849-53.
36. Tetzlaff TR, McCracken GH Jr, Nelson JD. Oral antibiotic therapy for skeletal infections of children. Therapy of osteomyelitis and suppurative arthritis. J Pediatr 1978;92:485-90.
37. Peltola H, Pääkkönen M, Kallio P, Kallio MJT. Clindamycin vs. first-generation cephalosporins for acute osteoarticular infections of childhood — a prospective quasi-randomized controlled trial. Clin Microbiol Infect 2012;18:582-9.
38. Dubnov-Raz G, Scheuerman O,Chodick G, Finkelstein Y, Samra Z, Garty BZ. Invasive Kingella kingae infections in children: clinical and laboratory characteristics. Pediatrics 2008;122:1305-9.
39. Atkins BL, Price EH, Tillyer L, Novelli V, Evans J. Salmonella osteomyelitis in sickle cell disease children in the east end of

London. J Infect 1997;34: 133-8.
40. Liu C, Bayer A, Cosgrove SE, et al. Clinical practice guidelines by the Infectious Diseases Society of America for the treatment of methicillin-resistant Staphylococcus aureus infections in adults and children. Clin Infect Dis 2011; 53:319.
41. Jagodzinski NA, Kanwar R, Graham K, Bache CE. Prospective evaluation of a shortened regimen of treatment for acute osteomyelitis and septic arthritis in children. J Pediatr Orthop 2009; 29:518-25.
42. Peltola H, Pääkkönen M, Kallio P, Kallio MJ. Short- versus long-term antimicrobial treatment for acute hematogenous osteomyelitis of childhood: prospective, randomized trial on 131 culture-positive cases. Pediatr Infect Dis J 2010; 29:1123-8.
43. Gomez M, Maraqa N, Alvarez A, Rathore M. Complications of outpatient parenteral antibiotic therapy in childhood. Pediatr Infect Dis J. 2001 May;20(5):541-3.
44. Bachur R, Pagon Z. Success of short course parenteral antibiotic therapy for acute osteomyelitis of childhood. Clin Paediatr (Phila) 2007;46(1)30-5.
45. Martí-Carvajal AJ, Agreda-Pérez LH.Antibiotics for treating osteomyelitis in people with sickle cell disease. Cochrane Database Syst Rev 2012;12:CD007175.
46. Meller I, Manor Y, Bar-Ziv J, Torok G. Acute hematogenous osteomyelitis in children: long-term results of surgical treatment. Orthop Rev 1989; 18:824-31.
47. Street M, Puna R, Huang M, Crawford H. Pediatric Acute Hematogenous Osteomyelitis. J Pediatr Orthop. 2015 Sep;35(6):634-9.
48. Hollmig ST, Copley LA, Browne RH, Grande LM, Wilson PL. Deep venous thrombosis associated with osteomyelitis in children; J Bone Joint Surg Am. 2007 Jul;89(7):1517-23.

Microplastics- All We Know till Now and the Way Out

Utsav Raj[1], Puneet Kumar[2], Abhiruchi Galhotra[3]

[1]Senior Resident, [3]Additional Professor, Department of Community & Family Medicine AIIMS Raipur, [2]Kumar Child Clinic, Dwarka, New Delhi

What is Microplastic? Is it the invisible plastic inside us which has entered every aspect of human life?

Using toothpaste early in the morning, drinking bottled water daily or using mild cosmetics are routine activities which are part of our daily lives. Ironically, these daily activities products are contributing not only to the problem of global plastic pollution, but also possibly various illnesses insidiously.

Plastic is defined as any synthetic or semi-synthetic polymer with thermo-plastic or thermo-set properties, which may be synthesized from hydrocarbons or biomass raw materials (UNEP 2016).[1] It is very light weight and can be transported to long distances. Plastic is durable—resistant to breakage and biodegradation.

Microplastics are generally referred to particles of plastic with a size lower than 5 mm. The terms 'microplastics' and 'microlitter' has been defined differently by various researchers. Gregory and Andrady (2003) defined microlitter as the barely visible particles that pass through a 500 lm sieve but retained by a 67 lm sieve (~0.06–0.5 mm in diameter) while particles larger than this were called mesolitter.[2] Others (Fendall and Sewell, 2009; Betts, 2008; Moore,2008), including a recent workshop on the topic (Arthur et al., 2009) defined the microparticles as being in the size range <5 mm.[3-4] Microplastics are small plastic particles derived from a number of sources as clothing, industrial processes, cosmetics, packaging materials, etc. They are the results of the breakdown of all plastic wastes ("secondary microplastics") or are specifically manufactured for skin care products (Microbeads; "primary microplastics"). These microbeads are tiny plastic granules and used as scrubbers in cosmetics, hand cleansers, air-blasting.

We all know that matter can't be destroyed: it can only transform from one form to another: Plastics are a good example of this: they are resistant to natural degradation. Plastics become microplastics, which become nanoplastics, but all remain plastics only, just of increasingly smaller size, allowing them to enter food chain easily and perhaps even cross the gastrointestinal tract after ingestion and be transported throughout a living organism (Brennecke et al. 2015, Sharma and Chatterjee 2017).[5-6] Presence of microplastics has not only been seen in bodies of vertebrates (fish, birds, and turtles) and invertebrates in marine ecosystem, but even has been confirmed in the samples of planktons.[7] All the three compartments of marine environment (water, sediments and biota) have been shown to be contaminated by microplastics. This malice of microplastics has not spared the remote, pristine marine enviornments, including deep-sea habitats upto 5000 m from surface and even Polar regions. [7-9]

Plastic production has seen an exponential growth since its entrance on the consumer stage, rising from a million ton in 1945 to over 300 million tons in 2014 (Plastics Europe 2015).[10]

Toxic link study in March 2018 confirmed that microplastics were indeed present in 50 per cent of face wash products commonly found in the Indian market. Alarmingly, more than 30 per cent toothpaste products were found to contain microplastics. Ranging from 5 to 7 millimetres in length, it is not difficult for these microplastics to slip through during production. But Toxic Links, and a few other organisations claim that microplastics are often used by manufacturers purposefully to help them increase the volume and weight of a product.

According to Sima Shakeri in India 80-90% of tap water contains microplastic in it.[11]

Why is Use of Microplastics Increasing?

Microplastics find their way into our daily use products because of their tiny nature that makes it easier for manufacturers to add them in products, thereby increasing their volume, weight, viscosity and adhesive quality: Thus, microplastics are very attractive from a manufacturing standpoint.

Address for Correspondence: *Dr Abhiruchi Galhotra Dept of CFM, AIIMS, Raipur.* **Email:** abhiruchigalhotra@aiimsraipur.edu.in

Received: *20/12/2018* ***Accepted:*** *31/12/2018*

In addition to introduction during manufacturing of various products, the second major source of microplastics is by degradation of plastic products. Due to durability, light weight, ease of manufacturing and low cost as compared to products made from natural fibres, the use of plastics has grown exponentially in last few decades. Globally, an estimated 8.3 billion tonnes of plastic have been manufactured since mass production began in the 1950s. Eighty per cent of this astonishing mass has accumulated in land fill or the natural environment. The University of Minnesota's School of Public Health tested 159 tap water samples from seven countries, spanning five continents. Eighty three per cent of the tested samples were reported to be contaminated with microplastics <5 mm.[12] The water samples contained up to 57 microplastic particles per litre, with average global concentrations of 4.34/L (3.8/L for Europe). The authors estimate that we may consume 3000 to 4000 microplastic particles each year from tap water.[13]

Health Impact

The tiny nature of microplastics can lead to their being stuck between teeth, in skin pore or hair roots, resulting in infection. Skin ageing and dark spots are common results of microplastics coming in contact with the skin regularly. Microplastics have also been known to enter the eye and result in corneal infection. The microplastics used in toothpaste can get stuck in the gum and trap bacteria leading to gingivitis. Over time that infection can also move from the gum into the bone holding the teeth and resulting into bleeding from gum.

Environmental microplastics also carry a cocktail of chemicals, including additives that are incorporated during manufacture and accumulate contaminants from the surrounding environment.[16] These contaminants often have known reproductive, carcinogenic, and mutagenic effects. Moreover, microplastics present a novel substrate, which becomes rapidly colonised by microbes, including pathogens leading to infection.[14]

Airborne microplastics can reach deep inside the lungs as their tiny size helps them bypass our first lines of defence (nasal hairs, sticky lining and cilia) lining our repiratory tract. These airborne microplastics are one of the constituents of particulate matter in air (PM2.5) that is increasingly being recognized as a grave public health hazard. [15]

The chronic biological effects have been seen in marine organisms which have resulted due to accumulation of microplastics in their cells and tissues. Human have similar biological make up which can lead to chronic effect on humans. Rising cancer could be linked to microplastics theoretically, but there is no concrete data as on date.

What is the alternative?

Because of the recent threat of microplastics to marine biota as well as on human health, it is important to control excessive use of plastic additives and to introduce certain legislations and policies to regulate the sources of plastic litter. By setting up various plastic recycling processes or promoting plastic awareness programmes through different social and information media, we will be able to clean our sea dustbin in future. As for cosmetic manufacturers, a number of international companies have come up with alternatives like beeswax and jojoba waxes starched from corn and other natural compounds, which can be used in place of microplastics to have similar results. The Indian cosmetic manufacturers also cannot shy away from their responsibility till the government steps in. They must also take recourse to all these natural compounds for the larger interest of health of people and environment. And since there is not exclusive law barring the use of microplastics in products, manufacturing companies have no qualms including them. So legislation should be formulated soon. In addition to public, private, and government efforts to curb the generation of microplastics, another innovative and promising approach could be provided by exploiting the potentials of microorganisms, especially those of marine origin that can degrade microplastics.

The data on the impact of microplastics on humans is still lacking, but research on animals has suggested the particles can cause cancer, hormone disorders and other problems when they release chemicals during digestion. Plastic isn't biodegradable either, so scientists fear it will continue to break down into smaller fragments that can pierce cells and travel through lymph nodes and other organs. More research is needed to elucidate this in detail. Further, these microplastic particles can also possibly act as a vector for the transfer and exposure of persistent organic pollutants to marine organisms.[17, 18]The evidence that microplastics act as factitious substrate for colonization of biofilm-forming microorganisms and that the flora on microplastics is distinct from other non-plastic substrates in water[19-21] also raises plausible concern on its impact on marine/ fresh water ecosystem and ultimately on epidemiology of human infectious conditions.

Conclusion

Plastic production has seen an exponential growth in past four decades. It is becoming an inevitable component of daily routine, which is leading to various health problems. There is a paucity of published data on its direct effect on human health. Time has come to have multi disciplinary team for further documentation of its effects and have a three dimensional approach for preventing the use of micoplastic in our day to day activity.

Conflict of interest: Nil

References:

1. Annual Report Empowering People to Protect the Planet 2016 accessed from https: wedocs.unep.org/bitstream/handle/20.500.11822/19529/
2. Gregory MR, Andrady AL. Plastics in the marine environment. Plastics and the Environment. 2003 Feb 20; 379:389-90.
3. Fendall LS, Sewell MA. Contributing to marine pollution by washing your face: microplastics in facial cleansers. Marine pollution bulletin. 2009 Aug 1; 58(8):1225-8.
4. Betts, K., 2008. Why small plastic particles may pose a big problem in the oceans. Environ. Sci. Technol. 42, 8995.
5. Moore, C.J., 2008. Synthetic polymers in the marine environment: a rapidly increasing, long-term threat. Environ. Res. 108 (2), 131–139
6. Arthur, C., Baker, J., and Bamford, H., (Eds.), 2009. Proceedings of the International Research Workshop on the Occurrence, Effects and Fate of Micro-plastic Marine Debris, Sept 9-11, 2008. NOAA Technical Memorandum NOS-OR&R-30.
7. Costa MF, Barletta M. Microplastics in coastal and marine environments of the western tropical and sub-tropical Atlantic Ocean. Environ Sci Process Impacts, 2015: 17(11):1868-79.
8. Auta HS, Emenike CU, Fauziah SH. Distribution and importance of microplastics in the marine environment: A review of the sources, fate, effects, and potential solutions. Enviorn Int, 2017; 102:165-176.
9. Van Cauwenberge L, Vanreusel A, Mees J, Jeesen JR. Microplastic pollution in deep-sea sediments. Enviorn Pollut, 2013; 182:495-9
10. Mohn F, Handler D, Brennecke J. piRNA-guided slicing specifies transcripts for Zucchini-dependent, phased piRNA biogenesis. Science. 2015 May 15; 348(6236):812-7.
11. Sharma S, Chatterjee S. Microplastic pollution, a threat to marine ecosystem and human health: a short review. Environmental Science and Pollution Research. 2017 Sep 1;24(27):21530-47.
12. The Facts 2016: an analysis of European plastic production, demand and waste data. 2016 accessed from http://www.plasticseurope.org/home.aspx
13. Synthetic polymer contamination in global drinking water. Orb Media, 2017. https://orbmedia.org/stories/Invisibles_final_report/multimedia
14. EndoSYuyamaMTakadaH. Desorption kinetics of hydrophobic organic contaminants from marine plastic pellets. Mar Pollut Bull2013;74:125-31.doi:10.1016/j.marpolbul.2013.07.01823906473
15. ZettlerERMincerTJAmaral-ZettlerLA. Life in the "plastisphere": microbial communities on plastic marine debris. Environ Sci Technol2013;47:7137-46.doi:10.1021/es401288x23745679
16. Microplastics in air: Are we breathing it in? Johnny Gasperi1,a, Stephanie L. Wright2,a, Rachid Dris1, France Collard1,Corinne Mandin3, Mohamed Guerrouache4, Valérie Langlois4,Frank J. Kelly2 and Bruno Tassin1 Current Opinion in Environmental Science & Health 2018, 1:1–5)
17. Ng KL, Obbard JP. Prevalence of microplastics in Singapore›s coastal marine environment. Mar Pollut Bull, 2006; 52(7):761-7.
18. Andrady AL. Microplastics in the marine environment. Mar Pollut Bull, 2011:62(8):1596-605.
19. Miao L, Wang P, Hou J, Yao Y, et al. Distinct community structure and microbial functions of biofilms colonizing microplastics. Sci Total Enviorn, 2018: 650(Pt 2):2395-2402.
20. Ogonowski M, Motiei A, Ininbergs K, Hell E, et al. Evidence for selective bacterial community structuring on microplastics. Enviorn Microbiol, 2018: 20(8):2796-2808.
21. Zettler ER, Mincer TJ, Amaral-Zettler LA. Life in the "plastisphere": microbial communities on plastic marine debris. Enviorn Sci Technol, 2013: 47(13):7137-46.

ORIGINAL ARTICLE

Levels and Determinants of Glycosylated Hemoglobin (HbA1c) Status among Reproductive Age Women of Tripura, North East India

Subrata Baidya[1], Rituparna Das[2]

[1]Associate Professor, [2]Assistant Professor, Department of Community Medicine, Agartala Government Medical College, Tripura

Abstract

Introduction: Glycosylated hemoglobin (HbA1c), a marker of chronic hyperglycemia, has been recommended for use, in the diagnosis of diabetes. **Objective**: To assess the mean HbA1c level among reproductive age women in Tripura and to study the factors associated with high HbA1c level (≥ 6.5 %). **Material & Methods**: This cross-sectional study was conducted in Tripura among 2000 reproductive age women selected by Cluster sampling using PPS technique. **Results**: The present study revealed that the mean HbA1c level was 5.29 ± 0.83% among the reproductive age women with 3.95% participants having HbA1c level of ≥ 6.5%). Multiple logistic regression analysis revealed that the age group and income of the family had a significant effect on the HbA1c status. Scheduled tribe women had 0.43 odds (0.22-0.81) of having high HbA1cstatus compared to women from general caste. **Conclusion**: The present study provided the reference values for HbA1c distribution among reproductive age women in Tripura and may be useful in the early identification of at-risk individuals.

Key words: Glycosylated hemoglobin, HbA1c, Diabetes Mellitus, reproductive age women, Tripura.

Introduction

Diabetes is a metabolic disorder characterized by chronic hyperglycemia, which leads to long-term complications affecting multiple organs. [1] In India, it is estimated that 61.3 million people aged 20-79 years live with diabetes (2011 estimates) which is expected to rise to 101.2 million by 2030.[2]

Glycosylated hemoglobin (HbA1c), a marker of chronic hyperglycemia, is the standard measure for monitoring glycemic control.[3,4] HbA1c level is an indicator of average blood glucose concentration over preceding 2–3 months and has been suggested as a diagnostic and screening tool for diabetes in general population.[5–7] Although the normative distribution for HbA1c levels has been described and standardized for adults in the developed countries.[8] but HbA1c status and its associated factors among Reproductive age women has been less explored. Hence the present study was conducted with the objective to identify the baseline mean HbA1c level among reproductive age women in Tripura and to study the factors associated with high HbA1c level among them.

Material and Methods

This community based cross-sectional study was conducted in the northeastern state of India, Tripura; among reproductive age women between 15 to 49 years of age. The study was conducted using cluster sampling technique and 30 clusters were selected from the state using probability proportionate to size (PPS) sampling method; by calculating the cumulative population according to Gram Panchayet and Nagar Panchayet population records.

Sample size was calculated considering the mean HbA1c level to be 4.99% in general population, with Standard deviation of 0.50% and an absolute precision (E) of 0.04, at 95% confidence interval, and the minimum required sample size to estimate the baseline mean HbA1c level was calculated to be 600, using the formulae, $N = Z^2_{1-\alpha/2}$ $(S.D.)^2/E^2$.[9] But since, cluster sampling through PPS technique was considered, hence, the sample size was multiplied with a design effect of 2 and calculated to be 1200.However, in the present study 2000 reproductive women were included which was above the minimum required sample size. Approximately 66 number of eligible female were selected

Address for Correspondence: *Dr Subrata Baidya, Associate Professor,Department of Community Medicine,Agartala Government Medical College, Tripura. P.O. Kunjaban, PIN- 799006.* **Email**- drsubratabaidya@gmail.com

Received :*19/4/2018* ***Accepted:*** *23/5/2018*

by simple random sampling technique from each cluster to include 2000 reproductive age females in the present study.

The randomly selected women were interviewed in their home after taking written informed consent from them and information regarding socio-demographic particulars was taken and HbA1c level was estimated by Nycocard Reader which is a boronate affinity binding test where the result was read by a reader. As HPLC assay is the standard method for HbA1c estimation, 10% of the sample tested ≥ 6.5% and < 6.5% were subjected to HPLC assay and the results were found to be same. A patient was considered to be Diabetic if theHbA1clevel is ≥ 6.5% i.e. ≥48 mmol/mol or 140 mg/dL [3,4,10]

Data analysis has been done in Epi info version 7.0 and data has been expressed in frequency and percentage. Statistical analysis has been done using chi square test and multiple logistic regression analysis and p value of < 0.05 was considered to be statistically significant. The study was conducted as a part of the study titled "Prevalence of anemia and chronic energy deficiency in women of Tripura" which was approved by the institutional ethics committee of Agartala Govt. Medical College [Ref No.: F.4(5-2) / AGMC / Academic / Project / Research / 2007/ Sub –II/ 9272-77. Dated: 20.11.2012].

Results

The study included 2000 reproductive age females of the state with majority of the study participants being within 20 to 29 years of age (41.50%). Majorityof the participants were Hindu by religion (84.30%) and belonged to Scheduled Tribe (33.90%). Most of the participants were married (92.50%) and were housewife (71.50%) by occupation. The study also showed that majority of them had primary education (52.10%) and had a per capita monthly income of ≤Rs 2500 (86.40%). (Table 1)

The present study revealed that the Mean HbA1c level among the reproductive age women of Tripura was 5.29% (34 mmol/mol or 105 mg/dL) with a standard deviation of 0.83% (Fig 1). The present study also revealed that 1921 participants (96.05%) had normal HbA1c level whereas the remaining 3.95% (N=79) participants had clinically relevant HbA1c level.

Univariate analysis revealed that 8.43% females in the age group of 45 to 49 years had high HbA1clevel and age of the females was significantly associated with HbA1c status. The study also showed that the community of the participants was significantly associated with high HbA1c status with the local tribes (Scheduled Tribe) of the state showing lower prevalence of raised HbA1c level. A per capita monthly income of ≥Rs 5000 had high HbA1clevel, and income was significantly associated with the HbA1c status (p value- 0.00). Again, married women had high HbA1c level and it was statistically significant (p value- 0.03).(Table 2).

Considering the significant variables of the univariate analysis as independent variables multiple logistic

Table 1: Socio-demographic profile of the study participants(N=2000)

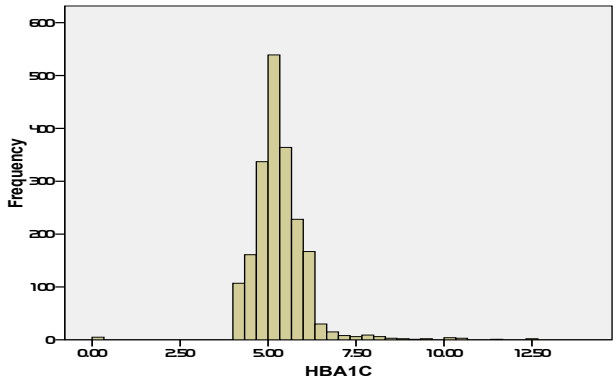
		Frequency	Percent
Age group in years	15 to 19 years	215	10.8
	20 to 24 years	415	20.8
	25 to 29 years	413	20.7
	30 to 34 years	260	13.0
	35 to 39 years	207	10.4
	40 to 44 years	158	7.9
	45 to 49 years	332	16.6
Religion	Hindu	1686	84.3
	Muslim	206	10.3
	Christian	90	4.5
	Buddhist	18	0.9
Caste	General	474	23.7
	Scheduled Caste	357	17.9
	Scheduled Tribe	678	33.9
	Other Backward Class	491	24.6
Marital status	Married	1851	92.5
	Unmarried	149	7.5
Education	Illiterate	257	12.9
	Primary	1041	52.1
	Secondary	650	32.5
	Graduate & Above	52	2.6
Occupation	Govt. Service	198	9.9
	Business	13	0.7
	Skilled Labour	61	3.1
	Unskilled Labour	194	9.7
	Housewife	1430	71.5
	Student	104	5.2
Per capita monthly Income	80-2499	1727	86.4
	2500-4999	224	11.2
	5000-7499	32	1.6
	7500-9999	6	0.3
	10000-30000	11	0.6

Table 2: Factors associated with high HBA1C level among reproductive age females:

		N = 2000	HbA1c (>=6.5%) N= 79 (%)	P value*
Age Group	15 to 19 years	215	2 (0.93%)	**0.00**
	20 to 24 years	415	7 (1.68 %)	
	25 to 29 years	413	15 (3.63%)	
	30 to 34 years	260	6 (2.30%)	
	35 to 39 years	207	9 (4.34%)	
	40 to 44 years	158	12 (1.26%)	
	45 to 49 years	332	28 (8.43%)	
Religion	Hindu	1686	69 (4.09%)	0.51
	Muslim	206	8 (3.88%)	
	Others	108	2 (1.85%)	
Community	General	474	27 (5.69%)	**0.03**
	Scheduled Caste	357	14 (3.92%)	
	Scheduled Tribe	678	16 (2.36%)	
	Other Backward Class	491	22 (4.48%)	
Education of the respondent	Illiterate	221	12 (5.42%)	0.46
	Primary	1093	44 (0.04%)	
	Secondary	583	21 (3.60%)	
	H/S or Graduate & Above	103	2 (1.90%)	
Occupation	Govt. Service or Business	211	13 (6.16%)	0.12
	Labor	255	12 (4.70%)	
	Housewife	1430	53 (3.70%)	
	Student	104	1 (0.96%)	
Per capita income of the family	<2500	1727	64 (3.70%)	**0.00**
	2500 to 4999	224	8 (3.57%)	
	≥5000	49	7 (14.28%)	
Marital Status	Married	1851	78 (4.21%)	**0.03**
	Unmarried	149	1 (0.67%)	
Family Type	Nuclear	1455	63 (4.32%)	0.15
	Joint	545	16 (2.93%)	

* Using Chi square Test.

Fig 1: Histogram showing HbA1c distribution among the respondents



Mean = 5.30, Std. Dev. = 0.815, N = 2000

regression analysis was conducted as shown in Table 3. Women who belonged to 45 to 49 years age group had 6.67 times (1.46-30.45) and women between 40 to 44 years age group had 6.26 times (1.28-30.48) more chance respectively of having high HbA1cstatus compared to women in the age group 15 to 19 years. Scheduled tribe women of the state had 57% less chance [OR- 0.43 (0.22-0.81)] of having high HbA1c status compared to women from general category. Women belonging to family with per capita monthly income of less than Rs 2500 had 69% less chance [OR- 0.31 (0.13-0.73)], and per capita monthly income of Rs 2500 to Rs 4999 had 75% less chance [OR-0.25 (0.08-0.75)] of having high HbA1c status compared to women belonging to family with a per capita monthly income of ≥Rs 5000.

Discussion

The present study revealed that 3.95% of reproductive age women had high HbA1c level (≥6.5%) suggesting that they were diabetic. This level is similar to what found in a study conducted in another North Eastern state of India, Manipur by Singh et al which reported the prevalence of diabetes in peri-urban population to be 4.0%.[12] Again, the Prevalence of Diabetes in India Study (PODIS) which was carried out in 108 centers in different parts of India showed similar prevalence of diabetes with 5.6% urban and 2.7% rural population having diabetes respectively.[13,14]

The present study also revealed that the Mean HbA1c level among the reproductive age females of Tripura was 5.29 ± 0.83 %. This finding is high compared to a study conducted by Jinan B. Saaddine et al where mean HbA1c level was 4.99% (SD 0.50%) and varied from 4.93% (±0.04) in non-Hispanic whites to 5.05% (±0.02) in Mexican-Americans to 5.17% (±0.02) in non-Hispanic blacks.[9] This variation may be because the study was conducted among children and young adults unlike the present study which include young adults and adults.

The study showed that, age was significantly associated with high HbA1cstatus and women in 40 to 49 years

Table 3: Multiple logistic regression analysis showing factors associated with high HbA1c level

		OR (95% C.I.)*	Sig. (p value)
Age group	45 to 49 years	6.67 (1.46 – 30.45)	**0.01**
	40 to 44 years	6.26 (1.28 – 30.48)	**0.02**
	35-39 years	3.42 (0.68 – 17.20)	0.13
	30 to 34 years	1.81 (0.34 – 9.71)	0.48
	25 to 29 years	3.08 (0.65 – 14.57)	0.15
	20 to 24 years	1.41 (0.27 – 7.26)	0.67
	15 to 19 years	1	.
Community	Scheduled Caste	0.75 (0.38-1.47)	0.41
	Scheduled Tribe	0.43 (0.22 – 0.81)	**0.01**
	Other Backward Class	0.83 (0.46 – 1.51)	0.55
	General	1	.
Per capita income of the family	<2500	0.31 (0.13 – 0.73)	**0.00**
	2500 to 4999	0.25 (0.08 – 0.75)	**0.01**
	≥5000	1	.
Marital Status	Married	3.10 (0.38 – 24.96)	0.28
	Unmarried	1	.

***OR (95% C.I.) - Odds Ratio (95% confidence interval)**

age group had significantly higher chance of having high HbA1cstatus compared to women in the age group 15 to 19 years. Similar finding was obtained from a study conducted by Lydie N. Pani et al on the Framingham Offspring Study and the National Health and Nutrition Examination Survey cohorts, where HbA1c levels were positively associated with the age of the non-diabetic subjects. Again similar finding was obtained from studies conducted by John B Buse et al and Hajame Haimoto et al where HbA1c level was significantly associated with age of the respondents.[16-17] In a study conducted in Vellore, India the scheduled caste appeared to be the most susceptible to develop uncontrolled diabetes compared to other castes like scheduled tribe and general caste.[18] But the present study revealed that women who were scheduled tribe had 57% less chance of having high HbA1cstatus compared to general caste. This may be due to the fact that scheduled Tribes are less affluent and more hardworking people in the state compared to general category. Again the present study revealed that women belonging to poor socio economic status had less chance of having high HbA1c level. This finding can be explained with the fact that diabetes is usually associated with affluent economic status.

Thus the present study provided the reference values for HbA1c distribution among reproductive age women (15-49 years) in Tripura and also revealed that age, community and income of the respondents had a significant influence on HbA1cstatus. Hence, the present study may be useful in the early identification of at-risk individuals and patients with Diabetes Mellitus at the community level and thereby help in prevention of diabetes mellitus and reduce the burden of its complications and health care costs in India.

Strengths of the study

The study was carried out on large sample of reproductive age women with cluster sampling with PPS technique in the difficult areas of this North Eastern State of India.

Limitations of the study

Though Nycocard Reader has high sensitivity and specificity, still chances of giving false positive and false negative result cannot be excluded.

Conflict of interest

There are no conflicts of interest involved in the study.

Source of support

National Health Mission, Tripura

Reference

1. International Expert Committee: International Expert Committee Report on the Role of the A1C Assay in the Diagnosis of Diabetes. Diabetes Care 2009, 32(7):1327–1334.
2. Whiting D R., Guarguata L, Weil C, Shaw J. IDF Diabetes Atlas: Global estimates of the prevalence of diabetes for 2011 and 2030, Diabetes Research and Clinical Practice, Volume 94, Issue 3, December 2011, Pages 311-32:
3. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care 2010;33(Suppl. 1):S62–S69
4. World Health Organization. Use of Gly-catedHaemoglobin (HbA1c) in the Diagnosis of Diabetes Mellitus: Abbreviated Report of a WHO Consultation. Geneva, World Health Org.,2011 (Reportno. WHO/NMH/CHP/ CPM/11.1)
5. Rohlfing CL, Little RR, Wiedmeyer HM, England JD, Madsen R, Harris MI, Flegal KM, Eberhardt MS, Goldstein DE: Use of GHb (HbA1c) in screening for undiagnosed diabetes in the U.S. population. Diabetes Care 23:187–191, 2000
6. Herman WH, Engelgau M, Zhang Y, Brown MB. Use of GHb (HbA1c)

to screen for undiagnosed diabetes in the U.S. population (Letter). Diabetes Care 23:1207– 1208, 2000
7. Davidson MB, Schriger DL, Peters AL, Lorber B: Relationship between fasting plasma glucose and glycosylated hemoglobin: potential for false positive diagnosis of type 2 diabetes using new diagnostic criteria. JAMA. 1999; 281:1203–1210
8. Simon D, Senan C, Garnier P, Saint-Paul, M, Papoz L: Epidemiological features of glycatedhaemoglobinA1c distribution in a healthy population. Diabetologia 32:864–869, 198
9. Jinan B. Saaddine, Anne Fagot-Campagna, Deborah Rolka, K.M. Venkat Narayan, Linda Geiss, Mark Eberhardt. Distribution of HbA1c Levels for Children and Young Adults in the U.S. Diabetes Care, August 2002; 25 (8): 1326-1330.
10. Katherine M. F. HbA1c targets. Available from:http://www.diabetes.co.uk/what-is-hba1c.html. Accessed on- 05.01.17
11. RBS. What are Normal Blood Glucose Levels. Available from: https://www.virginiamason.org/WhatareNormalBloodGlucoseLevels. accessed on 12. 03.17
12. Singh T.P, Singh A.D, Singh T.B. Prevalence of diabetes mellitus in Manipur. In: Shah S.K. ed Diabetes Update Guwahati, India. North Eastern Diabetes Society, 2001,13-19.
13. Sadikot SM, Nigam A, Das S. The burden of diabetes and impaired glucose tolerance in India using the WHO 1999 criteria: prevalence of diabetes in India study (PODIS). Diabetes Res ClinPract 2004; 66:301-07.
14. Sadikot SM, Nigam A, Das S, Bajaj S, Zargar AH, Prasannakumar KM, et al. Diabetes India. The burden of diabetes and impaired fasting glucose in India using the ADA 1997 criteria: prevalence of diabetes in India study (PODIS). Diabetes Res ClinPract 2004; 66: 293-300.
15. Lydie N. P, Leslie K, James B. M, Cynthia D, Shadi C, Caroline S. F, et al. Effect of Aging on A1C Levels in Individuals Without Diabetes. Diabetes Care. October 2008; 31(10): 1991-1996.
16. Bose J, Kaufman F, Linder B, Hirst K, Ghormli L, Willi S. Diabetes Screening with Haemoglobin A1c verses fasting plasma glucose in a multicentric middle- school cohort. Diabetes care. Feb 2013; 36: 429-435.
17. Haimoto H, Tae S, Kawamura T, Umegaki H, Komeda H, Wakai K. Three-graded stratification of carbohydrate restriction by level of baseline hemoglobin A1c for type 2 diabetes patients with a moderate low-carbohydrate diet. Nutrition & Metabolism. 2014; 11(33).
18. Odetola L. Comparison of Dietary Patterns and Socio-economic Status of Uncontrolled and Controlled Diabetic Patients in K.V. Kuppam Block. Available from: http://pages.stolaf.edu/cis-lodetola/files/2014/05/Uncontrolled-Controlled-Diabetes-in-India.pdf

ORIGINAL ARTICLE

Neck Circumference as a Marker of Malnutrition among Children Attending the Under Five Clinic of a Tertiary Care Hospital in Nagpur, Maharashtra

Chaitanya R Patil[1], Ketan R Dagdiya[2], Prithvi B Petkar[3], Abhijit Kherde[3]

[1]Department of Palliative care and Psycho oncology, Tata Medical Centre, Kolkata, [2]Assistant professor, [3]Post Graduate Resident, Department of Community Medicine, Indira Gandhi Government Medical College, Nagpur, Maharashtra

Abstract

Introduction: India is facing a dual burden of overweight/obesity and under nutrition among children less than 5 years of age. Neck circumference is recently studied marker for malnutrition among adults and older children. **Objective:** To correlate neck circumference with body mass index and to associate it with wasting and underweight status. **Material & Methods:** A cross sectional study was conducted among children less than 5 years of age attending the outpatient setup of a tertiary care setup in Nagpur, Maharashtra. Demographic details and anthropometric measurements were done for the children with necessary permission before the start of the study. Anthropometry was done using standard guidelines and WHO charts were used for classification of wasting and underweight **Results:** We included 260 study subjects in our study. The mean age of the children was 21.55 ± 17.31 months and majority of them were females, belonged to Hindu religion (58.07%), belonged to Class 4 (33.08%) and the mothers were educated up to senior secondary (34.62%). Neck circumference had significant positive correlation with birth weight (r=0.138) and body mass index (r=0.211). The average neck circumference was significantly lower in case of wasted ($p<0.05$) and underweight children ($p<0.05$). **Conclusion:** Neck circumference correlated significantly with body mass index and was significantly lower in wasted and underweight in children less than 5 years of age.

Key words: Malnutrition; Neck Circumference; Under 5 children

Introduction

Malnutrition is major public health concern. It is like a coin of which one facet is over nutrition and the other facet is under nutrition.[1] Developing country like India is facing a dual burden of this disease which is affecting all age groups of the society among which children are one of the vulnerable groups.[2] Adiposity or under nutrition in children will have serious effects in later life.[3] Body mass index, weight for age and weight for height are most commonly used measures to quantify the malnutrition.[4] But these represent the total body fat and hence do not give sufficient information regarding distribution of body fat.

Upper body fat is known to have associations with increased cardiovascular risk in adults and children.[5,6] Neck circumference measures the upper body fat and has been associated with obesity, hypertension, cardiovascular risk and metabolic syndrome in many studies done across the world.[6–10] But very few studies have been conducted in this regard specially on children less than 5 years.[11,12] So we conducted this study to find out the association between neck circumference and wasting and underweight and to correlate neck circumference with body mass index among the children attending under five clinics of our tertiary care setup.

Material & Methods

This cross sectional study was conducted in the under five clinics training centre (1 each in rural and urban health centre) of a tertiary care centre in Nagpur, Maharashtra. The children less than 5 years of age who attended the under five clinics between January 2017 to April 2017 have been included in this study. Children with pre-existing thyroid illness, chronic illness on treatment and with neck abnormalities were excluded from the study. Necessary permissions were taken from the ethics committee. An informed assent was taken from the parents before start of the study.

Address for Correspondence: *Dr Ketan Dagdiya, Department of Community Medicine, Indira Gandhi Government Medical College, Nagpur, Maharashtra. Mob No: 7774030137.* **Email:** kedyrdagdiya@gmail.com

Received: *19/08/2018* ***Accepted:*** *18/10/2018*

Data collection was done by interviewing the mother/ attending guardian using a case record which contained demographic variables and anthropometry. The demographic variables included were name, age, address, gender, religion, socio economic status, educational status of mother and birth weight. Religion was classified according to the categories of Indian census. Socio economic status was classified using BG Prasad classification based on the consumer price index of the study period.[13] Anthropometry included height/length and weight were measured using standard guidelines.[14, 15] Further, body mass index was calculated using this data. Based on the World health organisation (WHO) charts for weight for height and weight for age it was classified in wasted, underweight respectively.[16] Body mass index was calculated using the standard formula. Birth weight was categorised using the standard WHO guidelines into low birth weight and normal birth weight.[17] Neck circumference was measured using a non stretchable tape at the level of most prominent portion of the neck, the thyroid cartilage. The child's head was held erect with eyes forward and the neck in horizontal position.[12]

A pilot testing was done in 50 study subjects for finding the final sample size and to feasibility of variables used in the case record form. The case record form was finalised and data was collected by interviewing the mothers/ guardians attending the children. The correlation coefficient of neck circumference with body mass index based on this pilot study was 0.182. Using this data and formula for sample size based on correlation coefficient, with 80% power and 5% absolute error we found the minimum sample size to be 235.[18] The final sample size was achieved after adding up non response rate of 10% and further increased upto 260 study subjects.

Statistical analysis

The data was collected, entered using EPI Info (version 7.2). The analysis was done using statistical package of social sciences (version 20.0). The qualitative data was expressed in terms of percentages and the quantitative data was represented using mean and standard deviation or categorised and expressed in terms of percentages. The difference between the two means was tested using student t-test. The correlation between the two continuous variables was done using Pearson's correlation coefficient. All the p values were two tailed and significance level was set below 0.05.

Results

We included 260 study subjects in our study.

From Table 1, the mean age of the children was 21.55 ± 17.31 months. Majority of the children were females (51.54%), were delivered normally (53.08%) and 23.46 % were low birth weight. Majority of families belonged to Hindu religion (58.07%), belonged to Class 4 SES (33.08%) and the mothers were educated up to senior secondary (34.62%).

Table 1: Socio demographic characteristics of the study subjects

Socio demographic characteristics	No	%
Age (months)		
0-12	98	37.69
12-36	105	40.38
36-60	57	21.92
Gender		
Male	126	48.46
Female	134	51.54
Religion		
Hindu	151	58.07
Muslim	52	20.00
Sikh	13	5.00
Christian	4	1.54
Buddhist	40	15.39
Socio economic status [a]		
Class 1	14	5.38
Class 2	54	20.77
Class 3	73	28.08
Class 4	86	33.08
Class 5	33	12.69
Educational status of mother		
Illiterate	11	4.23
Primary	2	0.77
Upper Primary	61	23.46
Secondary	71	27.30
Senior secondary	90	34.62
Graduate and above	25	9.62
Type of delivery		
Normal	138	53.08
Caesarean section	122	46.92
Low birth weight		
Yes (<2.5kg)	61	23.46
No (≥ 2.5kg)	199	76.54

a- B G Prasad classification

Table 2, showed the mean height, weight, neck circumference and body mass index was higher in females compared to males (p>0.05).

Table 2: Anthropometric parameters of the study subjects

Anthropometric variables	Male n= 134		Female n= 126		P value
	Mean	SD	Mean	SD	
Height	77.20	15.57	77.97	16.08	0.6962
Weight	8.76	3.49	8.96	3.53	0.6609
Neck circumference	23.32	1.76	23.52	1.33	0.3041
Body mass index	14.15	2.07	14.28	2.54	0.6496

SD- Standard deviation

Table 3: Pearson's correlation coefficient of neck circumference with other anthropometric parameters

Anthropometric variables	Neck circumference	
	r	P value
Height	0.024	0.705
Weight	0.115	0.064
Body mass index	0.211	0.001*
Birth weight	0.138	0.026*

r- Pearson's correlation coefficient

From Table 3, neck circumference was positively correlated with birth weight (r=0.138) and body mass index (r=0.211). But, there was no significant correlation with weight and height of the children (p>0.05).

Table 4: Association of neck circumference with weight for height in the study subjects (wasting)

Weight for height	Neck circumference		P value
	Mean	SD	
Normal (reference)	23.54	1.65	
Wasted	22.8	1.42	<0.001*
Overweight/obese	24.12	1.18	0.0459*

SD- Standard deviation, b- unpaired t test applied

From Table 4, the mean neck circumference was significantly lower in children who were wasted when compared with normal children. (p<0.001) The neck circumference of the children who were overweight/ obese had significantly higher neck circumference than those with normal children (p=0.04).

Table 5: Association of neck circumference with weight for age in the study subjects (underweight)

Weight for age	Neck circumference	
	Mean	SD
Normal	23.77	1.64
Underweight	23.21	1.40
P value	0.004*	

SD- Standard deviation

From Table 5, the mean neck circumference of the children who were underweight was significantly higher than those having normal weight for age (p<0.05).

Discussion

Two of the global nutrition targets set by World Health organisation to achieve by 2025 are to maintain and prevent childhood wasting to less than 5% and to achieve no increase in the childhood overweight and obesity status.[19] Neck circumference is a novel anthropometric marker which has been studied to indicate malnutrition. We conducted a cross sectional study to correlate neck circumference with body mass index and to associate it with wasting and underweight status. The mean age of the study subjects was 21.55 ± 17.31 months with majority of them being females, belonging to Hindu religion, upper lower socio economic status, the mothers were educated upto secondary school and based on the birth weight of children 23.46% had low birth weight.

Neck circumference had significant correlation with body mass index of the children (r=0.211; p<0.001). A study conducted by dos Santos et al[11] in children between 13 to 24 months of age showed that there was a significant correlation between neck circumference and body mass index in both the genders. Similar findings were inferred by Yashoda HT et al (13 to 17 years), Hassan NE et al (7 to 12 years), Atef A et al (7 to 12 years), Kelishadi R et al (7 to 18 years), Hatipoglu N et al (6 to 18 years), Kim Y et al (7 to 13 years) and Rajagopalan A et al (6 to 18 years).[20-26] Another study conducted by Kondolot M et al inferred that neck circumference maybe used as a marker to define obesity in preschool children.[12] They further even reported the neck circumference percentiles to classify the same in Turkish preschool children. A systemic review and Meta analysis done by Ma C et al reported that neck circumference has moderate efficacy in indentifying overweight and obese children and adolescents (6 to 18 years).[27]

We also found that the neck circumference was significantly lower in case of wasted and underweight children when compared to normal children. One study conducted by Continho CA et al inferred similar results but the study was conducted in children of 6 to 17 years of age.[28] Of all the above review conducted, our study was the first of

its kind to correlate neck circumference with body mass index, wasting status and underweight status in this vulnerable age group. Further, we also correlated neck circumference with birth weight of the children and found a significant correlation with it. The results based on our study less generalizable since it was a hospital based cross sectional study and was a single centre study (One Urban and one rural health training centers of single tertiary care hospital).

Conclusion

In the present study, neck circumference positively correlated with body mass index of the children less than 5 years of age. Further, the neck circumference was lower in underweight and wasted children when compared with the normal children indicating its importance in detecting the under nutrition of the children. The study gives a scope to conduct future studies with larger sample size and population based studies.

Source of Funding: Nil

Conflict of Interest : Nil

References

1. Kolčić I. Double burden of malnutrition: A silent driver of double burden of disease in low–and middle–income countries. J Glob Health 2012;2(2):020303.
2. Müller O, Krawinkel M. Malnutrition and health in developing countries. Can Med Assoc J 2005;173(3):279–86.
3. Tzioumis E, Adair LS. Childhood dual burden of under-and overnutrition in low-and middle-income countries: a critical review. Food Nutr Bull 2014;35(2):230–43.
4. Nuttall FQ. Body mass index: obesity, BMI, and health: a critical review. Nutr Today 2015;50(3):117.
5. Jaksic VP, Grizelj D, Livun A, Boscic D, Ajduk M, Kusec R, et al. Neck adipose tissue–tying ties in metabolic disorders. Horm Mol Biol Clin Investig 2018;33(2).
6. Lee JJ, Pedley A, Therkelsen KE, Hoffmann U, Massaro JM, Levy D, et al. Upper body subcutaneous fat is associated with cardiometabolic risk factors. Am J Med 2017;130(8):958–66.
7. Niniya J, Patil CR, Bhatkule PR, Ughade SN, Narlawar UW. Neck circumference: a potential anthropometric marker for screening of hypertension in adult population of central India. Int J Community Med Public Heal 2016;3(12):3374–9.
8. Patil CR, Deshmukh JS, Yadav S, Patil S, Sheikh AR. Neck circumference: A novel anthropometric tool for screening obesity in adults. Int J Collab Res Intern Med Public Heal 2017;9(7):711–20.
9. Patil CR, Deshmukh JS, Lalwani CR, Bagde H. Neck Circumference: An Alternative Tool for Screening Cardiovascular Risk among Adults. J Clin Diagnostic Res 2018;12(3):LC01-LC04.
10. Ben-Noun L, Laor A. Relationship of neck circumference to cardiovascular risk factors. Obes Res 2003;11(2):226–31.
11. Santos D dos, Contarato AAPF, Kroll C, Bertoli M, Czarnobay SA, Figueirêdo KBW, et al. Neck circumference as a complementary measure to identify excess body weight in children aged 13-24 months. Rev Paul Pediatr 2016;34(1):302–7.
12. Kondolot M, Horoz D, Poyrazoglu S, Borlu A, Öztürk A, Kurtoglu S, et al. Neck Circumference to Assess Obesity in Preschool Children. J Clin Res Pediatr Endocrinol 2017;9(1):17–23.
13. Singh T, Sharma S, Nagesh S. Socio-economic status scales updated for 2017. Int J Res Med Sci 2017;5(7):3264–7.
14. Ben-Noun LL, Laor A. Relationship between changes in neck circumference and cardiovascular risk factors. Exp Clin Cardiol 2006;11(1):14.
15. Who's certified [Internet]. Physical status: the use and interpretation of anthropometry: World Health Organization technical report series 1995 Available from: http://apps.who.int/iris/bitstream/handle/10665/37003/WHO_TRS_854.pdf (Last accessed on 22 july 2018)
16. Who.int [Internet]. The WHO Child Growth Standards Available from: http://www.who.int/childgrowth/standards/en/ (Last accessed on 13 August 2018)
17. Marta J, Feit J. Classification of newborn infants by weight and gestation. Atlas of Neonatology [Cited 2018 Aug 01]. Available from: https://atlases.muni.cz/atlases/novo/atl_en/klasifnovgestporhm.html
18. Hulley SB, CummingsSR, Browner WS, Grady D, Newman TB. Designing clinical research: an epidemiologic approach. 4th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2013. Appendix 6C, page 79.
19. Who.int [Internet]. Global Targets 2025: To improve maternal, infant and young child nutrition. [Cited 2018 Jul 10]. Available from: http://www.who.int/nutrition/global-target-2025/en/ (Last accessed on 10 july 2018)
20. Yashoda HT, Swetha B, Goutham AS. Neck circumference measurement as a screening tool for obesity in children. Int J Contemp Pediatr 2017;4(2):426–30.
21. Hassan NE, Atef A, El-Masry SA, Ibrahim A, Abu Shady MM, Al-Tohamy M, et al. Neck circumference as a predictor of adiposity among healthy and obese children. Maced J Med Sci 2015;3(4):558–62.
22. Atef A, Ibrahim A, Hassan NE, Elmasry SA, Elashry GI. Neck circumference as a novel screening method for estimating fat distribution and metabolic complications in obese children. Egypt Pediatr Assoc Gaz 2015;63(3–4):91–7.
23. Kelishadi R, Djalalinia S, Motlagh ME, Rahimi A, Bahreynian M, Arefirad T, et al. Association of neck circumference with general and abdominal obesity in children and adolescents: The weight disorders survey of the CASPIAN-IV study. BMJ Open 2016;6(9):e011794.
24. Hatipoglu N, Mazicioglu MM, Kurtoglu S, Kendirci M. Neck circumference: An additional tool of screening overweight and obesity in childhood. Eur J Pediatr 2010;169(6):733–9.
25. Kim Y, Lee J-M, Laurson K, Bai Y, Gaesser GA, Welk GJ.Accuracy of Neck Circumference in Classifying Overweight and Obese US Children.ISRN Obes 2014;2014:16.
26. Rajagopalan A, Balaji N. Association of neck circumference and obesity with blood pressure among adolescents in urban and rural population in North Tamil Nadu. J Nat Sci Biol Med 2017;8(2):144-147
27. Ma C, Wang R, Liu Y, Lu Q, Liu X, Yin F. Diagnostic performance of neck circumference to identify overweight and obesity as defined by body mass index in children and adolescents: systematic review and meta-analysis. Ann Hum Biol 2017;44(3):223–9.
28. Coutinho CA, Longui CA, Monte O, Conde W, Kochi C. Measurement of neck circumference and its correlation with body composition in a sample of students in Saõ Paulo, Brazil. Horm Res Paediatr 2014;82(3):179–86.

ORIGINAL ARTICLE

Vaccine Hesitancy and Attitude towards Vaccination among Parents of Children Between 1-5 Years of Age Attending a Tertiary Care Hospital in Chennai, India

Sahana Sankara Narayanan[1], Aparna Jayaraman[2], Vijayaprasad Gopichandran[3]

[1]MBBS Student, [2]Assistant Professor, Department of Paediatrics, [3]Assistant Professor, Department of Community Medicine, ESIC Medical College & PGIMSR, KK Nagar, Chennai

Abstract

Introduction: Vaccination is an effective public health intervention; however, coverage of vaccination is declining in states like Tamil Nadu which have good health indicators. **Objective**: To evaluate the presence of vaccine hesitancy among parents of children between 1 and 5 years of age attending the paediatric out patient department of a tertiary care hospital in Chennai and to assess its relationship with attitudes towards vaccines. **Material & Methods**: A cross sectional questionnaire-based survey was conducted among 100 consecutively sampled parents of children between 1 and 5 years of age attending a tertiary care paediatric out-patient department. The Parental Attitude towards Childhood Vaccines scale of vaccine hesitancy and the Beliefs and Attitudes towards Childhood Vaccines scale were used to measure vaccine hesitancy and beliefs and attitudes towards vaccination respectively. The data were analysed descriptively and statistical correlation between vaccination attitudes and vaccination hesitancy were studied. **Results**: In the predominantly urban, educated, working class population, the prevalence of vaccine hesitancy was 21%. But all the children had received complete vaccination appropriate for age. The major drivers for vaccine hesitancy were suspicions about newer vaccines, concerns about adverse effects of vaccines and the perception that there is no need for vaccines against uncommon diseases. The vaccine hesitancy scores were negatively correlated with the vaccine attitude scores (R = -0.266; p = 0.007). **Conclusion**: Vaccine hesitancy is present among the sampled mothers and is influenced mainly by concerns regarding safety of newer vaccines. Vaccine hesitancy needs to be clearly addressed for strengthening the Universal Immunization Program.

Key words: vaccination, vaccine hesitancy, attitudes towards vaccination, childhood vaccines

Introduction

Vaccination is one of the most successful and cost effective public health interventions in preventing infectious diseases.[1] High coverage of vaccinations is required for effectively interrupting the transmission of infectious diseases in the communities. With this intent, the Universal Immunization Program (UIP) was launched in India in 1985 targeting six main Vaccine Preventable Diseases (VPD) namely tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis and measles.[2] The coverage of vaccination in India has remained average to low through the years. The state of Tamil Nadu which has some of the best health indicators in the country has an interesting pattern of vaccination coverage. In the National Family Health Survey NFHS 1 (1992-93) the coverage of all basic vaccines was about 65%, which drastically increased to 89% in NFHS 2 (1998-99).[3,4] NFHS 3 (2005-06) saw a vaccination coverage rate of 81%, a reduction over the coverage in NFHS 2 and the NFHS 4 (2015-16) saw a further reduction to 69%.[5,6] This trend of reduction in vaccination coverage in a high performing state is a matter of concern. A state-wide representative coverage survey conducted in 2017 revealed a full vaccination coverage of 79.9% and appropriate vaccination coverage of 69.7%.[7] Despite having a robust and well-functioning health system some states face reduction in vaccination coverage due to vaccine hesitancy. The term vaccine hesitancy stands for the delay in acceptance or refusal of vaccines despite easy access to the vaccines. Several factors have been said to influence vaccine hesitancy including socio-cultural context, religious beliefs, misinformation spread through social media, historical influences and mistrust, beliefs and attitudes about vaccines and specific characteristics of the vaccines.[8] A vaccine decision making model typically involves receiving information about vaccines, active

Address for Correspondence: *Dr.Vijayaprasad Gopichandran, Assistant Professor, Department of Community Medicine, ESIC Medical College & PGIMSR, KK Nagar, Chennai 600078,* **Email:** vijay.gopichandran@gmail.com

Received: *15/09/2018* ***Accepted:****21/12/2018*

engagement with the information and decision making, which is strongly influenced by social, political, economic, religious and cultural factors. Trust in the vaccination policy, health system, vaccine providers and specific vaccines also plays a major role.[9] There is a need to understand the phenomenon of attitudes towards vaccinations and vaccine hesitancy among parents of children between 1 and 5 years in Tamil Nadu. This understanding will help to inform the state's vaccination policy for further improving the coverage rates.

Material & Methods

Study Setting

The study was conducted in the paediatric out patient department of a tertiary care hospital in Chennai, India. The hospital serves people who are covered under a national contributory social health insurance scheme that covers employees earning less than a certain amount per month. The insurance scheme provides for maternity, child health, sickness, medical, and disability benefits. Chennai is the capital city of Tamil Nadu and the hospital is located in the heart of the city.

Study Participants

The participants included in the study were parents of children between 1 and 5 years of age attending the paediatrics out patient department of the tertiary hospital. Participants who met this criterion were consecutively selected from the out-patient clinic in the period of June-July 2018.

Sample Size and Sampling

The prevalence of vaccine hesitancy in this population has not been previously documented. Therefore, assuming that the prevalence will be about 50%, and for a 95% confidence level and 20% relative precision of estimate, the sample size was calculated to be 100. The 100 samples were identified by non-probabilistic consecutive sampling method from the paediatric out patient department.

Study Instruments

The study used a questionnaire which comprised of three parts namely – (1) socio-demographic details of the respondent, spouse and child, (2) a scale to measure the parental attitude towards childhood vaccines and vaccine hesitancy and (3) a scale to measure beliefs and attitudes towards childhood vaccines.[10,11] The Parent Attitude towards Child Vaccines scale is a valid and reliable measure of parental attitudes and vaccine hesitancy.[12] This scale has not been previously validated for the Indian context. Therefore, the scale was validated by content validity method among experts in paediatrics and public health who evaluated the relevance of the scale in the Indian context and cultural and social appropriateness of the statements in the scale. The questionnaire was translated to Tamil, the local language and the validity of translation checked by an independent expert.

Data Collection and Management

A trained interviewer used the translated questionnaire to interview the respondents who consented to participate in the study. Their responses were marked in the paper-based questionnaire. The data was later entered into an Excel spreadsheet and was analysed using the SPSS Statistical Software version 21.

Ethical Considerations

The study was approved by the Institutional Ethical Committee of the institution of origin of this study. Informed consent was obtained from all participants before data collection. Adequate privacy was provided during the interviews and the details of the participants were maintained in strict confidentiality.

Results

A total of 100 consecutive parents attending the paediatrics out patient department were approached for the study and all of them consented to participate. The socio-demographic characteristics of the respondents and their children are shown in Table 1. All the children who were part of the study had full coverage of all age appropriate vaccines.

It was observed that about half of the children were in the 4-5 years age group. There was an almost equal distribution of boys and girls. More than half (65%) of the mothers were below 30 years of age, about 57% were home makers and about 40% had college education. This profile reflects a middle class, educated, working class population of a typical Indian urban area.

Table 2 and 3 show the responses of the parents on the scale on parental beliefs and attitudes. It was found that while most parents (94%) thought that the diseases prevented by vaccines are all severe ones, a substantial number (64%) thought that children receive more vaccines than necessary and about half of them thought that it is better to acquire immunity by natural methods. The responses also revealed that a majority (90%) of the respondents were concerned about adverse effects of vaccines as well as failure of vaccines. Though majority knew that vaccines protect their children from diseases, however the main motivator for vaccinating their children was to gain entry to school (schools require that children get vaccinated fully and produce the certificate of vaccination).

Table 4 shows the responses of the parents to vaccine hesitancy questions. It is noteworthy that there is a

Table 1: Characteristics of the study population

S.no	Characteristic	Categories	Frequency (n = 100)
1	**Age of Child**	1 – 2	19
		2 - 3	19
		3 - 4	12
		4 – 5	50
2	**Sex of child**	Boy	52
		Girl	48
3	**Age of Mother**	20 – 25	23
		26 - 30	42
		31 - 35	23
		36 – 40	12
4	**Education of Mother**	Middle school	18
		High school	22
		Higher secondary	15
		UG and Diploma	36
		PG	7
		No schooling	2
5	**Occupation of Mother**	Home Maker	57
		Unskilled workers	26
		Professionals	17
6	**Education of Father**	Middle school	16
		High school	25
		Higher secondary	9
		UG and Diploma	38
		PG	9
		No schooling	3
7	**Monthly family income**	5000 - 10000	31
		10001 - 20000	47
		20001 - 30000	15
		30001 - 50000	6
		>50000	1
8	**Access to smart phone**	Mother	54
		Father	71
9	**Access to WhatsApp, Facebook**	Mother	43
		Father	65
10	**Seen Messages regarding Vaccines**	Newspaper	46
		Television	82
		Radio	27
		Social Media	69
11	**Source of knowledge regarding vaccine**	Health Worker	49
		Doctor	37
		WhatsApp, Facebook, SMS	14
12	**Knowledge regarding AEFI**	Yes	19
		No	81

Table 2: Parental beliefs about vaccine safety and efficacy

S. No	Statement	Agree	Neutral	Disagree	
1	Children get more vaccines than are good for them	64	10	26	
2	Many of the illnesses that vaccines prevent are severe	94	3	3	
3	It is better for my child to develop immunity by getting sick than by getting a vaccine	49	9	42	
S. No	**Statement**	**Very Concerned**	**Concerned**	**Neutral**	**Not Concerned**
4	How concerned are you that your child might have a serious side effect from a vaccine?	21	58	2	19
5	How concerned are you that a vaccine might not prevent the disease?	86	6	1	7

tendency of suspicion towards newer vaccines, concerns about adverse events following vaccination and a feeling that vaccines are not necessary for diseases that are not common. These responses indicate a sense of hesitancy in a small proportion of the sample and the main reasons for their hesitation.

Table 3: General attitudes towards childhood vaccines

S.NO	Question	Yes	No
1	The main reason I have my child get vaccines is so that they can enter school	81	19
2	Do you believe that vaccines can protect children from serious diseases?	98	2
3	Do you think that most parents like you have their children vaccinated with all the recommended vaccines?	86	14
4	Have you ever been reluctant or hesitated to get a vaccination for your child?	21	79
5	Have you ever refused a vaccination for your child?	10	90

Table 4 shows the responses of the parents to vaccine hesitancy questions. It is noteworthy that there is a tendency of suspicion towards newer vaccines, concerns about adverse events following vaccination and a feeling that vaccines are not necessary for diseases that are not common. These responses indicate a sense of hesitancy in a small proportion of the sample and the main reasons for their hesitation.

The parental belief scale was scored in such a way that higher scores indicated better attitudes towards vaccines. Similarly, the vaccine hesitancy scale was also scored to indicate higher scores to indicate greater hesitancy. The overall vaccine hesitancy score was plotted against the parental belief and attitude scores and correlation coefficient calculated. This is shown in Figure 1.

Figure 1: Relationship between vaccine hesitancy and parental belief

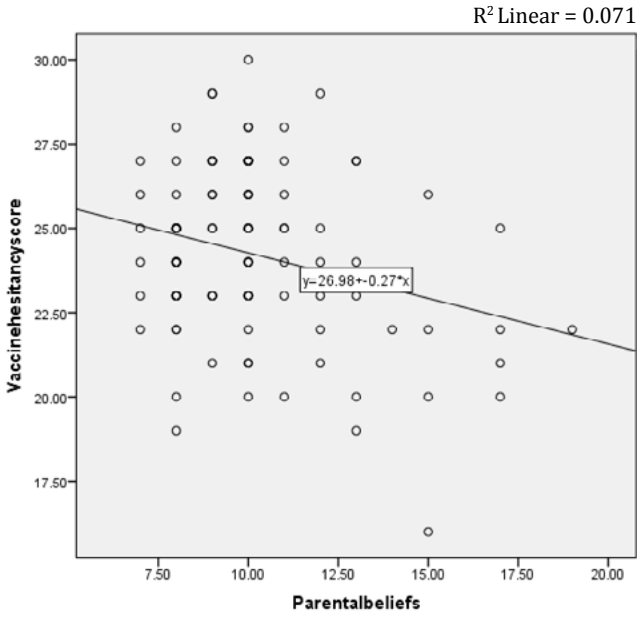


Table 4: Vaccine Hesitancy among mothers

S.No	Statement	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1	Childhood vaccines are important for my child's health			1	75	24
2	Childhood vaccines are effective			1	87	12
3	Having my child vaccinated is important for the health of others in my community		11	15	71	3
4	All childhood vaccines offered by the government programme in my community are beneficial		4	3	89	4
5	New vaccines carry more risks than older vaccines	1	33	27	24	15
6	The information I receive about vaccines from the vaccine program is reliable and trustworthy		2	8	88	2
7	Getting vaccines is a good way to protect my child/ children from disease				36	64
8	Generally I do what my doctor or health care provider recommends about vaccines for my child/children				83	17
9	I am concerned about serious adverse effects of vaccines	1	10	3	67	19
10	My child/ children does not / do not need vaccines for diseases that are not common anymore	3	18	1	58	20

Legend: The scatter plot shows that as the parental beliefs and attitudes regarding vaccination increase the vaccine hesitancy decreases Pearson's Correlation Coefficient -0.266; p = 0.007

Discussion

This study systematically documented the tendency of vaccine hesitancy and attitude among parents belonging to an educated, middle class, working population in a metropolitan city of India. The main findings of the study are that the parents felt that vaccines are important as they prevent serious illness, but they also felt that children nowadays receive more vaccines than necessary and instead they should be allowed to acquire natural immunity against infections. The parents were concerned about adverse events following vaccination. About 21% reported hesitancy to vaccinate and 10% reported refusal to at least one vaccine (mostly outside the Universal Immunization Program schedule). The main factors influencing vaccine hesitancy were scepticism against newer vaccines, concerns about adverse events and the feeling that vaccines against uncommon diseases are not necessary. It was also observed that vaccine hesitancy is inversely proportional to attitudes towards vaccines.

Vaccines are important but there are concerns regarding safety

A previous study from the same area showed that parents had a great level of trust in the health system and the vaccination policy. Therefore, they were willing to vaccinate their children. However, they did not take up optional vaccines as much as the mandatory vaccines in the government vaccination schedule. The reasons cited by this study was high cost, lack of awareness and concerns regarding safety.[13] The major reason for the perception that the vaccines are too many is probably concern regarding their safety. Introduction of newer vaccines are associated with concerns regarding their safety.[14] One of the major reasons found in this study for hesitancy was concerns regarding safety. Previous studies of vaccine acceptance in the same area for the newly introduced Measles-Rubella vaccine also revealed that trust in the health system and suspicious about new vaccines spreading through social media campaigns had a strong influence on vaccine hesitation.[15] Therefore vaccination programs and policies have to feature strong community engagement strategies to increase awareness about the vaccines and remove fears associated with them.

Vaccine hesitancy and attitudes towards vaccination

This study has documented that about 21% of the interviewed parents reported some form of hesitancy to vaccinate their children. A previous study from the same area has documented that the level of vaccine hesitancy is low and the reasons behind the strong motivation of the parents to vaccinate their children in this area can be adopted to reduce hesitancy in the United States.[16] However, the vaccine hesitancy reported in this study is higher. This is likely to be due to overall better educational attainment, better socio-economic status and greater levels of awareness among the respondents. This higher vaccine hesitancy is likely to be present in many of the metropolitan areas and educationally and socioeconomically developed areas of the country. Such hesitancy to undergo vaccination has also been reported previously in Kerala, which has a high level of literacy and good health indicators.[17] There is a clear trend of greater vaccine hesitancy in areas with higher socio-economic status and higher education and awareness.

Need to address vaccine hesitancy to improve vaccination coverage

In states like Tamil Nadu and Kerala which have good health indicators, the time period between NFHS 3 and 4 has seen a drastic fall in vaccination coverage rate.[5,6] While various authors have referred to important systemic issues related to such fall in vaccine coverage, one of the main issue to be considered is the demand side factor of vaccine hesitancy.[7] The important finding of this study is majority of the vaccine hesitancy is to newer vaccines, concerns regarding safety of vaccines and the perception that vaccines are not necessary for illnesses that are uncommon. There is a need to develop interventions at the community level to address these concerns. Active community engagement before introduction of newer vaccines, to allay any anxieties in the minds of the parents is very important. Awareness should be created certain infections are rare is due to effective vaccination coverage the myth to stop vaccinating children against uncommon diseases. Such awareness programs will help address vaccine hesitancy and ensure active community engagement in the vaccination program.

Strengths and Limitations of the study

To the best knowledge of the authors this is the first study to evaluate vaccine hesitancy in a systematic manner in the Indian context. Therefore, the study provides insights to this issue, so that interventions can be planned to improve vaccination coverage rates even in the well-developed states. The limitations of the study include a small sample size, non-probabilistic sampling method, and a cross sectional design, which precluded any causal association between vaccine attitudes and hesitancy. Future studies should aim at performing a 30 cluster sampling method of vaccine coverage as recommended by the World Health Organization (WHO) and United Nations Children's Fund (UNICEF). Qualitative studies of vaccine hesitancy in the Indian context, should inform development of a unique scale to measure vaccine hesitancy in India. This can better conceptualize the construct of vaccine hesitancy in India.

Conclusion

Even among populations with near universal vaccine coverage, vaccine hesitancy exists. The main driving factors for such vaccine hesitancy are concerns regarding its safety. Vaccine hesitancy should be evaluated thoroughly in the Indian context in order to strengthen the Universal Immunization Program.

Source of Funding: Nil

Conflict of Interest : Nil

References

1. World Bank. World Development Report 1993 : Investing in Health [Internet]. New York; 1993. Available from: https://openknowledge.worldbank.org/handle/10986/5976
2. Lahariya C. A brief history of vaccines & vaccination in India. Indian J. Med. Res. India; 2014;139:491–511.
3. International Institute for Population Sciences. National family health survey (NFHS-1) 1992–93 [Internet]. Mumbai; 2009. Available from: http://www.rchiips.org/nfhs/nfhs1.shtml
4. International Institute of Population Sciences. National family health survey (NFHS-2) 1998–99 [Internet]. Mumbai; 2009. Available from: http://www.rchiips.org/nfhs/nfhs2.shtml
5. International Institute of Population Sciences. National family health survey (NFHS-3) 2005–06 [Internet]. Mumbai; 2009. Available from: http://www.rchiips.org/nfhs/nfhs3.shtml
6. International Institute of Population Sciences. National family health survey (NFHS-4) 2015-16 [Internet]. Mumbai; 2016. Available from: http://www.rchiips.org/nfhs/nfhs4.shtml
7. Murhekar M V, Kamaraj P, Kanagasabai K, Elavarasu G, Rajasekar TD, Boopathi K, et al. Coverage of childhood vaccination among children aged 12-23 months, Tamil Nadu, 2015, India. Indian J. Med. Res. [Internet]. India: Medknow Publications & Media Pvt Ltd; 2017;145:377–86. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC5555068/
8. Dubé E, Gagnon D, Nickels E, Jeram S, Schuster M. Mapping vaccine hesitancy—Country-specific characteristics of a global phenomenon. Vaccine [Internet]. Elsevier Science; 2014;32:6649–54. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC5355208/
9. Gopichandran V. Public trust in vaccination: an analytical framework. Indian J. Med. Ethics. 2017;2.
10. Opel DJ, Taylor JA, Zhou C, Catz S, Myaing M, Mangione-Smith R. The Relationship Between Parent Attitudes About Childhood Vaccines Survey Scores and Future Child Immunization Status: A Validation Study. JAMA Pediatr. [Internet]. 2013;167:1065–71. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4957941/
11. Larson HJ, Jarrett C, Schulz WS, Chaudhuri M, Zhou Y, Dube E, et al. Measuring vaccine hesitancy: The development of a survey tool. Vaccine. 2015;33:4165–75.
12. Oladejo O, Allen K, Amin A, Frew PM, Bednarczyk RA, Omer SB. Comparative analysis of the Parent Attitudes about Childhood Vaccines (PACV) short scale and the five categories of vaccine acceptance identified by Gust et al. Vaccine. Netherlands; 2016;34:4964–8.
13. Manthiram K, Blood EA, Kuppuswamy V, Martins Y, Narayan A, Burmeister K, et al. Predictors of optional immunization uptake in an urban south Indian population. Vaccine. Netherlands; 2014;32:3417–23.
14. Braka F, Asiimwe D, Soud F, Lewis RF, Makumbi I, Gust D. A qualitative analysis of vaccine safety perceptions and concerns among caretakers in Uganda. Matern. Child Health J. United States; 2012;16:1045–52.
15. Palanisamy B, Gopichandran V, Kosalram K. Social capital, trust in health information, and acceptance of Measles-Rubella vaccination campaign in Tamil Nadu: A case-control study. J. Postgrad. Med. India; 2018;
16. Manthiram K, Edwards K, Hassan A. Sustaining motivation to immunize. Hum. Vaccin. Immunother. [Internet]. Taylor & Francis; 2014;10:2930–4. Available from: https://doi.org/10.4161/hv.29871
17. Muhammed S, Nayar KR, Lal SS. Diphtheria deaths in Kerala: signs of an impending crisis. Econ. Polit. Wkly. [Internet]. 2015;50. Available from: http://ovidsp.ovid.com/ovidweb.gi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=cagh&AN=20153390463%5Cnhttp://oxfordsfx.hosted.exlibrisgroup.com/oxford?sid=OVID:caghdb&id=pmid:&id=doi:&issn=0012-9976&isbn=&volume=50&issue=43&spage=unpaginated&pages=unpaginated&date

ORIGINAL ARTICLE

Epidemiology of Ovarian Tumours in Northern India - A Tertiary Hospital based Study

Sonia Puri[1], Veenal Chadha[2], A K Pandey[3]

[1]Assistant Professor, [2]Demonstrator, [3]Prof and Head, Deptt Of Community Medicine GMCH-32, Chandigarh

Abstract

Introduction: Ovarian cancer is the leading cause of mortality of female gynaecological cancers and ranks seventh as the most common cancer worldwide. The increasing life expectancy has led to increase in its burden exponentially now even in developing countries but limited knowledge is there about the pattern of ovarian tumours. **Objective:** To determine the burden and describe the pattern of ovarian tumours in patients visiting GMCH. **Material and methods:** This epidemiological study is retrospective, descriptive hospital based study over five years. The data so collected was analysed using SPSS software. **Results:** Maximum number i.e 74(24.4%) of cases were in the age group of 50 to 59 years followed by 40 to 49 years. It is also seen that maximum number of cases i.e total of 65 registries were in the year 2013. Maximum number of cases were from the state of Haryana contributing to nearly 41% of total cases. Most of the cases could not be classified into four stages i.e they were categorized as unknown. Chemotherapy is the most commonly used treatment modality. Epithelial adenocarcinoma was the commonest histology subtype. **Conclusion:** Research should be aimed to find tools for screening and early diagnosis so that better therapeutic approaches can be designed to decrease the burden.

Key words: Ovarian cancer, Chemotherapy, Epidemiology

Introduction

Ovarian cancer is the seventh most common cancer worldwide (Age standardized mortality rate being 4.0/100,000). In USA, it accounts for just 2.5% of all female cancer cases, but leads to 5% of cancer deaths. This explains the low survival of the disease. In India, too female cancer cases, especially ovarian cancer figures are escalating. India shows dangerous data of having 3rd highest number of cancer cases among women after China and USA. Infact, India has the 2nd highest incidence of ovarian cancer globally. The increase in longevity has led to an increase in its incidence that accounts for the fact that 90% of cases of it are seen in postmenopausal age group i.e 55-64 years. However, these figures are just the tip of the iceberg, as they depict the registered cases only. And many cases are usually underdiagnosed and unreported.[1] The World Health Organization histological classification ovarian tumors separate ovarian neoplasms according to the most probable tissue of origin; surface epithelial (65%), germ cell (15%), sex cord-stromal (10%), metastasis (5%), miscellaneous. Surface epithelial tumors are further classified by cell type (serous, mucinous, endometroid etc) and atypia (benign,borderline [atypical proliferation, low malignant potential] or malignant; malignant may be invasive or non-invasive) most malignant tumors are surface epithelial (90%).

Though risk factors are evident but most ovarian cancer patients (60%) are diagnosed with distant-stage disease, for which 5-year survival is just 29%.[2] The major risk factor is the family history. Studies corroborate that risk of ovarian cancer is increased by about fourfold among women with a first-degree relative with a history of the disease and by about twofold for those with an affected second-degree relative. Approximately 20% of ovarian cancer cases, particularly high-grade serous tumors, are estimated to be due to inherited mutations that confer elevated risk, the majority from BRCA1 and BRCA2.[3]

The International Agency for Research on Cancer recently also concluded that excess body weight modestly increases the risk of developing epithelial ovarian cancer. Height is associated with elevated risk by about 7% for each additional 5 centimeters of adult height. This may be related to genetic and environmental factors including growth hormone exposure during early life. Cigarette smoking increases risk of mucinous ovarian cancer by about 80%[4] Physical inactivity is associated with about a 30% higher risk of epithelial ovarian cancer.[5,6,7] The

Address for Correspondence: *Dr. Sonia Puri, Assistant Professor, Deptt Of Community Medicine GMCH-32, Chandigarh.*
Email : soniagpuri@gmail.com,

Received: *20/10/2018* ***Accepted:****31/12/2018*

International Agency for Research on Cancer has found that perineal use of talc-based body powder increases the risk of ovarian cancer but evidence is limited .[8]

The hindrances for not diagnosing this tumor early are late presentation and ineffective screening modalities. The screening tests related to estimation of Ca-125 and TVS are nonspecific. Hence the disease is diagnosed in late stage with more chances of high mortality. These characteristics make this tumor a public health issue. Hence an understanding of epidemiologic factors is important for managing this menace. The present study is an effort to learn the burden, pattern and characteristics of ovarian carcinoma.

Material and methods

The present hospital based epidemiological study was carried out in a Government Tertiary Care Hospital of India.

Sample size: All the patients suspected of suffering from ovarian cancer, who were registered in hospital based cancer registry of GMCH in the study time period were enrolled.

Time Period: Four years (2011-2015)

Study type: Retrospective Descriptive Hospital Based Study.

All the patients so registered in GMCH were screened in different departments for their ailment and those found suspected of suffering from symptoms of cancer were sent for diagnostics to pathology department. After being diagnosed for any benign or malignant cancer, patients were referred to Radiotherapy department for treatment and further management. And those suffering from ovarian tumour were further sent to gynaecology (cervical, ovarian, uterine) department for management. The histology pattern report of these patients was collected from pathology department. The patients with ovarian tumours comprised our study sample. As per WHO standardized guidelines on patient information for Hospital based cancer registry, detailed information was taken. Information on sociodemographic profile, medical history, family history and previous treatment, if any, was obtained from the patient. But if the patient couldn't be contacted then information was retrieved from pathology, radiotherapy or medical records department of the hospital.

Ethical consideration: Subjects were explained the purpose of study and those who gave consent to participate in the study were interviewed to collect the desired information on the WHO (World Health Organization) designed cancer information leaflet. In case of respondents below 18 years of age, consent was taken from parents. Confidentiality of responses was assured as per Ethical guidelines of Helsinki.

Statistical analysis: The data was collected, compiled and analyzed using percentages, mean and median using SPSS.

Results

There were 7177 total malignancies from the year 2011 to 2015. Out of the total, 3370 and 3870 males and females respectively suffered from cancer. There were 1174 gynaecological malignancies encompassing 304 ovarian and 870 cervical along with endometroid carcinoma during the four year period.

Table 1: Age and Statewise distribution of ovarian cancer cases from 2011-2015

Age group	2011	2012	2013	2014	2015	Grand Total
10—19	2		3	1	1	7 (2.3%)
20—29	3	3	6	3	6	21(6.9%)
30—39	10	4	9	9	8	40(13.1%)
40—49	18	16	15	10	14	73(24.0%)
50—59	16	24	12	11	11	74(24.3%)
60—69	5	10	15	17	15	62 (20.3%)
70—79	6	4	4	4	2	22 (7.2%)
>=80	2		1		2	5 (1.6%)
State						
Haryana	20	24	24	24	31	123(40.5%)
Himachal Pradesh	4	5	2	1	3	15 (4.9%)
Madhya Pradesh		1				1 (0.3%)
New Delhi			1			1 (0.3%)
Punjab	17	13	26	22	19	97 (31.9%)
UT Chandigarh	16	6	7	4	3	36 (11.8%)
Uttar Pradesh	4	9	4	3	4	24(7.9%)
Uttrakhand	1	3	1	1	1	7 (2.3%)
Grand Total	62	61	65	55	61	304 (100%)

Table 1 shows age group wise distribution of ovarian cancer patients from the year 2011 to 2015. Maximum number i.e 74 (24.4%) of cases were in the age group of 50 to 59 years followed by 40 to 49 years 73(24.0%). It is also seen that maximum number of cases i.e total of 65 registries were in the year 2013. This table also shows state wise distribution of ovarian cancer patients from the year 2011 to 2015. Maximum number of cases were from the state of Haryana 123(40.5%). Also there was increase in the number of cases with every passing year. Second highest number of cases were from Punjab 97(31.9%) followed by Union territory (UT) Chandigarh36(11.8%). Least number of ovarian cancer cases were from the states

of Madhya Pradesh and Delhi.

Table 2: Stage and treatment wise distribution of ovarian cancer cases from 2011-2015

Stage wise (FIGO)	2011	2012	2013	2014	2015	Grand Total (%)	Mean age (years)	Median age (years)
Stage 1	4	9	8	4	2	27(8.9)	44.51	47
Stage 2	2	4	5	7	4	22(7.2)	52.36	52.5
Stage 3	14	15	20	11	14	74(24.3)	51.09	51
Stage 4	5	19	12	12	13	61(20.1)	48.72	50
Unknown	37	14	20	21	28	120(39.5)	49.39	50
Grand Total	**62**	**61**	**65**	**55**	**61**	**304**		
Treatment status	**2011**	**2012**	**2013**	**2014**	**2015**	**Grand Total**		
No treatment	14	19	23	26	33	115(37.8%)		
Chemotherapy (C)	44	29	33	23	27	156(51.3%)		
R+C	1	6	6	4	1	18(5.9%)		
Radiotherapy (R)	3	4	1	-	-	8(2.6%)		
S+C		3	-	-	-	3(0.98%)		
Surgery (S)			2	2		4(1.3%)		
Grand Total	**62**	**61**	**65**	**55**	**61**	**304(100%)**		
Histology types								
Clear Cell	2	1	1	1	-	5(1.6%)		
Epithelial	26	29	24	27	29	135(44.4%)		
Mucinous	3	6	4	3	2	18(5.9%)		
Others	21	17	22	14	23	97(31.9%)		
Serous	10	8	14	10	7	49(16.1%)		
Grand Total	**62**	**61**	**65**	**55**	**61**	**304(**100%)		

Table 2 shows stage wise distribution of ovarian cancer patients from the year 2011 to 2015 as per hospital based cancer registry data at GMCH, Chandigarh. FIGO stage of ovarian malignancy, histopathological type and management were studied. Most of the cases could not be classified into four stages hence were categorized as unknown 120(39.5%). Second most common stage of this cancer was Stage III 74 (24.3 %). Among the treatment modalities chemotherapy was the most commonly used 156(51.3%). Only few patients were put to surgical treatment and surgical treatment along with chemotherapy 3(0.9%). Epithelial adenocarcinoma was commonest histology subtype and was seen in 135 cases (44.4%) followed by others 97 (31.9%), serous carcinoma 49 (16.1%), mucinous carcinoma 18(5.9%) and clear cell carcinoma 5 (1.6%). Patient's mean age at diagnosis of ovarian malignancy was 52.1±8.96 years (median=52 years). The mean age at diagnosis for Stage I was 44.51 years (median=47 years), for Stage II 52.36 years (median= 52.5 years), 51.09 years (median=51 years) for Stage III, and 48.72 years (median=50 years) for Stage IV .

Discussion

In our study, the proportion of ovarian malignancy cases was 26% of all gynaecological malignancies during four year period. The proportion of epithelial ovarian carcinoma (EOC) among all ovarian cancer types comprised 44% . Se Ik Kim et al reported histologic subtype in 90% cases as EOC.[9] Basu et al reported 80% EOC among all ovarian malignancies while in study by Yogambal et al epithelial tumors were seen in 71.6% cases.[10,11] Mondal et al reported EOC in 60.9% cases.[12]

In our study in almost all the years similar number of cases were found to be reported. This was in contrast to various studies in that reported increasing trends in ovarian cancer over the years.[13,14-16] Murthy et al reported mean annual percent increase of ovarian cancer in India ranging from 0.7-2.4% in different age groups.[13] This increasing trend may

reflect increased exposure to risk factors or due to increased awareness and increase in proportion of elderly women.

Age has a strong corelation to ovarian cancer risk and 80% cases are diagnosed after 50 years of age.[14] Advancing age increased the possibility of malignant transformation. Murthi et al reported that the disease increases from 35 years of age and reaches a peak between the ages 55-64 years.[13] In their study, the mean age at diagnosis reported varied between 52.2 to 59.5 years. Saini et al in their study reported median age as 55years with mean age of 55.98±9.24 years.[17] Basu et al reported mean age as 48.8±11.2 years.[10] Another study in India by Mondal et al reported median age of 48 years at diagnosis and maximum incidence of 44.3% in age group of 41-50 years.[12] Doufekas K reported mean age at diagnosis to be 63 years in UK.[14] An epidemiologic risk prediction model By K li reported median age of EOC in various countries as 52.4 years.[15] In our study too the mean age at diagnosis was 52.1±8.96 years (median=52). It was also found that the mean age increased in relation to stage of EOC at diagnosis from 44±9.53 years in stage1 to 55.35±9.74 years in stage IV. Similar findings were evident in a study by Saini et al with mean age of 52.67±8.04 in stage1 to 58.30±8.48 years in stage 4.[17]

In a limited resource setting, ovarian malignancy screening program may be restricted to age group above 45 years, being at high risk. The disease is diagnosed in late stages as there is delay between onset of symptoms and diagnosis. Doufekas and Olaitan reported that 60% cases were diagnosed in stage III and IV.[14] In our study, 24% patients were in stage III and 20% were in stage IV. In study by Saini et al 20.8% cases were in stage II, 47.85% in stage III and 16.56% in stage IV.[17] Mondal et al also reported 20% cases in stage II and 60% in stage III while Basu et al reported 80% patients in stage III/IV at diagnosis.[10,12,14]

Determination of histology pattern is useful in diagnosis, treatment and prognosis in EOC.[9,11] Endometroid carcinoma is identified at early stage and being chemosensitive is associated with better prognosis. Clear cell carcinoma when identified at early stage has good prognosis but in later stage has worse prognosis in comparison to serous carcinoma as it is less sensitive to platinum based chemotherapy.[9] There is increase in clear cell carcinoma which is related to increased incidence of endometriosis while mucinous carcinoma is related to cigarette smoking.[9] Doufekas K et al reported serous subtype in one third cases.[14] Its malignant potential is highest, spread is faster but response to chemotherapy is good. In our study 16.1% cases were serous carcinoma. Histopathological grading is also related to patient survival. Basu et al reported tumors to be well differentiated in 27%, moderately differentiated in 48% and poor differentiation in 25% cases while in our study only 7% were well differentiated, 42% had moderate differentiation and 51% poor differentiation.[10]

The standard management of ovarian tumor consists of surgical staging with optimal cytoreduction followed by a platinum based chemotherapy as per stage of tumor. In present study, 1.3% patients were treated with surgery i.e. Total Abdominal Hysterectomy (TAH) with Bilateral Salpingo Oophrectomy (BSO) with infracolic omentectomy, followed by chemotherapy. 20% patients were given Neo adjuvant chemotherapy (NACT), surgery and postoperative chemotherapy. 51% cases received palliative chemotherapy. There is improvement in survival rates in early stage disease due to advancement in chemotherapy and surgery but unfortunately majority of the patients report in late stage. According to Basu et al optimal debulking could be done in only 20.3% cases due to advanced disease stage. Stage IV patients were not treated with surgery in his study.[10]

Conclusion and Recommendations

Epithelial ovarian cancer has emerged as one of the commonest malignancy affecting women in India. A steady increase has been observed in the incidence of ovarian cancer in several registries. EOC is disease of fifth decade and above age group. Its diagnosis is done in advanced stage with poor survival. Efforts should be made to detect the disease at early stage through population education with respect to epidemiological factors. Currently, a major goal of ovarian cancer research is to develop an effective test that can detect the disease at its earliest stages, which would ultimately result in decreased mortality. Increased knowledge of ovarian cancer etiology and pathogenesis would greatly enhance the development of this tool.

Another approach that can improve diagnosis of epithelial ovarian cancer is to educate primary care physician about ovarian cancer and to include it in differential diagnosis in the specific patient population. Further studies are needed to elicit the causative factors responsible for the increase in the incidence of the disease and also their mechanism of action. Most ovarian cancers are environmental in origin and therefore in principle preventable. It is suggested that in low resource settings like India, an epidemiological study should be done to find effect of screening programs using relatively easy available imaging modality (USG) on diagnosis in ovarian cancer risk age group patients with vague gastric symptoms. Research should be aimed to find tools for screening and early diagnosis so that better therapeutic approaches can be designed to decrease the burden.

Source of Funding: Nil

Conflict of Interest : Nil

References

1. SEER*Stat Database: NAACCR Incidence Data – CiNA AnalyticFile, 1995-2014, for Expanded Races, Custom File With County, ACS Facts and Figures projection Project December 2016.
2. Howlader N, Noone AM, Krapcho M, Miller D, Bishop K, Kosary CL. SEER Cancer Statistics Review, 1975-2014, National Cancer Institute. Bethesda, MD. Available from https://seer.cancer.gov/csr/1975_2014. [Last accessed on May 3,2018]
3. Whittemore AS, Harris R, Itnyre J. Characteristics relating to ovarian cancer risk: studies. II. Invasive epithelial ovarian cancers in white women. Collaborative Ovarian Cancer Group. Am J Epidemiol. 1992;136: 1184-1203.
4. Collaborative Group on Epidemiological Studies of OvarianCancer, Beral V, Gaitskell K, et al. Ovarian cancer and smoking:individual participant meta-analysis including 28,114 women with ovarian cancer from 51 epidemiological studies. Lancet Oncol.2012;13: 946-956.
5. World Cancer Research Fund / American Institute for Cancer Research. Continuous Update Project Report. Food, Nutrition, Physical Activity, and the Prevention of Ovarian Cancer 2014. Available from http://www.dietandcancerreport.org/cup/cup_resources.php. [Last accessed on May 3, 2018]
6. Crane TE, Khulpateea BR, Alberts DS, Basen-Engquist K, Thomson CA. Dietary intake and ovarian cancer risk: a systematic review. Cancer Epidemiol Biomarkers Prev. 2014;23: 255-273.
7. Cannioto R, LaMonte MJ, Risch HA, et al. Chronic recreational physical inactivity and epithelial ovarian cancer risk: evidence from the Ovarian Cancer Association Consortium. Cancer Epidemiol Biomarkers Prev. 2016;25: 1114-1124.
8. Houghton SC, Reeves KW, Hankinson SE, et al. Perineal powder use and risk of ovarian cancer. J Natl Cancer Inst. 2014;106.
9. Kim SI, Lim MC, Lim J, Won YJ, Soo S, Kang SS, et al. Incidence of epithelial ovarian cancer according tohistologic subtypes in Korea. 1999 to 2012. J Gynecol Oncol. 2016;27(1):5.
10. Basu P, De P, Mandal S, Ray K, Biswas J. Study of 'patterns of care' of ovarian cancer patients in a specialized cancer institute in Kolkata, eastern India. Indian J Cancer. 2009;46:28-33.
11. Yogambal M, Arunalatha P, Chandramouleeswari K,Palaniappan V. Ovarian tumours- Incidence anddistribution in a tertiary referral center in south India.IOSR. 2014;13(2):74-80.
12. Mondal SK, Banyopadhyay R, Nag DR,Roychowdhury S, Mondal PK, Sinha SK. Histologic pattern, bilaterality and clinical evaluation of 957ovarian neoplasms: A 10-year study in a tertiary hospital of eastern India. J Can Res Ther. 2011;7:4337.
13. Murthy NS, Shalini S, Suman G, Pruthvish S, MathewA. Changing Trends in Incidence of Ovarian Cancer the Indian Scenario. Asian Pacific J Cancer Prev2009;10:1025-30.
14. Doufekas K, Olaitan A. Clinical epidemiology ofepithelial ovarian cancer in the UK. InternationalJournal of Women's Health 2014:6 537-45.
15. Li K, Husing A, Fortner R, Tjønneland A, Hansen L, Dossus L, et al. An epidemiologic risk prediction model for ovarian cancer in Europe: the EPIC study. British J Cancer. 2015;112:1257-65.
16. McLemore M R, Miaskowski C, Bradley E. Chen L M, Dodd M J. Epidemiologic and Genetic Factors Associatedwith Ovarian Cancer Cancer Nurs. 2009; 32(4):28190.
17. Saini SK, Shrivastava S, Singh Y, Dixit AK, Prasad SN. Epidemiology of epithelial ovarian cancer, a single institution based study in India. Clin Cancer Investig J. 2016;5:20-4.

ORIGINAL ARTICLE

Shared Risk Factors of Non-Communicable Diseases: A Community based Study among Adults in an Urban Resettlement Colony of Delhi

Anshu Singh[1], Anita Shankar Acharya[2], Balraj Dhiman[3]

[1]Assistant Professor, Department Of Community Medicine School Of Medical Sciences And Research, Greater Noida, [2]Professor, [3]Director Professor, Department Of Community Medicine Lady Hardinge Medical College, Delhi

Abstract

Introduction: As urbanisation is increasing, the problem of communicable as well as non-communicable diseases (NCDs) is also increasing. Hypertension, diabetes, obesity, cardiovascular diseases constitute most of the NCDs whose risk factors are almost similar. They could be modifiable like physical activity, waist circumference, diet, smoking, alcohol intake .**Objective:** To study the magnitude of shared risk factors for Non-communicable diseases in adults of an urban resettlement colony of Delhi. **Material and Methods:** A cross sectional survey was conducted on adults >30 years (n=580) in both genders in an urban resettlement colony of Delhi in 2014. A Semi-structured interview schedule consisting of Socio-demographic characteristics, risk factor profile was used. Data was entered and analyzed in SPSS 12 **Results:** Out of the total 580 subjects (313)53.96% were women and 267(46.03%) were men. Majority 405(69.8%) of the study subjects were taking inadequate fruits and vegetables (<5 times/day) and 212 (36.6%) were taking >5 gm salt per day. About 181(31.2%) of the study subjects were sedentary workers, the proportion was more among women 99(31.6%). 223(83.5%) men had waist circumference within normal limits whereas 178 (56.9%) women had waist circumference more than 88 cm. One in four men were smokers. Nearly 49(18.4 %) of the men were current tobacco chewers as compared to 17(1.6%) of women. Only 33 (12.4%) men were currently consuming alcohol. Results of multiple logistic regression showed increasing age, education and marital status as significant socio demographic factors for increased prevalence of risk factors for NCDs. **Conclusion:** Promotion of lifestyle change to address these risk factors that can be modified including weight reduction, increased physical activity and healthy eating should be encouraged along with changing of behavioural factors like quitting smoking and alcohol.
Keywords: NCDs, Adults, Diabetes mellitus, Hypertension, Risk factors, Delhi.

Introduction

As the world is moving in 21st century and in the next phase of urbanisation and development, the problem of communicable as well as non-communicable diseases (NCDs) is also increasing day by day. NCDs are a group of gradually progressing, largely preventable diseases of long duration that are responsible for various morbidities and mortality. NCDs like cardiovascular diseases, cancers, diabetes and chronic respiratory diseases are currently the leading causes of death and disability globally. In India, NCDs were responsible for 53 per cent of deaths and 44 percent of disability.[1] They cause an estimated 8.5 million deaths each year in South East Asia region, with half of these deaths being premature and among productive citizens aged 30-70 years. In India, nearly 38% of the population stays in urban areas whose lifestyle and dietary changes are side effects of being in urban areas.[2] Hypertension, diabetes, obesity, cardiovascular diseases constitutes most of the NCDs who share common risk factors either modifiable like physical activity, waist circumference or non- modifiable such as increasing age or family history. The diagnosis,treatment and management of disease as well as its complications are life threatening and expensive but at the same time, are preventable if taken into account at the right time .The premature deaths and disability can be decreased through implementation of cost effective, affordable and proven health policies that enable and promote healthier life style.

Address for Correspondence: *Dr Anshu Singh,Department Of Community Medicine School Of Medical Sciences And Research, Greater Noida,* **Email:** simplyanshu07@gmail.com
Received: *29/09/2018,* ***Accepted:****22/12/2018*

Objective

To study the magnitude of shared risk factors for Non-communicable diseases in adults of an urban resettlement colony of Delhi.

Material and Methods

The present community based cross sectional study was conducted in an urban resettlement colony of East Delhi, Kalyanpuri to assess the common risk factors of Non-communicable diseases in an adult population (>30years) during January 2014 to December 2014. Both government and private health care agencies cater to the health care needs of the residents. Using the prevalence of obesity in the study done in north with same settings, the sample size size came was 566.[19] Kalyanpuri, an urban resettlement colony had total 11blocks numbering 11 to 21. Out of these, 5 blocks i.e. block 11, 12, 16, 18, 20 were selected using simple random sampling. Proportionate numbers of houses were identified by Population proportional to size sampling in each block. Permanent residents of Kalyanpuri (residing >1year) were included and 586 subjects gave consent to participate in the study. Six subjects were excluded as they were pregnant. Thereby, the final sample size was 580.

Information regarding shared risk factors for Non-communicable diseases was obtained from study subjects using a Semi-structured interview schedule consisting of

a) Socio-demographic characteristics: Age, gender, marital status, education, occupation, religion, family type and total family income. Socio economic status was calculated by modified Kuppuswamyscale.

b) Risk factor profile: The shared risk factors for Non-communicable diseases are physical inactivity, unhealthy diet, smoking, alcohol use, stress etc. A detailed interview was taken to assess the various risk factors of for Non-communicable diseases:

- Physical activity was measured using GPAQ (Global Physical Activity Questionnaire) by WHO.
- Dietary assessment was done by collecting information regarding intake of fruits and vegetables, dietary fibre, oil intake, salt intake, junk food items.
- Addiction habits regarding smoking, alcohol, substance use were enquired.
- Stress was assessed using General Health Questionnaire 12 (GHQ 12).

***Data analysis*:** Data was entered and analyzed in SPSS version 12. Continuous data was expressed as mean, median, standard deviation, and 95% CI was used. The categorical data was expressed as percentage/proportions and where ever applicable $\chi 2$ and analysis of variance (ANOVA) after check of normality by Kolmogorov Smirnov were used. Multivariable logistic regression models were constructed relating the significant factors with socio demographic factors. A p value of less than 0.05 was taken as statistically significant.

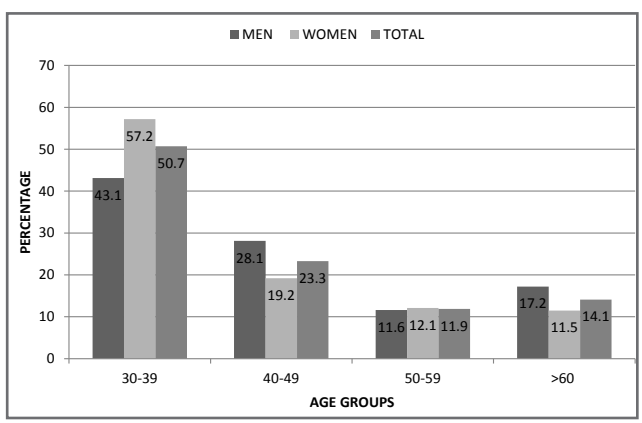
Ethical Issues

Approval was taken from Institutional (Lady Hardinge Medical College) Ethical Committee. A written consent was taken from each study subject. Those who were illiterate, thumb impressions were taken in front of a witness. All information collected was kept confidential. All the study subjects who were found with risk factors were referred to a secondary level hospital/Tertiary level hospital for their further workup.

Results

The present study was conducted in Kalyanpuri, an urban resettlement colony of Delhi. A total of 580 study subjects were recruited. Figure1 shows the age group of the study subjects. The overall mean age was 43.38 (±11.26) years with a range 30-75 years. The mean age was 44.98 (±10.89) years and 42.01(±11.40) years for men and women respectively. Out of the total 580 subjects 53.96% were women and 46.03% were men. Nearly three -fourths of the study subjects belonged to 30-49 age group as seen in figure 1. Table 1 represents the dietary risk factors where majority (69.8%) of the study subjects were taking inadequate fruits and vegetables (<5 times/day) which was almost similar for both men and women. Majority (91.7%) of the study subjects were taking <25 gm /day of saturated fats/oils which was almost similar across gender. Nearly 27% of the subjects were taking >5 gm of salt per day. Table 2 represents the distribution according to physical activity and waist circumference. Majority of the study subjects were moderate workers (62.9%) and about 31.2% of the study subjects were sedentary workers and the proportion was similar among both the gender. Only few 34 (5.9%) were heavy workers, men (7.1%) slightly more than

Fig 1: Distribution of study subjects according to age



women (4.8%). The overall mean waist circumference was 85.48cm (±7.680) with a range of 67-153cm. It was 84.89 cm (±6.47) and 85.98 cm (±8.55) for men and women respectively. More than half of the women 178 (56.9%) had waist circumference more than 88 cm. Majority of the men (83.5%) had waist circumference within normal limits. Table 1 shows the consumption of tobacco, smoking and alcohol. Majority 303(96.81%) women were non-smokers but one in four men were smokers.18.4 % of the men were current tobacco chewers as compared to 1.6% of women. Only 33 (12.4%) men were currently consuming alcohol whereas none of the women were currently taking alcohol. Chi-square test showed the significant association between per capita salt consumption/day, behavioural risk factors and waist circumference.

Table 1: Distribution of dietary and behavioural factors among study subjects

Dietary Factors		Gender			χ2, df, p value
		Men (n=267)	Women (n=313)	Total (N=580)	
		N (%)	N (%)	N (%)	
Consumption of fruits and vegetables/day	<5 times/day	185(69.3)	220(70.3)	405(69.8)	0.068 1 0.7939
	>=5times/day	82(30.7)	93(29.7)	175(30.2)	
Per capita/ fat/oil consumption/ day	<25gm/day	246(92.1)	286(91.4)	532(91.7)	0.110 1 0.7402
	>=25gm/day	21(7.9)	27(8.6)	48(8.3)	
Per capita salt consumption/ day	<5gm/day	211(79.0)	215(68.6)	426(73.4)	0.005 1 7.893
	>=5gm/day	56(21.0)	98(31.3)	154(26.6)	
Behaviorial Risk Factors					
Smoking	Ex –smoker	58(21.7)	8(2.6)	66(11.4)	159.10 1 0.001
	Current smoker	70(26.2)	2(0.6)	72(12.4)	
	Non smoker	139(52.1)	303(96.8)	442(76.2)	
Smoke-less Tobacco	Ex tobacco chewer	17(6.4)	3(1.0)	20(3.4)	63.58 1 0.0001
	Current tobacco chewer	49(18.4)	5(1.6)	54(9.3)	
	Non tobacco chewer	201(75.3)	305(97.4)	506(87.2)	
Alcohol	Past use of alcohol	35(13.1)	3(1.0)	38(6.6)	78.30 1 0.001
	Current use of alcohol	33(12.4)	0(0)	33(5.7)	
	Never used alcohol	199(74.5)	310(99)	509(87.8)	

Table 2: Distribution of study subjects according to physical activity, BMI and Blood pressure .

Physical Activity		Gender			χ2, df, p value
		Men (n=267)	Women (n=313)	Total (N=580)	
		N (%)	N (%)	N (%)	
Sedentary worker		82(30.7)	99(31.6)	181(31.2)	1.410 1 0.2351
Moderate worker		166(62.2)	199(63.6)	365(62.9)	
Heavy worker		19(7.1)	15(4.8)	34(5.9)	
Waist Circumference*					
No Risk		223(83.5)	135(43.1)	358(61.7)	99.492 1 0.0001
Risk Present		44(16.5)	178(56.9)	222(38.27)	
BMI					
Underweight	<18.5	0(0)	5(1.6)	5(0.8)	1.121 1 0.2897
Normal	18.5-24.9	224(83.9)	247(78.9)	471(81.2)	
Overweight	25-29.9	38(14.2)	37(11.8)	75(12.9)	
Obese	>=30	5(1.9)	24(7.7)	29(5.0)	
Blood Pressure					
Normal		149(55.8)	167(53.3)	316(54.4)	0.349 1 0.5547
Pre-hypertensive		41(15.3)	54(17.2)	95(16.4)	
Hypertensive stage I		53(19.8)	67(21.4)	120(20.6)	
Hypertensive stage II		24(8.9)	25(7.9)	49(8.4)	

**male > 90cm ,females> 80 cm : risk present*

Table 3: Association of systolic and diastolic blood pressure with age

Blood pressure	Gender	Age	Mean ± SD	F	P value
Systolic blood pressure	**Male**	30-39	112±10	13.962	<0.0001
		40-49	116±10		
		50-59	126± 15		
		>60	119± 11		
	Female	30-39	114± 10	19.42	<0.001
		40-49	135± 13		
		50-59	126± 15		
		>60	121± 17		
Diastolic blood pressure	**Male**	30-39	74± 7	4.73	0.003
		40-49	75± 7		
		50-59	80± 9		
		>60	77± 9		
	Female	30-39	73± 7	6.27	<0.0001
		40-49	77± 8		
		50-59	79± 10		
		>60	78± 10		

Comparison of systolic and diastolic BP with ANOVA among different age groups is shown in Table 3. The mean systolic and diastolic BP increased with age in both sexes. At 30-39 and 50-59 age group mean systolic BP was significantly higher in male ($P < 0.001$ in both age group), but at >60 years age group, it was only significant in females. Mean diastolic BP at 30-39 age group in female significantly higher than male ($P < 0.001$), but there was no significant difference between both gender at other age groups. Results of multiple logistic regression analyses are shown in Table 4. Increasing age, education and marital status were found to be significant socio demographic factors for increased prevalence of risk factors for NCDs.

Discussion

The common risk factors for Non-Communicable Diseases are tobacco use, unhealthy diet, physical inactivity and excess adiposity. This study showed high prevalence of these risk factors in the community.

Majority 405 (69.8 %) of the study subjects did not consume the recommended intake of fruits and vegetables that is at least five servings of fruits and vegetables per day, which was similar for both men and women .These findings

Table 4: Multiple logistic regression for associated risk factors for NCDs

	Waist Circumference		Smoking		Amount of Salt Per Day	
Socio demographic variables	Prevalence %	OR(95% CI)	Prevalence %	OR(95% CI)	Prevalence %	OR(95% CI)
Age groups						
30-39	8.6	Referent	2.4	Referent	14.5	Referent
40-49	32.8	4.41(3.87-6.42) *	35.8	1.72(0.78-2.45)	36.2	4.67(3.56-5.28) *
50-59	28.7	3.81(2.44-4.78) *	24.6	1.23(1.06-1.67) *	33.8	3.42(2.55-4.78) *
>60	22.6	2.78(1.65-3.02) *	19.3	0.87(0.67-1.21)	25.6	2.43(1.98-3.66) *
Marital Status						
Married	64	Referent	18	Referent	35	Referent
Widowed Separated Unmarried	19	0.56(0.35-0.88) *	24	1.01(0.67-1.86)	28	2.56(1.79-3.46) *
Occupation						
Unemployed/ Homemakers	43	Referent	38	Referent	28	Referent
Employed	28	1.67(0.87-2.33)	33	3.21(2.54-4.22) *	17	1.43(0.53-2.00)
Education						
<5th	38	Referent	26	Referent	35	Referent
>5th	44	0.50 (0.42-0.60)*	18	1.71 (1.49-1.96)*	25	0.90 (0.36-2.26)
Type of family						
Joint	15	Referent	13	Referent	21	Referent
Nuclear	43	1.84 (1.57-2.26)*	35	1.45(1.11-2.32)*	32	0.78(0.22-2.34)

OR= odds ratio,*P<0.05

are supported by other studies conducted in India[7,12,14,16,23] and globally.[13,15,24]

Majority (93.7 %) of the study subjects did not report any family history of diabetes and hypertension. These observations are similar to that conducted by Anand et al, Sadeghi et al and Gupta et al.[11,13,14] Few Indian studies conducted by Revathi et al and Mohan et al in Kerala and Tamil Nadu reported a higher prevalence of family history of diabetes.[6,16] This may be due to the fact that the study subjects lacked awareness regarding family history of diabetes. Only 7.2% of the study population, including 8.9% of women and 5.2% of men, reported to be under stress close to the findings of Laskar et al as assessed with General Health Questionnaire-12.[12]

Physical activity was assessed by Global Physical Activity Questionnaire (GPAQ). Almost 3 out of 10 study subjects were sedentary workers which was similar across gender. This is similar to findings of Prabhakaran et al.[12] Majority (62.9%) of the study population was engaged in moderate physical activity which was similar among both males and females while only 5.9% were heavy workers. The findings of our study were concordant to that of Ketkar et al and Gupta et al.[5,14] Sedentary life style was also reported in studies by Deepa(>50% in both men and women) and Anand(23.2% of men, 52.4% of women).[8,11] Laskar et al reported moderate physical activity in around 21 % study subjects while Shah et al found that 42% subjects were engaged in moderate physical activity.[12,23]

Although majority of women in our study were homemakers they were engaged in moderate physical activity doing all the household chores themselves. Overall the level of physical activity was found to be high in our study population. This is a very encouraging finding in our study and must be promoted at all levels.

In the present study, tobacco consumption was observed to be much less (12.7%) unlike other studies done in various parts of India where this number was almost double.[6,7,11,15,17]

In our study 52% men and 96% women were non-smokers which is similar to other studies but still it is almost double the number reported by Anand et al.[8,11]

Alcohol consumption was seen in 21% of men while in other studies, 32% and 28% of men and women were consuming alcohol respectively in studies by Deepa et al & Gupta et al.[8, 14] This might be due to social stigma leading to under-reporting by the study subjects.

Based on the WHO cut-offs, 18% subjects were in pre-obese or obese category similar to that reported by other authors while few authors also reported higher prevalence of obesity in their studies.[4,5,6,16,18,20,22]Majority (81.2%) of the study subjects had normal weight which was similar across gender. The overall mean BMI was 23.79 (±3.03) kg/m^2 and it was almost same among both the genders while in studies done by Laskar, Ravikumar and Shah mean BMI among women was higher than men.[12,19,23] One hundred and seventy eight (56.9%) women had waist circumference more than 85 cm and 44(16.5%) men had waist circumference >90 cm. These findings were similar to that reported by Gupta et al and F Asgari et al.[14,24]

A concern in our study sample was the proportion of participants with sub optimal blood pressure. Nearly 44.2% of the participants had high blood pressure (>120/80 mmHg). About 15.3% and 28.7% of the participants had pre-hypertension and hypertension respectively that is increasing with advancing age. The findings of our study are concordant to those reported by Bhalerao.[9] However Ketkar conducted a study in workplace and reported higher prevalence of pre-hypertensives (61.5%).[5] More than half (54.4%) of the study subjects had normal blood pressure which was similar across gender. Increasing age,education and marital status were found to be significant socio demographic factors for increased prevalence of risk factors for diabetes.

Conclusion

In this community based study we have found a high prevalence of risk factors for NCDs which warrants for immediate concerted action. Promotion of lifestyle change to address these risk factors as weight reduction, increased physical activity and healthy eating should be encouraged. Population based screening for common risk factors for all non-communicable diseases needs to be started in this community with regular follow up and action. In view of the high burden of risk factors in this community, it is recommended to start an NCD clinic at Urban health centre Kalyanpuri so that screening of all adults can be done along with health education of the community.

Source of Funding: Nil

Conflict of Interest : Nil

References

1. Mortality and burden of disease estimates for WHO Member States in 2004. Geneva: World Health Organization; 2010.
2. Census of India, 2011.Available at http://censusindia.gov.in/date[Accesed on 28- 09-176]
3. World Health Organization. WHO STEPS surveillance manual:The WHO STEPwise approach to chronic disease risk factorsurveillance. Geneva: World Health Organization; 2005.
4. Lopez AD, Mathers CD: Measuring the global burden of diseaseand epidemiological transitions: 2002–2030. Ann Trop Med Parasitol2006, 100(5–6):481-499
5. Ketkar AR,Veluswamy SK, Prabhu N, Maiya AG. Screening for non communicable disease risk factors at a workplace in India: A physiotherapy initiative in a healthcare setting. Physiotherapy journal, 2015; 33(1): 3-9.
6. Revathi R, Logaraj M, John KR, Sathiyothan K. A community based cross-sectional study on factors associated with diabetes mellitus in an urban area in Tamil Nadu. The Health Agenda.2014; 2(3): 1-4.
7. Bhagyalaxmi A, Atul T, and Jain S. Prevalence of Risk Factors of Non-communicable Diseases in a District of Gujarat. India.J Health PopulNutr. 2013; 31(1): 78–85.
8. Deepa M, Pradeepa R, Mohan V. Noncommunicable Diseases Risk Factor Surveillance: Experience and Challenge from India. Indian J Community Med. 2011; 36(Suppl1): S50–6.
9. Bhalerao SD, Somannavar M, Verneka S, Ravishanka R, Goudar SS. Risk factors for type 2 diabetes mellitus in rural population of north Karnataka: a community-based cross-sectional study. Internatioanl Journal Of Pharma Med And Biological Science.2014; 3(1):1-14.
10. Shirani S, Poormoghadas M, KelishadiR,Baghaii A, Sarraf-Zadegan N: Diabetes and associated cardiovascularrisk factors in Iran: the Isfahan Healthy Heart Programme.
11. Anand K, Shah B, Gupta V, Khaparde K, Pau E, Menon GR et al. Risk factors for non-communicable disease in urban Haryana: a study using the STEPS approach. Indian Heart J. 2008; 60(1): 9-18.
12. Laskar A, Sharma N, Bhagat N. Lifestyle Disease Risk Factors in a North Indian Community in Delhi . Indian J Community Med 2010; 35(3):54-9. 8.
13. Sadeghi M, Roohafza H, Ann Acad Med Singapore 2007, 36(3):175-180. 9. Sadeghi M, Roohafza HR, Kelishadi R: Blood pressure and associated cardiovascular risk factors in Iran: Isfahan Healthy Heart Programme. Med J Malaysia 2004, 59(4):460-467.
14. Gupta R, Rastogi P, Sarna M, Gupta VP, Sharma SK, Kothari K. Body-mass index, waist-size, waist-hip ratio and cardiovascular risk factors in urban subjects. J Assoc Physicians India 2007; 55 : 621-7.
15. Galal O: Nutrition-related health patterns in the Middle East.Asia Pac J ClinNutr2003, 12(3):337-343.
16. Mohan V, Deepa M, Farooq S, Prabhakaran D, Reddy KS.Surveillance for risk factors of cardiovascular disease among an industrial population in southern India.Natl Med J India 2008; 21 : 8-13.
17. Prabhakaran D, Shah P, Chaturvedi V, Ramakrishnan L,Manhapra A, Reddy KS. Cardiovascular risk factor prevalence among men in a large industry of northern India.Natl Med JIndia 2005; 18 : 59-65.
18. Report of the ICMR – WHO study on assessment of burdenof non-communicable diseases. New Delhi: Indian Council of Medical Research; 2006.
19. Ravikumar P, Bhansali A, Ravikiran M, Bhansali S, Walia R, Shanmugasundar G, Prevalence and risk factors of diabetes in a community-based study in North India: The Chandigarh Urban Diabetes Study (CUDS). Diabetes & Metabolism .2011; 37: 216–21.
20. Mishra A, Pandey RM, Devi JR, R Sharma, Vikram NK and Khanna N. High prevalence of diabetes, obesity and dyslipidaemia in urban slum population in northern India. International Journal of Obesity and Related Metabolic Disorders. Journal of the International Association for the Study of Obesity 2001, 25(11):1722-1729.
21. Sugathan TN, Soman CR, Sankaranarayanan K. Behavioural risk factors for non-communicable diseases among adults in Kerala, India. Indian J Med Res 2008; 127 : 555-63.

22. Raghavendra AH, Chabra P, Sharma AK, MadhuSV Prevalence of diabetes mellitus in an urbanized village of east delhi.. National Journal Of Community Medicine.volume7,issue 4,apr 2016,302-306.
23. Shah B, Mathur P. Surveillance of cardiovascular disease risk factors in India: The need & scope. Indian J Med Res 2010;132: 634-642
24. F Asgari, H Aghajani, M Haghazali, H Heidarian. Non-Communicable Diseases Risk Factors Surveillance in Iran. Iranian J Publ Health 2009 (38):.119-122.

ORIGINAL ARTICLE

Depression and its Correlates among Geriatric People: A Community Based Study from Southern Haryana, India

Suraj Chawla[1], Neeraj Gour[1],Pawan Kumar Goel[2], Ravi Rohilla[3]

[1]Associate Professor, [2]Professor, Department of Community Medicine, SHKM Govt. Medical College, Nalhar, Haryana, [3]Assistant Professor, Department of Community Medicine, Govt. Medical College & Hospital, Chandigarh

Abstract

Introduction: On account of improved life expectancy, better education and health facilities in India, the proportion of the geriatric population has gone up. In India, prevalence of depression estimated to be 4.5% in the year 2015, which affects about 57 million people. **Objective:** To determine the prevalence of depression and its epidemiological correlates among geriatric people residing in southern Haryana, India. **Material and Methods:** This community based study with cross-sectional design was conducted in rural and urban field practice areas of department of Community Medicine. Geriatric people were contacted by investigators through house to house visit. Study subjects were screened for depression by using standard shorter version Geriatric Depression Scale (GDS-15). Pearson's Chi-square test was used for categorical variables. Stepwise multiple logistic regression was used to find out an independent factors associated with depression. **Result:** A total of 308 elderly persons belonging to rural and urban areas participated in our study. Prevalence of depression (GDS score >5) among the elderly population in the present study was found to be 22.72% (95% CI: 18.2-27.8). **Conclusion:** Present study depicted that every fourth elderly person was suffering with depression. Nuclear family, sleep problems, not consulting elderly in decisions, chronic morbidity, lack of physical activities, and death of close relatives were identified as risk factors of depression.
Keywords: Geriatric depression scale, Risk factors, Predictors

Introduction

World Health Organization (WHO) describes depression as a major, worldwide cause of disability and labels it as an important public health challenge in low and middle income countries. The proportion of the global population with depression in 2015 is estimated to be 4.4% which affects approximately 322 million people. Prevalence rates vary by age, peaking in older adulthood (above 7.5% among females and above 5.5% among males). In India, prevalence of depression was estimated to be 4.5% in the year 2015, which is estimated to be about 57 million people.[1]

Life expectancy in India has increased from 45 years in 1970 to 66.2 years in 2012.[2] On account of improved life expectancy, better education and health facilities, the proportion of the geriatric population has gone up from 5.3% in 1971 to 8.6% in 2011.[3] An increasing geriatric population is expected to increase burden of depression since prevalence of depression peaks in older adults. Geriatric people comprise a particularly vulnerable group as they usually have multiple co-existing medical and psychological problems.[4]

Depression adversely affects functional status, quality of life and contributes to premature deaths. Given the relative ease of diagnosing depression and availability of effective treatments, there is enormous potential for alleviating this largely untreated or undertreated public health burden among geriatric people.[5,6] Most of the Indian elderly live in the rural areas and urban slums where the access to the health care facilities is meagre and there is paucity of community based studies assessing depression among elderly in India. Considering the aforesaid facts, the present study was conducted in rural and urban slum areas to determine the prevalence of depression and its epidemiological correlates among geriatric people residing in southern Haryana, India.

Address for Correspondence: *Dr. Suraj Chawla, Associate Professor, Department of Community Medicine, SHKM Govt. Medical College, Nalhar, Nuh, Haryana-122107,* **Email ID***:* surajpgirohtak@gmail.com
Received: 16/12/2018 ***Accepted:***28/12/2018

Material and Methods

This community based study with cross-sectional design, was conducted during November 2017 to March 2018 after obtaining approval from the Institutional Ethics Committee.

Study setting

The study was conducted in the area catered by Primary Health Centre (PHC), Nagina and Community Health Centre, Nuh of district Nuh of Haryana State (India). PHC, Nagina and CHC, Nuh are respectively rural and urban field practice areas of Department of Community Medicine, SHKM Govt. Medical College, Nalhar.

Sample size and study subjects:

The sample size of 308 elderly subjects was calculated using the formula for cross-sectional studies ($N = Z^2_{1-\alpha/2} P (1-P)/D^2$).[7] The Z is value of area under two tailed normal curve and α, level of significance was taken as 0.05. The 'P' was prevalence (14.4%),[5] and 'D' was absolute precision (4%). A house wise list of elderly people in the study area was made from the family folders prepared by the Department of Community Medicine. Investigator contacted elderly persons through house to house visit till the desired sample was reached. A total of 308 elderly persons i.e. 154 each from urban and rural field practice area participated in the study.

Inclusion and exclusion criteria

Geriatric people equal to or more than 60 years of age and consented for participation in study, were recruited as study subjects and those having gross communication difficulties such as speech problems, hearing abnormalities and who didn't consent were excluded from the study.

Data collection

Geriatric people were contacted by investigators through house to house visit. Conversation with elderly was started with general discussion to build the rapport, then informed written consent was obtained. Study subjects were interviewed using a semi- structured questionnaire having two parts. Part 1 was used to collect information regarding socio-demographic profile, chronic morbidity, substance abuse, physical activity, living arrangement and other factors. The socioeconomic status of study population was measured using Udai Pareek scale for rural population and modified Kuppuswamy scale for urban population.[8] Part 2 was consisting of shorter version of the "Yesavage's Geriatric Depression Scale (GDS-15)" having 15 questions that are simple and clear.[9] Study subjects were screened for depression by using standard Shorter version" (GDS-15). A valid Hindi language version of Geriatric Depression Scale-30 was readily available[10] and Hindi version of GDS-15 was developed from it.

The participants were asked to respond questions by answering 'yes' or 'no' in reference to how they felt over the last one week. Each negative answer was given 1 point and thus, the more the scores will be, the more will be the chances of having depression. A score of > 5 i.e. Score 6-15 is suggestive of depression. Every study subject, found positive for depression, was referred to the Psychiatry Outpatient Department of SHKM Govt. Medical College, Nalhar at the earliest for appropriate management.

Definitions

Elderly: Elderly refers to the individuals with age 60 years or above.[11] Age of study participants was verified by Aadhaar card or any other government issued Identity Card.

Physically Activeness/Inactiveness: Elderly were labelled 'physically active' if they were involved in farming/ labor or could do household work regularly. A study participant was taken as 'physically inactive' if he/she was able to perform the activities of daily living on his/her own, but not involved in any occupation or household work regularly. An elderly was labelled 'dependent on others for the day to day activities' if he/ she needed help of others for activities of daily living.

Economic Dependence/Independence: Elderly were considered 'economically independent' if their life is economically productive; 'Partially Dependent' if they had very less income like old age pension; and 'Totally Dependent' if they were not having any income.

Engagement in work/hobbies: Refers to time spent by elderly persons by doing household work, occupation, or hobbies like playing with grandchildren and attending community gatherings etc.

Chronic morbidity: It was considered present among elderly those who were known cases of hypertension or any other cardio-vascular diseases, diabetes mellitus, arthritis, respiratory diseases, stroke, carcinoma or any illness of more than six months' duration.

Statistical analysis

The data were analyzed using IBM Statistical Package for Social Sciences for Windows (Version 20.0). The Pearson's Chi-square test at significance level of 5% was used for categorical variables. Categorical variables were presented as proportions (%) and variables with quantitative data were presented as mean and standard deviation (SD). Stepwise multiple logistic regression was used to find out an independent factors associated with depression, its outputs were presented as Odds Ratio (OR) with 95% Confidence Interval (CI).

Table 1: Socio-demographic correlates of depression among study subjects (n=308)

Variable		Depression Present		Chi square value	P value
		Yes (%)	No (%)		
Age	60-69 Years	40 (19.1)	169 (80.9)	12.09	0.002*
	70-79 Years	14 (21.8)	50 (78.2)		
	80 years or above	16 (45.7)	19 (54.3)		
Gender	Female	33 (26.2)	93 (73.8)	1.456	0.228
	Male	37 (20.3)	145 (79.7)		
Residence	Rural	43 (27.9)	111 (72.1)	4.733	0.041*
	Urban	27 (17.5)	127 (82.5)		
Type of family	Nuclear	20 (35.7)	36 (64.3)	6.573	0.014*
	Joint	50 (19.9)	202 (80.1)		
Sleep problems	Yes	33 (33.3)	66 (66.7)	9.345	0.003*
	No	37 (17.7)	172 (82.3)		
Day time spending in hobbies	Yes	47 (19.3)	197 (80.7)	8.028	0.007*
	No	23 (35.9)	41 (64.1)		
Activity level	Dependent on others	11 (50.0)	11 (50.0)	24.08	0.000*
	Lack of physical activity	14 (48.3)	15 (51.7)		
	Physically active	45 (17.5)	212 (82.5)		
Substance abuse	Yes	21 (28.8)	52 (71.2)	1.987	0.200
	No	49 (20.9)	186 (79.1)		
Living arrangements	Married/with family	42 (17.7)	195 (82.3)	14.66	0.000*
	Widowed/separated/living alone	28 (39.4)	43 (60.6)		
Chronic Morbidity	Yes	47 (46.1)	55 (53.9)	47.35	0.000*
	No	23 (11.2)	183 (88.8)		
Consulted for decision	Yes	55 (18.7)	239 (71.3)	23.44	0.000*
	No	15 (62.5)	9 (27.5)		
Death of close relative	Yes	20 (58.8)	14 (41.2)	28.35	0.000*
	No	50 (18.2)	224 (71.8)		

*Statistically significant

Results

A total of 308 elderly persons belonging to rural and urban areas participated in our study. The mean age of study subjects was 67.4 years (SD=7.25). Of the total, 51.2% of study participants belonged to lower class, 39.9% lower middle and 9.9% middle class. Most of the elderly (76.6%) were illiterate, 15.3% persons studied below primary and only 8.1% elderly were educated above primary. Prevalence of depression (GDS score >5) among the elderly population in the present study was found to be 22.72% (95% CI: 18.2-27.8).

Table 1 shows that the prevalence of depression increased with increasing age and was significantly higher among rural, nuclear family residents and those who were living alone (widowed/separated). Significantly high prevalence of depression was found among elderly with sleep problem, lack of day time spending in hobbies, lack of physical activity, dependency on others for day to day activity, chronic morbidity, and lack of consultation for decisions and death of the close relative. Depression was not significantly associated with the factors like gender of the participants, socio-economic status, literacy level and substance abuse.

On applying multiple logistic regression model, nuclear family, sleep problems and death of close relative in last one year were found to be the independent predictors of depression. Factors like, spending daytime in activities and consultation for decisions were found to have strong protective effect in depression among elderly (Table 2). Rural residence was not found to have a significant effect on depression in the multivariate analysis though it was significantly associated with depression on bivariate analysis.

Discussion

Depression in later life is associated with disability, increased mortality, and poorer outcomes from physical illness.[12] Considering the gravity of depression among elderly population as explained in various literature, this community based cross sectional study has been planned

Table 2: Multivariate analysis representing independent factors of depression (n= 308)

Variable		OR† (95% CI‡)	P value
Residence	Urban	Reference	0.482
	Rural	1.30 (0.62-2.69)	
Family	Joint	Reference	0.028*
	Nuclear	2.37 (1.09-5.16)	
Day time spending in hobbies	No	Reference	0.015*
	Yes	0.39 (0.18-0.83)	
Sleep problems	No	Reference	0.005*
	Yes	2.66 (1.33-5.31)	
Consulted for decision	No	Reference	0.002*
	Yes	0.20 (0.07-0.56)	
Death of close relative in last one year	No	Reference	0.000*
	Yes	9.88 (3.97-24.56)	

*Statistically significant, †OR-Odds ratio, ‡CI- Confidence Interval

to extrapolate the burden of this psychological malady of depression among elderly population of field practice areas of department of Community Medicine.

In terms of several vital socio-economic parameters, the Nuh district falls way behind other parts of the country, despite being a part of the prosperous state of Haryana. The majority of the district's population (88%) reside in rural areas. The education statistics reveal that merely 37.6% of females are literate as against 73% literacy rate among males.[13] India has one of the world's largest population of elderly and it is estimated to be 100 million elderly at present and the number is expected to increase to 323 million, constituting 20 % of the total population, by 2050.[14]

In present study prevalence of depression among selected cohort of geriatric sample has been found to be 22.72%. The study findings were consistent with the observations made by Barua A et al from West Bengal and by Pracheth R et al in urban slums of Dharwad district, Karnataka, who had determined the prevalence of depressive disorders in the elderly population to be 21.7% and 29.36% respectively.[15-16] However, a high prevalence of depressive disorders of was observed by Swarnalatha N et al among rural elderly in Andhra Pradesh (47%) and by Nandi PS et al in the rural West Bengal (52.2%).[17-18] SHARE study conducted among elderly with age ≥50 years from Europe found depression prevalence rate as 18%-37%.[19] Studies have revealed that the prevalence rates vary from 6 to 50% for depression in community samples of elderly in India.[20,21,22] This wide difference in the figures is mainly due to different sampling strategies, sample sizes, study setting and instruments used in different studies.

Prevalence of depression was more among higher age group of elderly population. Similar finding has been noticed by a Ludhiana based study.[23] Some of the reasons for the increase in the prevalence of depression with increasing age may be an increased economical and physical dependency, loss of the spouse, negligence by the family members and loss of self-esteem. Similar findings were found in Jariwala Vishal et al's and Raj Kumar et al's studies.[20,21]

Depression was more noted among elderly population of rural area compared to urban in our study. This association was contrary to the study done by Sen Gupta et al in which urban elderly had depression more than rural elderly.[23] Increased prevalence among rural persons did not appear to result from rural residence itself, as residence was not independently associated with depression once health and resource factors were held constant. Rather, people in rural areas were more likely to have characteristics that are strongly associated with depression, including poor health status, chronic disease, and poverty.[24]

In this study, it was also found that elderly people from nuclear family were more prone for depression. Similar findings have been reported by Sengupta et al & other researchers.[23, 25]

Nuclear family leads to separate living of geriatric people therefore, a decrease in their care and support. On contrary Pilania et al found no association of type of family with depression in their study.[5] This difference of findings may be attributed to difference in sample size and geographical area of study.

The incidence rates of depression and anxiety are significantly higher in people with a sleep disorder than those in patients without one. Furthermore, there is a bidirectional connection between insomnia and depression. Insomnia aggravates depression, and depression negatively affects the quality of sleep, creating a vicious circle.[26] In our study depression was found more among those who have sleep problems/lack of sleep (OR=2.36). Similar findings were also reported by Pilania et al[5] and Sengupta et al in their studies.[23]

The present study also reported negative significant association between day time spending in hobbies and depression (OR= 0.39). Similar findings were also observed in other studies.[5,27] Work/ hobbies improve the person's self-esteem and act as distractors for depressive thoughts. Peer group at work place provide support and opportunity to share, which prevents development of depressive symptoms.

Consultation of elder people in the major decision of family also does reduce the depression level. Same was noticed in our study with negative significant association between consultation in major decision and depression (OR = 0.20).

Almost similar findings were noticed by Pilania et al and Maulik et al.[5,28] When, elderly members are involved in major decision of family and shown respect by young ones, they do not develop feeling of worthlessness and hopelessness.

The present study found that geriatric people living with other comorbidities have more chances of having depression which corroborates the findings reported from a tertiary hospital of Delhi and other studies.[29,30,31] In fact, relationship between depression and chronic comorbidities is bidirectional. Depression is itself a risk factor for the development of chronic diseases and leads to their poor outcome. On the other hand, chronic diseases may also lead to depression.[32]

There is almost 10 times probability of having depression among elderly populations who have lost any of their close relative in last one year. Barua et al, Cole et al and Blazer et al reported bereavement significantly increases the risk of developing depression in the elderly.[15,33,34] Death of a close relative, especially son or spouse, is devastating in elder people life. After the death of an earning member, geriatric people are forced to face financial problems.

There were certain limitations in the present study. Chronic morbidities were either already diagnosed or self-reported only. Therefore, we might have missed certain chronic comorbidities such as undiagnosed hypertension, diabetes etc. Secondly, we didn't confirm the diagnosis of the elderly found positive for depression with GDS-15.

Conclusion

The present study depicted that approximately every fourth elderly person was suffering with depression. Nuclear family, sleep problems, not consulting elderly in major household decision making, chronic morbidity, lack of physical activities, and death of close relatives were identified as major risk factors of depression among geriatric population.

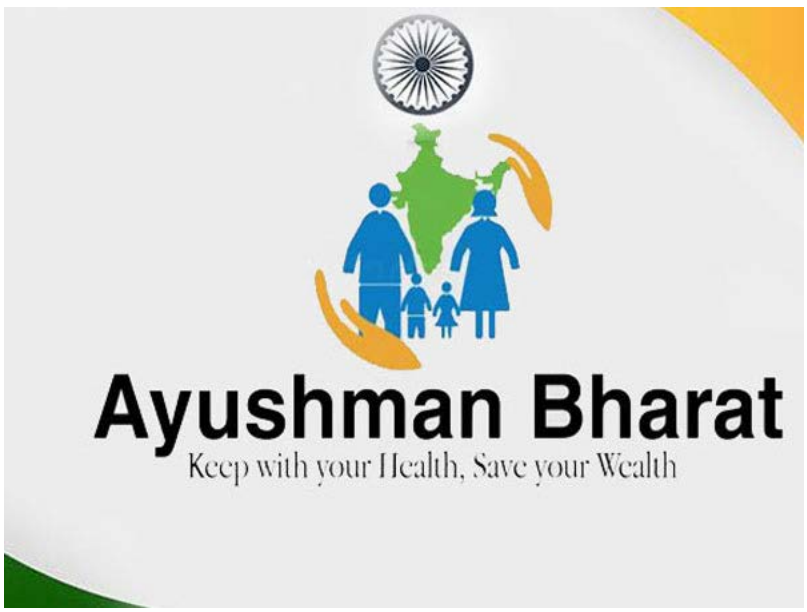
Source of Funding: Nil

Conflict of Interest : Nil

References

1. World Health Organization. Depression and Other Common Mental Disorders: Global Health Estimates. Geneva: World Health Organization Publications; 2017. [Accessed Jan 28, 2018]. Available from: apps.who.int/iris/bitstream/10665/254610/1/WHO-MSD-MER-2017.2-eng .pdf.
2. UNICEF Statistics, India 2012. All India Report. [Accessed Feb 06, 2018]. Available from: file:///C:/Users/Suraj/Downloads/statistics-india-unicef.pdf.
3. Ministry of Statistics and Programme Implementation, Govt. of India. Elderly in India-Profile and Programmes. New Delhi: Central Statistics Office; 2016. [Accessed Feb 06, 2018]. Available from: http://mospi.nic.in/sites/default/files/publication_reports/ElderlyinIndia_ 2016.pdf
4. Raja S, Wood SK, de Menil V, Mannarath SC. Mapping mental health finances in Ghana, Uganda, Sri Lanka, India and Lao PDR. Int J Ment Health Syst 2010 May 27; 4:11.
5. Pilania M, Bairwa M, Khurana H, Kumar N.Prevalence and predictors of depression in community-dwelling elderly in rural Haryana, India. Indian J Community Med 2017; 42:138.
6. Radhakrishnan S, Nayeem A. Prevalence of depression among geriatric population in a rural area in Tamilnadu. Int J Nutr Pharmacol Neurol Dis 2013; 3:309-12.
7. Chadha VK. Sample size determination in health studies. NTI Bulletin 2006; 42:55-62.
8. Singh T, Sharma S, Nagesh S. Socio-economic status scales updated for 2017. Int J Res Med Sci 2017; 5:3264-7.
9. Yesavage JA. Geriatric depression scale (short version); Psycho pharmacol Bull 1998; 24:709-11.
10. Indo-US cross national epidemiology study Geriatric depression scale- Hindi version (GDS-H). Available from: http://www.wpic.pitt.edu/research/dementia_epidemiology /IndoUS/Instruments/Geriatric%20Depression%20Scale-Hindi.pdf. [Last accessed on 2018 April 25].
11. Govt. of India. Ministry of Social Justice and Empowerment Policies/Acts/ Rules/ codes/ circulars. Care of older persons. Concessions and Facilities given to Senior Citizens. Available from: http:// socialjustice.nic.in/consd.php. [Last accessed on 2018 Apr 30].
12. Rodda J, Walker Z, Carter J. Depression in older adults. BMJ 2011. [cited 2018 Sep 3];343:d5219. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21957206.
13. S M Sehgal Foundation. Identifying Backwardness of Mewat Region in Haryana: A Block-Level Analysis 2015. Available from:http://niti.gov.in/writereaddata/files/document _publication/Identifying Backwardness of Mewat Region in Haryana- A Block Level Analysis_final_0.pdf.
14. Ministry of women and child development, Govt of India. A situational analysis of Muslim widows in Delhi, Bhopal, Lucknow, Hyderabad and Mewat 2016. [cited 2018 Aug 16]. Available from: http://www.wcd.nic.in/sites/default/files/draft report Mewat.pdf
15. Barua A, Das A, Nagaraj K, Bhat HV, Nair NS. Depression in elderly: a cross-sectional study in rural south India. JIMSA 2007;20:259-61.
16. Pracheth R, Mayur SS, Chowti JV. Geriatric Depression Scale: A tool to assess depression in elderly. Int J Med Sci Public Health 2013;2:31-5.
17. Swarnalatha N. The Prevalence of Depression among the Rural Elderly in Chittoor District, Andhra Pradesh. J Clin Diagn Res 2013;7:1356-60.
18. Nandi PS, Banerjee G, Mukherjee S, Nandi S, Nandi D. A study of psychiatric morbidity in an elderly population in a rural community in West Bengal. Indian J Psychiatry 1997; 39:122-29.
19. Castro-Costa E, Dewey M, Stewart R, Banerjee S, Huppert F, Mendonca-Lima C, et al. Prevalence of depressive symptoms and syndromes in later life in ten European countries: the SHARE study. Br J Psychiatry 2007;191:393-401.
20. Jariwala V, Bansal RK, Patel S, Tamakuwala B. A study of depression among aged in Surat city. National J Community Med 2010; 1(1): 47-9.
21. Rajkumar AP, Thangadurai P, Senthilkumar P, et al. Nature, prevalence and factors associated with depression among the elderly in a rural south Indian community. International

Psychogeriatrics 2009; 21: 372-8.
22. Venkoba Rao A. Psychiatry of old age in India. International Review of Psychiatry 1993;5:165-70.
23. Sengupta P, Benjamin AI. Prevalence of depression and associated risk factors among the elderly in urban and rural field practice areas of a tertiary care institution in Ludhiana. Indian J Public Health 2015;59:3-8.
24. Probst JC, Laditka SB, Moore CG, Harun N, Powe MP, Baxley EG. Rural-Urban Differences in Depression Prevalence: Implications for Family Medicine. Health Serv Res 2006;38(9):653–60. Available from: http://www.stfm.org/fmhub/fm2006/October/Janice 653.pdf.
25. Taqui AM, Itrat A, Qidwai W, Qadri Z. Depression in the elderly: Does family system play a role? A cross-sectional study. BMC Psychiatry 2007;7:57.
26. Mohan J, Xiaofan G, Yingxian S. Association between sleep time and depression: a cross-sectional study from countries in rural Northeastern China. J International Med Res 2017;45(3):984-92. doi:10.1177/0300060517701034.)
27. Sandhya GI. Geriatric depression and related factors - a cross sectional study from a rural community in South Kerala. J Ind Acad Geriatrics 2010;6:61-3.
28. Maulik S, Dasgupta A. Depression and its determinants in the rural elderly of West Bengal -a cross sectional study. Int J Biol Med Res 2012;3:1299-302.
29. Akhtar H, Khan AM, Vaidhyanathan KV, Chhabra P, Kannan AT. Socio-demographic Predictors of Depression among the Elderly Patients Attending Out Patient Departments of a Tertiary Hospital in North India. Int J Prev Med 2013;4:971-5.
30. Malhotra R, Chan A, Ostbye T. Prevalence and correlates of clinically significant depressive symptoms among elderly people in Sri Lanka: findings from a national survey. Int Psychogeriatr 2010;227-36.
31. Arslantas D, Ünsal A, Ozbabalık D. Prevalence of depression and associated risk factors among the elderly in Middle Anatolia, Turkey. Geriatr Gerontol Int 2014;14:100-8.
32. Katon WJ. Epidemiology and treatment of depression in patients with chronic medical illness. Dialogues Clin Neurosci 2011;13:7-23.
33. Cole MG, Dendukuri N. Risk factors for depression among elderly community subjects: a systematic review and meta-analysis. Am J Psychiatry 2003;160:1147-56.
34. Blazer DG, 2nd, Hybels CF. Origins of depression in later life. Psychol Med 2005;35:1241-52.



Concept of Primary Eye Care & School Health in India

Anjan Kumar Giri[1], Sunita Behera[2], Abhiruchi Galhotra[3]

[1]Associate Professor, [3]Additional Professor, Department of Community & Family Medicine (CFM), [2]Ex- Senior Resident, Department of Ophthalmology, AIIMS Raipur

Abstract

Primary eye care consists of promotive, preventive and curative actions by trained personnel or other interested people. Teachers are the best manpower to be trained for this purpose since they are more close to the students always. Poor visual function during early childhood may have several adverse outcomes. Through the school children, health messages can be propagated to their families, friends and peer groups. Training school teachers and empowering students and other staff of the school on simple and safe eye care practices through organized activities may come out as a cost effective way of improving general health and academic performance.

Key words: primary, eye care, school health

Introduction

School Health Program is one of the important components of total Health Care Delivery System in a State, which helps in keeping close watch on the health of school going children. Primary eye care comprises a simple but comprehensive set of promotive, preventive and curative actions that can be carried out by suitably trained primary health workers, specialized auxiliary personnel or other interested people. It is a frontline activity, providing care and identifying disease before it becomes a serious medical issue. Primary eye care can be delivered in many different ways comprising the components such as eye health education, symptom identification, visual acuity measurement, basic eye examination, diagnosis and timely referral. The development and implementation of primary eye care activities depends on existing primary health care system.[1] To implement the concept of primary eye care in schools, the teachers have to be trained to address the components mentioned above.

Various nutritional deficiencies affecting the preschool children range from 4 per cent to 70 per cent. Developmental delays are common in early childhood and affect at least 10 percent of the children. These nutritional deficiencies and developmental delays if not intervened timely may lead to permanent disabilities including cognitive, hearing or vision impairment.[2]

In developing countries, 7%–31% of childhood blindness and visual impairment is avoidable, 10%–58% is treatable, and 3% to 28% is preventable.[3] The overall prevalence of visual impairment in school children is to the tune of 7.3% in North India and 6.37% in South India.[4-5]

Despite having good health indicators for the state, visual problems constitute up to 7.8% of the health problems according to the annual school health report for the state of Kerala.[6]

Investment in school health programs is the most efficient and cost effective way to improve students' health and consequently their academic performances. Beside the students, teachers and other staff also get health benefits.[7]

Importance of Preventive Eye care in Early Life stages

In most regions of the world, approximately 50% of the children in schools for blind have blindness that could have been prevented.[8] India is home to the largest number of blind children in the world and about half of them are preventable. Among the rural population of the economically backward states of Central India, childhood cataract, refractive error and vitamin A deficiency are the most common causes of childhood blindness. Most of the causes of childhood blindness are exacerbated by lack of community awareness. Ignorance and harmful traditional practices can unwittingly lead to blindness.[9]

Vision influences development of postural reflexes. Abnormal postural reflexes, faulty motor patterns and consequent postural and balance deficits may be seen in blind children. Posture and mobility go hand in hand. Children learn body language by observing their friends

Address for correspondence: *Dr Anjan Kumar Giri, Associate Professor, Community & Family Medicine, AIIMS Raipur.GE Road, Tatibandh, Raipur-492099.***Email:** dranjan2000@rediffmail.com

Received: *11/12/2018* ***Accepted:*** *30/12/2018*

and family. Blind children cannot observe and learn such normal mannerisms and exhibit faulty motor patterns through inappropriate gestures, facial expressions, eye movements, lack of coordination in gait (visual ataxia), rigid inability to change position associated with fear and body stiffening (freezing), etc. which further predispose to postural abnormalities.[10]

Considering that 80% of what a child learns is processed through the visual system, good vision is critical to the child's ability to participate in and benefit from educational experiences. Blind or visually impaired children are economically unproductive and they also consume 10% of the time of an economically productive member of their family. The global cost in "lost productivity" on account of avoidable distant vision impairment in the Southeast Asian region is $ 44.5 billion.[11]

In the light of these observations, it is felt that primary eye care services in schools should be developed as an integral part of the health care delivery system through changes in education policies.

Need and rationale of primary eye care in school children

Worldwide 20-40 million children are estimated to have at least mild vitamin A deficiency (VAD) and half of them reside in India. VAD causes an estimated 60,000 children in India to go blind each year.[12]

Children in the school going age (6-14 years) represent over 25 per cent of the population in the developing countries. School children form a large, needy target group requiring identification and treatment of eye diseases due to the following reasons:

1. They are a "captive" group and can be reached through the organized educational system.
2. Reading and writing are their basic school level activities requiring good eyesight.
3. Children are good ambassadors who can carry messages ranging from hygiene to healthy diet and outdoor activities to prevent trachoma, vitamin A deficiency, diabetes and high myopia. Hence they may advocate on the need and benefits of eye test and good eyesight to their parents, siblings and friends, who are not attending schools.[1,13]
4. Early detection and referral of children with eye problems is the key to timely provision of highly cost-effective interventions such as provision of glasses. School-based screening programs allow early detection of conditions that cannot be cured but require appropriate low vision services.[1]
5. Irritated, sore, light sensitive eyes significantly impede children's ability to learn and may lead to the use of harmful practices, which can further damage the eyes.
6. In some areas, eye morbidity represents a significant cause of school dropout. The detection and treatment of common eye conditions, such as conjunctivitis and lid infections are a critical part of child-centered comprehensive school health programs.[1]
7. Health education to reduce stigma associated with visual impairment or spectacle wear is another essential yet neglected aspect.[1]
8. Many school eye health initiatives focus on the detection and treatment of under- or un- corrected refractive errors (uRE) in school going children, with referral of those with other eye conditions. The limited focus of this type is not an efficient use of resources and does not address the eye health needs of teachers, children with other disabilities and those who are out of school.[1]

Eye health issues related to teachers and non-teaching staff

More than 80% of adults aged 40 years and above have presbyopia, many of whom are likely to be un- or under corrected. Presbyopia increases with increasing age, so that by the age of 50 years, 50% of people need spectacles to read or see near objects clearly which increases to 80% or more by the age of 60 years.[1] A sizable number of teachers and other staff may be in this age bracket. This can have an impact on a teacher's ability to prepare and mark school work. Diabetes is increasing in all regions. Up to 10% of people living with diabetes have sight threatening retinopathy that they are not aware of as this can be asymptomatic at the earlier stages. Glaucoma affects 4-5% of adults aged 40 years in African and Asian countries. Teachers having any kind of eye problem may be more interested in knowing and caring about eye diseases.

All school health initiatives should include the eye health of teachers and other staff with approaches and aims towards extending the services to parents and family members of students as far as possible.[1]

Primary eye care activities feasible at school level

Locally available personnel and training programs for primary health care can be used to promote and strengthen the delivery of eye care in the schools. The primary eye care worker from local public health care facility in collaboration with the trained school teachers should carry out promotive and preventive activities, focusing on education and students' participation to prevent visual loss. The clinical activities involved in primary eye care consist of simple means of treating the three major eye symptoms presented by patients: inflamed ("red") eyes, loss of vision and pain in the eye. In schools, the trained

teacher alone or whenever necessary, with the help of the health worker can manage these problems by definitive treatment, by referral after immediate treatment or by referral alone.

Role of school teachers as primary eye care providers

Teachers get opportunity to interact with their students daily. Hence, it is possible for them to observe the behavior of their students to facilitate early detection of vision defects. School teachers can ensure compliance on the advised corrective measures for eye diseases and use of spectacles among children who are provided with spectacles. School teachers can serve as good counselors to parents and students and motivate them to use spectacles and have good eye health habits. It is well known fact that correction of refractive errors improves academic performance and efficiency of the child. If teachers are trained to identify and refer eye diseases as per symptoms, workload on ophthalmic assistants and ophthalmologists will be reduced. Credibility of eye care services increases because teachers are in a trustworthy position in the society. Key health messages can be spread to community via school children (child-to-child approach) as they can also be used as case detectors. The proximity between the teacher and the students make the "school teacher" the most appropriate "primary screeners" for the vision screening programme among school children[13].

WHO guidelines for primary eye care[8]

A. ***Conditions to be recognised and treated by a trained primary health care worker***

- Conjunctivitis and lid infections
- Acute conjunctivitis
- Ophthalmia neonatorum
- Trachoma
- Allergic and irritative conjunctivitis
- Lid lesions, e.g., stye and chalazion
- Trauma
- Subconjunctival haemorrhages
- Superficial foreign body
- Blunt trauma
- Blinding malnutrition

B. ***Conditions to be recognised and referred after treatment has been initiated***

- Corneal ulcers
- Lacerating or perforating injuries of the eyeball
- Lid lacerations
- Entropion/trichiasis
- Burns: chemical, thermal

C. ***Conditions that should be recognized and referred for treatment***

- Painful red eye with visual loss
- Cataract
- Pterygium
- Visual loss; <6/18 in either eye

Most of the diseases listed in the above three categories, managed by health care worker can be managed well by trained teachers. The teachers have to be in close contact with the health care worker of the local health facility for any help in initial treatment, recognition and referral.

Eye care component in current school health services in our country

Under School Health Services the most visible activity is School Eye Screening (SES) program, which became the integral part of the National Program for Control of Blindness (NPCB) since 1994. Based on administrative, logistic, social and medical reasons, it is envisaged under the program to focus initially on screening of students in "middle and secondary schools" or schools having 5th to 10th standard students. The age of the pupils in these classes is around 10-14 years and they are able to understand the purpose and need for vision screening.[14]The WHO also recommends the priority age group for vision screening as 11–15 years.[15]

The activities under SES program include identification of schools, collection of information on number of students and teachers, screening and referral centres, training of school teachers, training of general health care personnel, confirmation of "suspect" students by ophthalmic assistant or ophthalmologist, prescription of glasses, and provision of free glasses to students from poor socioeconomic strata.

The screening programme consists of three major activities:[13]

1. Preliminary screening in the schools
2. Examination (including refraction) by ophthalmic assistant
3. Provision of spectacles by optician

The children of 0-6 years age group are managed at District Early Intervention Center (DEIC) and 6-18 years age group at existing public health facilities. DEIC acts as referral linkages for both the age groups.[13] Outreach screening is done by dedicated Mobile Health teams for 6 weeks to 6 years at anganwadi centres and 6-18 years children at school. Treatment for any child screened and referred from any of these points of identification is free of cost.

Child Health Screening and Early Intervention Services under RBSK envisages to cover 30 selected health conditions for Screening, early detection and free

management. Among these 30 health conditions, 5 are related to visual function directly or indirectly.[2]

Way Forwards

Inclusion of health promotion component and adding other activities of primary eye care to the School Eye Screening (SES) will go a long way not only for eye care but for other health issues in school children.

Integrating primary eye care in schools into health programs

Any one from the school, such as students, teachers, and non- teaching staff diagnosed to be having any of the below listed diseases can be linked to the concerned national health programs as beneficiaries through the local health facility

Table 1: Suggestions[16]

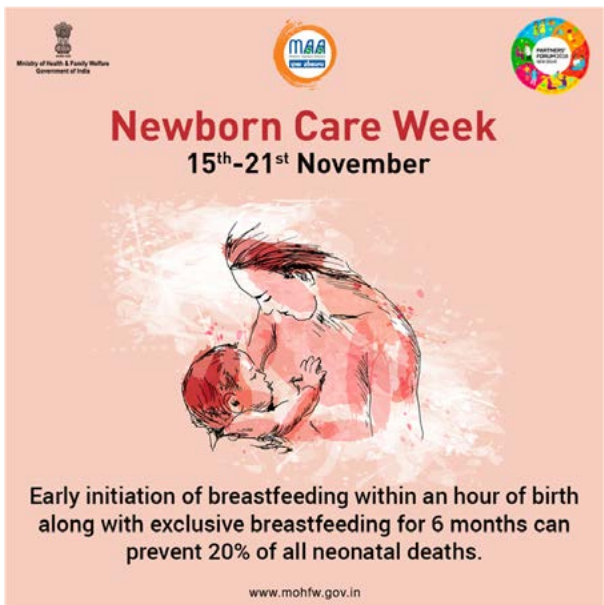
Aspect	Specific activity
Healthy School Policy	• Development of formal eye care policy in consultation with the school authority and target setting
Personal Skills Development	• Training of students, teachers and non teaching staff in primary eye care. • Literacy programmes – both in terms of general and 'basic health literacy' skills • To spread eye care messages among students, several competitive events can be organized. Some basic themes suggested are:[17] 1. Importance of vitamin A rich food for good eye health. 2. Better reading habits and the importance of good illumination 3. Problems of Corneal Blindness 4. Normal TV viewing distance 5. Importance of the eye glasses for defective vision 6. Common safety procedures
Participation	• Involvement of the school in planning, implementation and evaluation of eye care programmes. • Involvement of interested school students, teachers and other staff in eye care awareness and service delivery programs. • Some aspects of eye care awareness are:[18] • Have a comprehensive dilated eye exam • Know your family's eye health history • Eat right to protect your sight • Wear protective eyewear • Quit smoking or never start • Maintain a healthy weight • Be cool and wear your shades • Give your eyes a rest • Clean your hands and your contact lenses—properly • Practice workplace eye safety
Supportive Environments	• Nutrition programmes (vitamin A supplementation, fortification programmes, concept of balanced diet and food diversity). • Accessibility to sanitation and safe, drinkable water, relevant to the prevention of trachoma.
Re-organisation of Health Services of that locality	• Integration of eye care services in existing local primary health care programmes. • Increased focus on research into eye conditions as well as on 'appropriate' service delivery mechanisms.

Table 2: Linkages with Health Programs[19]

Eye disease	Health Program
Cataract	Healthy ageing/ programs for elderly
Refractive errors	Healthy schools/ School health program Healthy ageing
Diabetic Retinopathy	Non-communicable Diseases/NPCDCS

References

1. Clare Gilbert, Hasan Minto, Priya Morjaria, Imran Khan. Standard Guidelines for comprehensive school eye health programme.
2. RBSK- http://nhm.gov.in/images/pdf/programmes/rbsk-new.pdf last assessed on 11.11.2018
3. Kong L, Fry M, Al-Samarraie M, Gilbert C, Steinkuller PG. An update on progress and the changing epidemiology of causes of childhood blindness worldwide. J AAPOS. 2012 Dec; 16(6):501-7.
4. Shukla P, Vashist P, Singh SS, Gupta V, Gupta N,Wadhwani M, et al. Assessing the inclusion of primary school children in vision screening for refractive error program of India. Indian J Ophthalmol 2018;66:935-9
5. Vishnuprasad R, Bazroy J, Madhanraj K, Hannah Ranjee Prashanth, Singh Z, et al Visual impairment among 10–14-year school children in Puducherry: A cross-sectional study. J Family Med Prim Care. 2017 6(1): 58–62
6. SPH_ANNUAL_REPORT_2011-12 Kerala.pdf, SPH_ANNUAL_REPORT_2012-13 Kerala.pdf, SPH_ANNUAL_REPORT_2013-14 Kerala.pdf
7. Kishore J. National Health Programs of India. 2017;13:662
8. WHO. Strategies for the prevention of blindness in national programs: A primary health care approach. WHO 1997;2:96
9. Jain B K, Anand Sudhan , Sangeeta Pinto. Community participation in addressing the challenges of childhood blindness.Community Eye Health Journal 2005;18(56):S70
10. Alotaib A Z , Alghadir, A Zaheen, Iqbal A, Shahnawaz A. Effect of absence of vision on posture. J. Phys. Ther. Sci 2016; 28: 1374–1377
11. Smith TS, Frick KD, Holden BA, Fricke TR, Naidoo KS. Potential lost productivity resulting from the global burden of uncorrected refractive error.Bull World Health Organ. 2009 Jun; 87(6):431-7.
12. Sightsavers International, India. Eye care in India: A situation analysis.2007 page 24
13. Vision Screening in School Children:A comprehensive school screening manual A VISION 2020: The Right to Sight - India Publication
14. Jose R and Sachdeva S. School Eye Screening and the National Program for Control of Blindness. Indian Pediatrics 2009; 46:206
15. WHO. Elimination of Avoidable Visual Disability Due to Refractive Errors: Report of an Informal Planning Meeting, Geneva, 3-5 July, 2000. Geneva: WHO; 2000.
16. Dineen B. Health Promotion and Community Participation in Eye Care Services. Community Eye Health 1999;12(31):36
17. Veerasamy M. Field experiences in popularising eye health awareness. Community Eye Health Journal 2006;19(58):1
18. CDC- Basic Information - Eye Health Tips - Vision Health Initiative (VHI) available from www.cdc.gov >visionhealth> tips
19. Murthy GVS, Raman U. Perspectives on Primary Eye care. Communi ty Eye Heal th Journal 2009;22(69):10



Role of Artificial Intelligence (AI) in Public Health

Prem Sagar Panda[1] ,Vikas Bhatia[2]

[1]Senior Resident, [2]Dean, Professor and HOD, Department of Community Medicine & Family Medicine, All India Institute of Medical Sciences, Bhubaneswar

Artificial Intelligence (AI) is the branch of computer science that deals with the simulation of intelligent behavior in computers.[1] The term was first coined by a group of researchers in the year 1956. [2] Though application of Artificial Intelligence has been more rampant, still in poor countries with low resource settings, the use is still lying nascent. For that the needs and opportunities have to be deployed for the optimization of public health services. In 2017, the United Nations (UN) convened a global meeting to discuss the development and deployment of AI applications to reduce poverty and deliver a broad range of critical public services. More recently, another UN meeting including various stakeholders to assess the role AI in achieving the Sustainable Development Goals (SDGs) was discussed.[3] Some experts opine that Artificial Intelligence acts intelligently in several aspects like a) works according to the appropriateness of circumstances and goals b) changes flexibly with the changing environment and goals c) learns from past experience d) works within the limit of perceptual and computational limits.[4] AI enables computers to mimic the cognitive function of human minds, by using AI to review vast sets of real-time data, health experts can identify at-risk populations for any number of chronic diseases. It will eventually decrease the disease burden.[5]

Simply to say AI is all about taking advantage of the fast pace that computer can process information to draw insights. It can help detect threats before traditional mechanisms and help us understand what kind of interventions prevent disaster & make us healthier.

Types of Artificial Intelligence

Generally, AI is classified into two categories- i) Artificial General Intelligence ii) Artificial Narrow Intelligence

Artificial General Intelligence is the ability of a machine to represent the human mind and perform any intellectual task that a human can perform. [6] It was the original focus of early AI research and the predominant representation of AI in popular culture. [7]

Artificial Narrow Intelligence represents the ability of a machine to perform a single task extremely well. Mostly all AI applications are based upon artificial narrow intelligence.[7]

1. Machine Learning: It is a method for automating data analysis by using algorithms that iteratively identify patterns in data and learn from them. Machine learning applications are generally classified into three broad categories: (1) supervised learning, (2) unsupervised learning and (3) reinforcement learning. [8]

2. Expert systems (Knowledge Based System): The process by which expert system is built is known as knowledge engineering. It consists of a knowledge base and a reasoning engine. It helps human to approach complex situation with high degree of uncertainty. The logic system works for improving chronic conditions with highest possible accuracy.[9] This has been used by researchers in South Africa to predict cholera outbreak.[10]

3. Natural Language Processing: It aims to bridge the divide between the languages that humans and computers use to operate.

4. Automated planning and scheduling: It is a relatively nascent branch of AI focused on organizing and prioritizing the activities required to achieve a desired goal.

5. Image and signal processing: It can also be used to process large amounts of data from images and signals. Steps in image and signal processing algorithms typically include signal feature analysis and data classification using tools such as artificial neural networks (ANN). [8]

6.Health informatics and electronic medical records (EMRs):__Health informatics describes the acquisition, storage, retrieval and use of healthcare information to improve patient care across interactions with the health system. Health informatics can help shape public health programs by ensuring that critical information is available for making sound policies and

Address for Correspondence: *Dr. Prem Sagar Panda, Senior Resident, Dept. of Community Medicine & Family Medicine, All India Institute of Medical Sciences, Bhubaneswar-751019* **E-mail***:* drpspanda@gmail.com

Received: *8/12/2018* ***Accepted:*** *22/12/2018*

program decisions. EMRs, which are digital versions of patient and population health information, are an important source of data for health informatics.[8]

7. Cloud computing: It refers to the use of a network of remote servers to store, manage, access and process data rather than a single personal computer or hard drive. While EMRs maintained in the cloud with adequate privacy and security precautions, can be used with a multitude of data related to public health. The intervention has been found to be effective in low resource settings where the IT infrastructure is not that much developed.

8. Mobile health: mHealth uses mobile and wireless technologies to achieve health objectives. The rapid& easy availability and expansion of mobile phones in low-income countries has created several opportunities for using these technologies to support health efforts. Mobile phones have been used by community health workers to improve the provision of health services within resource-poor settings. These tools can further engage and empower the public, changing how we communicate in public health. Smartphone and mobile applications are tools that could facilitate healthy decision-making by monitoring behaviors and collecting personal data such as mental health and social networks.[11]

9. Cross Sectoral Data Application: It is useful in identifying social inequities, epidemic forecasting similar to the Google Flu tracker. [12]

AI is also useful in Integrating AI in Research Processes, Modelling Policy Decisions and its effect on Public Health, universal availability & accessibility of data, Population-level Social Interactions and behavior & outbreak management.

Artificial Super Intelligence (ASI) is a novel concept in the field of AI. ASI refers to that level of AI where machines will surpass human cognitive ability and they can mimic human thoughts. But there are still no machines that can process the depth of knowledge & cognitive ability as that of a fully developed human being. For ASI, there are two schools of thoughts. Some scientists think that ASI is a treat to humanity where as some have the opinion that it would be helping hand to mankind.

Challenges in Artificial Intelligence

Designing and implementing expert systems for supporting clinical decision making still remains a challenge. Clear definition of clinical problems has to be set for implementation of expert system.[13]

Supervised machine learning applications require high-quality datasets that can be used to train machine learning algorithms for identification of risk factors or diagnosis of diseases. In addition, better diagnosis does not permit to access to appropriate or quality treatment options. While remote diagnostics and machine learning applications might help to identify diseases, but the curative services at that point may or may not be executed.[13]

There could be also some of the challenges associated with adapting clinical NLP (Natural Language Processing) systems to diverse healthcare settings. Hand written local language health records also pose a big problem in the diagnosis of the diseases.[14] The WHO has advocated for the adoption of standardized medical terminologies or the development of local data dictionaries to address some of these challenges.[15]

Weak Communication network, IT platform pose difficulties in delivering primary health care services in low/poor resource settings. Due the above problems, the electronic health record access becomes a tough job. So, a uniformity in the treatment modality can't be assured in these poor resource settings. [15]

There is a sense of hesitation to share, store, and link data from public, private, and quasi-public sectors, as well as between, across, and outside jurisdictions. So for this certain principles has to be set for data sharing.

Ethical issues arising due to the AI, the potential abuse of technology may be the greatest challenge for AI for which robust AI principles have to be laid down.

Private sector partnership may be creating fear in sharing the data available in HER/ cloud computing. So responsible use & privacy standards have to be strictly followed as there may be potential for commercialization of data to produce harm to the society.

Conclusion

The AI tools and techniques are still in their infancy stage. Despite the limitations, these tools and techniques are beneficial in providing in depth knowledge on individuals' health and predicting population health risks, and their use for medicine as well as public health is likely to increase substantially in the near future. Privacy, confidentiality, data security, ownership and informed consent have to be maintained in the human right lens. Effective implementation will also require understanding the local social, epidemiolocal, health system and political contexts. So in long run the correct & efficient use of AI technologies will definitely help in achieving the health related goals in SDG and attainment of Universal Health Coverage.

References

1. Malley CS , Kuylenstierna JC ,Vallack HW , et al Preterm birth associated with maternal fine particulate matter exposure: a global, regional and national assessment. Environ Int 2017;101:173–82.
2. Knapp S Artificial intelligence: past, present, and future. 2006. http://www.dartmouth.edu/~vox/0607/0724/ai50.html
3. Looking to future UN to consider how artificial intelligence could help achieve economic growth and reduce inequalities. http://www.un.org/sustainabledevelopment/blog/2017/10/looking-to-future-un-to-consider-how-artificial-intelligence-could-help-achieve-economic-growth-and-reduce-inequalities/2017
4. Poole DL , Mackworth AK.Artificial Intelligence: foundations of computational agents: Cambridge University Press, 2010.
5. https://www.beckershospitalreview.com/healthcare-information-technology/using-artificial-intelligence-to-solve-public-health-problems.html
6. Goertzel B, Pennachin C. Artificial general intelligence: Springer, 2007.
7. Pennachin C, Goertzel B .Contemporary approaches to artificial general intelligence. Artificial general intelligence: Springer 2007:1–30
8. Wahl B, Cossy-Gantner A, Germann S, Schwalbe NR. Artificial intelligence (AI) and global health: how can AI contribute to health in resource-poor settings?. BMJ global health. 2018 Aug 1;3(4):e000798.
9. Fathi-Torbaghan M ,Meyer D . MEDUSA: a fuzzy expert system for medical diagnosis of acute abdominal pain. Methods Inf Med 1994;33:522–9.doi:10.1055/s-0038-1635055
10. Fleming G , Merwe Mvander , McFerren G . Fuzzy expert systems and GIS for cholera health risk prediction in southern Africa. Environmental Modelling & Software 2007;22:4428. doi:10.1016/j.envsoft.2005.12.008
11. Piette JD , Mendoza-Avelares MO , Ganser M , et al . A preliminary study of a cloud-computing model for chronic illness self-care support in an underdeveloped country. Am J Prev Med 2011;40:629–32.doi:10.1016/j.amepre.2011.02.014
12. Application of Artificial Intelligence Approaches to Tackle Public Health Challenges – Workshop Report. Open access url: http://www.cihr-irsc.gc.ca/e/51018.html
13. Sheikhtaheri A , Sadoughi F , HashemiDehaghi Z . Developing and using expert systems and neural networks in medicine: a review on benefits and challenges. J Med Syst 2014;38:110.doi:10.1007/s10916-014-0110-5
14. Carrell DS , Schoen RE , Leffler DA , et al Challenges in adapting existing clinical natural language processing systems to multiple, diverse health care settings. J Am Med Inform Assoc 2017;24:986–91.doi:10.1093/jamia/ocx039
15. Organization WH. Electronic health records: manual for developing countries. Manila: WHO Regional Office for the Western Pacific, 2006.

SHORT COMMUNICATION

Study of Morbidity Pattern in Readymade Denim Factory Workers in Suburban Slum of Maharashtra: A Cross-sectional Overview

Sunil Kumar Panigrahi[1], Parmeshwar Satpathy[2], Vineeta Singh[2] , Sulabha V. Akarte[3]

[1]Department of Community & Family Medicine, AIIMS, Raipur, [2]Department of Community & Family Medicine, AIIMS, Bhopal, [3]Department of Community Medicine, Grant Govt Medical College, Mumbai

Abstract:

Introduction: Clothes form indispensible trade in modern society & jeans clothes are among the clothes with highest demand among youth. Most of the times the jeans fabrics are made in some industries and then they are transported to different small scale industries to make readymade clothes. Mostly these small scale industries consist of small labour force mostly involved in cutting & making of readymade jeans clothes. Most of these industries are unorganised sectors. This study intends to assess morbidity patterns workers in one of such industries invoved in cutting & making of readymade jeans clothes. **Objective:** To assess the morbidity pattern among the workers. **Material & Methods**: It is a crossectional study conducted in one of the small factory producing readymade jeans clothes. The total number of workers included was 256.The objective of the study was to assess the morbidity among the workers. The study tool used was a pre validated &pretested questionnaire, which included their demographic characteristics, general & systemic examination. **Results:** Among all the 256 workers in the factories, highest number i.e. 136 (53.13%) were in 20-30 year age group followed by 68(26.56%) in 30-40 year age group, 24(9.38%) each in 10-20 years & 40-50 years age group and only 4(1.56%) were in 50-60 years of age group. All of them were males. **Conclusion:** The health needs of the people working in these industries are high due to significant co morbidities, long working hours, lack of health awareness regarding substance abuse and safe sexual practice.

Key Words: Morbidity, Denim Factory workers, Suburban slum

Introduction

India is the 2nd largest manufacture of textile globally. The textile industry constitutes 14% of the industrial production of textile all over the world. 4% of the national GDP depends on the textile sector only. The textile industry employs around 45 million of the people.[1] The people are not only employed in the primary textile industries but also work in various ancillary industries like readymade garment factories. One of the ancillary industry is denim industry, the global market of which forecast to reach 64.1 billion dollar by the year 2020. Despite slowdown the Indian denim industry has consistently delivered CAGR of 15%-18% per year over many years. The increased demand in denim industry has over the years attracted many workers in readymade denim industry in various metropolises in India including Mumbai. The ancillary denim industries are mostly involved in sewing making denim pants and shirts. Most of the factories are in unorganised sector. Their workers are temporary workers, mostly work under fixed payment basis. They do not enjoy any of the benefits, which are provided to organised factory workers.[1]

More than 80 percent of the world's workforce that resides in the developing world disproportionately shares in the global burden of occupational disease and injury.[2] Keeping in view of the ever expanding demand for ancillary textile industries and the employment opportunity it generates in future, this study intends to assess the health needs of the workers involved in these industries.

Material & Methods

The study was a cross sectional study done among the workers of two ancillary jeans industry, which were selected conveniently in Thane district of Maharashtra. The workers who had worked for at least 6 months were included in the study. The total number of workers included was 256.The objective of the study was to assess

Address for Correspondence: *Dr.Sunil Kumar Panigrahi, Flat no 1 B, Block 5, Singapore city, Mohaba Bazar, Raipur, Pin 492001*
Email: sunil1986panigrahi@gmail.com

Received: 18/12/2018 ***Accepted:***30/12/2018

the morbidity among the workers. The study tool used was a pre validated &pretested questionnaire, which included their demographic characteristics, general & systemic examination.

Table 1 :Demographic characteristics of the workers in jeans factory:

Characterstics	Frequency (%)
Education	
Graduation	4 (1.56%)
High school	24(9.38%)
Secondary School	84(32.81%)
Primary School	120(46.88%)
Illiterate	24(9.38%)
Marital status	
Married	164(64.06%)
Unmarried	92(35.94%)
Religion	
Hindu	252(98.44%)
Muslim	4(1.56%)
Working Hour	
<12 hrs	96(37.5%)
12-24hr	160(62.5%)
Working years	
<10 years	140(54.69%)
10-20 years	108(42.19%)
20-30 years	8(3.13%)

Results

Among all the 256 workers in the factories, highest number i.e. 136 (53.13%) were in 20-30 year age group followed by 68(26.56%) in 30-40 year age group, 24(9.38%) each in 10-20 years & 40-50 years age group and only 4(1.56%) were in 50-60 years of age group. All of them were males.

Table 2: Anthropometry of All workers in the factory (N=256)

BMI	Frequency (%)
<20	92 (34.95%)
20-23	80(31.25%)
23-30	76(29.69%)
>30	8(3.13%)
Mean BMI	21.72±3.68
WC: HC	0.90±0.069

Table 3 : Behaviours affecting health of the workers:

Condom Use	Frequecy (%)
Regular use	18(7.03%)
Irregular use	98(38.8%)
No use	140(54.69%)
Tobacco chewing	184(71.88%)
Smoking	112(43.75%)
Alcoholism	76(29.9%)
Workers having any kind of insurance	84(32.81%)

Table 4 : Association of various factors and morbidities: (p value)

Factors	Oral lesion	BMI	WC:HC	Neck pain	Lower back pain	Skin lesion
Age (>30 years)	0.0092*	<0.001*	<0.001*	<0.001*	<0.001*	0.8
Alcoholism	<0.001*	0.17	<0.01*	<0.01*	<0.001*	0.43
Tobacco	<0.001*	0.404	0.04*	0.004*	0.006*	0.59
Smoking	<0.001*	0.0021*	0.052	0.61	0.058	0.62
Working hours (>12 hrs)	0.76	0.95	<0.001*	0.79	0.58	0.04*
Woking years(> 10 years)	0.09	<0.001*	0.42	<0.001*	0.0001*	0.36

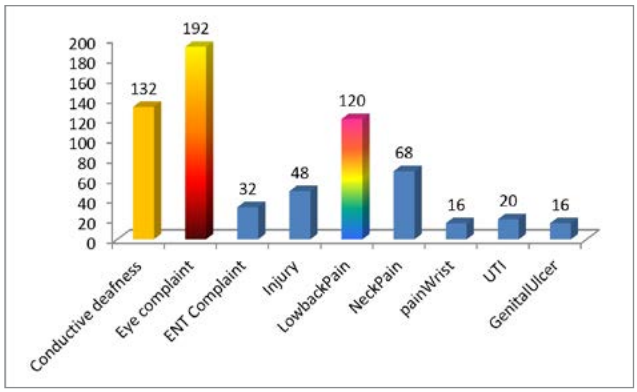
* significant values

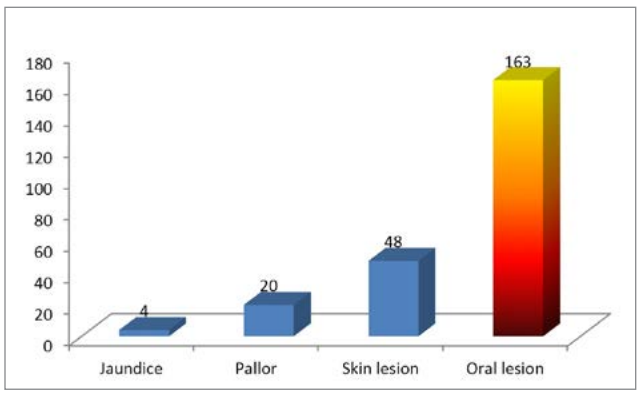
Table 5 : Association of various factors with demography & health related behaviours: (P values)

Factors	Alcoholism	Smoking	Tobacco	Extra/premarital sex	Regular Condom Use
Age	<0.001*	0.004*	0.0042*	<0.001*	<0.001*
Marital status	0.01*	0.001*	0.53	<0.001*	0.00034*
Working hours	0.001*	0.11	0.38	0.08*	<0.001*
Working years	0.006*	0.003*	0.08	<0.001*	0.04*

* significant values

Figure 1 : Morbidity patterns observed among all the workers in the factory (N=256):





There was a significant difference in proportion of condom use among the workers who are involved with extra/ premarital sexual relationship (p value 0.04). Only 32 (36.78%) of the workers among those involved in extra/ premarital sexual relationships (87) use condom during sexual intercourse compared to 84(49.01%) of those workers, who were not involved in extra/premarital relations. Alcoholism among the workers remains an important determining factor for condom use. Among the non-alcoholics (N=76) the workers involved in extra/ pre-marital affairs do not have significant difference in proportion of condom use from those without extra/ premarital affairs (p value 0.57). But among alcoholics the condom use among those involved in extra/pre-marital sexual relations i.e 19(37.25%) was significantly lower than those not involved in extra/premarital relationships i.e 72(55.81%) (p value 0.02).

Discussion

Among all the workers, 84 (32.5%) were having BMI more than 23. The mean WC:HC (Waist circumference: Hip circumference) was also higher than normal.Ravichandran et al in 2018 concluded 27.6% were overweight and only 2.1% were found to be obese.[3] Study done by Joseph et al in Karnataka where 11.8% and 2.9% were overweight and obese respectively.[4]

Among all the morbidity identified, eye complaint (192) were most common followed by conductive deafness (132) and ear, nose, throat complaint (32). The most common lesion identified during examination was the oral lesion among 163 workers.Ravichandran et al in 2018 concluded The common problems experienced by the workers during the last one year in the present study were musculoskeletal problems (77.6%), anaemia (57.1%) visual problems (51.6%) followed by symptoms of respiratory problems (31.3%).[3] Saha et al in Kolkata reported that musculoskeletal problems were the commonest health problem (69.64%) followed by sleep disturbances, gastrointestinal problems and malnutrition.[5] Dr Yerpude et al in 2010 concluded, the common morbid conditions found were eosinophilia (18.35%), iron deficiency anemia (28.90%), byssinosis grade 1 (7.80%), dental stains (6.54%), refractive errors (7.80%), chronic bronchitis (4.85%), and upper respiratory tract infection (8.64%).[6] Mehta et al in 2012 concluded that , the nature of work in Garment factories created various types of health hazards among the selected respondents such as headache, musculoskeletal pain, eye strain etc.[7] Only 18 (7.03%) of the workers were using condom regularly. 71.88% of the workers were tobacco chewers. 43.75% were smokers and 29.9% of the workers were alcoholics.

The oral lesions among the workers were significantly associated with more than 30 years of age, Aloholism, tobacco chewing and smoking of the individuals.

The Body mass index was associated significantly with more than 30 years of age, smoking and more than 10 years of working. The waist hip ratio of the workers were significantly associated with more than 30 age, alcoholism, tobacco chewing working hours more than 12 hours per day. The neck pain and lower back pain were significantly associated with more than 30 years age, alcoholism, tobacco chewing and working years more than 10 years. The skin lesion was associated significantly with people working more than 12 hours a day .

The pattern of irregular condom use was significantly associated extra marital/ pre marital sexual relations (p value 0.04) and was significantly high among peoples with less than 30 years of age, and more than 12 years of working.

Conclusion

The small scale jeans industry contributes significant part of unorganised labour force in western part of our country (Maharashtra, Gujarat etc), which are devoid of many basic facilities, those are available in an organised industry. The health needs of the people working in these industries are high due to significant comorbidities, long working hours and lack of health awareness regarding substance abuse and safe sexual practice.

References

1. An overview of the Global and Indian Denim Market. [cited 2018 Feb 26]; Available from: http://www.indiantextilemagazine.in/denim-industry/an-overview-of-the-global-and-indian-denim-market/
2. Rosenstock L, Cullen M, Fingerhut M. Occupational Health [Internet]. Disease Control Priorities in Developing Countries. 2006 [cited 2018 Dec 27]. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21250328
3. Ravichandran SP, Shah PB. Health problems and risk factors prevailing among garment workers in Tirupur , Tamil Nadu. Indian J Community Med Public Heal. 2018;5(6):2400–5.
4. Joseph B. Pakistan journal of medical sciences quarterly. A Stitch Time . Annu Heal Apprais Garment Ind Employees [Internet]. Professional Medical Publications; 2008 [cited 2018 Dec 27]; Available from: https://www.pjms.com.pk/issues/janmar08/article/article21.html
5. Saha TK, Dasgupta A, Butt A, Chattopadhyay O. Health Status of Workers Engaged in the Small-scale Garment Industry: How Healthy are They? Indian J Community Med [Internet]. Wolters Kluwer -- Medknow Publications; 2010 Jan [cited 2018 Dec 27];35(1):179–82. Available from: http://www.ncbi.nlm.nih.gov/pubmed/20606949
6. Yerpude PN, Jogdand KS. Morbidity profile of cotton mill workers. Indian J Occup Environ Med [Internet]. Medknow Publications and Media Pvt. Ltd.; 2010 Sep [cited 2018 Dec 27];14(3):94–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21461162
7. Mehta R. Major Health Risk Factors prevailing in Garment Manufacturing Units of Jaipur. J Ergon [Internet]. OMICS International; 2012 Feb 13 [cited 2018 Dec 27];02(02):1–4. Available from: https://www.omicsonline.org/open-access/major-health-risk-factors-prevailing-in-garment-manufacturing-units-of-jaipur-2165-7556.1000102.php?aid=5620

Sickle Cell Anemia: An Update on Diagnosis, Management and Prevention Strategies

Shruti Mishra[1], Gaurav Chhabra[2]

[1]Senior Resident, [2]Assistant Professor, Department of Pathology & Laboratory Medicine, All India Institute of Medical Sciences, Bhubaneswar

Abstract

Sickle cell anemia is the most common disease entity of all the monogenic disorders. This is an autosomal recessive disorder. HbS polymerization, vaso-occlusion, and hemolytic anemia are central to the pathophysiology of sickle cell disease, they precipitate a cascade of pathologic events, which in turn lead to a wide range of complications. The disease is particularly more prevalent in certain regions of the country like Odisha, Madhya Pradesh, Tamilnadu and has a significant impact on morbidity. Community based approach by providing availability of screening tests, & pre-marital and pre-pregnancy counselling should be initiated to reduce the disease burden in the society.

Key Words: Sickle cell anemia, Sickle cell disease, Sickle cell anemia diagnosis, sickle cell anemia management.

Introduction

Sickle cell anemia is the most common disease entity of all the monogenic disorders. This is an autosomal recessive disorder. The prevalence is estimated to be increasing worldwide.[1,2] Latest reports say that around 300,000 infants are born each year with Homozygous Sickle cell anemia. This disease is specifically prevalent in sub-Saharan African countries, the Mediterranean basin, the Middle Eastern countries, and the Indian subcontinent.[3-4] The prevalence of Sickle cell anemia is at par with that of Malaria. It is postulated that the disease is still there in the population as it protects against life-threatening malarial diseases. The famous "malaria hypothesis" was formulated by Haldane in 1949 and by Allison in 1954. This disease is a prototype example of natural selection and balanced polymorphism, a process that is ongoing. Although, this hypothesis is highly debatable. The fact remains that the disease load is nowhere near eradication. So, the need of the hour is a better diagnostic facility, reduction of the disease load by providing pre-marital counselling and pre-pregnancy work-up. The disease has many modifying many modifying factors, some of which are still under investigation.[5,6]

Prevalence in India

In 1952, in the Nilgiri hills of northern Tamil Nadu sickle cell disease was first described. After the first discovery, it has been found widespread in all the regions of the country.[7] The Anthropological Survey of India has conducted extensive studies on sickle cell distribution and have found that in some communities the prevalence is as high as 35%.[8]

Prevalence in Odisha

According to a statement released by the State health department in 2015 Odisha has 5.35 lakh of the population affected by the disease, among them 5 lakh people could be found in 13 western Orissa districts.[9]

Pathophysiology

Hemoglobin is a tetrameric protein. Each unit of hemoglobin comprises two pairs of globin chains with each group having one haem molecule. Thus, each molecule of hemoglobin had four haem molecules, and in turn, these can carry four oxygen molecules. Globin chains are derived from Chromosome 11 and Chromosome 16, which codes for beta (β) chains and alpha (α) chains respectively. There are four genes coding for alpha chains and 2 for beta chains. Sickle cell disease is caused by a point mutation in the sixth codon of β-globin that leads to the replacement of a glutamate residue with a valine residue. Due to the point mutation in sickle cell anemia, hemoglobin undergoes a conformational change during oxygenation and de-oxygenation and the globin molecule becomes "sticky" or unstable leading to polymerization and precipitation. This happens in the deoxygenated state. As the hemoglobin

Address for Correspondence: *Dr. Gaurav Chhabra, Assistant Professor, Pathology & Lab Medicine, AIIMS, Bhubaneswar,*
Email: *gauravchhabra2001@gmail.com*

Received: 11/12/2018, **Received:** 26/12/2018

precipitates, it makes the RBCs sickle-shaped. These RBCs again gain their original structure on oxygenation. But repeated episodes of sickling leads to membrane damage and severe dehydration of the cells, thus rendering them rigid and non-pliable. This results in its reduced lifespan.

Membrane damage leads to exposing of phosphatidylserine on the outer leaflet of the membrane. This helps in easy removal of these cells by macrophages, thus resulting in extravascular hemolysis. Excessive sickling can lead to the stacking of these sickle cells and occlusion of micro-vessels. Vaso-occlusion is one of the most frequent complications in these patients.

Vaso-occlusion affects various organs and can present in varied forms like acute chest syndrome, acute abdominal pain due to mesenteric vaso-occlusion, acute Ischemic stroke, and avascular necrosis of bones and renal impairment. Auto-splenectomy is a characteristic feature of homozygous sickle cell anemia.[10,11]

Although HbS polymerization, vaso-occlusion, and hemolytic anemia are central to the pathophysiology of sickle cell disease, they precipitate a cascade of pathologic events, which in turn lead to a wide range of complications. These processes include vascular–endothelial dysfunction, functional nitric oxide deficiency, inflammation, oxidative stress, and reperfusion injury, hypercoagulability, increased neutrophil adhesiveness, and platelet activation.[10,11]

The interaction of HbS with other globin chains affects its polymerization properties. HbA and HbF prevents polymerization. Coexisting alpha thalassemia and iron deficiency enhances the severity of the disease. Non-genetic factors precipitating sickling are infection, inflammation, dehydration, humidity, high altitude, smoking, and air pollution.[10,11]

Crisis in Sickle cell disease

A crisis arises because of rapid hemolysis or non-production of RBCs. Increased hemolysis can be seen in infections, inflammatory conditions or sudden changes in weather. Reduced production can be due to megaloblastic precipitation leading to ineffective erythropoiesis, i.e., destruction of RBCs within the marrow. Aplastic crisis can be precipitated by Parvovirus B19, which results in erythroid maturation arrest in pro-normoblast stage and erythroid destruction.

A patient of sickle cell anemia can also present with pancytopenia. That can be either due to hypersplenism or due to marrow infarction (vaso-occlusion of marrow). Prompt action is therefore required in such conditions.

Laboratory diagnosis

Complete Blood counts

In heterozygous sickle cell anemia, the numbers and RBC indices are all normal. Lower MCV and MCH may be seen in patients with co-existing alpha thalassemia. In people with homozygous sickle cell anemia, the presentation is uncommon in the first year of life attributed to the presence of fetal hemoglobin. After one year of age, following the switchover, the HbF is entirely replaced by HbS, the patient develops chronic anemia and reticulocytosis.

Peripheral smear

In heterozygous sickle cell anemia, the blood picture is predominantly normocytic normochromic with target cells and sickle cells are usually not seen while in homozygous condition, sickle cells will be more easily found. [Fig:1]

Other investigations

Figure 1: Peripheral blood showing Sickle cells: A-X400, B- X1000 (Leishman).

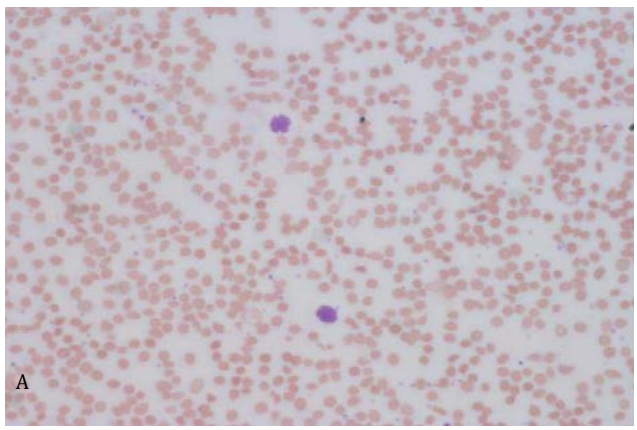
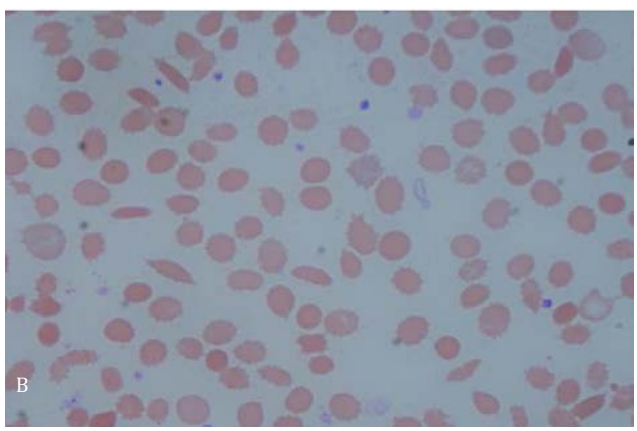


Figure 2: Sickling test (2% Sodium metabisulphite)



Sickling test

This is an easy and reproducible method to screen both heterozygous and homozygous conditions. Here blood is incubated at 37 C with 2% sodium metabisulphite or sodium dithionite. Wet-mounts are prepared and examined to detect sickling changes in the red corpuscles. [Fig:2]

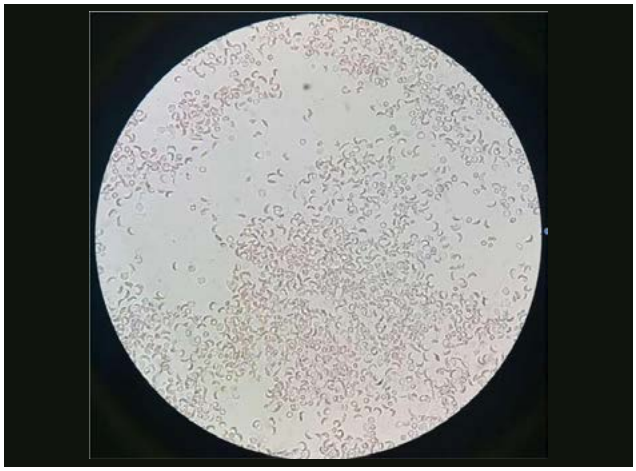


FIG 2: Sickling test (2% Sodium metabisulphite)

Hemoglobin Electrophoresis

Electrophoresis can be done in cellulose acetate at acidic or alkaline pH. Alkaline pH separates HbS from other hemoglobins such as Hb D and Hb G, which co-elutes with Hb S at acidic pH.

High Performance Liquid Chromatography (HPLC)

Hemoglobin HPLC or High-Performance Liquid Chromatography is the test of choice today to screen all hemoglobinopathies. It gives a correct estimate of HbA2 and HbF along with an HbS peak. The charge separates the hemoglobins. The stationary medium is negatively charged, and the mobile medium carries the hemolysate. Most positively charged hemoglobin is eluted last. The concentration of cations in the mobile phase gradually increases with an increase in pressure leading to elution of these positively charged hemoglobins. [Fig 3A, B]

Molecular analysis

Reverse Dot-blot, Restricted fragment length polymorphism (RFLP), and gene sequencing are the methods used to confirm the diagnosis.

Management

Science and treatment modalities are developing leaps and bounds. Within a few decades there has been an exponential change in patient management. But still we have not found a definite cure for sickle cell anemia.

There are four main treatment modalities available[12,13]

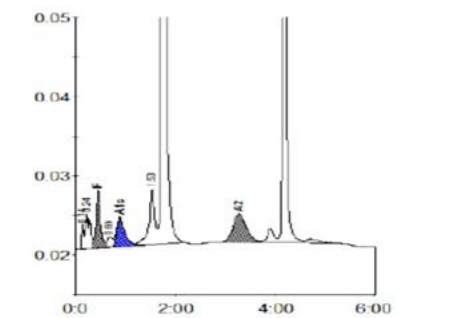
- Drug Treatment
- Blood Transfusions,
- Bone Marrow Stem Cell Transplantation
- Gene Therapy

The first two are useful in acute crisis and prevent complications and the last two modalities hope to give a disease-free survival to the patients.

Drug Treatment

Hydroxyurea which is a DNA-demethylating agent is the most effective drug found till now. Its mechanism of action pertains to induction of synthesis of HbF. 5-Azacytidine and decitabine were the first HbF-inducing agents to be tested as a therapeutic agent in patients with SCD.

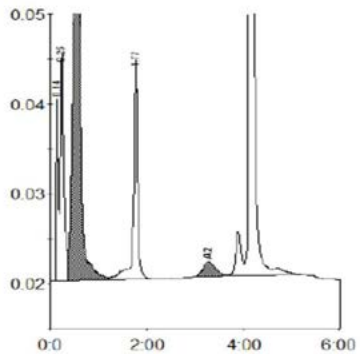
Figure 3: Chromatograms showing (A)Sickle cell trait (B) Homozygous Sickle cell anemia



Peak table - ID: RACK03-6-7-24-12-2018

Peak	R.time	Height	Area	Area %
Unknown	0.14	3117	6777	0.3
A1a	0.24	4483	29708	1.5
F	0.45	7205	41142	1.9
LA1c/CHb-1	0.69	1318	10227	0.5
A1c	0.88	3787	41418	4.6
P3	1.53	7011	57599	2.9
A0	1.72	287738	1255466	62.9
A2	3.26	3538	64011	3.9
S-Window	4.15	124571	490962	24.6
Total Area:		1997310		

Concentration:	%
F	1.9
A1c	4.6
A2	3.9



Peak table - ID: RACK03-8-9-24-12-2018

Peak	R.time	Height	Area	Area %
Unknown	0.14	21848	44834	2.1
A1a	0.25	25425	127641	6.0
F	0.55	56710	516295	27.9 *
A0	1.77	24400	134161	6.3
A2	3.26	1631	29396	1.7
S-Window	4.12	252376	1274115	59.9
Total Area:		2126443		

Concentration:	%
F	27.9 *
A2	1.7

People suffering from sickle cell disease undergo auto-splenectomy in the early years of their life. This is because of vaso-occlusion in the microvasculature of the spleen. Thus, they are susceptible to infection by capsulated organisms like pneumococcus. Specific prevention strategies are useful. Vaccinations are recommended for all infants and children. Painkillers and intravenous fluid are main pillars of management of pain crisis.

Blood transfusion

The indication is only during a painful crisis, not to correct anemia, but to relieve vaso-occlusion as during painful crisis, sickle cells causes vaso-occlusion resulting in tissue hypoxia. Transfusion helps by increasing functional red blood corpuscles and thus increase in oxygen carrying capacity of the blood. With supply of oxygen getting restored, pain subsides, thus, transfusions prevent strokes and hypersplenism. However, the hemoglobin should not be raised above 11 g%, as over-correction of anemia will lead to increased viscosity and sickling precipitation. Automated/ Manual red cell exchange can be done before proceeding for surgeries in sickle patients, so as to maintain HbS < 30%

Hematopoietic Stem Cell Transplant

Hematopoietic stem cell transplant is the best treatment available which promises a disease-free survival once engraftment occurs. Basic idea is to replace the patient's disease marrow by that of a normal marrow. Stem cells are collected from matched related or matched unrelated donors. The preferred method of stem cell is from peripheral blood by apheresis after adequate mobilization.

If the transplant is performed when the affected person is still young, then success rates can be as high as 90-95%. (Sickle Cell Society 2005).[13]

Gene Therapy

Gene therapy either addresses the defect and corrects it or silences the defective gene. This is still under evaluation and not readily available yet.

Caring for Patients with SCD in the Community Care Setting

"Prevention is better than cure"- This is the dictum of community-based approach. Our country has already initiated National Thalassemia Control Program. Indian patients predominantly have Arab Indian haplotype linked with their sickle gene which is associated with higher levels of fetal hemoglobin and mild clinical presentation. Therefore, there should be a better application of cheap tests like sickling and HPLC to screen the patients and carriers.[14,15,16,17]

a) The need of the hour is to increase awareness among the mass and to give proper health facilities to those already suffering from the disease.

b) Each PHC, at least in high prevalence areas, should be equipped with these basic facilities for screening the patients.

c) Pre-marital counselling, pre-pregnancy counselling, and proper ante-natal check-ups should be established.

d) Workers trained for counselling can be provided in each state as per the requirement.

e) The actual burden of the disease is still eluding as we are not aware of all the patients and carriers. So, a national registry can be initiated.

f) General physicians heading the PHCs especially in the high-density areas like Western Odisha should be educated about the SCD and its varied presentations.

g) Screening can be set-up at the community level in places like colleges before admission, offices before placement and screening in schools on a rotational basis.

h) Blood banks should be established and be well equipped with red cell exchange facilities.

i) Bone marrow transplant facilities should be improved.

Conclusion

Sickle cell anemia poses to be a major problem in India, particularly in Odisha. Adequate knowledge of pathophysiology and clinical symptom is important for the diagnosis and better management of the patients. Community based screening programs, pre-marital and pre-pregnancy counselling should be made an integral part of antenatal check-ups particularly in the regions with high prevalence of the disease.

References

1. Piel FB, Hay SI, Gupta S, Weatherall DJ, Williams TN. Global burden of sickle cell anaemia in children under five, 2010-2050: modelling based on demographics, excess mortality, and interventions. PLoS Med. 2013;10(7):e1001484
2. Williams TN, Weatherall DJ. World distribution, population genetics, and health burden of the hemoglobinopathies. Cold Spring Harb Perspect Med. 2012 Sep1;2(9):a011692.
3. Baruah MK, Saikia M, Baruah A. Pattern of hemoglobinopathies and thalassemias in upper Assam region of North Eastern India: high performance liquid chromatography studies in 9000 patients. Indian J Pathol Microbiol. 2014 Apr-Jun;57(2):236-43.
4. Nagar R, Sinha S, Raman R. Haemoglobinopathies in eastern Indian states: a demographic evaluation. J Community Genet. 2015 Jan;6(1):1-8.
5. Piel FB, Patil AP, Howes RE, Nyangiri OA, Gething PW, Williams TN,et al. Global distribution of the sickle cell gene and geographical confirmation of the malaria hypothesis. Nat Commun. 2010 Nov 2;1:104.
6. Sinha S, Black ML, Agarwal S, Das R, Bittles AH, Bellgard M. ThalInd. A β-thalassemia and hemoglobinopathies database for India: defining a model country-specific and disease-centric bioinformatics resource. Hum Mutat. 2011 Aug;32(8):887-93.
7. Collah, R, Khushnooma, I, Gorakshakar, A. Burden of thalassemia in India: The
8. Roadmap for control. PediatricHematology Oncology Journal .2017;2(4): 79-84.
9. Rao VR. Genetics and epidemiology of sickle cell anemia in India. Indian J MedSci. 1988 Sep;42(9):218-22.
10. Balgir RS. The spectrum of haemoglobin variants in two scheduled tribes of Sundargarh district in north-western Orissa, India. Ann Hum Biol. 2005 Sep-Oct;32(5):560-73.
11. Rees DC, Williams TN, Gladwin MT. Sickle-cell disease. Lancet. 2010 Dec 11;376(9757):2018-31.
12. Piel FB, Steinberg MH, Rees DC. Sickle Cell Disease. N Engl J Med. 2017 Apr; 20;376(16):1561-73.
13. Anand Kumar K, Radhakrishna N, Sachdeva A. Management of thalassemia in Indian perspective. In: Sachdeva A, editor. Thalassemia: National Guidelines for management of transfusion-dependent thalassemia and non-transfusion dependent thalassemia; 2014. 296-302.
14. Yawn BP, Buchanan GR, Afenyi-Annan AN, Ballas SK, Hassell KL, James AH,et al. Management of sickle cell disease: summary of the 2014 evidence-based report by expert panel members. JAMA.2014 Sep; 10;312(10):1033-48.
15. Collah R, Mehta P, Mukherjee MB. Newborn Screening for Sickle Cell Disease: Indian Experience. Int. J. Neonatal Screen. 2018; 4(4): 31.
16. Chatterjee T, Chakravarty A, Chakravarty S. Population Screening and Prevention Strategies for Thalassemias and other Hemoglobinopathies of Eastern India: Experience of 18,166 cases. Hemoglobin. 2015;39(6):384-8.
17. National Health Mission Guidelines on Hemoglobinopathies in India Prevention and control of hemoglobinopathies in India-Thalassemia, Sickle cell disease and other variant hemoglobins. Ministry of Health and Family Welfare, Govt of India; 2016.

CASE REPORT

Foot Gangrene following Dorsalis Pedis Artery Cannulation: Risk Versus Benefit of Arterial Cannulation in Polytrauma Patient

Ritesh Panda[1], Chitta Ranjan Mohanty[2]

[1]Assistant Professor, [2]Assistant Professor, Department of Trauma & Emergency (Plastic Surgery), Department of Trauma & Emergency (Anaesthesia), All India Institute of Medical Sciences, Bhubaneswar

Digital gangrene following arterial cannulation for invasive blood pressure monitoring is a dreaded complication. Radial artery is the preferred site for arterial cannulation but dorsalis pedis artery can be used in polytrauma patients when there are concomitant upper limb injuries. Though finger ischemia and gangrene following radial artery cannulation has been reported in literature, but gangrene of foot and toes following dorsalis pedis artery cannulation in adult is not yet reported. We are reporting a case of foot gangrene following dorsalis pedis artery cannulation in a patient of polytrauma with blunt trauma abdomen.

A 32-year old gentleman presented to our emergency department with polytrauma due to road traffic accident and sustained blunt trauma to abdomen with crush avulsion injury and multiple fractures of bilateral upper limbs. His vitals were Blood pressure - 108/56 mm Hg in lower limb, Pulse rate-132/min, Respiratory rate- 20/min, GCS-14/15, RTS (revised trauma score)- 7.841, ISS (injury severity score)- 75, TRISS(trauma injury severity score)-40.8% and FAST positive. Arterial blood gas analysis showed metabolic acidosis with lactic acidosis. Patient was intubated in emergency, right Internal Jugular Vein central line and left dorsalis pedis arterial cannulation was done due to fracture of bilateral upper limbs.

Intra-operative after giving laparotomy incision, there was sudden hypotension (BP- 76/34 mm Hg) which was managed with fluid and noradrenaline infusion. There was bowel perforation with peritonitis so thorough washout followed by closure with colostomy done. In the postoperative period, patient was kept in ICU for mechanical ventilation and vitals monitoring. In view of septic shock, noradrenaline support was continued. In the second postoperative day, patient developed patchy discoloration over dorsum of left foot, instep area and first 3 toes. Suspecting arterial thrombosis, arterial cannula was removed immediately and supportive treatment was started. The patient was in septic shock with coagulopathy (raised PT and INR), so heparin was

Figure 1: Discoloration over dorsum of left foot and medial three toes on POD 2 and tape residue over dorsum showing site of arterial cannulation.

Figure 2: Discoloration over plantar aspect of medial three toes, medial aspect of foot and instep area.

Address for Correspondence: *Dr. Ritesh Panda, Department of Trauma and Emergency, AIIMS Bhubaneswar-751019*
Email: tem_ritesh@aiimsbhubaneswar.edu.in

Received: *17/12/2018* ***Accepted:*** *29/12/2018*

avoided. Foot was covered and kept warm. Aspirin 100 mg/day OD and clopidogrel 75 mg/day was started. USG Doppler suggested pulsatile triphasic flow with normal flow velocities in CFA,SFA, popliteal artery, ATA and PTA and monophasic flow in dorsalis pedis artery. There was gradual progress of gangrene with demarcation and was limited to foot (figure1,2). Eventually patient succumbed to his injuries on POD 10. We suspect peripheral gangrene due to arterial thrombosis precipitated by low perfusion caused by high-dose vasopressors along with prolonged arterial cannulation as the causative factor.

Discussion: Peripheral gangrene is a rare devastating complication involving distal portions of two or more extremities simultaneously precipitated by low perfusion, high dose of inotropes, disseminated intravascular coagulation, and arterial cannulation. Radial artery cannulation for invasive blood pressure monitoring is the preferred site.[1] and dorsalis pedis artery cannulation preferred in polytrauma patient when there is concomitant upper limb injuries. Vascular complications from arterial cannulation are uncommon, factors that may increase risk include vasospastic arterial disease, previous arterial injury, thrombocytosis, protracted shock, high-dose vasopressor administration, prolonged cannulation, and infection.[2,3]

To conclude, we strongly recommend monitoring of limbs for signs of ischemia in patients with any of above risk factors in whom cannula has to kept for prolonged period and early removal of cannula when benefit is less than risk of keeping arterial cannula.

References

1. Mandel MA, Dauchot PJ: Radial artery cannulation in 1000 patients. Precautions and complications, J Hand Surg 2(6):482-485,1977.
2. Brzezinski M, Luisetti T, London MJ: Radial artery cannulation: acomprehensive review of recent anatomic and physiologic investigations,AnesthAnalg109(6):1763-1781, 2009.
3. Rehfeldt KH, Sanders MS: Digital gangrene after radial artery catheterization in a patient with thrombocytosis, Anesth Analg 90:45-46, 2000.

Public Health Updates (July -November 2018)

Dinesh P Sahu[1], Susmita Dora[1], Madhushree Acharya[1], Kavi Nila D R[1]
Pradnya Chandanshive[1], Akshaya R[1]

[1]*Junior Resident, Dept. of Community Medicine & Family Medicine, All India Institute of Medical Sciences, Bhubaneswar*

International

Events

The National Institute for Transforming India (NITI Aayog) provides critical knowledge, innovation and entrepreneurial support to the country. The NITI Aayog and the United Nations signed the Sustainable Development Framework (Government of India-UNSDF) for the year 2018-2022 in New Delhi on 28th Sep, 2018 in presence of 19 UN agencies. The Framework outlines the work of UN agencies in India to support the achievement of key development outcomes that are aligned to the national priorities. It marks a commitment towards attaining the Sustainable Development Goals (SDGs) and promotes "Sabka Saath Sabka Vikas"– development for all.[1]

According to the Human Development Report 2018, India ranks 130 in Human Development Index. The Human Development Index is a composite index measuring average achievement in three basic dimensions of human development- a long and healthy life (life expectancy at birth), knowledge (expected years of schooling and mean years of schooling) and a decent standard of living (Gross national income per capita).

BCG has been the only available vaccine against tuberculosis administered to neonates. It has beneficial effect in very young children but does not protect the adolescents and adults. A new vaccine for tuberculosis- M72/AS01E, developed by GlaxoSmithKline is the first vaccine to show more than 50% protection against development of TB infection in people. It is a subunit fusion protein vaccine derived from two M. Tuberculosis antigens (32A and 39A) with an adjuvant (AS01E) designed to provide protection against active TB.[2]

World Hepatitis Day was celebrated on 28th of July on the theme 'Test. Treat. Hepatitis'. WHO has launched a new online Global reporting system for hepatitis (GRSH). The data is entered through a web-based District Health Information System (DHIS) module located on the WHO integrated data platform.[3]

Reports

World Health Organization (WHO) Malaria Report for the year 2018 was published in the month of November. A total of 219 million malaria cases were reported in 2017 with 4,35,000 malaria deaths. The overall incidence has remained stagnant for the past 3 years around 59 per 1000 population though it has declined by 18% globally between 2010 and 2017 (72 to 59 cases per 1000 population at risk). Fifteen countries in sub-Saharan Africa and India carried almost 80% of the global malaria burden. Furthermore, the percentage of the population with access to an Insecticidal Treated Net (ITN) increased from 33% in 2010 to 56% in 2017, which was a marginal increase since 2016. In India, the coverage is less than 50%. The percentage of households with at least one ITN for every two people doubled to 40% between 2010 and 2017. The WHO South-East Asia Region continued to see its incidence rate fall from 17 cases of the disease per 1000 population at risk in 2010 to 7 in 2017 (59% fall). Paraguay was certified by WHO as malaria free in 2018 while Algeria, Argentina and Uzbekistan have made formal requests to WHO for certification. In 2017, China and El Salvador reported zero indigenous cases. To get the global malaria response back on track, a new country-driven approach – "High burden to high impact" has been launched with four key elements: - political will to reduce malaria deaths, strategic information to drive impact, better guidance, policies and strategies, and a coordinated national malaria response.[4]

A first-of-its-kind single dose Malaria drug- Tafenoquine (Krintafel), has been approved by FDA in over 60 years for the "radical cure" of Plasmodium Vivax malaria in patients aged ≥16 years. In an RCT that compared Chloroquine plus either Tafenoquine or Primaquine, the relapse-free efficacy rate at 6 months was similar- 67% with Tafenoquine v/s 72.8% with Primaquine. Tafenoquine is an 8-aminoquinoline derivative with activity against all stages of the Plasmodium vivax parasite lifecycle including hypnozoites, with a single dose of 300 mg. However, this medicine is contraindicated in G6PD deficient individuals.[5]

Address for Correspondence: *Dr. Dinesh Prasad Sahu, Junior Resident, Department of Community Medicine & Family Medicine, AIIMS, Bhubaneswar,* **E-mail:** dineshprasad.sahu@ yahoo.in

Received:*21/12/2018* ***Accepted:****30/12/2018*

There was an Ebola outbreak in the Democratic Republic of Congo (DRC) and it has been confirmed that the new Ebola outbreak is caused by the Zaire ebolavirus species. Health authorities in DRC have been instructed to use the ZEBOV vaccine. As of 14 December, 529 total cases (481 confirmed and 48 probable), including 311 deaths have been reported.[6]

Measles cases hit a record high in the European region. As high as 41,000 measles cases were reported in the WHO European Region in the first half of the year 2018. The highest annual number of measles cases between 2010 and 2017 was 23,927 for 2017, and the lowest was 5273 for 2016. Monthly country reports indicate at least 37 deaths due to measles. Serbia reported the highest number of 14 deaths. Ukraine saw the highest number of cases with over 23,000 people affected which accounts for over 50% of the Regional total.[7] On the other hand, nine countries were announced Measles free: Australia, Brunei Darussalam, Cambodia, Hong Kong SAR(China), New Zealand, Japan, The Republic of Korea and Singapore. Among these, five countries have also stopped transmission of Rubella: Australia, Brunei Darussalam, Hong Kong SAR(China), New Zealand, The Republic of Korea.[8] Intensified efforts towards immunization, disease surveillance and adoption of a regional strategy and plan of action led to this achievement.

National

Events

Since 1988 WHO has recommended that TT should be replaced by Td vaccine. National Technical Advisory Group of India (NTAGI), MoHFW has also recommended the replacement in India's immunization programme for all age groups including pregnant women. It is a combination vaccine of Tetanus and Diphtheria with lower concentration of Diphtheria antigen (d) as recommended for older children and adult. WHO and UNICEF highlight that replacement of TT with Td vaccine will boost the waning diphtheria immunity in addition to assuring tetanus protection.[9]

India got its first Quadrivalent Influenza Vaccine-FluQuadri®. It is India's first four-strain Influenza Vaccine for population aged above 3 years. It is manufactured in Swiftwater, USA. Sanofi Pasteur launched the FluQuadri in India on 23rd July. Currently majority of seasonal influenza vaccines are trivalent (two A strain and one B strain Victoria/Yamagata). Both B lineages have been consistently observed. It is a single dose vaccine with dose of 0.5 ml for adults and children above 3 years given intra-muscularly in the upper arm.[10]

Health Ministry issued a notification for bringing the HIV/AIDS Act 2017 into force from 10th September, 2018. The HIV and AIDS Prevention & Control Act 2017 safeguards the rights of people living with HIV (PLHIV) and affected by AIDS. It seeks to prevent and control the spread of HIV & AIDS, prohibits discrimination against PLHIV /AIDS. Court of a Judicial Magistrate First Class shall take cognizance of an offence under this Act. Penalty for contravention is imprisonment for 3 months to 2 years and with fine upto Rs. 1 lakh, or both.[11]

September was celebrated as Rashtriya Poshan Maah (National Nutrition Month). It marked the country's fight against malnutrition. Aim was to reach every household with message of nutrition- 'Har ghar poshan tyohar' (every house a celebration of nutrition). The target was to bring down stunting among children up to the age of 6 years from 38.4% (as per NFHS-4) to 25% by 2022.[12]

The Cabinet approved ASHA Benefit package w.e.f. 1st October with 2 components: ASHA and ASHA facilitators will be enrolled in social security schemes namely Pradhan Mantri Jeevan Jyoti Bima Yojana and Pradhan Mantri Suraksha Bima Yojana and an increase in routine incentives from Rs. 1000 per month to Rs. 2000/month. This is in addition to other task-based incentives approved at Central/State level. The Estimated beneficiaries are 10,22,265. Cabinet also approved an increase in the honorarium of AWW/AWH from Rs. 3,000 to 4,500 and Rs. 1,500 to 2,250 respectively.[13]

Guidelines

National Viral Hepatitis Control Program was released with a set of guidelines which are Operational Guidelines for National Viral Hepatitis Control Program, National Laboratory Guidelines for Viral Hepatitis Testing and National Guidelines for Diagnosis and Management of Viral Hepatitis and offering free drugs and diagnostics for hepatitis B & C. This initiative will provide laboratory testing and management of viral hepatitis with a decentralized approach. The goal of the program is to end viral hepatitis as a public health threat by 2030 in the country. The key strategies are: preventive and promotive interventions; awareness generation; safe injection practices and socio-cultural practices; sanitation and hygiene; safe drinking water supply; infection control and immunization; co-ordination and collaboration with different Ministries and departments; increasing access to testing and management of viral hepatitis; promoting diagnosis and providing treatment support; capacity building at national, state, district levels and sub-district level up to Primary Health Centres (PHC) and Health and Wellness Centres (HWC).[14]

Schemes

Ayushman Bharat scheme was launched on 25th September with aim to cover over 10 crore poor vulnerable families (over 50 crore beneficiaries). Coverage of up to Rs. 5 lakh per family per year which has a positive impact on reducing out-of-pocket expenditure. An Empanelled Health Care

Provider known as Arogya Mitra will be employed to provide support to the beneficiaries for the scheme.[15]

Regional

Events

WHO has appreciated Odisha for rapid reduction of malaria cases and has marked the state as a role model. There were 56 reported deaths in the period of July- Dec in 2016 which fell by more than two thirds to 16 in 2017 with an 85% reduction in deaths. It accounts for 40% reduction of total cases in India. The state attributes to IEC activities and Durgama Anchalare Malaria Nirakaran (DAMAN) scheme implemented in Dec 2016.[17] A month-long programme, Anemia Mukt Bharat/Odisha- a 'Test & Treat' campaign focussed on women of Reproductive age (15-49 years) and under-5 children was launched in collaboration with State National Health Mission and UNICEF as a part of 'Poshan Maah'. AIIMS New Delhi was the Nodal Centre along with six peripheral AIIMS conducting the 'Test and Treat Anemia' campaign. People identified to be mild/moderate anemic were provided oral IFA supplementation and counselling and those found to be severely anemic were referred for management at higher centres. The strategy focussed on testing & treatment of anemia in school going adolescents & pregnant women using newer technologies like Haemocue 301, establishing institutional mechanisms for advanced research in anemia and a comprehensive communication strategy including mass/media communication material. A web-portal-anemiamuktbharat.info has been developed as part of the monitoring mechanism of the strategy. It will provide survey data on anemia across beneficiary groups, target prevalence of anemia as per POSHAN Abhiyan and quarterly HMIS based reporting of programme implementation coverage up to the district level.[17]

References

1. NITI Aayog and United Nations in India sign Sustainable Development Framework for 2018-2022. UN India. [last accessed 16 Dec, 2018]. Available from: http://in.one.un.org/un-press-release/niti-aayog-and-united-nations-in-india-sign-sustainable-development-framework-for-2018-2022/
2. India ranks 130 on 2018 Human Development Index | UNDP in India. UNDP. [last accessed 16 Dec, 2018]. Available from: http://www.in.undp.org/content/india/en/home/sustainable-development/successstories/india-ranks-130-on-2018-human-development-index.html
3. WHO | Global reporting system for hepatitis. WHO. [last accessed 16 Dec, 2018]. Available from: http://www.who.int/hepatitis/reporting-database/en/
4. WHO | World malaria report 2018. WHO. [last accessed Dec 28, 2018]. Available from: http://www.who.int/malaria/publications/world-malaria-report-2018/en/
5. WHO | GSK's Investigational Vaccine Candidate M72/AS01E shows promise for prevention of TB disease in a Phase 2b trial conducted in Kenya, South Africa and Zambia. WHO. [last accessed 16 Dec, 2018]. Available from: http://www.who.int/tb/features_archive/vaccine-phase2b-trial-tb/en/
6. Ebola | Ebola situation reports: Democratic Republic of the Congo. WHO. [last accessed 16 Dec, 2018]. Available from: http://www.who.int/ebola/situation-reports/drc-2018/en/
7. Measles cases hit record high in the European Region. 2018 [last accessed 16 Dec, 2018]. Available from: http://www.euro.who.int/en/media-centre/sections/press-releases/2018/measles-cases-hit-record-high-in-the-european-region
8. World Health Organization, DPR Korea, Timor-Leste eliminate measles, six countries in WHO South-East Asia achieve rubella control. SEARO. [last accessed 16 Dec, 2018]. Available from:http://www.searo.who.int/mediacentre/releases/2018/1693/en/
9. Guide_to_TT_to_Td_Replacement_Final_28June2018.pdf. [last accessed 16 Dec, 2018]. Available from: https://www.who.int/immunization/diseases/tetanus/Guide_to_TT_to_Td_Replacement_ Final_28June2018.pdf
10. Press-Release--FluQuadri_India_Press-Release.pdf. [last accessed 16 Dec, 2018]. Available from: https://www.sanofi.in/-/media/Project/One-Sanofi-Web/Websites/Asia-Pacific/Sanofi-IN/Home/Media/press-release/2018/Press-Release-- FluQuadri_India_Press-Release.pdf
11. Delhi September 11 I in N, September 11 2018 UPDATED:, Ist 2018 16:09. Health ministry finally implements HIV/AIDS Act 2017: All you need to know. India Today. [last accessed 16 Dec, 2018]. Available from: https://www.indiatoday.in/education-today/gk-current-affairs/story/health-ministry-finally-implements-hiv-aids-act-2017-all-you-need-to-know-1337619-2018-09-11
12. Rashtriya Poshan Maah | National Health Portal Of India. [last accessed 16 Dec, 2018]. Available from: https://www.nhp.gov.in/rashtriya-poshan-maah_pg
13. Cabinet approves ASHA Benefit Package. [last accessed 16 Dec, 2018]. Available from: http://pib.nic.in/newsite/PrintRelease.aspx?relid=183557
14. National Viral Hepatitis Control Program (NVHCP) | National Health Portal Of India. [last accessed 16 Dec, 2018]. Available from: https://www.nhp.gov.in/national-viral-hepatitis-control-program-(nvhcp)_pg
15. Home | Ayushmaan Bharat. [last accessed 16 Dec, 2018]. Available from: https://www.pmjay.gov.in/
16. Bureau OST. Odisha ranked second in AMRUT, OPD services | OdishaSunTimes.com. [last accessed 16 Dec, 2018]. Available from: https://odishasuntimes.com/odisha-ranked-second-in-amrut-opd-services/
17. Anemia Mukt Bharat. [last accessed 16 Dec, 2018]. Available from: https://anemiamuktbharat.info/dashboard/#/
18. pmjdy. Biju Swasthya kalyan Yojana Odisha (BSKY). PM Jan Dhan Yojana. [last accessed 16 Dec, 2018]. Available from: http://pmjandhanyojana.co.in/biju-swasthya-kalyan-odisha-naveen-care-health-insurance-scheme

Lepromatous Leprosy with Erythematous Nodosum Leprosum: A Public Health Challenge

Dinesh Prasad Sahu[1], Prajna Paramita Giri[2], Debjyoti Mohapatra[3]
Binod Kumar Behera[2], Sonu H Subba[4]

[1]Junior Resident, [2]Assistant Professor, [3]Senior Resident, [4]Professor, Department of Community Medicine & Family Medicine, All India Institute of Medical Sciences, Bhubaneswar

Introduction:

Leprosy, a chronic systemic granulomatous disease caused by Mycobacterium leprae is eradicated from India since 2005.[1] It was possible due to the wide spread use of MDT (Multidrug Therapy). Currently the disease prevalence is 0.66 per 10,000 populations. But still a considerable number of new cases of leprosy are being detected every year in our country. Odisha is one of the states where this disease is still prevalent. The annual new case detection rate of leprosy for Odisha in 2017 was 22.13 per lakh population, which was only below that of Chhattisgarh and Dadra and Nagar Haveli.[2] It is transmitted from person to person by aerosol. It can also spread through contact with ulcerated skin of bacteriologically positive cases of leprosy. Majority of the cases of leprosy can be diagnosed clinically by eliciting cardinal signs. However, few cases don't manifest visible skin patches or nodules but may present with skin changes like redness, swelling and mild thickening of skin.[3] Such cases with infiltration of the skin are generally multi-bacillary with positive skin smears. In these cases, skin slit smear helps in confirmation of diagnosis. Some of the cases of leprosy presents with thickening of peripheral nerves and with sensory and motor impairment along the course of the nerve.

Case Report

A 43 years old male, a native from Nayagarh district of Odisha, staying alone in an urban slum of Bhubaneswar for last 15 years whose family members were staying in their maternal village. The patient was a construction worker by profession, but was not working since the disease onset.

At the time of presentation to the primary health care centre, the patient had symptoms of multiple joints pain (ankle, wrist and knee), multiple infiltrative patches all over the body, ichthyotic patches over bilateral legs and ulcer over left lateral malleolus.

On eliciting the history, the authors came to know that, the patient was a known case of Lepromatous leprosy and was on MDT for the last seven months. At the onset of the disease, the patient had nasal stuffiness for 2 months, epistaxis for one-month, bilateral knee, ankle and wrist joint pain for last 2-3 months. It was associated with intermittent fever. There was restricted movement of the joints with swelling. The patient had no known allergies and was not using any tobacco products or alcohol. For the first two months he did not seek healthcare, thinking of it as not serious. As the symptoms persisted, the patient went to a private medical college hospital in Bhubaneswar where slit skin smear was done.

Slit skin smear

Slit skin smear for Acid fast bacilli was done from four different sites namely left ear lobe, right ear lobe, forehead and right elbow. Solid uniformly stained bacilli were seen in all the four sites and bacteriological grading was found to be 3+, i.e. averagely 1-10 bacilli were seen each oil-immersion field. The overall bacteriological index of the patient was also found to be 3+ from all sites collectively. Histopathology from the right elbow showed thinned out keratinised stratified squamous epithelium with underlying dermis, spindle shaped cells arranged in bundles and fascicles mainly surrounding the dermal appendages infiltrating the subcutaneous fat. These features were compatible with Histioid Hansen's disease.[4]

General physical examination

The patient was conscious and oriented. His skin was found to be dry and sclerotic with decreased sweating. He had no dysphagia for solid and liquid foods. Local lymph nodes were not enlarged. The patient was found to have diffuse infiltration over back, face with shiny wrinkled skin and bilateral ear lobe infiltration. Eye brows and eye lashes of both sides were lost. An ill-defined erythematous

Address for correspondence: *Dr Prajna Paramita Giri, Assistant Professor, Department of Community Medicine & Family Medicine, All India Institute of Medical Sciences, Bhubaneswar.* **Email:** prajnaparamita.giri@gmail.com
Received: *20/12/2018,* ***Accepted:*** *31/12/2018*

patch was seen with shiny and wrinkled skin over right elbow with intact sensation. Ichthyotic skin was seen over bilateral lower extremities with pigmentation and shiny surface. On peripheral nerve examination, bilateral ulnar nerves, bilateral common peroneal nerves and bilateral posterior tibial nerve were thickened and tender. All other nerves were not thickened and non tender. Mild sensory loss was seen over the ichthyotic area, and there was no glove and stocking pattern of loss of sensation. An ulcer was seen over left lateral malleolus.

Diagnosis

The symptoms were in accordance with type II lepra reaction i.e. (ENL) Erythema Nodosum Leprosum. The possible differential diagnosis could be tuberculosis, streptococcal and viral infections, and sarcoidosis, but were ruled out as the lesions in these above conditions persist for more than seven days in these conditions, where as it doesn't last for more than 2-3 days in ENL.

Treatments

The patient was on Multi-drug therapy with Dapsone, Clofazimine and Rifampicin. In view of the ENL, Methyl prednisolone was started and the dose was tapered over six month. But the inflammatory symptoms of ENL did not subside. In the subsequent visits the patient was prescribed Thalidomide. Paracetamol and Calcium were given for symptomatic management and Pantoprazole was given to the patient to reduce hyper-acidity due to the steroid therapy. Even after seven months of treatment, the inflammatory symptoms persisted. The patient was taking treatment for the first seven months from the private hospital. Then the patient consulted a dermatologist in a primary health centre.

The patient then continued MDT under National Leprosy Eradication Programme (NLEP) and Prednisolone was started for ENL according to the treatment guidelines in the PHC. After a month of treatment with Prednisolone the inflammatory symptoms resolved and no more new erythematous patches developed. The further treatment plan included continuation of MDT and tapering the steroid therapy as per recommendations. If the symptoms would not relieve, steroid with Clofazimine could be considered for ENL. The patient was advised for self care to assess the sensory loss.

Discussion

ENL can occur before the start of treatment, during treatment, or after the treatment has been completed. It can be mild or severe. If the peripheral nerves or eyes are affected the reaction is considered to be serious. Lepra reactions are mostly diagnosed by clinical examination. Inflammatory changes in skin lesions or appearance of new lesions, patches or nodules with acute onset, can be considered as lepra reaction. In this case, the patient had nerve involvement, inflammatory changes in skin lesions and constitutional symptoms like fever and joint pain.

MDT under NLEP is given free of cost. But this patient had to bear catastrophic expenditure for the treatment as he was taking treatment from the private hospital. The financial burden forced the patient to keep his family away from him in his native village. The patient's compliance for the treatment and healthcare seeking was good, that was evident from the prescription. Drug intake could not be monitored as the patient was not registered under NLEP in the first eight month of the treatment. The patient should have been referred to the government facility for MDT by the treating doctor of the said Private Medical College

instead of asking the poor patient to purchase medicines. The patient was also missed during the recent active case detection campaign of leprosy, which was on 2nd Oct 2018.[5] This may be considered the failure of health system and the robustness of national programme like NLEP.

Steroid therapy started for the treatment was not according to the dose recommended and the duration was also longer, which could have manifested as side effects like, gastric ulcer, secondary infections, fungal infections, osteoporosis, secondary cataract and moon face. Total duration of recommended steroid therapy is 12 weeks.[6]

This case was different from other published cases in terms of failure of the health system to provide affordable healthcare to the patient and the lower level of awareness on the part of the patient about the availability of government facilities and particularly of NLEP.

Impact of leprosy at individual level has physical, psychological, social and economic effects.[7] Financial assistance is only given to those with visible deformity and persons availing reconstructive surgery. No supports are provided to those who lose their wages and become economically handicapped. In this case, the patient had not been working for last nine months due to the disease and been economically handicapped. As the new cases of leprosy are deceasing and the person's with disability are limited with complete MDT treatment, focus should be shifted to keep these patients in mainstream by empowering the patients.[8]

Conclusion

As the case load of leprosy is decreasing, the health system & the programme directed for the control/ elimination/ eradication of leprosy are becoming lax. Thus, many new cases are missed in the community. These cases may act as trigger for resurgence of the leprosy. So the government health care system should have robust technology for early detection and registration of the new cases under the national programme.

References:

1. Annual Report 2007. [Internet]. [cited 2018 Dec 25]. Available from: http://nlep.nic.in/pdf/Annual_Report2007_08.pdf
2. NLEP annual report 2016 - 2017. Central Leprosy Division. Directorate General of Health Services. Ministry of Health and Family Welfare, GOI. 2017.
3. National Leprosy Eradication Program Disability Prevention & Medical Rehabilitation Guidelines for Primary , Secondary and Tertiary Level Care. Central Leprosy Division. 2012.
4. Sehgal V, Srivastava G, Singh N, Prasad P. Histoid leprosy: the impact of the entity on the postglobal leprosy elimination era. Int J Dermatol. 2009;48:603–10.
5. NLEP: Sparsh Leprosy Elimination Campaign. Central Leprosy Division. Ministry of Health and Family Welfare. 2018.
6. Treatment of Lepra Reaction [Internet]. WHO Model Prescribing Information: Drugs Used in Leprosy. [cited 2018 Dec 25]. Available from:http://apps.who.int/medicinedocs/en/d/Jh2988e/6.html#Jh2988e.6
7. Guidelines for the Social & Economic Rehabilitation of People Affected by Leprosy. ILEP, London. 1999.
8. WHO Guideline for strengthening participation of persons affected by Leprosy in Leprosy Service;2011; https://www.who.int/lep/resources/B4726/en/ Accessed on 25th Dec 2018

Instructions for Authors

About the Journal and its scope

Indian Journal of Community and Family Medicine (IJCFM) envisaged during the Community and Family Medicine Conclave held in the National Institute of Health & Family Welfare, New Delhi in December 2013. Approved by the Ministry of Health & Family Welfare, Government of India, it reflects the commitment to promote research and improve health care.

Objectives of the journal

1. To promulgate high quality research carried out in the institutes of national importance.
2. To provide a platform for disseminating information, ideas and innovative developments in the field of Family Medicine and Community Medicine.
3. To serve as an important and reliable source of information for the health professionals, decision makers as well as the general population.
4. To build a strong scientific base for both clinical and public health practices and policies.

IJCFM will to cater to the needs of

1. Medical Officers at various levels of health care institutions
2. Faculty members of medical colleges
3. Policy makers at state and national level
4. Functionaries of the National Health Mission
5. Consultants in hospitals and institutions
6. Researchers in academic and other institutions
7. Junior and Senior Residents
8. Non-governmental and international organizations
9. Private practitioners
10. Medical Students

The journal will endeavour to encompass all fields of community medicine and family medicine. It will include original research relevant to the practice of medicine at primary care level and public health. There will be case reports that will be relevant to medical officers in general practice. It will also cover the latest diagnostic and treatment guidelines for communicable and non-communicable diseases. The section on health policy initiatives can be a forum for disseminating programmatic policies. It will include interviews with doyens of community and family medicine for them to share their vision for healthy nations. It will also strive to share the success stories from various parts of the country and the world, which will serve as inspiration for the readers. The aim will be to range from empowering medical officers at a primary health centre to enrich and inspire the accomplished researchers in academic institutions.

Types of articles

1. Editorial (by invitation)
2. Review articles
3. Original research
4. Short Communication
5. Case reports
6. Perspective
7. Current Updates
8. Continuing Medical Education
9. Book Review
10. Interviews (by invitation)
11. Health policy initiatives (by invitation)
12. Correspondence/ Letter to editor
13. News and events
14. Public Health Success stories
15. Student/Medical Residents corner

Preparation of Manuscripts

Manuscripts must be prepared in accordance with "Uniform requirements for Manuscripts submitted to Biomedical Journals" developed by the International Committee of Medical Journal Editors (October 2006). Strict guidelines regarding authorship criteria and ethics should be followed.

There should be uniformity of format with equal 2.54 cm margins on all the sides. First lines of the paragraphs should **not** be indented. Font should be Times New Roman, size 12, pages should be justified, double spaced with page numbers on the bottom right corner. Each section should start in a new page. Manuscript should be written in British English.

Cover page: This should contain the title, running title, category of article, authors names and affiliations (not degrees), institution name and address, key words, number of words in abstract and main text, number of tables and figures, source of fund and conflict of interest.

Abstract: for research communication, should be of 250 words and structured as Background, Methods, Results & Conclusion. However it may not be structured in review article, CME, perspectives or health policy initiatives.

Introduction: should be short, specific, relevant and justify the study objectives.

Methods: should talk about all components of research including study design, study participants, study tools and statistics. There should be clear mention of the institutional ethics board approval and informed consent form. For clinical trials, registration number, and where the trial is registered should be mentioned.

Result: Text should not repeat the information in the tables and figures. Figures and tables should be serially numbered, separately in Arabic numbers. It should be in logical sequence and should not consist of inferences.

Discussion: should be in relation to the findings of the study, in view of prevailing situations/conditions or results of other researchers. Results should not be repeated here. Recommendations should be included along with limitations of the study in this section.

Conclusion: should be based on the study findings and comprise of salient points.

References: Listing of references should be in Vancouver style. After six authors, et al should be used. Citation within the text should be in superscript at the end of the sentence. Unpublished work should not be used for reference. Do **not** type the numbers but use bullets for numbering the references. Webpage citations should be accompanied by URL and citation date in parenthesis.

Tables and figures: Tables & figures should be made in Excel and then pasted into word. They should feature after references. Each should be in a new page. Figures should not be in colour. There should be a maximum of three tables and three figures.

Photographs: can be black and white or coloured in jpg/jpeg and TIF/TIFF formats

Word Limits

Original article (Maximum 4000 words)

Review articles: should be structured with relevant headings, which should include background and conclusion. (Maximum 3000 words)

Short Communication (Maximum 2000 words)

Updates & Perspectives (Maximum 1500 words): This will encompass the recent clinical guidelines, updates in the national programmes, opinions and viewpoints toward important clinical, health programmes, educational, policy issues.

Case report (Maximum 1000): They should be reflective of the types of cases seen by a general practitioner or a family physician.

Continuing Medical Education: 2000 words

Book Review/Public Health Success stories/Resident or student corner (Maximum 1000)

Clinical Trial registration

All clinical trials should have been registered in the relevant Clinical Trial Registry to be accepted for publication. Clinical Trial number and date of registration should be clearly mentioned. An unregistered or retrospectively registered trial will not be considered for publication.

Units

Système international units should be used throughout the text.

Drugs

Whenever drugs are mentioned, generic names should be used except when proprietary brands are used. In latter case, first the generic name should be used with manufacturer's name in parenthesis, then the trade name can be used in rest of the manuscript.

Abbreviations

Only well known and accepted abbreviations may be used in the manuscript. Whenever an abbreviation is used for the first time, it should be written in full with abbreviation in parenthesis. Thereafter it can be written as such in rest of the text.

Conflict of interest

Any conflict of interest should be clearly mentioned; whether it be personal, professional or funds are involved.

Funding

Source of funding should be clearly mentioned

Plagiarism

Every manuscript submitted will undergo plagiarism check and if found to be plagiarized, will be either rejected or returned to the authors for amendment, depending upon the quality of the work and the extent of plagiarism.

Authorship

Only those individuals who qualify for authorship should be included in the authors list. They should have made substantial contribution to the article and there should be no gift authorship.

Acknowledgement

Acknowledgment should be given at the end of the manuscript before the references. Those individuals who helped in the research but do not qualify for authorship should be thanked in this section.

Not published previously/submitted elsewhere

The manuscripts will be received, subjected to editorial & peer reviews and accepted for publication on the premise that it has not been published previously nor is it submitted elsewhere for publication.

Copyright

Copyright of the published articles shall lie with the journal and authors will transfer the copyright of their published articles to the journal when they submit the manuscript. Authors will be provided with a copy of the issue in which their article is published. Reproduction of the published material shall require permission of the journal office and acknowledgment.

Please e mail your manuscript to:

ijcfm2015@gmail.com

Forthcoming Events

01 14th International Conference on Vector and Vector Borne diseases is scheduled to be held between 9th -11th Jan 2019. Details can be assessed from: http://www.navbd.org/icov-14/

02 63rd Annual National Conference of Indian Public Health Association is scheduled to be held at Rangaraya Medical College, Kakinada, Andhra Pradesh between 31st Jan -3rd Feb 2019. Details can be assessed from: http://www.iphacon2019.com/

03 4th International Conference on Occupational & Environmental Health is scheduled to be held at Lady Hardinge Medical College, New Delhi between 15th-17th February, 2019. Details can be assessed from: http://conferenceoeh.com/

04 3rd International Conference on Climate Change is schedule to be held at Kuala Lumpur Malaysia between 21st-22nd Feb, 2019. Details can be assessed from: https://climatechangeconferences.com/

05 46th Annual National Conference of Indian Association of Preventive & Social Medicine & International Symposium on National Health Protection Mission is scheduled to be held at IGMC, Shimla, and Himachal Pradesh between 8th–10th March 2019. Details can be assessed from: https://iapsmcon2019.com/

06 2nd International Conference on Public Health Nutrition is schedule to be held at Kuala Lumpur, Malaysia between 19th-20th Mar 2019. Details can be assessed from: http://publichealthconferences.co/

07 2nd Global Public Health Conference is schedule to be held at Rotterdam, Netherland between 25th-26th March, 2019. Details can be assessed from: https://globalpublichealth.conferenceseries.com/

08 2nd International Conference on Public Health, Epidemiology & Nutrition is schedule to be held at Milan, Italy between 15th-16th Apr 2019. Details can be assessed from: http://publichealthcongress.alliedacademies.com/

09 3rd World Congress on Public Health & Health care Management is schedule to be held at Dubai between 19th-20th Apr, 2019. Details can be assessed from: https://www.emedevents.com/c/medical-conferences-2019/3rd-world-congress-on-public-health-and-health-care-management

10 5th International Conference on Public Health is scheduled to be held at Kuala Lumpur Malaysia between 10th-12th July, 2019. Details can be assessed from: https://publichealthconference.co/

11 6th Annual Public Health Conference is schedule to be held at Bangkok, Thailand between 11th-13th Jul 2019. Details can be assessed from: http://www.publichealth-conference.org/

12 WONCA World Rural Health Conference is schedule to be held at Albuquerque, New Mexico between 12th-15th Oct 2019. Details can be assessed from: https://www.ruralhealthweb.org/events/event-details?eventId=1031

Institutions/ Organisations are requested to send the information about forthcoming events (conferences, workshop, seminars, etc.) to the Editor in Chief, IJCFM at ijcfm2015@gmail.com. These will be published in subsequent issues for wider dissemination

Editorial Office

Department of Community and Family Medicine

All India Institute of Medical Sciences, Bhubaneswar, Odisha-751019

Under The Aegis of

Ministry of Health & Family Welfare

Government of India

Submit your articles for consideration of publication to:

ijcfm2015@gmail.com

Design & Printed by: Siva Prasad Patra (Bindu Creative, 09438668784, 7008575985)

ISSN 2395 -2113 (Print)

Indian Journal of Community & Family Medicine

Content