Volume 7 • Issue 2 • July-December 2021

ISSN: 2395-2113
E-ISSN: 2666-3120

Indian Journal of Community and Family Medicine

www.ijcfm.org

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ISSN: 2395-2113
E-ISSN: 2666-3120

Indian Journal of Community and Family Medicine

Volume 7 | Issue 2 | July-December, 2021

Indian Journal of Community and Family Medicine

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Indian Journal of Community and Family Medicine, a publication of AIIMS Bhubaneswar, Department of Community Medicine and Family Medicine, is a peer-reviewed biannual journal. The journal's full text is available online at http://www.ijcfm.org. The journal allows free access (Open Access) to its contents and permits authors to self-archive final accepted version of the articles on any OAI-compliant institutional/ subject-based repository.

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Index Medicus for South East Asia Region (IMSEAR), Indian Science Abstracts.

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Under The Aegis of
Ministry of Health & Family Welfare
Government of India

Published by

Wolters Kluwer India Private Limited
A-202, 2nd Floor, The Qube, C.T.S. No.1498A/2 Village
Marol, Andheri (East), Mumbai - 400 059, India.
Phone: 91-22-66491818
Website: www.medknow.com

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Too little too late? Or a small step in the right direction? - Cancer screening in India

For the first time in India, National Family Health Survey-5 (NFHS-5) report has a new section on cancer. The data are on the percentage of the population aged 30–49 years who have ever undergone screening for cancer.[1] It focuses on three cancers: cervical, breast, and oral cancer for women and oral cancer for men. The screening coverage for these cancers is presented separately for urban, rural, and total populations for 23 states/union territories (UTs). It is a positive change, considering the trend of cancer in India. In 2020, more than 13 lakh new cases occurred, and more than 8.5 lakh people died due to cancer.[2] There has been a steady rise in the incidence and mortality due to cancer in India in the past decade.[3] The changing demographics, epidemiological transition, acculturation, and alteration of lifestyles have all contributed to the rise in noncommunicable diseases, including cancers in India. This warrants a robust program to decrease the cancer burden in the country.

However, NFHS-5 data on the cancer screening situation in India looks grim. The highest percentage of the eligible population covered by screening for any cancer was 10.1%, with one-tenth of eligible women in Andaman and Nicobar Islands screened for oral cancer. The state with the highest percentage coverage for cervical and breast cancer screening was Mizoram, with 6.9% and 2.7% women screened, respectively, for these cancers. For oral cancer, the highest was 6.3% in Andaman and Nicobar Islands. At the other end of the spectrum was no man screened for oral cancer in Lakshadweep and Ladakh, and only 1% of women screened for breast cancer in Gujarat and Sikkim. Cervical cancer screening was 4.7% in Andhra Pradesh and 4% in Kerala in the second and third place. The second-highest coverage for breast cancer was 2.6% in Andaman and Nicobar Islands, followed by 2.4% in Kerala. After Andaman and Nicobar Islands, the next highest coverage for oral cancer screening among women was in Andhra Pradesh at 7.3%, followed by 2.5% in Telangana. For oral cancer screening among men, Sikkim was second with 4%, followed by Andaman and Nicobar Islands at 3.8%. Cervical and breast cancer screening were higher in urban areas than rural in all the states/UTs, except in Andhra Pradesh, Andaman and Nicobar Islands, Telangana, Sikkim, and Jammu and Kashmir. Cervical and breast cancer screening were also higher in rural areas of West Bengal and Ladakh, respectively. Similarly, oral cancer screening was higher among urban women in all the states, except in Andaman and Nicobar Islands, Jammu and Kashmir, and Ladakh. However, oral cancer screening among men was higher in rural areas in a greater number of states, namely Andaman and Nicobar Islands, Gujarat, West Bengal, Maharashtra, and Karnataka, though, in some of them, the difference was narrow [Figure 1].

The National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases, and Stroke (NPCDCS) has cancer screening as essential component. It lays down guidelines for screening eligible men and women for different cancers.[4,5] Yet, the NFHS-5 data reveal that NPCDCS has not taken off in any state. With a maximum coverage of 10% for oral cancer screening among women in any state, the situation is grossly deficient. There is an asynchrony between what is required and what is happening on the ground. NPCDCS strategies notwithstanding, there are several paradoxes to the cancer screening besides the performance not matching the need. Oral cancer is the most common cancer among men and more common among men than women, i.e., 16.2% versus 4.6%;[2] however, the highest percentage of women and men screened for oral cancer in the best state was 10% and 6.3%, respectively. Even in most other states, oral cancer screening was just marginally better among men, which believes that men are more at risk of tobacco-related cancers. Tobacco smoking and chewing are more common among men in India, hence the higher risk, but their screening for oral cancer does not reflect the epidemiology.[6] Another paradox is the abysmally low level of breast cancer screening when it is the most common cancer in either sex and among women.[2] The best state had screened only 2.7% of the eligible women for breast cancer, and two states had zero screening. Cervical cancer screening is one of the earliest known methods with proven benefits, yet its coverage was no better than other cancers. Almost all cancers were screened more often in the urban areas, including cervical cancer, which should have been more in the rural areas.

The NFHS-5 data should be a wake-up call for the policymakers in the country that all is not well and that measures need to be

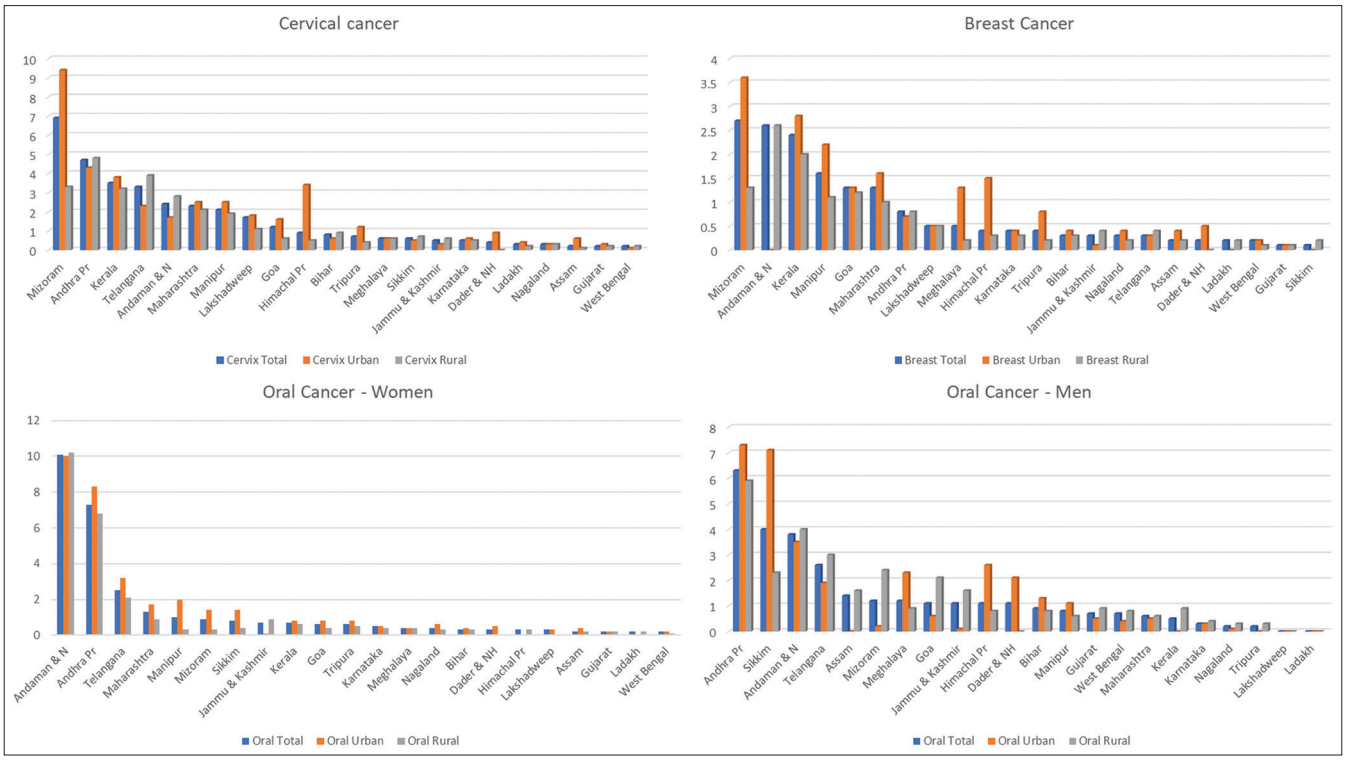

Figure 1: The urban–rural difference in screening for different cancers

taken urgently to improve cancer screening. Implementation of NPCDCS must be strengthened in all the states/UTs. Strategic planning is required to implement cancer screening after taking into consideration the epidemiology and resources. Situational analysis needs to be undertaken to find the reason for inadequate implementation and nonutilization of cancer screening services. However, it is not merely the policymakers who need to take it as a wake-up call, but all stakeholders should own responsibility and contribute their part. It has been observed that even the medical community of doctors and nurses in India does neither undergo cancer screening nor advise their family members.[7] Their knowledge and attitude have been found wanting, which hamper the service utilization by the rest of the population. The medical curriculum should place adequate emphasis on cancer screening and prevention. The department of community medicine in all the medical colleges should conduct a preventive oncology clinic in coordination with the departments of obstetrics and gynecology, surgery, pathology, radiodiagnosis, and dentistry. They should do the primary screening and refer the positive cases to respective departments for management. The peripheral centers attached to the department of community medicine should also conduct preventive oncology clinics. In remote areas, mobile screening vans can also be utilized. Along with information, education, and communication activities that should help improve awareness, every medical professional can propagate the message. Along with these, the cancer survivors who benefitted from screening can champion the cause of cancer screening, which might be more effective for those who are less inclined to accept it. These should work to increase the demand for cancer screening services. NFHS-5 data reveal that too little is being done after so many years, yet it can also be taken as a step in the right direction; at least, now, we have started acknowledging the component. Any disease control is a multipronged effort, and all stakeholders should fulfill their role. There is a need for the government and the community to join hands and act to improve cancer screening. Should this succeed, NFHS-6 may have much better statistics that should have translated into a better detection rate, management, and survival for the patients.

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Access this article online

Quick Response Code:

Website: www.ijcfm.org

DOI: 10.4103/ijcfm.ijcfm_99_21

How to cite this article: Subba SH. Too little too late? Or a small step in the right direction? - Cancer screening in India. Indian J Community Fam Med 2021;7:71-3.

Perspective

Neuropsychiatric aspect of social isolation following a lockdown: A perspective

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Abstract

Coronavirus disease 2019 pandemic spreads through inhalation of aerosols or droplets. Therefore, the use of face masks, alcohol-based sanitizers, and most importantly practicing quarantine/ isolation and social distancing are the main modalities for its prevention and control. Although isolation is essential, various psychological effects have been implicated with its practice in most of the age groups. Longstanding isolation and negligible interpersonal interactions can have changes in psychological processes and neurological and morphological changes in the brain. Morphological changes as seen through the neuroimaging studies include reduced volume of the structures involved in the synthesis of various nerve growth factors leading to impaired neurogenesis and subsequently psychological changes which can manifest as mood alterations such as anxiety, depression, feeling demoralized, obsessive thinking, and altered sleep–wake cycles besides others especially, in the vulnerable age groups such as children and the elderly. Although quarantine remains the cornerstone to contain the spread of the pandemic, its psychological impact run simultaneously, which should be, understood, and addressed to ameliorate its long-term impact.

Keywords: At-risk population, coronavirus disease 2019, psychological impact, social isolation

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Submitted: 30-Dec-2020 **Accepted in Revised Form:** 08-Nov-2021 **Published:** 24-Dec-2021

INTRODUCTION

Coronavirus disease 2019 (COVID-19) pandemic continuing till date, affecting more than 240 million people globally with a confirmed casualty of more than 5 million.[1]

The novel coronavirus is thought to spread through interpersonal contact primarily by inhalation of droplets through the nose and mouth into the lungs of the patient. A person while manifesting symptoms is thought to be most infective. The virus seems to be spreading easily and sustainably in the community (community spread) in most geographic regions of the world.[2]

Access this article online	
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	DOI: 10.4103/ijcfm.ijcfm_148_20

Many drugs/vaccines are being tested for the purpose of treatment and prophylaxis of the disease; until then, the mainstay preventive modalities include regular hand washing, avoiding contact of the face with bare hands, and most importantly social distancing/quarantine /isolation of the population.[2] Social distancing/ quarantine involves being contained for a duration of days to weeks together as an attempt to avoid community spread of the infection.[3]

Regardless of the significance of social isolation as a parameter in limiting the outbreak of the infection, the

How to cite this article: Khanna S, Jain A, Kalra BS. Neuropsychiatric aspect of social isolation following a lockdown: A perspective. Indian J Community Fam Med 2021;7:74-8.

widespread lockdown unavoidably has a psychological impact of its own on the people. Feelings of altered mood, anxiety, sadness, uncertainty, impending doom, and being in solitary confinement are usually observed as a sequel to mass quarantine, and the mainstream media reports of increasing number of casualties add to the already-existing fear and anxiety in the population.[4]

Psychological impact of quarantine in humans

Human beings are social animals, and our social, biological, and psychological systems are evolved to function and prosper along with other beings. Studies have suggested that the negative impact of long duration of social isolation on the physical and mental health of a person is almost similar to the risk factors such as high blood pressure, obesity, and smoking.[5]

It has been observed in various studies that long periods of social isolation can increase the risk of a variety of health problems including psychological disorders such as anxiety, depression, posttraumatic stress disorder, low self-esteem, and in worst cases death. A meta-analysis has found that chronic social isolation increases the risk of mortality by up to 29%.[5]

In a recent article published on COVID-19 outbreak, individuals who were isolated and had negligible social interaction experienced a sense of "cabin fever," often involving feeling of restlessness, dissatisfaction, irritability, and being stuck in the surroundings.[6]

There are reports highlighting social isolation as a precipitating factor to stress, confusion, and agitation especially, among the individuals who were isolated for a relatively longer time.[6]

Age-related factors associated with psychological impact of quarantine/isolation

Although people of all the age groups are susceptible to the psychological impact of social isolation, people with disabilities, children and elderly people are at a relatively higher risk. Decline in the overall health; coexisting illnesses; and physical absence of the immediate family, relatives, peers, and friends are some of the factors that can add to the impact of social isolation.[3]

A recent report from the National Academy of Sciences has also highlighted similar factors including the distance from family, decreased enthusiasm to socialize, chronic illnesses, and visual/auditory decline, which make the elderly population more vulnerable.[7]

Similarly, adolescent age is also a vulnerable time where the people require social interactions for their holistic development and are very sensitive to social challenges. Being isolated for long periods may hamper the overall development of self-esteem and communication skills later on in life. A sense of belonging at the school, to be among the peer group, is important for the adolescents, and a longer duration of detachment from their school during this age may have an everlasting impact. This can alter their perceptions about social conduct which can lead to social anxiety and subsequently social withdrawal later in life.[8]

The impact of a healthy social structure has been highlighted in various studies, indicating that people with social anxiety, fewer numbers of friends, and personal relationships were at a higher risk of detachment later in life. Previous researches have highlighted the importance of meaningful friendships, which act as a protective barrier against the feelings of perceived social isolation in this vulnerable age of adolescence.[9] Some studies highlighting the psychological impact of social isolation have been described in Table 1.

Neurobiological changes associated with social isolation

The brain is the central structure to understand the social connections and the impact of social isolation. There is substantial literature available that the perception of social isolation affects the brain structure, functioning, and subsequently the behavior and hence, is an important risk factor for a psychological impact. The available evidence on social isolation has also hypothesized that perceived social isolation leads to a significant decrease in the rate of cell proliferation in the brain.[15]

Animal studies also have long provided a strong basis of neurological effects due to social isolation in species living in a social surrounding.[16] In line with this, studies have indicated that enriched social interactions tend to enhanced neurogenesis and programming in the brain, particularly at the centers essential for social perceptions, communication, and memory consolidation.[17]

Various functional neurological cellular changes observed with social isolation include:

1. Dysregulated development of the hippocampus due to modifications in microtubular instability and decreased microtubule-associated protein-2 expression leading to dysregulated remodeling of axons and dendrites[18]
2. Diminished expression of synaptophysin and dendritic cell length and density of pyramidal cells[19]
3. Increased in Tac2 gene (Tachykinin gene) expression and the production of NkB throughout the brain associated with impaired cognition, increased response to fearful

Table 1: Some studies highlighting the psychological impact of social isolation

Authors	Country	Study design and participants	Quarantine period	Outcomes
Lee *et al*.[10]	Hong Kong	Mixed-methods; *n*=856 SARS patients	Unclear duration of isolation; residents after the SARS outbreak	Health measures such as quarantine are essential for preventing SARS but are stigmatizing by providing mental health support health system can deal with their stigmatizing consequences
Jeong *et al*.[11]	South Korea	Follow-up study; number of participants (*n*=1656)	Quarantine duration of 2 weeks after contact with MERS patients	Mental health issues during a period of social isolation can be altered by providing psychological support to individuals especially in the vulnerable population
Yoon *et al*.[12]	South Korea	Mental health analysis by professionals; (*n*=6231	Quarantine duration of 2 weeks after contact with MERS patients	The need for mental health services is increasing and traditional systems centered on hospitals and medical facilities are ill-suited to addressing many mental health problems
Sprang and Silman[13]	USA and Canada	Cross-sectional study; (*n*=398)	Quarantined individuals after contact with H1N1 or SARS	Pandemics are related to psychological trauma which require strategies to ensure the psychological health of people under quarantine
Reynolds *et al*.[14]	Canada	Cross-sectional study (*n*=1057)	Quarantine duration of 2-30 days after contact with SARS patients	As a result of quarantine, postcontact with patients of SARS, the health-care professionals experienced significant psychological distress including symptoms of posttraumatic stress disorder Difficulty in compliance with quarantine requirements can be minimized by reducing the duration of the quarantine

SARS: Severe acute respiratory syndrome, MERS: Middle East respiratory syndrome

stimuli, and difficulty in memory consolidation[16]

4. Diminished synthesis of newer neurons formation, brain-derived neurotropic factor, and nerve growth factor in hippocampal region[20]
5. Abnormal expression of cAMP response element-binding protein in the regions such as the ventral striatum and the amygdala, which has been associated with depression, anxiety, and psychosis-like behaviors.[20]

Several whole-brain exploratory studies in socially isolated individuals have highlighted various changes in brain:

1. Large differences in the gray matter volume neuronal clusters in the anterior hippocampus, amygdala, and entorhinal/para-hippocampal regions in isolated individuals in the voxel-based morphometry studies[21]
2. Decreased gray matter volume in the left posterior superior temporal sulcus, middle temporal gyrus, and entorhinal cortex regions that are usually associated with associative memory, motion perception, and social awareness[21]
3. Decreased resting-state functional connectivity between several nodes of the anterior insula/operculum, dorsal anterior cingulate cortex, and the superior frontal gyrus associated with diminished alertness, mood, and executive control on functional magnetic resonance imaging studies[22]
4. Weak activation of the mesolimbic dopamine system in isolated individuals suggesting decreased reward to social stimuli. In contrast, people that have a better social relationship tend to have a greater activation of the temporoparietal junction, dorsomedial prefrontal cortex, a region involved in cognition, information processing, and comprehension of language.[20]

Methods to reduce the impact of social isolation

A period of quarantine/isolation has a negative psychological impact, which can be detected months or years later. Hence, it is important to inquire about the history of any psychiatric or mental illnesses. For the population working in the health sector, support from the government authorities becomes imperative in ensuring the welfare, the basic necessities, and appropriate supplies for a proper functioning of the health-care system.

Some of the methods that maybe helpful in reducing the psychological impact include.

Communication

Studies have suggested that keeping in touch with health-care professionals during the periods of isolation could provide a sense of security during the isolation period. Communicating with one's family and friends also becomes paramount especially during emotionally demanding times like that of quarantine/isolation. In these present times, various social media platforms have become universal and could play a vital role in facilitating overall communication in various aspects of individual relationships.[2]

Yoga

Yoga is derived from Sanskrit yuj meaning "to attach, join, harness, yoke" and is a practice of spiritual, mental, and physical wellness and has been one of the classical schools of philosophical traditions that is thought to have originated in the prevedic civilizations.[23] In the context of a lockdown, yoga has garnered significant attention as a mainstream practice in many parts of the world as a complementary therapy to many psychological problems.[24] In a recent study involving depressed and anxious individuals, it was

seen that the ones who practiced yoga once a week for at least 6 weeks besides the usual therapy had statistically significant reduction in the levels of anxiety and depression scores compared to the control group.[25]

Exercise

Regular aerobic exercise has been found to have significant mood-alleviating capacity. Simple exercises including a brisk walk, skipping ropes, or stretch-up exercises can be helpful in alleviating the stress effects due to social isolation. Mechanisms of effectiveness of the physical activity have been linked to elevated plasma levels of endogenously produced opioids including β-endorphins and β-lipotrophin as a result of aerobic exercise.[26]An increase in the endogenous opioid concentrations after exercise has an association with the psychological changes including mood fluctuations, "exercise-induced euphoria," altered pain perception, and decreased stress response.[27]

Music therapy

Listening to music can produce a calming environment, acts as an anti-anxiety mechanism, and helps alleviate the emotional distress during long periods of social isolation.[28] In a study, participants experienced significant reduction in depression, anxiety, anger, and stress after 12 music sessions twice a week.[29]

Omega-3 fatty acids

Regular consumption of omega-3 fatty acids has been shown to play an important role in maintaining the pyschological well-being. In a study, lower plasma concentrations of docosahexaenoic acid and Eicosapentaenoic acid were found in the patients of depression.[30]

CONCLUSION

Major infectious disease outbreaks, like COVID-19, mandates quarantine/social isolation as an important preventive strategy to curb the spread of the infection. However, the available data suggest the downside to social isolation i.e. undesirable psychological impact which can be detected even weeks or months post quarantine. In this regard, multiple micro and macro cellular changes have been observed in animal and human brain studies pertaining to social isolation. Thus, it can reasonably be said that, although quarantine is the need of the hour for the current pandemic, there also lies a psychological issue which needs to be considered. Hence, in this regard, determining any prior history of psychiatric illness or any mental health issue is important. Certain aspects should be considered that may be helpful in reducing the psychological impact in individuals before implementation of the quarantine/ isolation. Meticulous planning in restricting the duration to a minimum and paying special attention to the needs of certain high-risk groups (e.g., health-care providers, patients with psychiatric illnesses) is warranted.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Perspective

Whether COVID-19 has waterborne transmission too?

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Abstract

SARS CoV-2 and COVID-19 have hogged the headlines for almost 18 months and over the last 2 months, it has occupied the mind space of entire India. Its second wave has not only sent shock waves across the nation but has created ripples across oceans too. There has been intense debate over how it went spiralling up in such a manner that India is is reporting large number of cases daily as well as deaths. One of most hotly debated topics is "Whether it is being transmitted through contaminated water too?" There is enough evidence that the virus sheds in feces and that the virus sheds in feces, sewage, sewer lines, waste water, and sewage treatment plants as well as effluents of plants. The important factor is that about two-third of sewer is not treated. On top of that, countries such as India do not have universal access to safe drinking water and practice of open defecation is still prevalent. In such a scenario, likelihood of waterborne transmission cannot be ruled out.

Keywords: Aerosol, contamination, coronavirus, safe drinking water, sewage treatment, transmission

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Submitted: 30-Jul-2021 **Accepted in Revised Form:** 08-Nov-2021 **Published:** 24-Dec-2021

INTRODUCTION

SARS CoV-2 and COVID-19 which caused the biggest pandemic over a century has been an enigma too. From beginning, there was a great deal of uncertainty regarding it and that included its mode of transmission. Initially initially believed to be a fomite and droplet borne infection an later on evidence emerged and it was accepted to be transmitted through aerosols too.

On top of that, hotly debated topic is "Whether it is being transmitted through water too?"

There are four steps required for a disease to be transmitted through feco-oral route, i.e., drinking water:

1. Shedding of the causative agents in feces
2. Survival of the causative agents in feces/stool sample
3. Presence of the causative agent in treated sewage.
4. Presence of the causative agent in drinking water.

Exponentially increasing number of infections among persons not having direct person to person contact with infected persons, raises questions that whether droplets, fomites, and aerosols are only Initially? A strong degree of suspicion arises about some other route of transmission that can explain the rising number of cases among people not directly coming in contact. So the question arises that; is there is a waterborne community transmission too? As of today, WHO's position is that there is no evidence of it being transmitted through water and chances of transmission

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/ijcfm.ijcfm_60_21

How to cite this article: Kumar CM, Chowdhry BK, Singh S. Whether COVID-19 has waterborne transmission too? Indian J Community Fam Med 2021;7:79-82.

are low.[1] However, WHO or the scientific community at large has not completely denied the possibility of such transmission. Experts don't have the definite viewpoint on it, but the virus that causes COVID-19, the notorious SARS-CoV-2, does definitely have the potential to spread through untreated sewage. Many investigations including that by Zhang *et al*. have reported evidence of presence of viral RNA fragments of SARS-CoV-2 in the stool samples of infected patients.[2]

A study by Xiao *et al*. reported that among samples of feces of 73 hospitalized patients admitted with SARS-CoV-2, 53.4% of the cases had positive real-time reverse transcriptase-polymerase chain reaction on stool samples.[3]

Now the second question is whether the SARS-CoV-2 survives in stool? There is an evidence for that too. In SARS coronavirus study by Wang *et al*., there was evidence of a surrogate human coronavirus surviving for two days in dechlorinated tap water and in hospital wastewater at 20°C.[4]

Hence, if the coronavirus survives in stool as well as flushed waters, that water entering sewerage systems also becomes the potential mode of transmission for this virus. A study by Gundy *et al*. has demonstrated that coronaviruses survive up to 2–3 days in sewage water and up to 10 days in tap water at 23°C.[5] Currently, there is no evidence that SARS-CoV-2 can be transmitted by treated drinking water. The virus being an encapsulated microbe is sensitive to oxidants such as chlorine and gets quickly destroyed, but what about transmission through untreated water? In countries like India, the access to proper safe and hygienic drinking water is not universal. In addition, poor sanitation conditions and practices such as open defecation have the potential to further increase the chances of transmission by flies, fomites, or surface water contamination.

In India also, in 2020, the SARS-CoV-2 was isolated from hospital wastewater and sewage in Jaipur where two samples were identified containing viral genome.[6] Their analysis pointed toward a continuous increase and clustering of COVID-19 patients in the areas served by the waste water treatment plants from where wastewater samples had tested positive. However, there were no viral genomes found in treated water. Treatment of sewage reduces likelihood of transmission as the treated efflux has not been found to have virus.[6] However, in Tehran, Iran two samples from treated sewage were also found positive, making it again a controversial subject[7] and with current evidence, nothing can be concluded with conviction. Similar suspected transmission of SARS-CoV-2 in public bath in China has also been reported.[8]

As the SARS-CoV-2 virus RNA has been documented in fecal matter, waste today various countries at various stages and waves, it can be assumed that irrespective of virus variants in circulation, the waterborne transmissibility potential exists.

WASH Facilities in India- Status Check

In India, another big issue is the lack of adequate facility for sewage treatment. The sewage treatment plants in India are not adequate to handle the total sewage generated. Only 26,869 million liters per day (MLD) of sewage is treated, whereas the total generated sewage stands at 72,368 MLD, with releasing of 45,499 MLD (>62%) of sewage untreated to the water bodies and thus creating a huge risk for waterborne transmission.[9] The model showing status of sewage treatment facility, availability of safe drinking water, and the likely possibility of untreated sewage/water being able to contaminate water bodies and drinking water is given as pieces of Zigsaw puzzle in Figure 1.

This concern about safety of water is not new. In the United States of America also where potable water, sanitation and hygiene (WASH) facilities are universal, during 2020 surge, there was 57% increase in the consumption of bottled water compared to same period a year ahead.[10] Hence, it is evident that even though there has been no concrete evidence of transmission through drinking water, there has definitely been a concern and suspicion.

The Needle of Suspicion

Giving more credence to such likely transmission is the fact that around 10% of COVID-19 cases present with gastrointestinal (GI) symptoms and which precede systemic and respiratory symptoms, suggesting feco-oral route as most likely transmission. The incidence of GI presentation is more in children which is in line to the study by De Man *et al*., which showed children are 7–8 times more vulnerable to GI symptoms in cases of waterborne exposures compared to adults.[11] Noteworthy is that in a study by Xiao 23.29% of the patients with viral RNA untraceable in respiratory tracts showed the presence of SARS-CoV-2 in their feces.[3]

Hence, if we revisit the four prerequisites of feco-oral waterborne transmission mentioned above, first two have documentary evidence, whereas in India, 62% of sewage is disposed off untreated and 28% urban and 48% rural households do not have access to safe drinking water.[12] Hence, in light of above-mentioned facts in a country like India, the possibility of waterborne spread of COVID-19 cannot be ruled out. Another

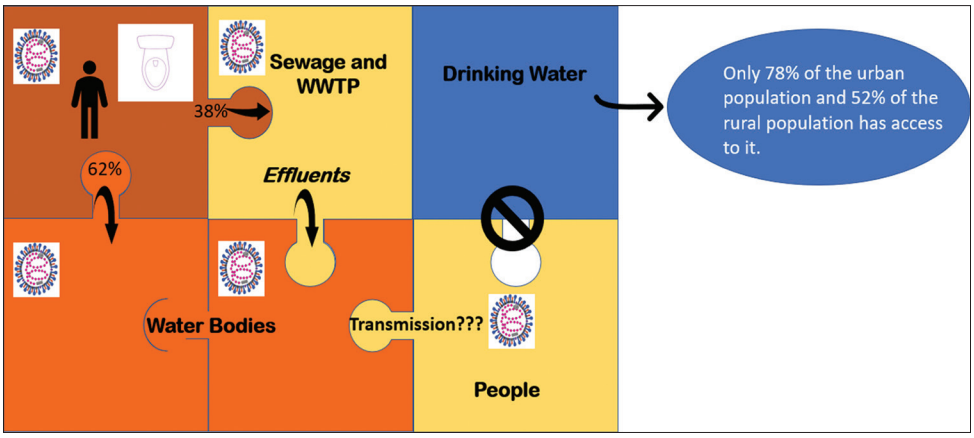

Figure 1: Model of waterborne SARS-CoV-2 transmission

point which is baffling, is the continued transmission of COVID-19 in April – September, the summer and monsoon/postmonsoon months, which normally is the transmission season for enteric fever, diarrheal diseases, viral hepatitis, etc., the classical water borne diseases. Whereas the classical droplet/aerosol borne acute respiratory infections are usually transmitted in bimodal peak of October – November and February – March.

On close analysis of incidence data for COVID-19 in India, during April to September 2020, morethan 6.2 million cases were reported which were higher than 5.9 million reported between October 2020 and March 2021. Even number of mortalities due to COVID-19 followed the similar trend and summer months accounted for more deaths, 96,000 as compared to 96,000 in winter months.[13]

CONCLUSION

Hence, going with the above-mentioned facts and studies, we can conclude that SARS-CoV-2 virus has been demonstrated to be present in stool of infected persons, sewage and has the potential of surviving in untreated water for sure. In countries with poor WASH facilities where untreated sewage is allowed to be discharged in water bodies and availability of safe drinking water is not universal, possibility of COVID-19 being transmitted as a waterborne infection cannot be ruled out. The jury is still out on whether COVID-19 has waterborne transmission.

Steps for Prevention of such Likely Transmission

In view of definitive evidence of presence of viral genome RNA in feces, urine, waste water, sewage, waste water treatment plant (WWTP) effluents, and likelihood of unsafe disposal of WWTP effluents leading to infection of water bodies and surface contamination, there is a need of revisiting WWTPs waste disposal policies as well as ensuring availability of safe drinking water in areas where sewage treatment facilities are not available. Various studies suggest that temperature treatment is the most effective way of destroying SARS-CoV-2 virus in WWTP effluents as increasing temperature denatures viral proteins and destroys enveloped viruses. Hospitals need to update their wastewater treatment systems and to use decentralized wastewater treatment systems so that viruses are not transmitted to the larger community. Ultraviolet-based portable devices for wastewater treatment, ensuring leakage free plumbing system, and ensuring residual chlorination of drinking water free of coronaviruses must get enough priority.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Review Article

Novel infectious causes of acute pancreatitis: A comprehensive review

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Abstract

Acute pancreatitis can result from a variety of infections. The causative pathogens have been well established to be certain viruses and parasites. However, certain infections fail to find mention in standard literature and have been overlooked due to the trivial number of cases of pancreatitis that result from them. Among these are influenza, leptospirosis, acute viral hepatitis, and certain tropical infections such as dengue, chikungunya, scrub typhus, malaria, and typhoid. In this narrative review, we have conducted a literature search on PubMed and EMBASE databases for cases of pancreatitis occurring in these diseases and compiled the data. Most of these infections are prevalent in the developing world, and consequently, more cases are reported from these regions. The pathogenesis, predictors of outcome, and the response to antimicrobial therapy have not been studied extensively. The actual incidence is probably higher than what is reported, and this subject deserves more attention.

Keywords: Acute pancreatitis, chikungunya, coronavirus disease 2019, dengue, infections, influenza, leptospirosis, malaria, scrub typhus, viral hepatitis

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Submitted: 27-Jan-2021 **Accepted in Revised Form:** 25-Nov-2021 **Published:** 24-Dec-2021

INTRODUCTION

Acute pancreatitis (AP) is characterized by abrupt onset of inflammation that is often reversible and resolves with conservative management alone. The damage caused by the initial insult is propagated by activation of digestive proenzymes or zymogens within the pancreas, rather than the duodenum, leading to autodigestion.[1] The diagnosis is made by the presence of any two of the following three criteria – the characteristic abdominal pain, elevation of serum amylase and/or lipase to more than three times the upper limit of normal, and imaging evidence of inflammation. The causes of AP are mentioned in Table 1.

The classic clinical symptoms are nausea, vomiting, and epigastric pain that is continuous, radiates to the back, is exacerbated by food intake, and is partially relieved on bending forward.[1] Third space fluid loss and systemic inflammation lead to hypotension. The clinical course can be complicated by certain local and systemic complications. The management involves bowel rest and early resuscitation with intravenous fluids. Early enteral feeding is preferred, and close monitoring for complications is needed. Antibiotics are indicated only when there is definite evidence of infection. Fluid collections may require drainage if they are infected or

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/ijcfm.ijcfm_7_21

How to cite this article: Gaba S, Gupta M, Gaba R, Lehl SS. Novel infectious causes of acute pancreatitis: A comprehensive review. Indian J Community Fam Med 2021;7:83-91.

cause mass effects. This can be done by percutaneous, endoscopic, or surgical approach.

Among infections, the causes of AP have conventionally been started to include viruses such as *Cytomegalovirus*, mumps, coxsackievirus, and human immunodeficiency virus and parasites such as *Toxoplasma* and *Ascaris*. Apart from these, there are certain infections that have failed to find recognition in standard literature. These are mostly tropical infections, and occur predominantly in developing countries and in travelers who return from these regions. The data available is confined to isolated case reports or small series. We have provided an overview of the infectious causes of AP, which are mentioned in Table 2.

MATERIAL AND METHODS

A search was conducted for articles indexed in PubMed and EMBASE databases using the keywords "specific infection + pancreatitis" and "specific infection + acute pancreatitis" to compile the available evidence of AP caused by influenza, chikungunya, viral hepatitis, dengue, malaria, fungi, leptospirosis, scrub typhus, typhoid, and coronavirus disease 2019 (COVID-19).

Table 1: Causes of acute pancreatitis

Gall stones
Alcohol
Metabolic – hypercalcemia and hypertriglyceridemia
Drugs – azathioprine, 6-mercaptopurine, valproic acid, didanosine, and diuretics
Post ERCP
Structural anomalies - pancreas divisum, annular pancreas, choledochal cysts, and pancreaticobiliary malunion
Trauma
Infections
Genetic – PRSS1, CFTR, and SPINK1 gene mutations
Autoimmune
Ischemia – hypotension, vasculitis, and embolism
Idiopathic

ERCP: Endoscopic retrograde cholangiopancreatography, PRSS1: Protease serine 1, CFTR: Cystic fibrosis transmembrane conductance regulator, SPINK1: Serine protease inhibitor Kazal-type 1

Table 2: Infectious causes of acute pancreatitis

Category	Organisms
Viral	CMV, HIV, HSV, VZV, EBV, coxsackievirus, mumps, dengue, hepatotropic viruses, chikungunya, influenza, and SARS-CoV-2
Parasitic	*Ascaris*, toxoplasmosis, cryptosporidiosis, and malaria
Bacterial	Scrub typhus, typhoid, mycoplasma, campylobacter, and *Yersinia*
Fungal	*Aspergillus*

CMV: *Cytomegalovirus,* HIV: Human immunodeficiency virus, HSV: Herpes simplex virus, VZV: Varicella-zoster virus, EBV: Epstein–Barr virus, SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2

RESULTS

Viral causes

People infected with HIV have a higher incidence of AP than the general population, and the risk is higher in advanced stages with lower CD4+ count.[2] The etiology is diverse and may result from direct inflammation due to HIV itself, or from opportunistic infections such as *Cytomegalovirus*, *Toxoplasma gondii,* and *Cryptosporidium*.[3] Drug-induced AP can result from antiretroviral drugs such as nucleoside reverse transcriptase inhibitors (didanosine, stavudine, and lamivudine) and nonnucleoside reverse transcriptase inhibitors (efavirenz and nevirapine).[4] Didanosine has consistently been shown to confer the highest risk, among the antiretroviral drugs, in a dose-dependent manner. The mechanism is not completely identified, but it may be related to mitochondrial toxicity. The protease inhibitors are less commonly implicated. Drugs used in conjunction with antiretroviral therapy, such as corticosteroids, pentamidine, and trimethoprim-sulfamethoxazole, can also lead to AP. There are numerous case reports implicating herpes simplex, coxsackievirus, Epstein–Barr virus, and varicella-zoster virus in AP.[5-7]

It has been shown that H5N1 influenza A can bind to pancreatic cells and induce apoptosis.[8] The infected pancreatic cells also produce pro-inflammatory cytokines. Human H1N1 and H3N2 and avian H7N1 and H7N3 influenza virus can also infect human pancreatic islet cells.[9] Damage to the pancreatic beta-cells by H1N1 influenza virus and precipitation of diabetes has also been documented.[10,11] Baran *et al*. have reported the case of a 19-year-old male who presented with abdominal pain, fever, and upper respiratory symptoms. He was found to have H1N1 influenza, and no alternate cause of AP was found. He was treated with oseltamivir for 5 days and recovered quickly.[12] Another case of AP has been reported in an 86-year-old male with untreated chronic lymphocytic leukemia.[13] Severe AP with acute respiratory distress syndrome (ARDS) and acute kidney injury (AKI) has been reported in a 42-year-old woman. She was also treated with oseltamivir and recovered after a week.[14] Possible association has also been reported by Sánchez Bautista *et al*. in a 12-year-old girl.[15]

During a chikungunya outbreak in French Guiana, two patients with underlying chronic pancreatitis developed AP. One was a 54-year-old man, and the other was a 55-year-old man who also developed Guillain–Barré syndrome and encephalitis.[16]

AP can occur in acute viral hepatitis due to the hepatotropic viruses. The pathogenesis has been proposed to be related to the edema of the ampulla of Vater, which impedes the normal flow of pancreatic secretions into the duodenum.[17] Direct injury of the pancreatic cells by virus is under investigation. The presence of hepatitis B DNA and surface antigen has been documented in the acinar cells of a patient of liver transplant suffering from AP due to acute-on-chronic hepatitis B.[18] If viral hepatitis is associated with acute liver failure, AP may also result from sepsis or pancreatic ischemia due to hypotension and disseminated intravascular coagulation.[19]

In their review, Haffar *et al*. have reported the incidence of AP in acute hepatitis A to be <0.1%.[20] They found that 6% of the cases of AP were associated with acute liver failure. The median interval between appearance of clinical jaundice and the onset of abdominal pain was 4 days. Mostly young patients (median age of 16 years) were affected, and most of the documented cases were from Asia. The mortality rate was noted to be similar to other causes of AP. In a retrospective analysis of 790 cases of AP over 6 years at an institution in India, 16 cases (2.1%), with a mean age of 25 years, were attributed to acute hepatitis E. One patient had acute liver failure.[19] From another center in India, Bhagat *et al*. have documented AP in four and three cases of acute hepatitis E and A, respectively.[21] All of them recovered with conservative management. Jain *et al*. have documented the incidence of AP in acute viral hepatitis to be as high as 5.6% (7 cases out of 124). Hepatitis E, A, and B were implicated in four, two, and one case, respectively.[22] The clinical course was uncomplicated, and all the patients recovered. The six cases of AP due to hepatitis E studied by Mishra *et al*. also recovered completely with conservative management.[23] Severe AP complicated by multi-organ dysfunction and local complications has also been documented in hepatitis E.[24,25] To the best of our knowledge, only one case of AP associated with hepatitis C (genotype 1b) has been published.[26] The patient was a 70-year-old female from Brazil, and AP was mild.

After the mosquito bite, dengue virus enters the Langerhans cells via membrane receptors, and replicates using its cellular machinery.[27] The new viruses are released by exocytosis, and they infect other cell types. Migration of the Langerhans cells to the lymph nodes accelerates the spread to other parts of the body. AP is a very rare complication since the number of reported cases is miniscule compared to the incidence of dengue. Most of the data are from India [Table 3]. The pathogenesis may involve direct invasion of the pancreatic acinar cells by the dengue virus, obstruction to bile flow due to edema of the ampulla of Vater, or as a part of multi-organ dysfunction in dengue shock syndrome (DSS).[28] The clinical course is comprised of three phases.[29] The febrile phase, which lasts for 3–7 days, is followed by the critical phase in which plasma leakage occurs that can lead to shock and organ dysfunction. The critical phase lasts for up to 2 days, but it can lead to certain complications that can be long lasting and determine the outcome of the illness. In the convalescent phase, complete defervescence occurs and the general well-being of the patient gradually improves. Clinically, dengue can present as dengue fever, dengue hemorrhagic fever (DHF), and DSS.[29] DHF is characterized by thrombocytopenia, evidence of increased vascular permeability, and hemorrhagic manifestations. DHF complicated by shock results in DSS that is often refractory to treatment. There is no specific antimicrobial drug, and the treatment is supportive. It is worth noting that AP can develop during both the febrile and critical periods of illness.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is responsible for the ongoing COVID-19

Table 3: Cases of acute pancreatitis reported in dengue

Author	Location	Age/sex	Comments	Outcome
Kumar *et al*.[28]	India	8/female	Had AP on presentation	Recovered
Nawal *et al*.[30]	India	25/male	Developed AP during the critical phase	Recovered
Kumar *et al*.[31]	India	10/female	Developed AP during the critical phase with DHF	Recovered
Correa *et al*.[32]	Panama	37/female	Had AP on presentation	Recovered
Anam *et al*.[33]	Bangladesh	20/male	Developed hemothorax	Recovered
Jain *et al*.[34]	India	27/male	Had AP and DSS on presentation	Expired
Simadibrata[35]	Indonesia	59/male	Developed DHF	Recovered
Lee *et al*.[36]	Taiwan	47/male	Developed DHF, intramural hematoma in duodenum, and peripancreatic fluid collections that persisted for weeks and resolved with percutaneous drainage and prolonged antibiotics	Recovered
Karoli *et al*.[37]	India	35/female	Had AP on presentation	Recovered
Wijekoon and Wijekoon[38]	Sri Lanka	47/male	Had AP with peripancreatic collection on presentation that was conservatively managed	Recovered
Seetharam and Rodrigues *et al*.[39]	India	56/male	Had AP on presentation	Recovered

AP: Acute pancreatitis, DHF: Dengue hemorrhagic fever, DSS: Dengue shock syndrome

pandemic that has led to unprecedented health and social and economic desolation.[40] It was first identified in the Wuhan city of China in December 2019 and quickly spread to the rest of the world. The coronavirus family consists of certain RNA viruses that have spikes on their surface and typically cause respiratory illness. The SARS and Middle East respiratory syndrome pandemics were also caused by coronaviruses. SARS-CoV-2 has a probable zoonotic origin (bats or pangolins), and human-to-human transmission occurs by respiratory droplets. Spread can also occur from a contaminated environment.[41-43] Its entry into the host cells is mediated by the angiotensin-converting enzyme 2 (ACE2) receptors and facilitated by transmembrane protease serine 2.[44] So far, only dexamethasone has been shown to reduce mortality in the severely ill patients.[45] Well-designed randomized controlled trials have either failed to establish a clear-cut benefit, have not been conducted, or are underway with regard to other drugs such as hydroxychloroquine, ivermectin, azithromycin, tocilizumab, remdesivir, and favipiravir.[46-51] The use of convalescent plasma is also being tried.[52] Supportive management and anticoagulation form the mainstay of therapy. Human trials for the vaccine are underway. In a retrospective study on 52 patients with COVID-19 pneumonia, evidence of pancreatic injury in the form of elevation of amylase and lipase was found in 17.3% of the cases.[53] In their study on 121 patients, Liu *et al*. found that pancreatic injury was more common in patients with severe COVID-19 infection.[54] Elevation of amylase or lipase was seen in 17.91% of the patients with severe disease, while it was seen in only 1.85% of those with mild disease. It might be related to the systemic inflammatory response or direct cell injury as the ACE-2 receptor is expressed both in the pancreatic islets and acinar glands.[54] The reported cases of AP are compiled in Table 4.

Parasitic causes

Ascaris is a well-known cause of AP, and the burden is highest in developing countries.[65] The pathogenesis involves obstruction of the bile flow when the worm enters the ampulla of Vater from the duodenum, or by irritating the sphincter of Oddi leading to its spasm. *Cryptosporidium* is a very rare cause of AP both in immunocompetent and immunodeficient individuals.[66] Toxoplasmosis can cause AP in patients with HIV.[67] Ahuja *et al*. and Hofman *et al*. have reported the presence of *Toxoplasma* cysts in the pancreatic acini on autopsy of patients with known AIDS.[68,69] Similar finding has been reported by Garcia *et al*., but the patient was found to have HIV after presentation with AP.[70]

Malaria is caused by five species of the parasite *Plasmodium*. These are *Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae, Plasmodium ovale,* and *Plasmodium knowlesi*. It is transmitted by the bite of female *Anopheles* mosquitoes which transmit sporozoites to the host while taking blood meal.[71] The parasite reproduces asexually in the liver and red blood cells (RBCs). The disease is a major public health problem in Sub-Saharan Africa and South Asia, and lower incidence is seen in some South American countries. It poses a significant danger to the travelers too, who are advised to take chemoprophylaxis when traveling to the endemic regions. Severe disease results from *P. falciparum* and less commonly *P. vivax*. Features of severe malaria are ARDS, shock, encephalopathy and seizures (cerebral malaria), AKI, hypoglycemia, acidemia, hemoglobinuria, severe anemia (hemoglobin <5 gm/dL),

Table 4: Cases of acute pancreatitis reported in Coronavirus disease 2019

Author	Location	Age/sex	Comments	Outcome
Aloysius *et al*.[55]	USA	36/female	Developed ARDS and severe AP	Recovered
Meireles *et al*.[56]	Portugal	36/female	Developed pneumonia and mild AP	Recovered
Hadi *et al*.[57]	Denmark	47/female	Developed pneumonia, dialysis requiring AKI, and severe AP	Still in intensive care unit when report was published
		68/female	Developed pneumonia, dialysis requiring AKI, and severe AP	
Miao *et al*.[58]	France	26/female	Respiratory symptoms were absent on presentation	Recovered
Schepis *et al*.[59]	Italy	67/female	Developed pneumonia and AP with pseudocyst from which SARS-Cov-2 genes were detected using PCR	Recovered
Karimzadeh *et al*.[60]	Iran	65/female	Respiratory symptoms were absent on presentation and later developed pneumonia	Recovered
Szatmary *et al*.[61]	UK	29/male	Moderately severe AP	Recovered
		41/male	Moderately severe AP	
		42/male	Moderately severe AP	
		47/male	Moderately severe AP with necrosis	
		53/male	Moderately severe AP	
Mazrouei *et al*.[62]	UAE	24/male	Developed upper respiratory tract symptoms without pneumonia and mild AP	Recovered
Brikman *et al*.[63]	Israel	61/male	Developed pneumonia and mild AP	Recovered
Kataria *et al*.[64]	USA	49/female	Developed pneumonia and moderately severe AP	Recovered

ARDS: Acute respiratory distress syndrome, AP: Acute pancreatitis, AKI: Acute kidney injury, SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2, PCR: Polymerase chain reaction

and hyperparasitemia (infection of >5% of RBCs).[71] For sensitive vivax malaria, chloroquine is the drug of choice. Falciparum malaria, chloroquine-resistant vivax malaria, and complicated malaria are always treated with artemisinin-based therapy or quinine. AP is reported in falciparum, and less commonly in vivax malaria [Table 5]. It has not been included in the criteria for severe malaria, and the pathogenesis has not been elucidated yet, but it may involve cytoadherence of the infected RBCs to the endothelium of the pancreatic vasculature with resultant ischemia.[72] It can be seen that AP occurs mostly in association with other complications.

Fungal causes

AP can occur as a part of disseminated fungal disease. It has been reported in invasive aspergillosis.[80] The mechanism may be related to direct invasion of the pancreas and its vasculature or microvascular thrombosis secondary to disseminated intravascular coagulation.

Bacterial causes

Cases of AP in *Mycoplasma pneumoniae* have been described in few studies.[81,82] The pathogenesis may be multifactorial. There is hematogenous dissemination of the bacteria and production of inflammatory cytokines locally in the affected organs. Vasculitis and immune modulation due to the phagocytosed macrophages may play a role. Sporadic isolated reports of AP due to *Campylobacter jejuni*, *Yersinia enterocolitica*, and *Yersinia pseudotuberculosis* also exist.[67,83] One author has suggested that AP in campylobacter disease may be due to direct invasion of the pancreatic duct, or due to the host immune response.[83]

Leptospirosis is a zoonotic disease caused by spirochetal bacteria of the genus *Leptospira*. The disease is distributed worldwide, but the incidence in tropics is ten times higher than other regions.[84] It can be controlled but not eradicated by improved sanitation. Humans are incidental hosts, and the infection is acquired by exposure of contaminated soil or excreta of infected animals to damaged skin, mucosa, or conjunctiva. Consequently, the disease is sporadic, and farmers, sewer workers, and animal handlers are at a higher risk. Less commonly, infection can also occur by ingestion of contaminated food or inhalation of aerosols. It commonly causes a mild and self-limiting febrile illness, but occasionally, it can be severe.[85] Leptospirosis complicated by jaundice and AKI is commonly referred to as Weil's disease. High-quality literature is available on reports of AP from America, Europe, Asia, and Africa [Table 6]. AP is very rare and has been seen in severe disease with multiple complications, but the outcome is good. The possible mechanisms are ischemia and vasculitis.[91]

Scrub typhus is caused by *Orientia tsutsugamushi*, a bacterium of the genus *Rickettsia* which comprises Gram-negative, obligate intracellular parasites.[95] Humans are accidental end hosts for the pathogen, which is transmitted by the bite of *Leptotrombidium* mites. Scrub typhus is a resurging zoonotic infection occurring in parts of Asia and Oceania. Its pathogenesis involves infection of the endothelial cells which leads to a vasculitic type of reaction with microvascular injury and thrombosis.[95] The same mechanism is probably responsible for AP. Many cases with AP have been reported from India [Table 7].

Typhoid or enteric fever is a bacterial infection caused by *Salmonella typhi*. It is a specter of the developing countries that are battling with overcrowding and poor sanitation. Contrariwise, a single case in the affluent countries is

Table 5: Cases of acute pancreatitis reported in malaria

Author	Location	Age/sex	Type	Comments	Outcome
Abhilash *et al*.[72]	India	50/male	Falciparum	-	Recovered
		35/male	Falciparum	-	Recovered
		65/male	Falciparum	Developed hepatic and neurological dysfunction with dialysis requiring AKI	Recovered
		21/male	Falciparum	-	Recovered
		31/female	Falciparum	-	Recovered
Singh *et al*.[73]	India	35/male	Mixed falciparum and vivax	Developed necrotizing pancreatitis with hepatic dysfunction and AKI	Recovered
Barman *et al*.[74]	India	65/male	Falciparum	Developed hepatic and neurological dysfunction, dialysis requiring AKI, and blood transfusion requiring anemia	Recovered
Lakhotia *et al*.[75]	India	22/male	Vivax	Developed ascites and AKI	Recovered
Reoyo *et al*.[76]	Spain	62/male	Falciparum	Developed AKI and hepatic and cardiovascular dysfunction. Pancreatic necrosis occurred which required open surgical debridement	Expired
Atam *et al*.[77]	India	42/female	Vivax	Developed ARDS	Expired
Ghosh *et al*.[78]	India	40/male	Falciparum	Developed hepatic dysfunction and paralytic ileus	Recovered
Mahdi *et al*.[79]	Oman	34/male	Falciparum	History of travel to Tanzania without chemoprophylaxis. Developed ARDS and dialysis requiring AKI. AP developed during admission, 72 h after artesunate was started (raising concern of drug-induced AP)	Recovered

AKI: Acute kidney injury, ARDS: Acute respiratory distress syndrome, AP: Acute pancreatitis

sufficient to make the public health authorities vigilant. Most of the cases in the developed country have a history of travel to the endemic regions. The infection is acquired by oral route. Resistance to gastric acid enables the bacterium to establish infection in the Peyer's patches of the small intestine from where lymphatic and hematogenous dissemination occurs.[102] Further replication occurs within the reticuloendothelial system. Carriers can release the bacilli via feces or urine for prolonged periods. The hypertrophy and necrosis of the Peyer's patches can lead to intestinal hemorrhage and subsequent perforation. The clinical features in an untreated patient follow a stereotypical timeline with fever, malaise, chills, nausea, abdominal pain, diarrhea, or constipation in the 1st week; hepatomegaly, spleenomegaly, salmon rash (rarely seen in dark-skinned individuals), and abdominal pain in the 2nd week; and intestinal bleeding, intestinal perforation, delirium, sepsis, and shock in the 3rd week.[103] The mechanism of AP has been postulated to reflux of *S. typhi* containing bile into the pancreatic duct, leading to direct injury.[104] The other possibilities include the effect of bacterial toxin and the host immune response. Patients with typhoid may have elevations of amylase and lipase without any clinical evidence of AP. This was confirmed by Hermans *et al*., who studied 14 adult patients and found that while seven patients had elevated serum enzyme levels, only four had AP, and this complication did not adversely affect the outcome.[105] The data published on AP in culture-proven typhoid are mentioned in Table 8.

We speculate that the true incidence of pancreatitis in the infections discussed in this review is higher than what is suggested by the available data. The reasons for this are manifold. Firstly, there may be significant under-reporting. Since most of the cases are from developing countries and a majority of the patients are treated at peripheral centers, there is little impetus for the clinicians to publish their experience. Secondly, the lack of diagnostic facilities at such centers can be an impediment. Thirdly, the symptoms of abdominal pain and vomiting may be attributed to the disease *per se*, or to other pathologies, such as gastritis, hepatitis, cholecystitis, or adverse drug reactions. The possibility of AP may not even be considered. Fourthly, the pancreatitis may be mild and have little symptoms, so the specific investigations required to diagnose it may not be done. Conversely, the patient may have severe pancreatitis and present in such sick condition that he is not able to give the history. Finally, pancreatitis may be attributed to other causes, such as gall stones, drugs, and alcohol, if there is a history of their intake. It is also possible that some patients in the endemic regions who present with a primary diagnosis of AP may have actually developed it as a complication of some infection. The antibiotics that they receive during their care resolve the underlying infection, precluding an accurate diagnosis.

Table 6: Cases of acute pancreatitis reported in leptospirosis

Author	Location	Age/sex	Comments	Outcome
Maier *et al*.[86]	Germany	73/male	Developed ARDS, AKI, and encephalopathy	Recovered
Mazhar *et al*.[87]	USA - Hawaii	23/male	Developed ARDS, AKI, and hepatic dysfunction	Recovered
Panagopoulos *et al*.[88]	Greece	32/male	Developed myocarditis, polyarthritis, neuropathy, and gangrene of feet	Recovered
Popa *et al*.[89]	Romania	34/male	Developed septic shock and pancreatic necrosis that required open surgical debridement	Recovered
Ranawaka *et al*.[90]	Sri Lanka	15/male	Developed pulmonary hemorrhage and AKI	Recovered
Baburaj *et al*.[91]	India	63/male	Developed hepatic dysfunction and AKI	Recovered
Monno and Mizushima[92]	Japan	65/male	Developed acalculous cholecystitis and dialysis requiring AKI	Recovered
Afzal *et al*.[93]	USA	61/male	Developed AKI, liver dysfunction, and portal vein thrombosis	Recovered
Diyas *et al*.[94]	Morocco	66/male	-	Recovered

ARDS: Acute respiratory distress syndrome, AKI: Acute kidney injury

Table 7: Cases of acute pancreatitis reported in scrub typhus

Author	Location	Age/sex	Comments	Outcome
SV *et al*.[96]	India	42/male	Developed dialysis requiring AKI	Recovered
Chaturvedi *et al*.[97]	India	14/female	Eschar present	Recovered
Ahmed *et al*.[98]	India	40/male	-	Recovered
		54/male	Eschar present Developed respiratory and hepatic dysfunction	Recovered
		52/male	Developed respiratory and hepatic dysfunction	Recovered
		57/male	Developed respiratory and hepatic dysfunction	Recovered
		53/female	Developed respiratory, hepatic, cardiovascular, and neurologic dysfunction	Expired
		47/male	Eschar present. Developed respiratory, cardiovascular, and neurologic dysfunction	Expired
		43/male	Eschar present. Developed, hepatic, cardiovascular, and neurologic dysfunction	Expired
Dhakal *et al*.[99]	India	22/male	Eschar present. Developed pleural effusion	Recovered
Iqbal *et al*.[100]	India	40/female	Concurrent scrub typhus and dengue	Recovered
Wang *et al*.[101]	Taiwan	41/male	Concurrent scrub typhus and leptospirosis	Recovered

AKI: Acute kidney injury

Table 8: Cases of acute pancreatitis reported in typhoid

Author	Location	Travel	Age/Sex	Comments	Outcome
Cho[106]	South Korea	Southeast Asia	61/female	Developed ascites, peripancreatic collection, and intestinal hemorrhage that required endoscopic clipping	Recovered
Khan *et al*.[107]	Qatar	Vietnam	23/male	Developed rhabdomyolysis and AKI	Recovered
Ali and Abdalla[108]	United Arab Emirates	India	42/male	Developed rhabdomyolysis, AKI and bronchopneumonia	Recovered
Rombolà and Bertuccio[109]	Italy	-	37/female	-	Recovered
			36/male	-	Recovered
Martinez-Roig *et al*.[110]	Spain	Bangladesh	11/male	Developed acalculous cholecystitis	Recovered
Adhikari *et al*.[111]	Nepal	-	16/male	Developed acalculous cholecystitis, ascites, and pleural effusion	Recovered
Snelling *et al*.[112]	Australia	-	11/female	Developed rhabdomyolysis	Recovered
Basak *et al*.[113]	Bangladesh	-	17/male	Developed ascites, pleural effusion, and hepatitis	Recovered
Roy *et al*.[114]	India	-	5/female	-	Recovered

AKI: Acute kidney injury

CONCLUSION

The current understanding of the infectious etiology of AP is incomplete. Although some causes are well established, AP is also a rare complication of infections such as dengue, malaria, scrub typhus, leptospirosis, typhoid, chikungunya, influenza, acute viral hepatitis, and COVID-19. Physicians should be wary of its possibility before attributing the symptoms to another abdominal pathology. The data available are limited and confined to case reports or case series. An attempt to investigate the pathogenesis has not been made yet. Due to the dearth of data and absence of a well-planned study, no statistical conclusions can be drawn at the moment, and it is currently not possible to comment on how its severity compares to AP caused by other causes, the effect of antimicrobial treatment, and the long-term outcome. The subject provides an opportunity for future studies and research.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Original Article

Prevalence and determinants of spacing contraceptive use among rural married women of Jammu, India

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Abstract

Introduction: Promotion of family planning, especially the use of contraceptive methods is essential to secure the well-being and development of society. Despite rise in the temporary contraceptive usage over the years, the implementation of the spacing method has been indicated lower in rural as compared to the urban areas of India. This study aims to find out the prevalence and determinants of current use of spacing contraceptives among married rural women of Jammu district, Jammu and Kashmir.

Material and Methods: A community-based, cross-sectional study was conducted from January to June 2018 among married rural women. The survey was conducted house to house, and data were collected with the help of a questionnaire and BG Prasad Scale. Multi-stage sampling procedure was adopted to select the participants. Bivariate and multivariable logistic regression model was fitted to identify the factors associated with the current use of spacing contraceptive methods.

Results: The current use of spacing contraceptive among married women was found to be 16.4%. The male condom was the most used method (55.7%) as well as most preferred contraceptive (46.8%). Lack of knowledge was reported as the main reason for not using contraceptive method. The current use of spacing contraceptive method was significantly higher among the upper socioeconomic status (adjusted odds ratio (AOR) 2.37(1.06–5.29), women with higher education (AOR) 5.04 (0.68–37.18), living in nuclear family (AOR 1.90; CI: 1.01–3.60), with 2 or more surviving children (AOR) 2.45 (1.27–4.73), and living near health center (AOR) 1.69 (0.91–3.14).

Conclusion: Effective targeted programs along with conduction of more field researches that give scientific information should be implemented to achieve the desired goal of contraceptive usage in the rural area among married couples.

Keywords: Family planning, married women, spacing contraceptives, temporary, trends

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Submitted: 02-Nov-2020 **Accepted in Revised form:** 21-May-2021 **Published:** 24-Dec-2021

INTRODUCTION

Contraceptive use is helpful for a couple to have the desired number of children by maintaining interpregnancy intervals. It is a pivotal dimension of overall family and child well-being and female reproductive health as it prevents unwanted pregnancies, unsafe abortions, and HIV/acquired immunodeficiency syndrome or sexually transmitted diseases. It has benefited women by creating opportunities, reducing poverty, improvement of economic security for families, communities, and countries.[1] Despite five decades of government-initiated family welfare program, the increase in the use of temporary contraceptives in India has been slow from 5.5% in 1992–92 to 11.4% in 2015–16,

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/ijcfm.ijcfm_128_20

How to cite this article: Khuda P, Gupta NL, Palaka N, Kaur G. Prevalence and determinants of spacing contraceptive use among rural married women of Jammu, India. Indian J Community Fam Med 2021;7:92-9.

as shown in Table 1. The use of spacing method among married women varied widely by state ranging from 0.6% in Andhra Pradesh, 1.2% in Telangana, 28.9% in Tripura, to 36.3% in Chandigarh.[2] There is wide variations and diversities in the demographic, cultural, and socioeconomic context within the states of the country.[3] The use of contraceptive methods in the majority of Indian states has been reported to be attributable to age,[4,5] residence,[4] wealth status,[5,6] type of family,[6] religion,[4,5] education of woman,[5,6] occupation of woman,[5] education of husband,[7] occupation of husband,[7] number of living children,[4-6] and distance from health center.[7]

In Jammu and Kashmir, the proportion of couple protection by spacing methods was stagnant from 10.0% during 1992–93 to 11.1% during 1998-99 an which increased to 15.9% was observed during 2005–2006 and an increase of 21.3% during 2015–2016. In case of contraceptive methods, the usage has declined from 49.4% in 1992–1993 to 49.1% in 1998–1999. An increase to 52.6% has taken place in the period 2005–2006 to 57.1% during 2015–2016, as shown in Table 1.

According to the district level household survey, the past trends of the use of spacing method in Jammu district have decreased from 55.7% in 2002–2004 to 16.5% in 2007–2008. The use of any contraceptive method (73.2% to 59.5%), any modern method (69.7% to 51.3%) has also decreased during 2002–2008, any traditional method (3.5%–8.0%) has only increased from 2002 to 2008, as shown in Table 2.

In Jammu and Kashmir slow increase in spacing contraceptive use over the years, and the total fertility rate (2.2 per woman) in a rural area is slightly above the replacement fertility level (2.1 per woman) have been major concerns. There is also the issues of poor use of the spacing method in the rural areas (19.9%) compared to urban (25.0%) and the unmet need for the spacing method is 4.2% in urban and 6.4% in the rural area of Jammu and Kashmir.[8]

As of now, there has been a dearth of research studies done on current spacing contraceptive use in rural Jammu and Kashmir. Therefore, this study was conducted to find the prevalence of the current use of a spacing contraceptive method and its determinants among married women in the disturbed rural area (Marh, Bhalwal, R S Pura and Bishnah) of Jammu, India.[9,10]

MATERIAL AND METHODS

Jammu province, the winter capital of Jammu and Kashmir State of India which is bordered by Udhampur district in the north and northeast, Kathua district in the east and southeast, by Pakistan in West and Pakistan Occupied Kashmir in the Northwest. A community-based, cross-sectional study was conducted from January to June 2018 in the rural area of Jammu district, one of the 10 districts of this province in India. It has eight community development blocks, and half of the population lives in the rural areas of the district with majority of the people engaged in agriculture activities and following Hindu

Table 1: Contraceptive use by residence, Jammu and Kashmir and India

Indicator and period	Jammu and Kashmir			India		
	Total	Rural	Urban	Total	Rural	Urban
Contraceptive use - Any method						
1992–93 (NFHS-1)	49.4	46.2	64.4	40.6	36.9	51.0
1998–99 (NFHS-2)	49.1	43.9	68.0	48.2	44.7	58.2
2005–06 (NFHS-3)	52.6	46.2	68.3	56.3	53.0	64.0
2015–16 (NFHS-4)	57.1	53.9	65.0	53.5	51.7	57.2
Any modern contraceptive						
1992–93 (NFHS-1)	39.7	37.5	50.1	36.3	33.1	45.3
1998–99 (NFHS-2)	41.7	36.8	59.7	42.8	39.9	51.2
2005–06 (NFHS-3)	44.9	40.4	55.8	48.5	45.3	55.8
2015–16 (NFHS-4)	46.0	41.9	55.9	47.7	46.0	51.2
Any spacing method						
1992–93 (NFHS-1)	10.0	7.4	22.6	5.5	3.3	11.6
1998–99 (NFHS-2)	11.1	9.5	16.9	6.8	4.5	13.4
2005–06 (NFHS-3)	15.9	14.8	18.7	10.0	7.1	16.8
2015–16 (NFHS-4)	21.3	19.9	25.0	11.4	9.5	15.2
Any traditional methods[¶]						
1992–93 (NFHS-1)	9.7	8.8	14.3	4.3	3.8	5.8
1998–99 (NFHS-2)	6.8	6.5	7.9	5.0	4.4	6.7
2005–06 (NFHS-3)	7.7	5.8	12.4	7.8	7.6	8.1
2015–16 (NFHS-4)	11.1	12.0	9.0	5.8	5.7	5.9

Note: [¶]Traditional method includes Rhythm and withdrawal methods only. Source: NFHS-1: IIPS (1995), PRC and IIPS (1994a); NFHS-2: IIPS and ORC Macro (2000 a and b); NFHS-3: IIPS and ORC Macro (2007a and b); NFHS-4: IIPS and ORC Macro (2017 a and b)

Table 2: Contraceptive use in Jammu district and J and K state, India

Indicator and period	Jammu district			Jammu and Kashmir State		
	2002-04	2007-08	2012-13	2002-04	2007-08	2012-13
Contraceptive use						
Any contraceptive method	73.2	59.5	-	54.8	54.1	54.7
Any modern method	69.7	51.3	-	51.9	41.2	42.7
Any spacing method	55.7	16.5	-	25.0	18.8	14.2
Any traditional method[1]	3.5	8.0	-	2.8	12.1	11.4

Note: [1]Includes Rhythm/Periodic abstinence, Withdrawal and Other traditional methods (2002-04, DLHS-RCH, Round-1); Rhythm/Periodic and withdrawal methods (2007-08 and 2012-13, for DLHS-RCH, Round-1&2 respectively). Source: DLHS-RCH- 1,2 &3, IIPS, Mumbai

religion. There are 74 primary health centers in the district that are owned by the government.[11]

The sample size was calculated on the infinite population of the study using Cochran's Formula:[12] $n = Z^2p\ (1 - p)/e^2$. Using $P = 0.5$ and d=5% . Adding 10% of non-response, total sample size was calculated to be 422.

The list of married women (18–49 years) of rural area of Jammu district was first obtained from the concerned health authorities. Based on the inclusion and exclusion criteria, the women who were willing to participate and who had or had not child/children were included in the study. Unmarried, widow, or divorced persons were excluded from the study. A multistage sampling technique was used to identify the study participants. First, four blocks out of the 8 in rural Jammu were selected using a simple random sampling method. From the 4 selected blocks, 94 subcenters were identified, out of which 24 subcenters were selected by the systematic random sampling technique. Finally, a sample of 422 was selected using a proportionate sampling technique from the number of participants living in these 24 selected subcenters. In case of presence of more than one married couple in a household, only one married couple were taken for the study using the lottery method [Supplementary File 1].

The survey was conducted house to house, and data were collected with the help of a structured interview schedule consisting of three sections, Section A, B, and C. Section A included questions to elicit information regarding sociodemographic variables. For the classification of socioeconomic status (SES) of the study participants, Modified BG Prasad scale[13] was used. Section B included questions to elicit information regarding contraceptives (knowledge, practice, and behavior). Section C included question to elicit information regarding barriers to contraceptive use. Collected data were verified and coded daily after completing the field activities; data entry and analysis were done in SPSS (Statistical Package for the social sciences) Version 23; Released in 2015, IBM Corp., Armonk, New York, USA. The descriptive analysis such as percentages and measure of central tendency were used. Bivariate technique cross-tabulation was used for understanding, differential levels of the use of spacing contraceptive method among respondents by different variables. Bivariate analysis was performed to see the associations along with their odds ratios (OR) at 95% confidence intervals (CI) and *P* values were obtained to identify the associations. All variables that were found to be significant at the bivariate level ($P < 0.05$) were entered into the multivariate analysis using the logistic regression model to test the strength of the association.

The dependent variable had two categories using spacing method and not using spacing methods. Since the focus was on spacing methods, sterilization cases ($n = 19$) were dropped from the analysis. The independent variables considered were the age of women, residence, SES, type of family, education of woman, occupation of woman, education of husband, occupation of husband, number of living children, and distance from the health center.

The study was done after taking approval from the Ethical Committee of the Eternal University, Baru Sahib, Himachal Pradesh, India, and the Directorate of Health Services/Block Medical Officers, Jammu. Informed verbal consent was obtained for voluntary participation from individuals before the administration of the questionnaire. The confidentiality of the participants was maintained, and data were used only for the research purpose.

RESULTS

A total of 422 married women were interviewed during the course of this study. Half of the study population were in the age group of 26–35 years. The 82.2% participants had secondary education and 89.6% were homemakers. The majority (84.4%) of the husbands of the participants had secondary level of education, and almost all (96.2%) were working. The majority were Hindu (89.8%), belonged to a joint family (77.5%), less than one-third (31.3%) were from the upper class, and 41% respondents had 2 children. More than half of participants (59.2%) were residing within 3 km area of the health center [Table 3].

In this study, the majority reported that they have heard about any contraceptive methods. The male condom (97.2%) was the main contraceptive method heard by the participants, followed by female sterilization (82.9%); Out of these, 77.2% reported mass media & 42.15 reported health personnel as the main source of information on any contraceptive method. Only about one-fifth (20.8%) were using any contraceptive method at the time of the interview. Out of those who were using, 16.4% were relying on spacing method and 4.5% had permanent sterilization. Among women who were involved in temporary contraceptive method, the male condom was the most used method (55.7%), followed by the oral pill (13.6%). Among the nonusers of contraceptive method, less than one-third (31.7%) gave the reason of not using that they did not know about any contraceptive method and about one-fourth (24.2%) were currently pregnant/breastfeeding their child. More than two-fifth of them wanted to use contraceptive in future. Among married women reporting future use for contraceptive method, the most preferred method was male condom (46.8%) and female sterilization (41.6%). Among the respondents, who did not want to use any method in future, 46% said that they did not know about the contraceptive method while 26.5% gave the reason of fear of infection/side effects [Table 4].

Table 5 revealed the use of temporary contraceptive methods among participants; the various methods varied with age. Less than one-third (30.3%) participants using the spacing method were in the age of ≥36 years with mean age was 29.6 ± 7.04 years. The respondents (17.7%) using spacing contraceptive methods were Hindu, 29.8% were from nuclear family, and 28.3% belonged to the upper class. Among the contraceptive user for spacing, 33.3% had higher education, 27.0% were working and 28.8% had two children, and 20.6% of users were living ≤3 km far from the health center.

In unadjusted odds ratio, age of women [OR: 4.54 (2.01 to 10.23)], type of family [OR 2.64 (1.50 to 4.66)], SES (adjusted odds ratio [OR: 3.77 (1.95 to 7.27)] education of women [OR 5.33 (1.35 to 21.01)], education of husband [OR 4.66 (1.15 to 18.79)], number of living children [OR 2.60 (1.43 to 4.71)], and distance from health center [OR 1.88 (1.07 to 3.30)] were found to be significantly associated with spacing contraceptive method use in bivariate analysis, as shown in Table 5.

Taking into account the influence of all other covariates simultaneously, multivariate logistic regression was conducted to identify the independent predictors for current use of the spacing contraceptive. These included age of women, education of women, education of husband, SES, number of living children, type of family and distance from health center with current use of spacing methods, except religion and occupation of women and husband.

The results revealed five significant predictors for the current use of spacing contraceptive methods: nuclear family [OR 1.90 (1.01 to 3.60)], upper class in SES [OR 2.37 (1.06 to 5.29)], more than secondary educated women [OR 5.04 (0.68 to 37.18)], ≤3 km distance form health center [OR 1.69 (0.91 to 3.14)], and having two or more living children [OR 2.45 (1.27 to 4.73]. As such, women living in the nuclear family, as well as belonging to upper class, were more likely to use temporary contraceptive method as compared to other classes. Besides lesser, the distance from the health center, higher the chance of adopting a spacing method, and women with higher education were more likely to use spacing method. Finally, the number of living children increased, women were more likely to rely on temporary method than women having one child, as shown in Table 5.

DISCUSSION

Although family planning program has been extensively implemented and has led to the steady increase in the prevalence of contraceptive use, with variation at different places in India, yet the progress of family planning program shows higher unmet of need in rural areas (13.7%) as compared to urban areas (8.8%) of Jammu and Kashmir.[8] The past trend of fertility rate has also declined from 3.36 to 2.2 during 1992–2016[1] and 2.1 to 1.8 during 2011–2017[14] in rural Jammu and Kashmir.

The present study showed that 16.4% of participants were currently using spacing contraceptive method. This result is almost similar to National Family Health Survey (NFHS)-4 report (19.2%),[8] whereas other studies showed a higher prevalence in Ludhiana (49.5%),[15] Mangalore (51.9%),[16] and Pune (81.5%),[17] contrary to our finding. This difference might be due to variation in the awareness of the people, availability of the contraceptive methods, and the difference in the study settings to access the service or change in sociocultural beliefs over time.

In the current study, it was observed that more than two-thirds of study participants were aware of any contraceptive method, a comparable finding of the study conducted in Bangalore.[18] However, contraceptive awareness was found

Table 3: Sociodemographic and obstetric characteristics of respondents (*n*=422)

Variables	*n* (%)
Age (years)	
≤25	126 (29.9)
26-35	211 (50.0)
≥36	85 (20.1)
Religion	
Hindu	379 (89.8)
Muslim	43 (10.2)
Type of family	
Joint	327 (77.5)
Nuclear	95 (22.5)
SES (BG Prasad scale)	
>6254 (upper class)	132 (31.3)
3127-6253 (upper middle class)	125 (29.6)
1876-3126 (middle class)	109 (25.8)
938-1875 (lower middle class)	51 (12.1)
<938 (lower class)	5 (1.2)
Education qualification of wife	
Illiterate	39 (9.3)
Primary + secondary	347 (82.2)
>Secondary/higher	36 (8.5)
Education qualification of husband	
Illiterate	33 (7.8)
Primary + secondary	356 (84.4)
>Secondary	33 (7.8)
Occupation of wife	
Working	44 (10.4)
Nonworking	378 (89.6)
Occupation of husband	
Working	406 (96.2)
Nonworking	16 (3.8)
Distance from health center (km)	
≤3	250 (59.2)
≥4	172 (40.8)
Number of living children	
1	141 (33.4)
2	173 (41.0)
3 and more	13 (3.1)
None	95 (22.5)

SES: Socioeconomic status

Table 4: Patterns of contraceptive use, awareness, sources of among study sample population Jammu district

Characteristics	*n* (%)
Knowledge	
Aware about any contraceptive methods (*n*=422)	
Yes	316 (74.9)
No	106 (25.1)
Type of contraceptive method (multiple choices) (*n*=316)	
Male condom	307 (97.2)
IUDs	174 (55.1)
Oral pills	219 (69.3)
Injectable	33 (10.4)
Implant	14 (4.4)
Emergency contraceptive	106 (33.5)
Male sterilization	156 (49.5)
Female sterilization	262 (82.9)
Calendar method	19 (6.0)
Lactational amenorrhea	11 (3.5)
Source of information (multiple responses) (*n*=316)	
Mass media	244 (77.2)
Health personnel	133 (42.1)
Spouse	90 (28.5)
Others (friends, family, neighbors, etc.)	98 (31.0)
Practice	
Current use of the contraceptive method (*n*=422)	
No	334 (79.1)
Use of temporary methods	69 (16.4)
Use of permanent methods	19 (4.5)
Type of the contraceptive method use (multiple choices) (*n*=88)	
Male condom	49 (55.7)
IUDs	6 (6.8)
Oral pills	12 (13.6)
Injectable	2 (2.2)
Male sterilization	1 (1.1)
Female sterilization	18 (20.5)
Reason for not using any contraceptive method currently (multiple choices) (*n*=334)	
Want children/male child	64 (19.2)
Harmful for health/fear of side effects	55 (16.5)
Currently pregnant/breastfeeding	81 (24.2)
Failure of contraceptive method/abstinence/fear of operation	52 (15.5)
No knowledge about contraceptive method	106 (31.7)
Others (husband opposes, wife opposes, etc.)	9 (2.7)
Behavior	
Future/intended use (*n*=403)	
No	230 (57.1)
Yes	173 (42.9)
Type of FP method prefer in future (multiple response) (*n*=173)	
Condom	81 (46.8)
IUDs	10 (5.8)
Implant	2 (1.2)
Oral pills	17 (9.8)
Injectable	1 (0.6)
Female sterilization	72 (41.6)
Reason for no future use (*n*=230)	
Fear of infection/side effects	61 (26.5)
Failure of contraceptives	3 (1.3)
Lack of knowledge	106 (46.1)
Abstinence	46 (20.0)
Fear of operation	14 (6.1)

FP: Family planning, IUDs: Intrauterine devices

higher in other parts of India, i.e. from 81% to 95.2%.[19-22] Some studies in Chandigarh (55.0%)[23] and Madhya Pradesh (58.0%)[24] had shown lower knowledge as compared to our findings. In the present study, the mass media (77.2%) turned out to be the main source of information regarding contraceptives, similar to the result of the studies conducted in various states of India, i.e. Karnataka,[19] Tamil Nadu,[20] Uttar Pradesh,[21] Chandigarh,[23] and Kashmir.[25] However, some studies conducted in Tamil Nadu,[26] Gujarat,[27] and Chhattisgarh[28] reported that health professional was the main source of information which was the second main source of information in our study.

The male condom (55.7%) found to be the most commonly used contraceptive in this study, similar to the study conducted in Pune[5,17] and Chandigarh.[23]

The current study reported the main reason for the nonuse of the contraceptive method as lack of knowledge (31.7%). This finding was concordant with some studies done in Pune,[17] Chandigarh,[23] Vadodara,[29] and Jammu,[30] while

Table 5: Differentials and determinants of spacing methods of contraceptive use among the study population according to select characteristics, Jammu district

Characteristics	Total (*n*=403)	Using spacing methods (69; 17.1), *n* (%)	Unadjusted OR with 95% CI, OR (CI)	AOR with 95% CI, OR (CI)
Age (years)				
≤25®	126	11 (8.7)	1	1
26-35	211	38 (18.0)	2.29** (1.12-4.67)	1.1 (0.51-2.5)
≥36	66	20 (30.3)	4.54*** (2.01-10.23)	1.6 (0.63-4.2)
Mean			29.6±7.04	
Religion†				
Hindu®	367	65 (17.7)	1	
Muslim	36	4 (11.1)	0.6 (0.199-1.69)	
Type of family				
Joint®	319	44 (13.8)	1	1
Nuclear	84	25 (29.8)	2.64*** (1.50-4.66)	1.90** (1.01-3.60)
SES‡				
Upper class	127	36 (28.3)	3.77*** (1.95-7.27)	2.37** (1.06-5.29)
Upper middle class	118	18 (15.3)	1.7 (0.82-3.56)	1.4 (0.64-3.07)
Middle class®	105	8 (7.6)	1	1
Lower middle class	48	6 (12.5)		
Lower class	5	1 (20.0)		
Education qualification of women				
Illiterate®	35	3 (8.6)	1	1
Primary + secondary	332	54 (16.3)	2.1 (0.61-7.01)	3.2 (0.55-18.28)
> Secondary/higher	36	12 (33.3)	5.33* (1.35-21.01)	5.04* (0.68-37.18)
Occupation of women				
Working®	37	10 (27.0)	1	
Nonworking	366	59 (16.1)	0.5 (0.23-1.12)	
Education qualification of husband				
Illiterate®	31	3 (9.7)	1	
Primary + secondary	339	55 (16.2)	1.8 (0.53-6.15)	0.5 (0.08-2.86)
> Secondary	33	11 (33.3)	4.66** (1.15-18.79)	0.8 (0.10-6.36)
Occupation of husband				
Working®	400	69 (17.2)	1	
Nonworking	3	0	0	
Distance from health center (km)				
≤3	238	49 (20.6)	1.88** (1.07-3.30)	1.69* (0.91-3.14)
≥4®	165	20 (12.1)	1	1
Number of living children§				
1®	141	19 (13.5)	1	1
2	156	45 (28.8)	2.60*** (1.43-4.71)	2.45** (1.27-4.73)
3 and more	11	1 (9.1)	0.31** (0.11-0.88)	0.30** (0.10-0.88)
None	95	4 (4.2)		

*,**,***Level of significance at 1%, 5%, and 10%, ®The reference category for categorical variables, †Religion and occupation of women variables did not include in the AOR as the Muslim respondents were very less compared to non-Muslims, ‡In SES (BG Prasad classification) variable, we have combined middle class, lower middle class and lower class in unadjusted as well as in AOR, §In number of living children variable, we have combined 3 and more and none in unadjusted as well as in AOR. OR: Odds ratio, AOR: Adjusted OR, SES: Socioeconomic status, CI: Confidence interval

others reported fear of side effects[31] and want of more children[16,18,21] were the main reasons for nonuse of the contraceptive method.

In the current study, the most preferred contraceptive for future was condom (46.8%), which got support from the finding of NFHS[8] report. Whereas, studies conducted in Maharashtra[31] and Jammu[32] revealed that female sterilization was the most commonly preferred method for future use. Moreover, a study from Karnataka[33] showed that oral pill found out to be the most preferred method for future use.

In the multivariate analysis, it was found that there was a highly significant association between temporary contraceptive usage and number of living children. Similar findings were also supported by the study done in Mangalore where it was found to be higher in women having two or more children (93.9%) than women having one children (69.6%).[16] Similarly, a study done in Pune showed the significant association between the number of children and the use of temporary contraceptive methods.[17]

A highly significant association was found between higher income class and use of temporary contraceptives. Two studies have also found the similar findings where the temporary methods were directly associated with SES of the respondents. The use of temporary contraceptive was 66.1%[16] and 90.5%[17] among higher income group than low income group.

There was a significant association found between the education of woman and the use of temporary methods of contraception. The women who attained higher levels of education were practicing temporary contraceptives more than woman with less and no education. This findings was consistent with earlier conducted study in Mangalore where the use of temporary methods in the women of higher education were significantly higher (100%) than illiterate (23.8%).[16]

Logistic regression analysis revealed that married women living in the nuclear family, belonging to high SES, more than secondary educated women, residing at ≤3 km distance from health center and having two or more living children were more likely to use temporary contraceptive methods. Married women from the nuclear family are relatively free to talk on sex issues with husband, than the women residing in joint family where they might feel ashamed of or fear to discuss the same and also find less time with husband due to multiple tasks for many people in the family. Hence, women from nuclear family are more likely to use contraceptive than women of joint family. Similarly, women with higher education and belonging to upper class income state are more likely to do the same with more knowledge and exposure to discussion on family planning and latest developmental issues as they may feel pride in experimenting in more free time than woman of poor family and less education. Those staying near the health center get more opportunity to health information than those staying far away and hence are more likely to use more contraceptive.

Strength and limitations

It was a community-based study covering a difficult geographical area. Although the sample size was adequate, the large population of the area could have been covered. Design effect was not used, even though multistage sampling was applied.

CONCLUSION

Despite India being the first nation in the world to launch family planning program in 1952, it has still not attained the desired level of temporary contraception usage in certain parts of India. J and K is a declared difficult area under the Indian Act[10] and this study focused on married women of rural area of Jammu and found temporary contraceptive usage prevalence with its determinants. Only one eighth of the married women of the rural Jammu were currently using temporary contraceptive. The mass media was reported to be the main source of information followed by health personnel regarding contraceptive use. SES, education of women, number of living children, type of family, and distance from health center were found to be strong five predictors of the use of spacing contraceptive methods. Dissemination of the scientific information through regular awareness campaigns and educational sessions regarding contraceptive use needs to be tailored to community by the devoted health-care personnel and mass media. Field researches need to enhance to unfold intricacies involved in this context to integrate new information that may emerge into the future programs to help create healthy society.

Acknowledgment

We would like to thank all the participants without whom this study could not have been possible.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Original Article

Perceptions of medical students regarding medical profession: Is there a change during graduation course?

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Abstract

Introduction: Medical students enter this profession with a set of perceptions toward the practice of medicine. The study of these factors becomes important as it may provide an insight into the perceptions of doctors toward medical profession to maintain a high standard of professionalism among medical practitioners.

Material & Methods: This study was conducted by the department of community medicine of a premier medical institute of Delhi and involved the analysis of 457 feedback forms filled by medical students about their perceptions regarding medical profession at the time of entry and at the end of graduation. The responses were read several times and categorized into similar thematic areas.

Results: At the time of choosing profession, 74.8% mentioned the reasons as, its respectable status in the society, 71.8% mentioned their interest to serve people, 26.9% the possibility of huge financial earning, and 21.2% the ease of getting employment. At the end of graduation, 312 (68.3%) considered ease of getting a job and 251 (54.9%) high paying capacity. The proportion of participants mentioning the profession to be prestigious and respectful (50.1%) and intention to serve people (51.2%) considerably declined. Regarding the reasons for change, majority (74.6%) mentioned stress, 66.7% felt it less rewarding, and 54.2% mentioned difficulty to maintain work-life balance.

Conclusion: There was a change in students' perceptions at the end of graduation as compared to the time of entry. Their focus shifted from being in a respectful profession and serving community to getting jobs and earning money.

Keywords: Change, medical profession, perceptions

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Submitted: 11-Mar-2021 **Accepted in Revised Form:** 29-Jul-2021 **Published:** 24-Dec-2021

INTRODUCTION

Medicine at its core is a human service profession. Medical students enter this profession with a set of perceptions toward the practice of medicine.[1] However, some studies have shown that students tend to lose their idealistic perceptions during the course of medical graduation.[2-5] Recently, there have been changes in medical curriculum also to support the maintenance and advancement of desirable attitudes among medical professionals.[6]

Several factors motivate a student to join medical career while there may be other factors that may influence the motivations of students later on during the years of graduation that may influence their practices and professional satisfaction. The study of these factors becomes important as it may provide an insight into the perceptions of doctors toward medical profession. Furthermore, if we know whether there is a change in their perception later on and the reasons for this change, it can provide an opportunity to address these

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/ijcfm.ijcfm_21_21

How to cite this article: Priyanka, Goel MK, Rasania SK. Perceptions of medical students regarding medical profession: Is there a change during graduation course? Indian J Community Fam Med 2021;7:100-4.

issues to maintain a high standard of professionalism among them. There is a dearth of research in this area, especially among Indian medical students. Hence, the present study was planned and conducted.

MATERIAL & METHODS

This study was conducted by the department of community medicine of a premier medical institute of New Delhi. The department coordinates the internship training of medical students. The students who pass their final professional examinations and are about to start their compulsory internship are routinely invited to give a feedback about their perceptions and experiences about medical graduation. We analyzed 457 feedback forms filled by the students of last three consecutive batches.

A self-designed semistructured questionnaire enquired about the demographic profile of students. It contained open-ended questions regarding their perceptions about medical profession at the time of entry and at the end of graduation. If there was a change in their perception during medical graduation, the reasons for change were also asked. The questionnaire was pretested on a group of students who were pursuing internship at the time of development of questionnaire. Their responses were not included in the final data analysis. The students were informed that their participation is completely voluntary and they could opt out if they felt so. The form was self-administered and filled anonymously. One student representative from each batch was responsible for collecting the filled forms and handing them over to one of the investigators.

The participants had filled the responses to open-ended questions in one or more sentences. Their responses were in their own verbatim , coding was initially done by two investigators independently. Any discrepancy or disagreement was resolved by discussion and mutual consensus was obtained for identification of themes. Subthemes were identified by examining persistently repetitive words and depicting the idea represented by them. After further discussion and mutual consent, less relevant areas were eliminated and synonymous ones were merged and data were finally categorized into similar thematic areas.

All the data were kept completely anonymous with no personal identifier. The confidentiality was strictly maintained. As this study involved retrospective analysis of anonymous data, the permission to do so was obtained from the Institutional Ethics Committee along with a waiver of written consent.

RESULTS

The study questionnaire was distributed to 502 students, out of which complete responses were obtained from 457 participants who were included in the final data analysis. Thus, the response rate came out to be 90.9%.The mean age of the participants was 22.8 ± 0.76 years (range 21–25). The majority of respondents (87.7%) belonged to the urban areas. As far as education of parents is concerned, 91.1% fathers and 71.1% mothers of respondents were graduates and above. Fourteen percent students had at least one parent who was doctor [Table 1]. The students were asked about their perceptions regarding medical profession at the time of choosing the profession. Four main themes emerged from data analysis:

1. Prestigious and respectful status in society
2. Meant for serving people
3. Capable of huge financial earning
4. Ease of getting an employment.

Almost three-fourth (74.8%) mentioned that the profession is very respectable in the society, 71.8% mentioned their interest to serve people, 26.9% said there is possibility of huge financial earning, and 21.2% the ease of getting employment. When asked about their perceptions regarding the same after completing final MBBS examination, there focus now seemed to shift more toward employment and earnings. Three hundred and twelve (68.3%) considered ease of getting a job and 251 (54.9%) mentioned high paying capacity. The proportion of participants mentioning the profession to be prestigious and respectful (50.1%) and intention to serve people (51.2%) considerably declined as compared to what it was at the time of entry to the profession [Table 2].

Similar perceptions were also highlighted when the students were enquired about their intentions for specialty choice. The students were asked whether or not they were interested in pursuing postgraduation and all of them

Table 1: Demographic profile of medical students (*n*=457)

Variable	*n* (%)
Residence	
Urban	401 (87.7)
Rural	56 (12.3)
Education of father	
Below graduate	41 (8.9)
Graduate and above	416 (91.1)
Education of mother	
Below graduate	132 (28.9)
Graduate and above	325 (71.1)
Parents' occupation	
Doctors (at least one parent)	64 (14.0)
Any other	393 (86.0)

mentioned that they were interested in doing so. Regarding the factors they would consider while choosing a specialty for postgraduation, a high demand in job market (72.3%) and high paying capacity (57.4%) were mentioned by a maximum proportion of respondents. A considerable proportion of study subjects (39.9%) wanted to choose a branch that is considered desirable and high rated by their peers while 133 (29.1%) preferred choosing a specialty with less hectic work hours.

When asked about the reasons for change in their perceptions about medical profession after clearing final professional MBBS examinations, five main areas were found. Maximum number of students (74.6%) mentioned that it is a stressful profession. Almost two third (66.7%) students described the profession as very demanding but comparatively less rewarding. The other perceptions about medical profession were, challenging and prestigious (55.4%), difficult to maintain work-life balance (54.2%) and takes a long time to settle in life (15.8%) [Table 3].

Table 2: Perceptions of students regarding medical profession at the time of entry and at the end of graduation

Perceptions*	At the time of entering medical profession, *n* (%)	At the end of graduation, *n* (%)
Prestigious and respectful in society	342 (74.8)	229 (50.1)
Meant for serving people	328 (71.8)	234 (51.2)
Capable of huge financial earning	123 (26.9)	251 (54.9)
Ease of getting an employment	97 (21.2)	312 (68.3)

*Multiple responses

Table 3: Reasons for change in perceptions about medical profession during graduation

Reason*	*n* (%)
Stressful	341 (74.6)
Less rewarding	305 (66.7)
Challenging and prestigious	253 (55.4)
Difficult to maintain work-life balance	248 (54.2)
Takes a long time to settle	72 (15.8)

*Multiple responses

DISCUSSION

The present study tried to find out if there is any change in the perceptions of medical students regarding medical profession at the end of graduation than at the time of entry to the profession. Being a respectable profession in the society (74.8%) and intention to serve people (71.8%) were cited as the most common perceptions at the time of joining medical profession by the students. High earning capacity was cited as important factor by approximately one fourth of subjects. This reflects that students enter medical profession primarily because of the nobility of the profession and with intention to serve the community. Another study by Morley *et al*. also shows that ability to make a difference in others' lives and serving community are the major reasons for choosing career in medicine.[2] A desire to help others is cited as the most important factor considered while entering medical profession by studies conducted by Gazibara *et al*. as well as by Scheffer *et al*.[7,8] Our finding are in accordance with those of Saad *et al*. showing that financial gain was not a major consideration for joining medical profession.[9] Although Heikkilä *et al*. have reported that good salary was cited by almost 50% participants as the reason for joining the profession.[10] Finding similar to ours has been documented by other researchers as well.[11-18]

After clearing final MBBS examinations, the students' perceptions about medical profession seemed to differ than what they were at the time of entry. The proportion of students considering it a respectable profession was almost 50% which was earlier cited as the most common reason for entering medical career by a majority of students (74.8%). Similarly, the proportion of students considering that medical profession is meant to serve people also dropped to almost 50% from the earlier level of 71.8% at the stage of entry. A study by Morley *et al*. also shows that there is a decline of medical student idealism later during medical training as compared to time of entry.[2] Ease of getting a job (68.3%) and high financial earning (54.9%) were mentioned by a significant proportion of students. Thus, at the end of graduation, students had become more concerned about jobs and earnings as compared to when they entered medical profession. These two factors were also the most important ones mentioned by respondents for choosing a specialty. Mirvis has also reported that medical students prefer to choose a specialty which is high paying.[19] Good earning capacity is mentioned as an important factor while choosing postgraduation by many other authors.[1,2,7,8,10,15,17,20]

All of the study participants showed interest in pursuing postgraduation. This may be a reflection that just MBBS is not a desirable qualification for a doctor nowdays and every doctor wants to become a specialist. A study from the United States reports that medical students think that primary care doctors are poorly valued by the rest of the medical profession.[2] Moreover, prestige and status issues for certain specialties also seem to make them more preferable, thereby indicating that doctors are concerned that they should have a desirable and high rated status.

Other studies have mentioned that 6%–22% students reported to choose a branch for postgraduation based on its high reputation.[8,11,20]

Regarding the reasons for change in their perceptions toward medical profession, almost three-fourth students were concerned about the mental stress associated with the profession while almost two-third considered it less rewarding. Similar results have been shown by other studies where students have also emphasized that there should be regular workshops for stress management for medical students.[21] A similar research from Pakistan found that students feel that doctors have excessive working hours and medical training is very difficult and prolonged.[14] Narayanasamy *et al*. in their study on Indian medical students have reported that students felt that doctors work for long hours with comparatively less salaries.[1] Our results also show that the students were now more concerned about maintaining a balance between personal and professional life, which was not their concern when they entered this profession. This may be the reason that many of them wanted to choose a specialty which has a less hectic lifestyle. These findings are in accordance with another study from Siberia which mentions that final year medical students are more concerned about comfortable work hours and balancing work life with family responsibilities as compared to 1st year students.[7] Jennet *et al*. have found that almost one fourth medical professionals report major changes in medical career because of general dissatisfaction with the profession and lack of life style compatibility.[12] A small proportion (15.8%) also mentioned about the long time it takes to settle in medical profession which is in accordance with the results of another study.[9] This may be an indication that young doctors do not consider the profession very rewarding and they have concerns over lifestyle, family life, and money.

Medical students were more idealistic in their approach at the time of entering the profession which declined later on. There is a need to look into the challenges faced by students which led to this decline so that the nobility of this profession can be maintained. It is high time to take remedial measures so that the medical doctors, who choose the profession primarily because of its respectful status and with intention to serve community, continue to work with the same principles throughout their professional lives.

Limitations

We used semi-structured questionnaire for obtaining the responses. Focus group discussion and in-depth interviews may be a better method for getting a deeper insight into the students' perceptions. It may have also resulted in reducing nonresponse rate, which was approximately 10% in this study because of incomplete responses.

CONCLUSION

The present study shows that a majority of students enter medical profession primarily because of respectful image of this profession in society and to serve the community while after clearing MBBS final exams, they seem to be more concerned about getting an employment and earning money. Thus, near the end of graduation, they worried about stress and challenges associated with medical profession. Furthermore, their priorities changed to having a stable less hectic job and work-life balance which were not their main focus while choosing medical career.

Recommendations

The authors are of the opinion that there should be more focus on extracurricular activities in medical institutes and mandatory organization of sports, yoga, and cultural events along with medical curriculum. Further, students should be encouraged to nurture their hobbies and interests so that they do not feel overburdened by their vast curriculum and it will help in coping up with stress. Setting up of a separate Indian Medical Services cadre will help the doctors regain the prestige for this noble profession as well as will be beneficial for uplifting the health status of population. Steps to improve doctor-population ratio and fixing the maximum number of work hours per day should be taken. Adequate efforts for providing job security to the doctors along with good salary at par with other reputed professionals can help.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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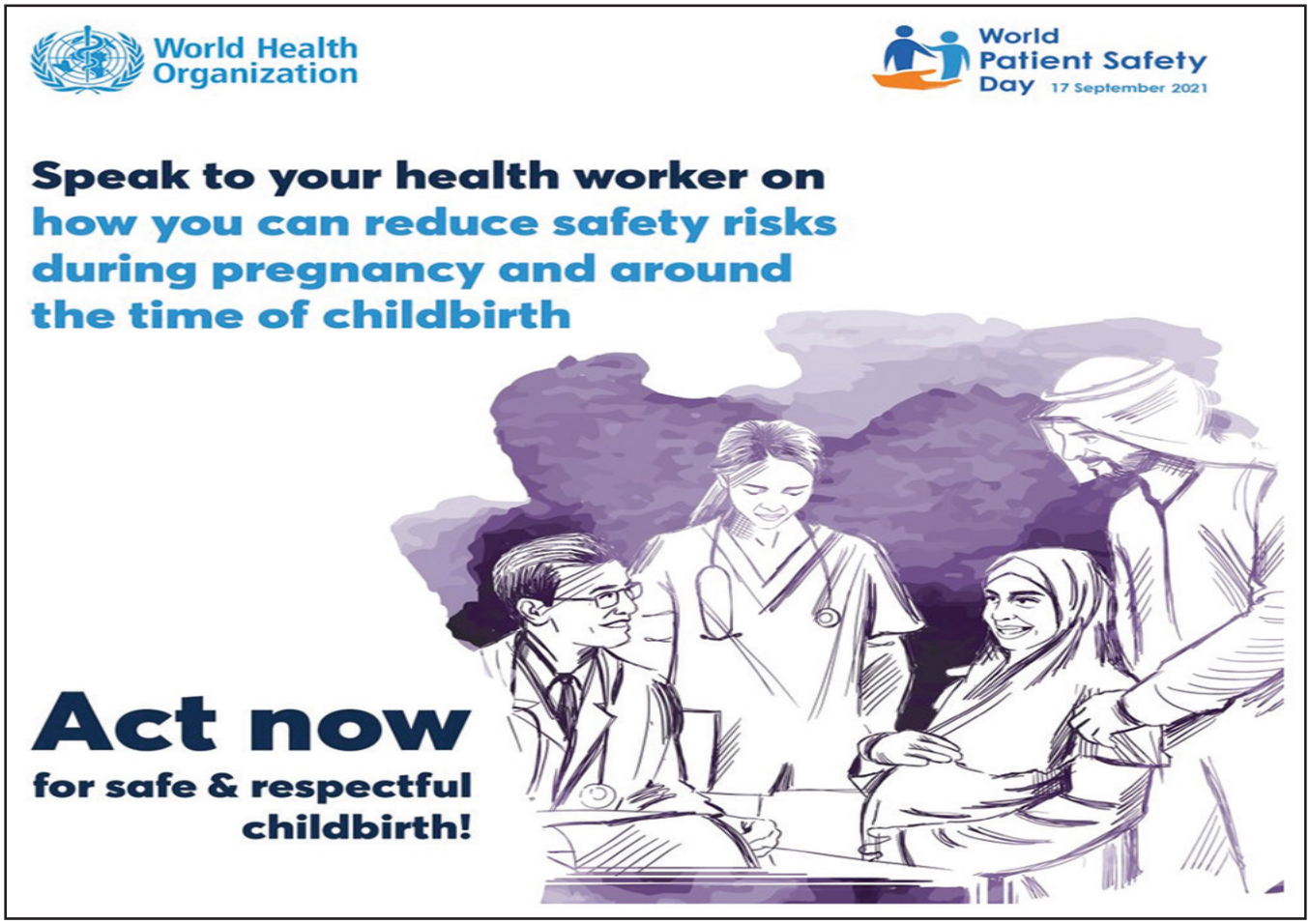

Original Article

Integrated approach for survival and development during first 1000 day of life: Assessing Health Systems Readiness in three Aspirational Districts of Jharkhand (India)

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Abstract

Introduction: With increased evidence of the association between early child-rearing practices and children's health, growth, and development, the government of India has introduced several policies and strategies, of which the home-based care for young child (HBYC) is the most recent. An assessment was conducted in three aspirational districts in Jharkhand to see system preparedness for implementation of the program.

Material & Methods: Eight district key health personnel from 3 districts were interviewed on health systems readiness components. A total of 100 Sahiyas (Accredited Social Health Activists) and 100 mothers were selected across 8 villages in 2 blocks in each of the 3 districts of Lohardaga, Simdega, and West Singhbhum, and interviewed with a structured questionnaire on knowledge and practices. In addition, 24 auxiliary nurse midwifes, Sahiya Sathis, and Anganwadi workers were interviewed. Data collection teams underwent an orientation.

Results: Most nodal persons were recruited; however, orientation to HBYC and awareness of key components such as incentives, supervision mechanism, and monitoring indicators was lacking. Supply of prophylactics and equipment was inadequate. Knowledge of community health workers was inadequate for many child care indicators except Oral Rehydration Salt (ORS) preparation (96%) and initiation of complementary feeding (97%). Knowledge of danger signs requiring referrals was particularly low (30%). Mothers' knowledge and practices were low on all the indicators.

Conclusion: The HBYC program can build its success on the present health system functioning by tailoring trainings to focus on gaps in knowledge, addressing specific gaps in supplies, improving supervision, and integration efforts

Keywords: Health system, home-based care of young child, Jharkhand

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Submitted: 20-Jul-2020 **Revised:** 16-Sep-2020 **Accepted:** 08-Oct-2021 **Published:** 24-Dec-2021

INTRODUCTION

Adequate nutrition from conception through infancy is the foundation for lifetime brain function. Children who are not adequately nourished are at risk for failing to reach their developmental potential in cognitive, motor, and socioemotional abilities.[1,2] Particularly, nutritional deficiencies result in low birth weight and developmental delays,[3] while stunting before 2 years of age is related to poor child development.[4] In India, nutritional deficiencies

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/IJCFM.IJCFM_81_20

How to cite this article: Mohanty JS, Prabhanjan AK, Saboth PK, Kumar H, Sarin E, Minz A, *et al*. Integrated approach for survival and development during first 1000 day of life: Assessing Health Systems Readiness in three Aspirational Districts of Jharkhand (India). Indian J Community Fam Med 2021;7:105-12.

are pervasive, particularly in low socio-economic households.[5-7] According to NFHS 4, wasting occurs in 21% of under-five children, stunting occurs in 38.4%, while 35.8% of children are underweight.[8] Although there has been a decline in stunting and underweight since the third round of NFHS, wasting among under 5 children has increased in India, which is concerning given that 4.4% of deaths have been shown to be specifically attributable to severe wasting.[9] Of the 5.9 million deaths annually among under- 5 years children, approximately 35% are due to nutrition-related factors.[10]

With increasing evidence of the strong association between nursing care and children's health, growth, and development,[11,12] governments have committed to early childhood development programs. The Indian government made significant advances in policy and guidelines in child health and nutrition. Through the home-based newborn care (HBNC) initiative, Accredited Social Health Activists (ASHAs) were able to reach 1.1 crore children until 2017.[13] However, their schedule put a limit to home visits to just 42 days after the birth of a child, leaving out a wide window of opportunity. A high proportion of deaths occur in the first 2 years of a child's life due to pneumonia (72%) and diarrhea (81%).[14] Reaching children during this critical period and providing treatment and referrals at home along with counseling for age-appropriate feeding practices and water, sanitation, and hygiene (WASH) is crucial. To fill this gap and provide an integrated platform, the government of India recently launched the home-based care for young child (HBYC) program in April 2018, an integrated approach for support in the first 1000 days of children's life.

The objective of the HBYC program is to reduce child mortality and morbidity and improve nutrition status, growth, and early childhood development of young children, through structured, focused, and effective home visits by ASHAs. HBYC envisages additional 5 visits after the newborn period – at months 3, 5, 9, 12, and 15 – to all children between 3 and 15 months, with focused counseling for complementary feeding, growth monitoring, vaccination, WASH practices, and childhood sickness. It was to be implemented in all aspirational districts of India.

In Jharkhand, all the districts have been selected for initiating HBYC in FY 2019–2020, and a baseline assessment was conducted by the community mobilization cell, NHM, to assess the readiness of the health system in implementing the program. The USAID Vriddhi project team provided technical support in designing tools and guidelines for the assessment. It also supported the orientation of district resource persons on the tools and facilitation of data collection in three target aspirational districts (Lohardaga, Simdega, and West Singhbhum). These districts, which are aspirational districts, were assigned to the Vriddhi project by the national government for the assessment. The current article reports findings from these three districts for the following objective:

- To find out the status of HBYC orientation, planning of trainings and task schedules, supplies of essential drugs and equipment, and finance
- To assess knowledge and skills of front line health workers (auxiliary nurse midwives [ANMs]), Sahiya (ASHAs as known in Jharkhand), SahiyaSathi (ASHA facilitators), Anganwadi workers (AWWs), and lady supervisor (ICDS) on nutrition and related child development information necessary for fulfilling their roles under HBYC
- To assess knowledge and practices of mothers on infant and child care practices.

MATERIAL & METHODS

A cross-sectional study was conducted among service providers through a survey method to assess the readiness of the health system for implementing and managing HBYC. Two blocks and 8 villages (4 villages in each block) were purposively selected from each district in consultation with state NHM officials. The total number of blocks was 6 and the total number of villages sampled was 24. Nodal officers for HBYC were recruited from each district. Sahiya Sathi, ANM, and AWW were selected from each village (24 villages), while one lady supervisor was selected from each block (6 blocks). The sample size for district program managers, district program coordintaors, and district accounts managers (DAMs) was exhaustive. All nodal persons assigned for HBYC were interviewed – 2 district program managers (DPMs), 3 DAMs, and 3 district program coordinator (DPC), along with 24 Sahiya Sathis, 24 ANMs, 24 AWW, and 6 lady supervisors. One of the districts did not have a DPM, so two were interviewed. At least, one representative from each of the three groups of Sahiya Sathi, ANM and AWW was selected from each village. The Sahiya Sathi, ANM, and AWW were a convenience sample. As each village was visited, one each of Sahiya Sathi, ANM, and AWW – whoever was available during that day– was recruited for the interviews.

The sample size for Sahiya (ASHA) has been calculated using Sahiya's knowledge of their role in postnatal care as sample proportion (p), while for mothers, measles coverage in rural India was used as sample proportion (p).

With 80.3% measles coverage in rural India taken as sample proportion of mothers and a 95% confidence interval, an error rate set at 10%, and design effect of 1.5, the total sample size of mothers was 100 per district ($Z^{\alpha}{}_{/2}{}^{2}$*p*[1 − *p*]/MOE^2). Nearly 80% ASHAs knew their role in postnatal checkup,[15] this was taken as the sample proportion, and taking the same values of the parameters as mentioned above, the sample size of Sahiyas similarly was 100 in each district.

From a list of villages for each block, 4 villages were picked randomly through a simple lottery system. The selected villages were presented to the state NHM and finalized. In each selected village, available and eligible mothers with children 3–15 months were interviewed through a random walk method. One hundred and forty-four mothers had infants in the age group of 3–6 months and 156 mothers had infants in the age group of above 6 months up to 15 months. Before each interview, an informed consent form was read out to participants and upon their agreement to participate in the study, the interview was conducted. Frontline health workers were interviewed at the block PHC and Anganwadi centers. Mother–child protection (MCP) cards and growth charts were physically verified. A total of 50 Sahiyas from each block were interviewed as per convenience.

Data collection tool was developed at state level with technical support from USAID Vriddhi project. There were 9 types of questionnaires developed for the different types of study participants. An informed consent form was developed which contained information about the study, the interview process, and risks, benefits, and confidentiality of the process. In the questionnaires, key processes for rollout of HBYC were included as indicators in district functionaries' tools, adapted from the WHO Service availability and readiness assessment (SARA) tool. Knowledge and practice questions were based on standards provided in IMNCI guidelines (MoHFW, 2019). A state-level one-day orientation of state team trainers (STTs) and DPCs from each district was held on July 9, 2019. After orientation, each district prepared two teams for data collection. Each team included 4 block team trainers (BTT) from neighboring blocks and 1 STT from the district. A Vriddhi project consultant and the state trainer interviewed district key functionaries.

The study was undertaken by the Jharkhand State NHM as part of the HBYC rollout and did not require an ethical review. Informed consent forms were prepared in accordance with the ethical principles laid down in the Helsinki Declaration. The consent form included explanation of the study, benefits, risks, and assurance of confidentiality.

RESULTS

For assessing the readiness of the district health system, interviews were conducted with NHM officials at district level. Certain questions were common, while others were unique to the type of functionary interviewed. Tables 1-3 present the findings.

The state program coordinator is the nodal person for HBYC at state level and DPC is the nodal person at the district level. DPM has the overall responsibility of the programs. One district had not yet appointed the DPM.

One of the two DPMs and the three DPCs were aware of HBYC guidelines released by the government of India. However, none of the DPMs and DPCs were formally oriented on HBYC. Unlike HBNC, the AWWs play an important part in the HBYC program; however, there was no joint planning exercise with ICDS department for the training of AWW under HBYC and their role in the implementation of HBYC. The DPMs were aware of the specific tasks of ASHA and ANM and have established supportive supervision mechanisms. They were aware of the incentive scheme for ASHA under HBYC but not of the supervision incentive. Only one DPC was aware of monitoring indicators for HBYC. The account managers were not aware of the HBYC periodic monitoring or any budgetary provisions for it.

Table 1: Awareness, supplies, and training for home-based care for young child among district program managers

Indicators	Number of DPM
A nodal person appointed for HBYC at district level	2
DPM/DPC aware of HBYC operational guidelines	1
DPM/DPC having a copy of HBYC operational guidelines	2
DPM aware of tasks to be performed by ASHA and ANM under HBYC	2
District NHM conducted joint planning exercise for HBYC with ICDS	0
DPM oriented on HBYC	0
Districts that have identified resource centre for conducting trainings of HBYC	2
DPM/DPC aware of monitoring indicators of HBYC program	0
Districts have procured additional stock of IFA syrup for HBYC	1
Districts have procured additional stock of ORS for HBYC	1
HBYC training package available in local language	1

DPM: District program manager, HBYC: Home-based care for young child, DPC: District program coordinator, ASHA: Accredited social health activists, ANM: Auxiliary nurse midwife, NHM: National health mission, ICDS: Integrated child development services, IFA: Iron Folic Acid, ORS: Oral Rehydration Salt

Table 2: Awareness, supplies, and training for home-based care for young child among district accounts managers

Indicators	Number DAM
DAM having a copy of HBYC operational guidelines	2
DAM aware of budget proposed for HBYC in the current financial year	3
DAM aware of the recommended amount for each training batch of HBYC	0
DAM aware of recommended amount for ASHA incentive for HBYC	3
DAM aware of recommended amount for ASHA supervisor incentive for HBYC	0
DAM aware of recommended amount for HBYC monitoring	0

DAM: District accounts manager, HBYC: Home-based care for young child, ASHA: Accredited social health activists

Table 3: Awareness, supplies, and training for home-based care for young child among district program coordinators

Indictors	Number of DPC
DPC aware of HBYC operational guidelines	3
DPC having a copy of HBYC operational guidelines	3
District NHM conducted Joint planning exercise for HBYC with ICDS	0
District established any supportive supervision mechanism for HBYC	2
HBYC training package available in local language	2
Districts that have identified resource centers for conducting trainings of HBYC	2

HBYC: Home-based care for young child, DPC: District program coordinator, NHM: National health mission, ICDS: Integrated child development services

Two districts have identified a resource center for trainings, while only one district had procured additional stocks of IFA syrup and ORS. Two districts had training packages available in the local language and only one district planned Training of trainers. None of the DPCs or DAMs were aware of recommended budget for training batches.

Status of knowledge of Sahiyas and SahiyaSathis on child care practices

As the HBYC program was not yet implemented in the districts, the Sahiyas were not aware of the tasks and home visit schedule as per HBYC protocol. Regarding supplies, 70% of Sahiyas reported availability of ORS, but only 6% reported pediatric IFA syrup availability. Although a majority of them knew when to introduce complementary feeding and how often to feed, their knowledge on adequate feeding (quantity more than or equal to half bowl during each feed) was low [Figure 1]. Moreover, while 97% of them knew how to prepare ORS, only a smaller percentage knew about the dose and frequency of IFA syrup [Figure 1]. In comparison, a higher proportion of SahiyaSathis had knowledge on the dose and frequency of IFA syrup. In addition, while 75% of SahiyaSathis knew at least 3 danger signs for which referral of a child is required, only 30% of Sahiyas had any knowledge about this.

Supervision of Sahiya

Slightly more than half of the SahiyaSathis (58%) had the latest records related to supervisory visit and half (50%) had completed all the necessary tasks during their supervision visit.

Status of knowledge of auxiliary nurse midwife, Anganwadi worker, and lady supervisor on child care

ANM, AWW, and lady supervisors were asked about their knowledge on child care. In addition, functionality of the Anganwadi center (AWC) was assessed [Table 4].

In terms of functionality, it is seen that growth chart was not plotted for every child. Only 17 out of the 24 AWW reported having a functional weighing scale. As regards knowledge, all the supervisors and the majority of AWW knew about weight plotting, timely initiation of complementary feeding, and detecting SAM using a MUAC tape. The knowledge was low for correct frequency and quantity of complementary food, and knowing all the components of the National Nutrition Mission. Interestingly, a higher proportion of AWW knew the correct frequency of feeding compared to their supervisors.

ANMs were also assessed in those indicators for which their knowledge was vital to provide correct referral and treatment to young children. Table 5 captures their knowledge.

Although knowledge was high on correct initiation of complementary feeding, duration of zinc provision for a child with diarrhea, and correct ORS preparation, knowledge regarding dosage and frequency of pediatric IFA syrup and zinc dosage was low. In addition only half of them had knowledge about critical danger signs.

Status of knowledge and child care practices of mothers

As shown Figure 2, only 28% of mothers had ORS available with them. Out of the total infants who were reported having diarrhea in the last 2 weeks preceding the survey, only 33% received ORS. Out of the total mothers who had given ORS to infants suffering from diarrhea, only 29% of mothers had prepared ORS correctly. Again, only a small percentage (11%) of mothers reported washing hands-on critical times of the day (after defecation, before feeding baby, before cooking, after washing baby's bottom). The knowledge of mothers about any two critical danger signs in infants that require referral to health facility appeared to be low (13%) [Figure 2].

Besides the above, mothers' knowledge on breastfeeding and complementary feeding was also assessed. A majority

of mothers were practicing exclusive breastfeeding (83%). Although a majority of mothers with infants of 6–15 months age had initiated complementary food at the appropriate age, not many were giving it in the correct frequency or in adequate quantity. Besides knowledge and practices of mothers, a few other essential indicators were also assessed during home visits, i. e., the status of MCP cards and mothers' interaction with their child. While the majority of mothers had MCP cards (98%), only 20% of infants were reported to have undergone age-appropriate vaccination, and 3% had age-appropriate weight plotted. The majority of mothers (89%) were observed to be adequately interacting: laughing, talking, and playing with their child [Table 6].

DISCUSSION

The baseline assessment was conducted to assess readiness of the health system in providing home-based care for infants and young children. For the HBYC program to succeed and achieve end goals, certain essentials need to be in place: trained service providers, supplies and job aids, adequate supervision, and monitoring among others. Results from the assessment make it clear that improvements in training, supplies, and supervision need to be a priority for the program to achieve its goals.

Table 4: Functionality of Anganwadi centers (*n*=24)

Indicators	(%)
AWW maintaining records of infants (0-2 years)	100
AWW maintaining length/height of every child	38
Availability of functional weighing Scale at AWC	71
Supervisors conducting monthly meetings with AWW	83

AWW: Anganwadi workers, AWC: Anganwadi center

Table 5: Knowledge of auxiliary nurse midwife on child care indicators (*n*=24)

Indicators	*n* (%)
Timely initiation of complementary feeding	24 (100)
Correct ORS preparation	22 (92)
Dosage of zinc tablet	13 (54)
Duration of zinc provision	24 (100)
Correct initiation of pediatric IFA syrup	15 (63)
Correct frequency of pediatric IFA syrup	9 (38)
Correct dose of pediatric IFA syrup	14 (58)
3 danger signs that require an infant's referral	14 (58)

IFA: Iron folic acid, ORS: Oral rehydration salt

At the time of the assessment, the awareness of program managers on the different aspects of HBYC was very low probably due to the newness of the program. Convergence with related programs and departments that address all the determinants of child health and development is a cornerstone of child and infant care. However, no coordination with ICDS was reported at the district level at the time. Awareness of the various components was low among key personnel. Most nodal persons were able to identify the program which is a strength. However, in other respects such as supplies, training plans, monitoring and incentive mechanisms, limitations were seen. Similar limitations or gaps were seen in other studies.[16-19] This highlights an incomplete preparation of the current public health systems and suggests that only once a program gets implemented do all the building blocks expect to get filled. Despite a national-level orientation being conducted, the cascade of information flow to the district level was limited.

The knowledge of Sahiya, AWW, ANM, and supervisors is adequate in some issues due to previous trainings under various umbrellas, whereas in some others, it is incomplete. For example, Sahiyas knew about when to initiate complementary feeding but lacked knowledge on how frequently and how much to feed. This was seen across all levels of frontline health workers including supervisors. Although more SahiyaSathis had correct knowledge on several indicators, they perhaps failed to transfer this knowledge to

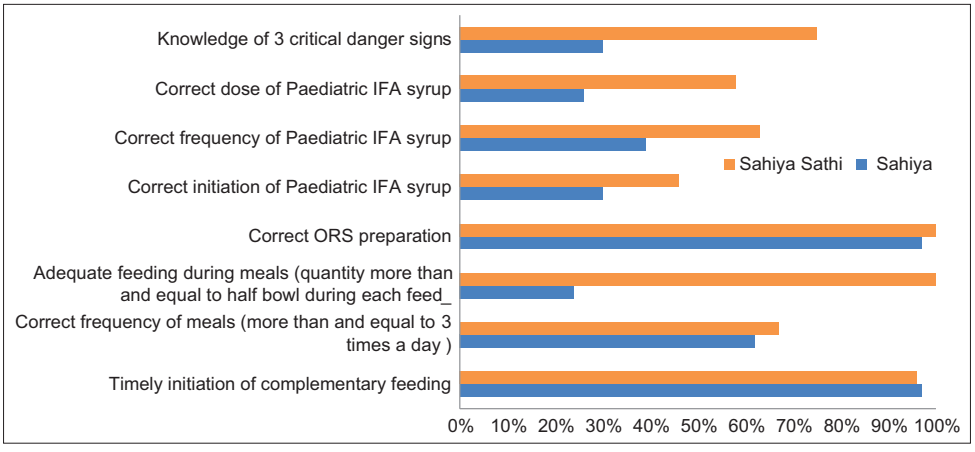

Figure 1: Knowledge of complementary feeding, ORS preparation and dose and frequency of pediatric IFA syrup among Sahiya (n = 300) and SahiyaSathi (*n* = 24)

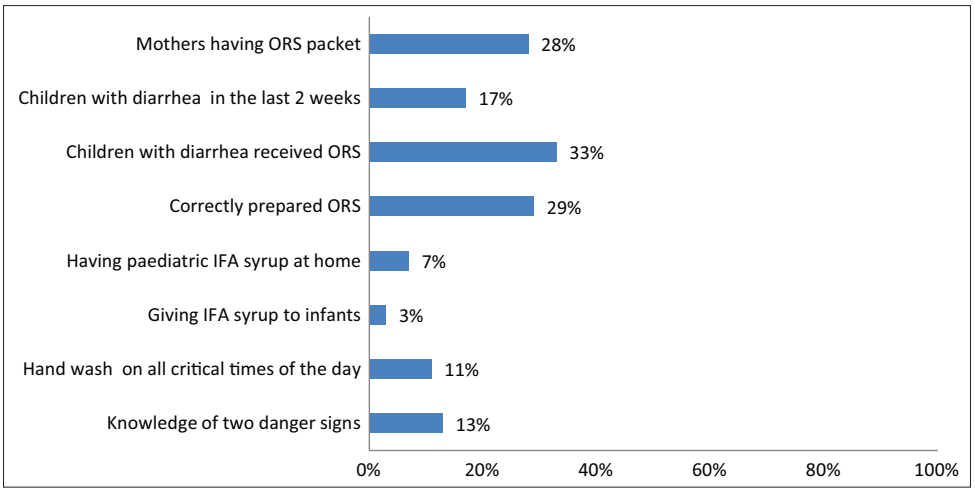

Figure 2: Percentage of mothers with correct knowledge and practice of child care (*n* = 300)

Table 6: Knowledge and practice of feeding among mothers and status of mother–child protection card (*n*=300)

	Percentage
Status of mother's feeding practices and knowledge	
Infants <6 months receiving exclusive breastfeeding	83.0
Infants initiated with complementary feeding at appropriate age (after completion of 6 months)	70.0
Infants receiving correct frequency of complementary food during each day	23.0
Infants receiving adequate quantity of complementary food during each day	49.0
Infants receiving appropriate quality and variety of complementary food during each day	67.0
Status of MCP card	
Mothers having MCP card	96.0
Infants with age-appropriate all vaccination	20.0
Infants with age-appropriate weight plotted on growth chart	3.0
Mothers adequately interacting with infant	89.0

MCP: Mother–child protection

Sahiyas. Moreover, ANM had knowledge of the duration of zinc in case of diarrhea but not of dosage. Most Sahiyas, supervisors, and ANM also lacked knowledge of the duration and dosage of pediatric IFA supplementation. On the other hand, their knowledge about ORS preparation and exclusive breastfeeding was high. What is of concern is that knowledge of the critical danger signs requiring referrals was low among Sahiyas and half of the ANMs. Studies have shown the importance of continuous training,[20] quality of training or competency-based training,[21,22] and shorter duration of training[23] in influencing the retention of knowledge and motivation and performance of community health workers. In implementing trainings on HBYC, the evidence on quality, duration, and nature of training must be considered.

Improved supervision with problem solving at its core is shown to have more effect on the performance of CHW.[24] The results, however, show less than optimal supervision which needs to be improved. Despite maintaining records, AWW failed to plot weights on charts. It could be due to lack of skills or due to perceived lack of importance of doing so. It is here that supervisors can handhold and monitor them.

Studies have time and again shown that inconsistent commodities and limited supplies affect CHW performance.[25-28] The assessment showed mixed results for supplies – while ORS was readily available, only 6% of Sahiyas mentioned having pediatric IFA syrup. Similarly, not all the AWW reported having functional weighing scales. The HBYC guidelines emphasize the tasks of monthly weighing of children and recording on growth chart, alongside counseling on age-appropriate and adequate complementary feeding as well as distribution of prophylactic IFA and ORS. To perform these tasks, it is essential that supplies and commodities are available, and training and monitoring on maintaining growth charts is improved. The fact that only 28% of mothers reported having ORS and only 33% of children with diarrhea received ORS reveals the inadequate supply to the target group suggesting a more vigorous reinforcement of supplies.

Availability did not often translate into appropriate action as evidenced from the low proportion of children actually being given prophylactic IFA. Furthermore, only a small proportion of mothers were able to prepare ORS correctly, thus indicating the need for enhanced counseling.

Although home visits by CHW are associated with children receiving age-appropriate frequency of meals and initiation of complementary feeding at the right age,[29] it may have to be more rigorously implemented through repeated reinforcement for a longer period of time to reduce undernutrition.[30] A high number of mothers reported initiating complementary feeding. However, the number decreased for frequency and quantity of meals.

There is, thus, a need for refresher training of Sahiyas and supervisors on complementary feeding.

Limitation

A major limitation of the current assessment was that health system building blocks and inputs were assessed only through interviews with a few key district personnel and were not based on a more rigorous evaluation. Another limitation is that there may be selection bias of the sample as the random walk method is not tightly controlled. In addition, the districts were purposely selected based on poor HBNC coverage which may portray the poor knowledge assessed during the study. Assessment was conducted by the supervisory team (BTT and STT) of the same district and the possibility of bias cannot be ruled out. The Sahiyas were a convenience sample and may not be representative of all Sahiyas.

CONCLUSION

Not all three districts were uniformly ready with supplies and trainings. While the districts had identified nodal persons for HBYC program and all of the district program coordinators were aware of HBYC operational guidelines, none of the districts yet had a joint planning exercise for HBYC with ICDS, and only one district had procured additional stock of ORS and IFA syrup. DAMs were aware of the HBYC budget but not about the incentives for supervision and monitoring. All the 24 AWWs maintained records of infants. However, only 38% maintained growth charts. Functional weighing scale was available at 71% of the Anganwadi centers, indicating that even such a basic item was not available at all the centers. In terms of knowledge, the frontline health workers had adequate knowledge on some aspects but not all. While nearly 100% ANM, Sahiya Sathis, and Sahiyas had knowledge of timely initiation of complementary feeding, the proportion decreased for other indicators such as knowledge on adequate feeding (quantity more than or equal to half bowl during each feed) and correct frequency of meals. Only 30% of Sahiyas knew about the three critical danger signs. Almost three-quarter of Sahiya Sathis knew correct dose and frequency of pediatric IFA syrup; however, only a quarter of Sahiya knew about the same. While 83% and 70% of infants, respectively, were exclusively breastfed and initiated with complementary food at the right time, 49% of them received correct quantity and only 23% received food at the correct frequency. Knowledge of mothers on correct preparation of ORS (29%), giving IFA syrup to sick infants (3%), knowledge of 2 danger signs (13%), and handwashing (11%) was low. By revealing specific gaps, inadequate supplies of pediatric IFA and ORS; training and supervision needs of AWW, Sahiya, ANM, and Sahya Sathi; and enhanced counseling need for mothers, findings from the study can be used to improve aspects of training, supervision, interdepartmental coordination, and supplies that require the most urgent attention.

Financial support and sponsorship

This work was made possible by the support of the American people through the United States Agency for International Development and its VRIDDHI (scaling up RMNCH + A Interventions) Project, implemented by IPE Global Ltd. under the terms of Cooperative Agreement Number AID 386 A 14 00001. The contents of this paper represent the views of the authors and do not reflect the views of the US Government.

Conflicts of interest

There are no conflicts of interest.

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Original Article

Smart phone usage pattern and associated insomnia among undergraduate students of a Medical College in Chengalpattu district, Tamil Nadu: A cross-sectional study

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Abstract

Introduction: With increased integration of technology into medical education, smart phones have become an indispensable tool. Excess exposure to smart phones and its inadvertent use result in adverse health consequences, both physical and psychological. This study was planned to assess smart phone usage pattern and prevalence of smart phone addiction among undergraduate medical students and to identify association between smart phone usage and insomnia.

Material and Methods: A descriptive, cross-sectional study was conducted among undergraduate students of a medical college in Chengalpattu, Tamil Nadu, during January and February 2020. A total of 221 students from first, second, and third year MBBS participated. A Google Form with informed consent, smart phone usage practices, Smartphone Addiction Scale-Short Version (SAS-SV), and Athens Insomnia Scale (AIS) was used as study tool. Data were summarized as percentages, mean, and standard deviation and appropriate statistical tests of significance applied using SPSS software.

Results: Approximately half the students (49.3%) used smart phones for up to 3 h daily. Online videos (37.5%) and social media (34.9%) were the most common applications used; 39.4% skipped night-time sleep to use smart phone. The prevalence of smart phone addiction and insomnia was 23.5% and 30%, respectively. Gender, duration of use, time spent in online chats, and Internet search were significantly associated with insomnia; 51.9% of those with smart phone addiction reported insomnia ($P < 0.05$).

Conclusion: The prevalence of smart phone addiction and associated insomnia are high among medical students. With evolving need for technology in medical education, it is imperative that students are sensitized to rational use of smart phones.

Keywords: Insomnia, medical students, sleep disturbances, smart phone addiction, smart phone dependence, smart phone use

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Submitted: 14-Dec-2020 **Accepted in Revised form:** 22-May-2021 **Published:** 24-Dec-2021

INTRODUCTION

The advent of smart phones and their various versions has revolutionized the way people interact and work in the last few decades. The number of smart phone users globally has increased from 2.5 billion in 2016 to an approximate 3.5 billion users in the year 2020.[1] Worldwide, the age

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/ijcfm.ijcfm_144_20

How to cite this article: Mani G, Elavarasan K, Norman P, Dhandapani T. Smart phone usage pattern and associated insomnia among undergraduate students of a Medical College in Chengalpattu district, Tamil Nadu: A cross-sectional study. Indian J Community Fam Med 2021;7:113-8.

group of 18–34 years is found to have the highest smart phone usage rate of 62%.[2] Fifty percent of android Smartphone users and 43% of apple iPhone users are younger than 34 years of age.[2] An approximate 53% of smart phone users are males and 47% are females.[2]

With increasing integration of technology in medical education, use of smart phones has become an essential tool for students. COVID19 pandemic and the ensuing lockdown with a complete shift to online learning have further incorporated smart phones into regular teaching-learning and assessment systems. The dependence of smart phones among young people and its inadvertent use makes it a double-edged weapon. The use for academic purposes also exposes them to various other applications which may disrupt their attention to academics. In addition, there are possible reported adverse health consequences.[3-5] These health effects may be physical such as risk of premature diabetes mellitus, hypertension, cardiac diseases, ocular or auditory ailments, and musculoskeletal disorders or psychological such as altered sleep or diet patterns, addiction behavior, low self-esteem, and risk behavior.[3-5] The distractions integral to smart phones have been reported to cause increased stress levels, poor sleep induction, insomnia apart from direct or indirect interruption to patient care.[4-6] Inculcating rational smart phone utilization among medical students is the need of the hour to ensure healthy physicians and responsible patient care in future. This study was planned as a reflection exercise for students to assess the extent of their smart phone usage practices and its impact on sleep. The objectives of the study were to assess smart phone usage pattern and prevalence of smart phone addiction among undergraduate medical students in a medical college in Chengalpattu district, Tamil Nadu, and to identify association between smart phone usage and insomnia among the study population.

MATERIAL AND METHODS

A cross-sectional study was conducted among undergraduate medical students of a medical college in Chengalpattu district, Tamil Nadu during January and February 2020. Based on a study by Dharmadhikari *et al*. among medical students in Maharashtra, where the prevalence of smart phone addiction was 46.15%, the required sample size was calculated using the formula $4pq/d^2$, where $P = 46.15\%$, $q = 53.85\%$ and d as an absolute error of 7%.[7] The sample size derived was 203 and assuming a nonresponse rate of 10%, the final sample size was approximated to 225. The first, second and third year students were chosen to participate in the study and 75 students from each batch were selected by simple random sampling using the list of students in each batch as sampling frame. The selected students were invited to participate in the study.

The study was approved by the Institutional Ethics Committee. The participation was voluntary. A pretested, semi-structured questionnaire was prepared by Google survey forms and sent to selected students through Whatsapp or E-mail. The complete information about the study and its implications were described in the title page of the Google survey form and the questionnaire was applied after the participants have declared that they have read the information and consent to participate in the study. The participants were given the option to withdraw from study at any stage before submission of responses. Complete confidentiality of responses and privacy of students was ensured.

The questionnaire consisted of the following sections: basic identification details, availability of smart phones, time spent on smart phone for various purposes, impact of smart phones on daily activities, night time use of smart phones, Smartphone Addiction Scale-Short Version (SAS-SV) developed by Min-Kwon and Athens Insomnia Scale (AIS).[5,8,9] The SAS-SV consists of 10 items rated on Likert scale from 1 to 6 (1 - strongly disagree to 6 - strongly agree). The sum of the individual scores was added to derive the final score. SAS-SV has been found to be internally consistent (Cronbach's α, 0.844) and stable over 1 week in various studies.[10] The AIS consists of 8 items and evaluates sleep onset, night and early-morning waking, sleep time, sleep quality, frequency, and duration of complaints, distress caused by experience of insomnia and interference with daily functioning.[9] Developed by Soldatos *et al*., it has been recorded to have an internal consistency ranging from 0.87 to 0.89 and a test–retest reliability of 0.88–0.89.[9]

The responses were saved in Microsoft Excel spreadsheet format. Statistical analysis was performed using the IBM SPSS Statistics for Windows, version 23.0 (IBM Corp., Armonk, New York, USA). Categorical variables such as baseline characteristics, smart phone usage pattern, prevalence of smart phone addiction, and insomnia among participants were summarized as frequencies and percentages. Continuous variables such as SAS-SV and AIS scores were summarized as mean and standard deviation (SD). Chi-square test was performed to identify statistical significance of relationship between smart phone usage and insomnia among study participants. Student's *t*-test was used to compare mean AIS score among those with presence or absence of smart phone addiction. A $P \leq 0.05$ was considered statistically significant.

Operational definitions

Smartphone addiction was defined as a SAS-SV score more than 31 for boys and 33 for girls.[8] A person was considered to have insomnia if the AIS score is 6 or above.[9]

RESULTS

Out of the 225 randomly selected students, a total of 221 students had provided complete responses. Both SAS-SV and AIS scales were found to have high internal consistency on reliability analysis in our sample population with Cronbach alpha values of 0.892 and 0.824 respectively. Among the 221 participants, 127 (57.5%) were females and 94 (42.5%) were males. The number of students from first, second, and third year were 81 (36.7%), 66 (29.9%) and 74 (33.5%) respectively; 187 students (84.6%) had single smart phone, 26 (11.8%) owned two and 8 students (3.7%) had three smart phones. Table 1 showcases the distribution of duration of smart phone use for various activities among the participants and Table 2 highlights their frequency of skipping routine academic or social activities due to smart phone use.

During daytime, 43 students (19.5%) reported having their smart phones always at a distance of 5–10 cm and 82 students (37.1%) reported having it within 10–20 cm. Only 12 students (5.4%) kept their smart phones switched off or in silent mode during sleep; 35 students (15.8%) reported having it within 5–10 cm and 46 students (20.8%) reported keeping them within 10–20 cm.

Based on responses to SAS-SV, 52 students were found to have smart phone addiction with a prevalence of 23.5% (17.9 to 29.1). The mean SAS-SV score among the participants was 26.14 ± 10.38.

With AIS score of more than 6, 67 students were categorized to have insomnia with a prevalence of 30.3% (24.3 to 36.4). The mean AIS score was 4.32 ± 3.67 [Table 3].

Male gender, increased duration of time spent in smart phone use in general, increased time spent in online chats, internet search, and online video-streaming were significantly associated with presence of insomnia ($P \leq 0.05$) [Table 4]. The mean AIS score among those participants with smart phone addiction was 6.25 ± 4.4 and those without smart phone addiction was 3.72 ± 3.2. The difference was statistically significant (*P*-value <0.001) [Table 5].

DISCUSSION

A total of 221 first, second, and third year medical undergraduate students participated in our study.

Table 1: Distribution of duration spent in various activities using smart phone among participants (*n*=221)

Activities	Duration spent in various activities (min), frequency (%)			
	<30	30-60	60-120	>120
Academic work	88 (39.8)	98 (44.3)	29 (13.1)	6 (2.7)
E-mail	217 (98.2)	3 (1.4)	1 (0.5)	_
Social networking sites	62 (28.1)	82 (37.1)	55 (24.9)	22 (10)
Chat	93 (42.1)	82 (37.1)	34 (15.4)	12 (5.4)
Internet search	99 (44.8)	89 (40.3)	25 (11.3)	8 (3.6)
Games	143 (64.7)	48 (21.7)	20 (9)	10 (4.5)
Videos	51 (23.1)	87 (39.4)	65 (29.4)	18 (8.1)

Table 2: Distribution of frequency of skipping routine academic and social activities due to smart phone use (*n*=221)

Frequency of skipping	Frequency (%)			
	Never	Occasionally	Frequently	Always
Academic activities	33 (14.9)	134 (60.6)	43 (19.5)	11 (5)
Sports and physical activity	55 (24.9)	102 (46.2)	46 (20.8)	18 (8.1)
Phone calls	96 (43.4)	84 (38)	37 (16.7)	4 (1.8)
Food schedule	119 (53.8)	83 (37.6)	16 (7.2)	3 (1.4)
Sleep at night	10 (4.5)	124 (56.1)	70 (31.7)	17 (7.7)

Table 3: Distribution of perceived sleep disturbances among study participants (Athens Insomnia Scale) (*n*=221)

Variable	Frequency (%)
Sleep induction	
No problem	112 (50.7)
Slightly delayed	80 (36.2)
Moderately delayed	23 (10.4)
Very delayed or did not sleep at all	6 (2.7)
Awakenings during night	
No problem	144 (65.2)
Minor problem	57 (25.8)
Considerable problem	19 (8.6)
Serious problem or did not sleep at all	1 (0.5)
Final awakening earlier than desired	
Not earlier	161 (72.9)
A little earlier	49 (22.2)
Markedly earlier	10 (4.5)
Much earlier or did not sleep at all	1 (0.5)
Total sleep duration	
Sufficient	120 (54.3)
Slightly insufficient	86 (38.9)
Markedly insufficient	13 (5.9)
Very insufficient or did not sleep at all	2 (0.9)
Overall quality of sleep	
Satisfactory	128 (57.9)
Slightly unsatisfactory	73 (33)
Markedly unsatisfactory	18 (8.1)
Very unsatisfactory or did not sleep at all	2 (0.9)
Sense of well-being during day	
Normal	145 (65.6)
Slightly decreased	60 (27.1)
Markedly decreased	11 (5)
Very decreased	5 (2.3)
Functioning during day	
Normal	158 (71.5)
Slightly decreased	48 (21.7)
Markedly decreased	12 (5.4)
Very decreased	3 (1.4)
Sleepiness during day	
None	52 (23.5)
Mild	115 (52)
Considerable	48 (21.7)
Intense	6 (2.7)

Approximately half of our study population (49.3%) spent up to 3 h using smart phone for various activities, while an equal proportion of students used their smart phone for more than 3 h, out of whom 17.2% used smart phone for more than 5 h. In Sharma *et al*. study, 75% students spent 3–6 h using internet in smart phone for multiple purposes.[11] Though the comparison is between two different characteristics, the fact that more than half the students spent a minimum of 3 h and above on smart phones, points to a substantially higher smart phone use in both studies.[11]

Online video-streaming services (37.5%) and social networking sites (34.9%) were the most frequently used

Table 4: Distribution of insomnia among medical students based on baseline characteristics and smart phone usage practices (*n*=221)

Variables	No insomnia (*n*=154), *n* (%)	Insomnia (*n*=67), *n* (%)	Total	χ^2
Gender				
Male	58 (61.7)	36 (38.3)	94	4.932*
Female	96 (75.6)	31 (24.4)	127	
Year of study				
I MBBS	63 (77.8)	18 (22.2)	81	5.107
II MBBS	40 (60.6)	26 (39.4)	66	
III MBBS	51 (68.9)	23 (31.1)	74	
Hours spent per day				
<1	13 (81.3)	3 (18.8)	16	12.625*
1-3	72 (77.4)	21 (22.6)	93	
3-5	51 (68.9)	23 (31.1)	74	
>5	18 (47.4)	20 (52.6)	38	
Time spent in academic work (min)				
<30	55 (62.5)	33 (37.5)	88	4.357
30-60	75 (76.5)	23 (23.5)	98	
60-120	20 (69)	9 (31)	29	
>120	4 (66.7)	2 (33.3)	6	
Time spent in e-mail communication (min)				
<30	152 (70)	65 (30)	217	2.325
30-60	2 (66.7)	1 (33.3)	3	
60-120	0	1 (100)	1	
Time spent in social networking sites (min)				
<30	44 (71)	18 (29)	62	3.446
30-60	61 (74.4)	21 (25.6)	82	
60-120	37 (67.3)	18 (32.7)	55	
>120	12 (54.5)	10 (45.5)	22	
Time spent in online chat (min)				
<30	65 (69.9)	28 (30.1)	93	8.937*
30-60	62 (75.6)	20 (24.4)	82	
60-120	23 (67.6)	11 (32.4)	34	
>120	4 (33.3)	8 (66.7)	12	
Time spent in internet search (min)				
<30	73 (73.7)	26 (26.3)	99	8.457*
30-60	57 (64)	32 (36)	89	
60-120	21 (84)	4 (16)	25	
>120	3 (37.5)	5 (62.5)	8	
Time spent in online gaming (min)				
<30	101 (70.6)	42 (29.4)	143	6.659
30-60	32 (66.7)	16 (33.3)	48	
60-120	17 (85)	3 (15)	20	
>120	4 (40)	6 (60)	10	
Time spent in watching videos (min)				
<30	41 (80.4)	10 (19.6)	51	8.682*
30-60	62 (71.3)	25 (28.7)	87	
60-120	43 (66.2)	22 (33.8)	65	
>120	8 (44.4)	10 (55.6)	18	

*Statistically significant at $P \leq 0.05$

Table 5: Distribution of insomnia among participants based on smart phone addiction (*n*=221)

Smart phone addiction	Insomnia present, *n* (%)	No insomnia, *n* (%)	Total	*P* (χ^2)
Addiction present	27 (51.9)	25 (48.1)	52	≤0.05 (15.027)
No addiction	40 (23.7)	129 (76.3)	169	
Total	67 (30.3)	154 (69.7)	221	

services. The predominant use of social media sites was also reported among medical students in similar studies by Dharmadhikari *et al*. in Maharashtra and Sharma *et al*. in Rajasthan.[7,11] Increased smart phone use predisposes to procrastination or skipping of many routine activities. In the present study, night-time sleep (39.4%) was the most common routine activity skipped due to smart phone use, followed by sports and physical activity (28.9%) and academic activities (24.5%). Amra *et al*. in their study among adolescents in Iran reported a concordant finding of higher proportion of night-time use of smart phones.[12]

In our study, 23.5% of the students had smart phone addiction as measured by SAS-SV, which was comparable to Brubaker and Beverly study among osteopathic medical students from Athens (22.3%).[13] The prevalence was considerably lower compared to the findings of Dharmadhikari *et al*. from a medical college in Maharashtra where 46.15% of participants had smart phone addiction.[7] In contrast, Alkhateeb *et al*. in their study among university students in Saudi Arabia reported a remarkably low prevalence of 14.7% among medical students.[3] Sharma *et al*. study among medical students in Rajasthan report that 57.29% students suffer from Nomophobia or the fear of being without mobile phone contact.[11] Shankar *et al*. in a sample population with predominantly adolescents and young adults in India, identified a prevalence of nomophobia to be 40.93%.[14] The wide range in the prevalence of smart phone addiction or dependence as reported in above studies could be accounted for by the use of different scales of assessment. However, the high figures in comparable studies from diverse parts of the world point to the growing dependence on smart phones among young medical students.

The prevalence of insomnia was 30.3% as reported in current study. Although it points to a substantial problem, it is considerably lower compared to Bayatiani *et al*. study from Iran where 39.7% had insomnia, Jniene *et al*. study among medical students in Morocco, Amra *et al*. study from Iran and Brubaker and Beverly study from Athens where 35.3%, 42.5%, and 66.2% students had poor sleep quality, respectively.[12,13,15,16] Despite the differences, all studies including the current study, report a considerable burden of poor sleep quality or insomnia in association with smart phone usage, which highlights the need for priority action among young students.

In our study, males had a higher prevalence of insomnia compared to females as measured by AIS, and the difference was statistically significant. This was in contrast to Amra *et al*. study and Bayatiani *et al*. study where a higher proportion of females had insomnia or poor sleep quality.[12,16] With increasing duration of use of smart phones, there was a proportionate increase in the prevalence of insomnia and this relationship was statistically significant on multinomial logistic regression analysis. This was in concordance with Amra *et al*. study where participants with poor quality of sleep had a mean duration of cell phone use of 5 h 58 min which was higher compared to those with good quality of sleep.[12] Huang *et al*. in a preliminary study among Chinese college students also reported poor quality of sleep among students with excessive smart phone use for more than 5 h.[17] Tamura *et al*. and Tokiya *et al*. reported similar association between duration of smart phone use and insomnia among Japanese adolescents.[5,18]

More than half the participants (51.9%) in our study with smart phone addiction reported insomnia and the distribution was statistically significant. In addition, there was a statistically significant difference between the mean AIS scores among those with smart phone addiction compared to those without smart phone addiction. Brubaker and Beverly study also revealed a significant positive relationship between smart phone addiction and poor sleep quality.[13]

Our study has its limitations. This being a cross-sectional study, the causal relationship could not be proved. The study was conducted among students of a single medical institution and the findings could not be generalized to other states or countries with vast sociocultural and geographical differences. Although complete privacy and confidentiality was ensured, self-administered surveys may have an element of subjective bias. Despite the limitations, the study offers a timely insight into the smart phone usage pattern and associated sleep disturbances among medical students. This study conducted during the early stages of pandemic and before the implementation of lockdown and shift to online learning, has the potential to serve as a baseline study to compare any future studies on distribution of smart phone usage practices and associated adverse effects among medical students.

CONCLUSION

The prevalence of smart phone addiction and associated insomnia are high among medical students. With the evolving need for smart phone technology in medical education as a consequence of the pandemic and the shift to online learning methods, it is imperative that students are sensitized to rational and responsible use of smart phones as part of promoting positive health behavior.

Acknowledgement

The authors are thankful to the students for their enthusiastic participation.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Original Article

Population-level interest and trends in meditation and yoga during lockdown imposed due to coronavirus disease 2019 pandemic in India: Evidence from Google Trends

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Abstract

Introduction: Yoga and meditation have a potential to give mental peace and calm. The present coronavirus disease 2019 (COVID-19) has forced countries to impose lockdown due to its infectious nature, thus restricting people in their homes posing psychosocial impact which can be reduced through yoga. Google Trends (GT) is a proxy indicator for population-level interests, which is used instead of traditional survey methods during pandemic. The objective of this study was to monitor population-level interest and trends in yoga and meditation during lockdown imposed due to COVID-19 in India through GT.

Material & Methods: GT is an open-access, web-based tool which provides unfiltered sample of active search requests made to Google. Various keywords related to yoga and meditation were used to retrieve web-based search volume from January 30, 2020, to June 7, 2020, for India. These data were correlated with number of cases and deaths reported due to COVID-19 as an increase in cases and death might lead to stress among masses.

Results: The search trends and daily number of confirmed cases were fairly correlated ($r = 0.647$, $P = 0.000$). The relative search volume for the search trends was also fairly correlated ($r = 0.665$, $P = 0.000$) with number of daily deaths due to COVID-19. States such as Uttarakhand and Goa had a higher share of search whereas Meghalaya and West Bengal searched the least.

Conclusion: GT showed an increase in population-level interest in yoga and meditation during COVID-19 lockdown which is a positive indicator for population. This indicates the need for continuity of trend so as to make it a routine habit even after the situation becomes normal.

Keywords: Coronavirus disease 2019, meditation, mental health, pandemic, trends, yoga

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Submitted: 19-Feb-2021 **Accepted in Revised Form:** 21-Sep-2021 **Published:** 24-Dec-2021

INTRODUCTION

Coronavirus disease 2019 (COVID-19) pandemic has spread rapidly defying geographical boundaries. Being a communicable disease, COVID-19 can spread through direct contact with patients, and hence, physical distancing became obligatory.[1] A sudden increase in cases can severely overwhelm health-care facilities, especially in a resource-constraint setting like India. This challenge of protecting its citizens and seeking time to increase health-care infrastructure was met by calling a countrywide lockdown on March 25, 2020. It also helped in breaking

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/ijcfm.ijcfm_16_21

How to cite this article: Sinha A, Ghosal S, Tyagi N, Singh N, Singh KP. Population-level interest and trends in meditation and yoga during lockdown imposed due to coronavirus disease 2019 pandemic in India: Evidence from Google Trends. Indian J Community Fam Med 2021;7:119-24.

the chain of viral transmission. Although this preventive measure of limiting movement of 1.3 billion people proved to be a boon in containing virus, it levied associated psychological impacts due to the uncertainties.[2]

Psychological impacts can be seen as increased stress or anxiety levels among population.[3] This can be attributed to fear of infection, frustration and boredom, inadequate/interrupted supply of essentials, and misinformation.[4] Psychological effects are also directly related to the extent of homestay, as the number of quarantine days increase, the psychological ill effects too increase.[5] It can even continue to have after effects, as people are concerned about their financial security, livelihood, and stigma/discrimination against the people who got infected.[6] An increase in number of cases and deaths in community makes people apprehensive, thus contributing directly to increased mental stress.[7] Further, this forces people to adopt strategies such as yoga to combat stressful situation.[8]

Physical health and mental health of an individual are interrelated. Regular practice of yoga and meditation has a tremendous potential to elicit physical benefits as well as mental peace and calm.[9] Yoga is a group of physical, mental, and spiritual practices done to calm down the fluctuations/patterns of consciousness.[10] It involves physical exercises in the form of asanas or postures which give physical fitness and relief from stress and relax body and mind.[11] It also helps in improving healthy eating practices and sleep quality and motivates to quit smoking and other addictions.[12-14]

Meditation is another technique which is practiced to attain mental awareness in the form of emotionally calm and stable mind.[15] The Ministry of AYUSH, Government of India (GoI), in its advisory to combat COVID-19 has recommended the practice of yoga, pranayama, and meditation for at least 30 min daily at home.[16] Keeping in view the awareness campaign and policy dynamics for physical activity and yoga, this study was planned with an objective to monitor population-level interest and trends in yoga and meditation during lockdown imposed due to COVID-19 pandemic in India through Google Trends (GT).

This is the era of the Internet, with India being one of the largest users of smartphones in the world.[17] The information dissemination and consumption has never been the same before. Infodemiology is the branch of science that deals with scanning the web-based health-related content with an aim of improving public health.[18] Google is one of the most widely used search engines with potential to explore health-related content. GT since its inception has been a popular tool used in addressing health-related issues by using Internet search volume data.[19] The online search volume is a proxy indicator for population interests and demands. This method is used as traditional survey methods are time and resource consuming. Furthermore, traditional survey method is not feasible in times of pandemic, complying with the social distancing norms. Therefore, GT data along with traditional COVID-19 data can give directions for taking further step toward the mental well-being of people.

MATERIAL & METHODS

GT (http://google.com/trends) is an open-access, web-based tool which provides unfiltered sample of active search requests made to Google. It uses sampled data which are representative of all Google searches. It is anonymous, i.e. no one is personally identified. The data are categorized and aggregated. It provides real-time data as well as the data dating far back to 2004, up to 36 h before search. It determines the number of searches over a period of time by analyzing the percentage of total Google web searches. Data do not represent absolute search volume number as data are normalized and are presented on a scale from 0 to 100. Data represent a relative search volume (RSV). An increase in the trend indicates that a search term's popularity is relatively increasing as compared to other searches. Percentages are based on percentage increase in search interest for the searched topic over time. Population level interests in any topic can be seen over time and region; and comparisons can also be done through GT. Trends eliminate repeated searches from the same user over a short period of time for better overall accuracy. Apostrophes and special characters are filtered out from the queries. The search results from GT can be downloaded as a comma-separated values (.csv) file.

Keyword selection for this study was based on the methodology described by Mavragani and Ochoa.[20] The keywords entered for search are not case sensitive, but they do take into account singular/plural and spelling mistakes. Punctuations such as (+) or (−) can be used to filter search results (+) is used as OR and (−) is used to exclude any term. To include the exact term, a double quotation mark can be used. Common misspellings or alternate spellings can be considered by joining them with (+) sign. Search terms and topics are two available options while entering a keyword. Search term gives the result of all included keywords whereas topic covers a wide range of similar concepts in any language.

In this study, we included "Yoga" and "Meditation" as the main keywords along with "Yogasana" and "Pranayama" as these words have been included in the Ministry of AYUSH's advisory. While searching these terms on GT, we further choose "asana" and "Dhyan" from the related search chart. Related search charts represent the top and rising terms searched in relation to the topic in the same region or category. (+) sign was used to combine all these above terms. These queries were searched within the time frame of January 30, 2020, when the first case reported in India till June 7, 2020.[21] The region selected was India. The data were then downloaded in a.csv file for further analysis.

The data on total number of cases of COVID-19 in India as on June 7, 2020, were obtained from the Ministry of Health and Family Welfare, GoI.[22] Countrywide lockdown started on March 25, 2020, in India and continued till June 7, 2020 (the day till which data for this study were assessed). Accessed data were cross checked by two different persons independently before analysis so as to check accuracy.

We used SPSS version 25.0 to analyze our data. Search trend analysis through RSV and subregional distribution was reported. The RSV was correlated with total number of cases and total number of deaths due to COVID-19 using Spearman correlation as the data are not normally distributed. Prelockdown volume for RSV was compared with RSV obtained during lockdown using Mann–Whitney *U*-test.

This study uses secondary data available in public domain with proper acknowledgment. GT data are anonymous and do not give personal identification of any individual, hence eliminating privacy concerns.

RESULTS

The overall search trends for (Yoga + Meditation + Yogasana + Pranayama + Asana + Dhyan) showed a steady rise, with the first peak seen around February 21, 2020, almost a month after the first COVID-19 case was confirmed in India [Figure 1]. The trend further declined, with the least RSV observed around March 20, 2020. The trend started gradually rising around March 22, 2020, after countrywide lockdown was imposed. It further kept rising, with the highest peak recorded on May 2, 2020, when the lockdown was further extended in its third phase.

Trends across different regions in India showed that yoga and meditation were quite popular in most parts of the countries, with Uttarakhand, Goa, Andaman and Nicobar Islands, Chandigarh, and Karnataka being the top five ranking states/union territory with higher RSV [Figure 2]. However, people of Meghalaya, West Bengal, Bihar, and Nagaland were among the bottom states in terms of RSV and did not show much interest in the topic.

The correlation analysis was done between RSV related to terms (Yoga + Meditation + Yogasana + Pranayama + Asana + Dhyan) and daily number of confirmed cases of COVID-19. RSV was also correlated with daily number of deaths due to COVID-19 [Figure 3]. The search trends and daily number of confirmed cases were fairly correlated ($r = 0.647$, $P = 0.000$) [Table 1]. The RSV for the search trends was significantly correlated ($r = 0.665$, $P = 0.000$) with number of daily deaths due to COVID-19.

In this study, prelockdown phase is from January 30, 2020, to 2020 March 24, followed by lockdown phase in India till the data for the study were extracted. We observed that RSV during lockdown was significantly higher than prelockdown phase with a median of prelockdown 68 (65–71) and during lockdown 89 (85–92). The Mann–Whitney *U*-test observed a significant increase in RSV during lockdown with U = 82.50, $P = 0.000$.

DISCUSSION

This study indicated an overall increase in search trend for yoga and meditation during the COVID-19 pandemic. The sudden emergence of a pandemic creates chaos and

Table 1: Correlation among relative search volume and total confirmed cases due to coronavirus disease 2019

	RSV	Total confirmed cases
RSV	1.000	0.647**
Total confirmed cases	0.647**	1.000

**Correlation is significant at $P<0.01$. RSV: Relative search volume

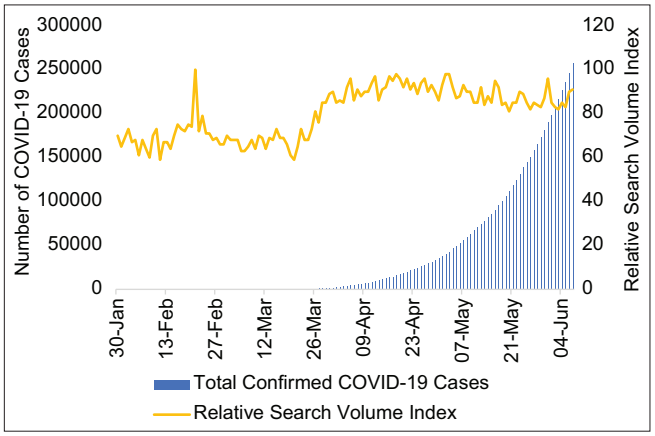

Figure 1: Trends in search volume for yoga and meditation and the number of coronavirus disease 2019 cases

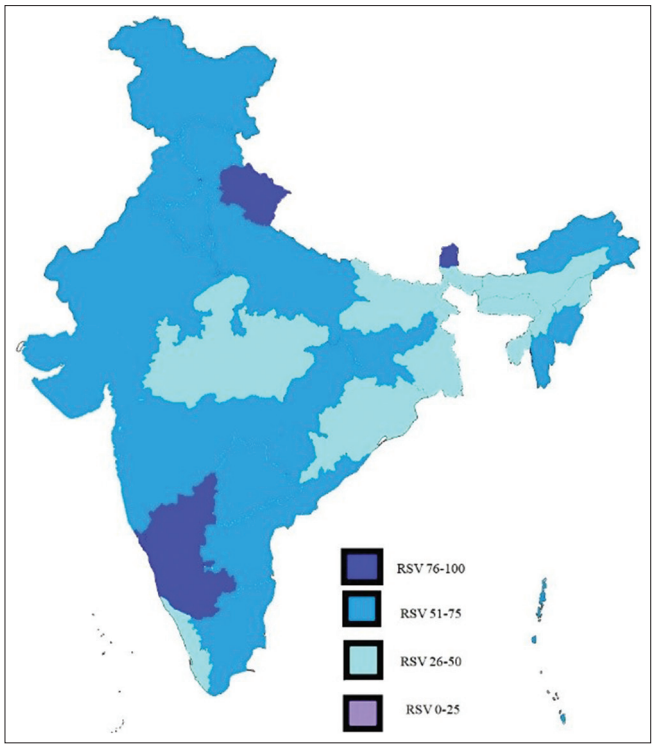

Figure 2: Trends in search volume across Indian states

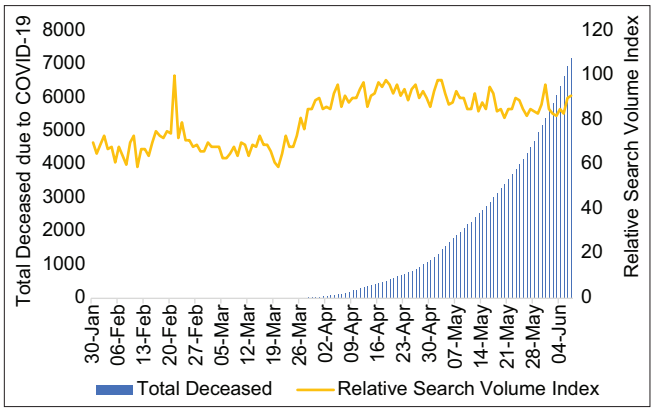

Figure 3: Trends in search volume for yoga and meditation and number of deaths

unrest among masses which can be attributed to arising insecurities. These insecurities can range from fear of infection to associated secondary factors such as availability of food and basic necessities for subsistence. The longer the pandemic, the higher will be the consequences which can be seen as a restriction of movement and closure of schools and workplaces. Further, loss of employment opportunities and distance from loved ones also aggravates the mental health problems during pandemic. This isolation has a direct impact on both physical and mental health among all age groups equally, as a result of which people tend to turn toward virtual world in the form of digital media. Digital media has a huge potential in creating positive changes which can be seen by this study.

At the start of COVID-19, the response of public toward yoga and meditation was diminished which gradually increased. By the end of February, there was a sudden rise in search trends as the pandemic drew greater attention of masses. Thereafter, again a lack of perseverance in the search trend was observed which again surged once the number of confirmed positive cases started increasing around the end of March. An increase in the number of confirmed cases might arouse a sense of consciousness about one's own health forcing people to take up healthy life choices. This surge in search volume can also be attributed to imposition of lockdown in the country around that time. The search trends kept increasing, with the highest peak observed in the 1st week of May. The highest peak also corresponds to the time when lockdown was further extended after the first phase. Yoga is said to improve immunity which has a potential to fight infections, a probable reason for people to adopt it to combat uncertainties surrounding COVID-19 infection.[23] A similar study conducted in the United States to investigate population-level interest in telehealth and telemedicine using Google searches during COVID-19 observed that people's interest in telehealth increased with the increase in number of COVID-19 cases.[24]

The search volume for yoga- and meditation-related terms showed a similar increasing trend when compared with the number of deaths due to COVID-19. Around February 21, 2020, the first peak in the search trend for yoga and meditation was observed which is consistent with the findings of a similar study using GT which demonstrated that a second worldwide wave of interest in novel coronavirus started on February 21, 2020, which was six times as big as the first wave.[25] Evidence suggests yoga to be a complementary stress-busting therapy which aided in stress reduction in patients taking radiotherapy for cancer.[26] Deaths in community raise a sense of apprehension and insecurity, a reason for adopting healthy practices among masses. Further, it is evident from this study that people are aware and motivated to take physical as well as mental exercises during isolation at home. One of the probable factors for increase in the trend could be attributed to various awareness campaigns to follow healthy lifestyle during pandemic. A similar study to examine global public awareness of COVID-19 using GT, observed an overall increased awareness during the early period of pandemic across different countries.[27] This study[27] also showed different public awareness levels among various subregions within the country which is also similar to our findings which suggest a varied response

related to yoga and meditation across Indian states. It is evident that while most of the western states searched more for yoga-related terms, eastern India showed diminished interests comparatively. Uttarakhand led with the most volume of search while Meghalaya searched least for the terms. Efforts should be made to create awareness in the states which lack in interest; whereas states where the trend in yoga has spiked, all efforts should be made to sustain it even after the pandemic.

The results of our study indicate the positive use of the Internet which has become a major tool to seek health-related content recently. On the contrary, a study done using Google website data revealed that most of the Internet users were obtaining misinformation related to coronavirus health crisis which has a potential risk to public health.[28] Although people tend to be highly dependent on the Internet, it can be a potential source of misinformation, especially in the context of disease outbreaks and pandemics. The country's government should be vigilant in relation to the information being disseminated through the Internet during such crisis. Channels of information must be regulated so that people are not misinformed as it might create panic.

Strengths and limitations

GT gives population-level real-time data over a long duration which itself is a strength of this study, but the data available take into account only those people having access to the Internet and hence may not reflect genuine population interest. This study is also limited by the level of digital literacy among masses of different socioeconomic strata. Although a wide range of keywords were used, it is worth mentioning that few keywords might have been missed leading to underestimation of trends. Furthermore, more data sources like social media can be used to investigate trends in future.

CONCLUSION

GT showed a substantial rise in population-level interest in yoga and meditation during COVID-19 lockdown which is a positive indicator for population. This increase can not only be attributed to apprehensions and stress due to increase in cases and deaths but also to other factors such as restriction of movement making people home bound, work from home practices, loss of job, and enough idle time to do such activities which were not feasible earlier. However, concurrently, this reflects a healthier lifestyle choice, and calls for continuity of this trend even after the situation becomes normal. These findings can be used by various governmental and nongovernmental organizations working on improving mental health, physical activity, and self-care to further help in sustaining the trends and making people more aware and motivated to adhere to physical and mental exercises when the country is witnessing demographic and epidemiological transition leading to an increase in noncommunicable diseases. Further, this trend needs to be validated through other studies using traditional methods to generate more evidence. In addition, this study also demonstrated the application of infodemiology in predicting the population-level interest and demands during a pandemic which could be explored further.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Original Article

Prevalence and gender differences in risk factors for noncommunicable diseases in an urban village of Delhi, India: A community-based cross-sectional study

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Abstract

Introduction: About 60% of all deaths in India occur due to noncommunicable diseases (NCDs) and their complications. Early screening for the risk factors can result in a significant reduction in morbidity & mortality. The study was conducted to assess the risk factors for common NCD in an urban village of Delhi, India.

Material & Methods: A house-to-house survey was conducted in the study area and risk assessment was done for apparently healthy individuals ≥30 years of age using Community-Based Assessment Checklist by the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke. Participants with a total risk score of more than four were categorized as being at risk of development of NCDs. Descriptive analysis was performed and Chi-square was used to find out gender-related differences in risk factor scores.

Results: A total of 478 adults participated in the study with a mean age of 40.3 ± 9.7 years and 54.6% were females. Majority (93.1%) of study participants had at least one risk factor. Approximately 17.2% of study participants had a total risk score of more than 4. There was a high prevalence of modifiable risk factors with more males being tobacco ($P < 0.001$) and alcohol users ($P < 0.001$) and more females being inactive ($P = 0.007$) and having abdominal obesity ($P < 0.001$).

Conclusion: One in six study participants with age ≥30 years was found to be at high risk of having NCDs. This calls for heightened screening activities in this age group along with gender-specific approaches to address the risk factors.

Keywords: Noncommunicable diseases, risk factors, screening, urban village

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Submitted: 23-Mar-2021 **Accepted in Revised Form:** 05-Oct-2021 **Published:** 24-Dec-2021

INTRODUCTION

Noncommunicable diseases (NCDs) account for 71% of all deaths globally, killing about 41 million people annually. They cause 15 million premature deaths among people between 30 and 69 years of age every year. More than three-fourth of total NCD deaths and 85% of premature deaths due to NCDs occur in low- and middle-income countries.[1] In India, about 5.8 million or 60% of all the deaths occur due to NCDs which mainly includes coronary heart disease, stroke, hypertension, chronic respiratory diseases, cancers, and diabetes.[2,3] There are about 25% chances for a 30-year

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/ijcfm.ijcfm_23_21

How to cite this article: Khokhar A, Tiwari P, Pardeshi G, Smanla S, Sharma P, Rashid M, *et al*. Prevalence and gender differences in risk factors for noncommunicable diseases in an urban village of Delhi, India: A community-based cross-sectional study. Indian J Community Fam Med 2021;7:125-9.

old person dying from one of these major NCDs before the age of 70 years.[2] NCDs contribute to about 50% of all cause-disability-adjusted life years in India, and this burden is equally contributed by males and females.[3]

Rise in NCDs can impede the progress toward the achievement of sustainable development goals and pose challenges in poverty reduction initiatives by increasing health-care costs and out-of-pocket expenditures due to lengthy and expensive treatment. One of the most important ways to prevent and control NCDs is to reduce the modifiable risk factors which mainly include tobacco, alcohol, physical inactivity, and overweight or obesity.[1] STEPwise approach to surveillance (STEPS) was therefore developed for NCD risk factor surveillance by the World Health Organization in response to control NCDs,[4] as timely screening and intervention for risk factors associated with NCDs can significantly reduce the mortality and morbidity associated with them.

In India, under the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Disease, and Stroke (NPCDCS) which was launched in the year 2010, opportunistic screening for NCDs was initiated, which was later expanded into population-based screening of healthy men and women ≥30 years of age for NCD risk factors.[5] A Community-Based Assessment Checklist (CBAC) for risk profiling of individuals was developed by NPCDCS to be used by frontline workers including accredited social health activists, auxiliary nurse midwives, and multipurpose workers and this information can be used to make people aware of consequences of unhealthy practices, motivate them to adopt healthy lifestyles as well as facilitate early diagnosis and management of NCDs.[3,5]

Due to rapid and haphazard urbanization, urban villages are emerging. They have high population densities, lower literacy rates and awareness levels, and are usually devoid of basic infrastructure including sanitation and piped water supply. There were about 135 urban villages in Delhi alone in 2011.[6] Many studies have been conducted in past to study the risk factors of NCDs, but there is a paucity of literature for the same in urban villages. With this background, the present study was undertaken to ascertain the risk factors for common NCDs in a community-based setting in an urban village, find out at-risk individuals using CBAC for risk assessment and study the gender differences in risk factors.

MATERIAL & METHODS

This was a cross-sectional community-based study conducted in an urbanized village of Delhi, India, which is the field practice area of authors' institution. The approximate population of this village is 6100, which is a mix of natives and migrants. The study duration was 3 months from October 2019 to December 2019.

The study was conducted among apparently healthy people of age 30 years or more, residing in the study area for at least 6 months. People with age <30 years or with a known history of diabetes, cancer, hypertension or other cardiovascular diseases, chronic respiratory diseases, and pregnant women were excluded from the study. People who were not available at the time of study and could not be contacted even after three consecutive visits to the household were also excluded.

The sample size for the study was calculated using the formula for proportions, i.e. $N = (Z_{1-\alpha/2})^2 \times p \times (1-p)/d^2$.[7] Taking p as 0.82, found out in a previous study by Sarma *et al.* as the proportion of individuals who had at least one risk factor for NCDs,[8] and d as absolute precision of 3.5%, we arrived at a sample size of 463. A nonresponse rate of 10% was added to get a final sample size of 510.

A house-to-house survey was conducted in the study area. All the members of each household were assessed for eligibility in the study. Eligible males and females were then invited to participate after explaining the nature and purpose of the study. Written informed consent was obtained from each participant before their inclusion. Households which were found locked or if the eligible participants were not present at the first visit, two more visits were paid to them to include in the study. Residents which could not be contacted even after three visits were excluded from the study. NPCDCS CBAC risk assessment checklist was used by field investigators to collect data on risk factors[5] [Table 1]. Field investigators were trained over a period of 2 days on procedures to do the anthropometric measurements and collect the required information. Waist circumference was measured using nonstretchable tape. All screened individuals were then advised to visit Urban Health Training Centre (UHTC), located in the study area for further assessment, management, and counseling.

All the data were entered into MS Excel and analyzed using IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp. The risk factors were scored as per CBAC scores[5] [Table 1]. The total score can range from 0 to 11. Study participants with a total risk score of more than 4 were categorized as being at risk of developing NCDs. Descriptive analysis was performed. Frequencies and percentages were used to depict results

wherever appropriate. Chi-square test was used to find out the association between gender and risk scores. $P < 0.05$ was considered significant.

The study was conducted within the boundaries of Helsinki Declaration. Written informed consent was obtained from each participant prior to inclusion in the study. Privacy and confidentiality of data was ensured. Participants with high-risk scores were referred to UHTC of the study area.

RESULTS

A total of 478 residents participated in the study. The response rate was 93.7%. Out of 478 study participants, 217 (45.4%) were male and 261 (54.6%) were female. The mean age of the study participants was 40.3 ± 9.7 years (range: 30–80).

A total of 33 (6.9%) study participants did not have any risk factor and the rest 445 (93.1%) had at least one risk factor. None of the study participants had all the risk factors. The median risk score was 3 (0-8) and the mean score was 2.8 ± 1.7. Eighty two (17.1%) of study participants were ≥50 years and 87 (18.2%) had a positive family history of high blood pressure or heart disease or diabetes. Less than one-fifth (17.8%) of study participants were daily tobacco consumers. Eighty two (17.2%) study participants had a total risk score of more than 4, thereby putting them at high risk of NCDs [Table 2].

A significantly higher percentage of males were found to be current daily users of tobacco ($P < 0.001$) and alcohol compared to females ($P < 0.001$). However, central obesity ($P = 0.007$) and physical inactivity ($P < 0.001$) were significantly higher among females as compared to males.

There was no significant difference in proportion of males and females at high risk of NCDs (P=0.394) [Table 3].

DISCUSSION

India is undergoing through epidemiological as well as demographic transition resulting in increased burden of NCDs. Due to rapid and haphazard urbanization, the risk factors for NCDs are also on the rise. Primary preventive measures including early detection of risk factors in populations can be an important method to prevent morbidity and mortality associated with NCDs. The present study therefore attempted to do a community-based risk factor assessment for people ≥30 years in an urban village using NPCDCS CBAC form for risk assessment.

About half (54.4%) of the study participants were in the age group of 30–39 years. Family history of hypertension or heart disease or diabetes was found to be present among 18.2% of participants. This was lower as compared to another study conducted by Thakur *et al.* in Haryana in which 42.6% of study participants had a family history of hypertension.[9] The possible reason for this could be they included participants with a known history of chronic diseases. Family history of NCDs has been identified as a significant risk factor for the development of NCDs in future.[10] This could be attributed to common

Table 1: Risk assessment as per Community-Based Assessment Checklist, National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Disease, and Stroke

Risk factor	Range		Score
Age (completed years)	30-39		0
	40-49		1
	≥50		2
Smoke/consume smokeless tobacco products	Never		0
	Used to consume in past/ sometimes now		1
	Daily		2
Consume alcohol daily	No		0
	Yes		1
Waist circumference	Female	Male	
	80 cm or less	90 cm or less	0
	81-90 cm	91-100 cm	1
	>90 cm	>100 cm	2
Undertake any physical activity for minimum of 150 min in a week	At least 150		0
	<150		1
Family history of high blood pressure/diabetes/heart disease	No		0
	Yes		2

Table 2: Distribution of study participants according to risk factors' scores (*n*=478)

Risk factor score	Frequency, *n* (%)
Nonmodifiable	
Age (completed years)	
0	260 (54.4)
1	136 (28.5)
2	82 (17.1)
Family history of high blood pressure/diabetes/heart disease	
0	391 (81.8)
2	87 (18.2)
Modifiable	
Tobacco consumption	
0	351 (73.4)
1	42 (8.8)
2	85 (17.8)
Alcohol consumption	
0	452 (94.6)
1	26 (5.4)
Waist circumference	
0	168 (35.1)
1	160 (33.5)
2	150 (31.4)
Physical activity	
0	280 (58.6)
1	198 (41.4)
Total score	
≤4	396 (82.8)
>4	82 (17.2)

Table 3: Gender distribution of risk factors' scores (*n*=478)

Risk factor score	Males (*n*=217), *n* (%)	Females (*n*=261), *n* (%)	*P*
Age (completed years)			
0	92 (42.4)	168 (64.4)	<0.001*
1	81 (37.3)	55 (21.1)	
2	44 (20.3)	38 (14.5)	
Family history of high blood pressure/diabetes/heart disease			
0	179 (82.5)	212 (81.2)	0.722
2	38 (17.5)	49 (18.8)	
Tobacco consumption			
0	114 (52.5)	237 (90.8)	<0.001*
1	34 (15.7)	8 (3.1)	
2	69 (31.8)	16 (6.1)	
Alcohol consumption			
0	193 (88.9)	259 (99.2)	<0.001*
1	24 (11.1)	2 (0.8)	
Waist circumference			
0	113 (52.1)	55 (21.1)	<0.001*
1	76 (35.0)	84 (32.2)	
2	28 (12.9)	122 (46.7)	
Physical activity			
0	142 (65.4)	138 (52.9)	0.007*
1	75 (34.6)	123 (47.1)	
Total score			
≤4	176 (81.1)	220 (84.3)	0.394
>4	41 (18.9)	41 (15.7)	

*Significant association

genetic makeup, similar behavioral characteristics, and identical environmental factors.[11]

In the present study, it was found that 17.8% of the participants were current daily tobacco users and 8.8% were past users or used tobacco sometimes at present. This was similar to the findings of other studies conducted in the country and other parts of the world where the prevalence of current tobacco use ranged from 13.3% to 25%.[9,12-15] However, this prevalence was lower as compared to studies conducted by Sajeev and Soman *et al*., Tushi *et al*., Bhattacherjee *et al*., and Srivastav *et al*.[16-19] The possible reasons for this difference could be different age composition as these studies included participants in the age group of 18–29 also and mostly were conducted among rural and tribal populations. However, the prevalence found in the present study was higher as compared to the study conducted in Kerala (7.9%) which included both urban and rural population of the state.[8]

Waist circumference which is a proxy measure for abdominal obesity was found to be higher than the normal cutoffs among two-third of the study participants. Similar findings were reported by other authors.[8,9,13] This prevalence was higher compared to other studies, where the prevalence of abdominal obesity was between 22.1% and 26.2%,[12,16] which could be explained by the fact that these studies were conducted specifically among rural tribal populations which have lower NCD rates than urban populations but are also slowly progressing toward high NCD burden.

About half of the study participants (41.4%) were found to be doing inadequate physical activity of <150 min/week. This was higher as compared to study findings of Thakur *et al*., Tushi *et al*., Aryal *et al*., and Pelzom *et al*.,[9,14,15,17] which reported prevalence of physical inactivity ranging from 3.4% to 26.2%. Most of these studies included participants with known chronic diseases. Already diagnosed participants might be more aware of the importance of physical activity for control of NCDs. In the present study, almost one-sixth of the participants (17.2%) were found to be at higher risk of NCDs based on a total risk factor score of more than 4.

A significantly higher percentage of males were found to be current alcohol and tobacco users compared to females. This was similar to the findings of other studies.[8,9,12,15,17,19] More of the women participants had abdominal obesity and were found to be doing <150 min/week of physical activity compared to men and this difference was also statistically significant. These findings were in line with previous studies.[9,12,15,19] However, the total risk score was not found to be significantly different among males and females.

Strengths and limitations

This study was a community-based study and used a standard tool for risk factor assessment, which is suitable for resource-limited settings in low and middle income countries. It is among the few studies conducted in urban villages that are rapidly increasing in number. It was exclusively done among apparently healthy individuals and its results can help in implementing primary preventive measures among disease-free population. The study was conducted in an urban village, so the findings cannot be generalized to other parts of the country. Family history of NCDs, physical activity, tobacco, and alcohol use were self-reported by study participants; therefore, information bias cannot be ruled out.

CONCLUSION

One in six study participants aged ≥30 years was found to be at high risk of having NCDs. This calls for heightened screening activities in this age group. A simple tool like NPCDCS CBAC form can be used by frontline workers in resource-limited settings to find out high-risk population at the community level and create awareness among individuals and persuade them to take on healthy practices. Both males and females had high prevalence of

modifiable risk factors with more males being tobacco and alcohol users and more females being inactive and having abdominal obesity. These risk factors, therefore, should be targeted with gender-specific approaches.

Acknowledgments

The authors would like to thank Mr. P.P. Pathak, Ms. Rashmi Sharma, and Mrs. Kiran for their support in survey and data collection.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Short Communication

Assessment of quality of life and its determinants among the elderly residing in a rural area of Faridabad: A cross-sectional survey

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Abstract

Introduction: Population aging as a result of demographic transition has brought into focus issues pertaining to health status of elderly. We aimed to assess different domains of quality of life (QoL) and its determinants among the elderly population of a rural area of Faridabad.

Material & Methods: A community-based cross-sectional study was carried out among 300 elderly people aged 60 years and above from October 2018 to January 2019 in village Pali of Faridabad, Haryana. The World Health Organization QOL-BREF scale was used for the assessment of QoL.

Results: The study included 44% males with a mean age of 67.1 ± 7 years. The mean QOL score was highest in psychological domain (63.26 ± 18.48), followed by environmental domain (62.64 ± 16.23), physical domain (60.58 ± 19.24), and lowest in social domain (59.33 ± 17.81).

Conclusion: Physical domain of QoL was significantly better in nondiseased elderly, while social domain was not significantly affected by morbidities or health-seeking behavior. Overall, QoL was fair to good. Determinants of good QoL included social as well as economic characteristics such as higher education, sex, and the absence of chronic disorders.

Keywords: Geriatric, Haryana, quality of life, World Health Organization-BREF

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Submitted: 06-May-2021 **Accepted in Revised Form:** 14-May-2021 **Published:** 24-Dec-2021

INTRODUCTION

At a time of unpredictable challenges for health, one trend which is certain is population aging and this demographic transition will impact on almost all aspects of society. India currently comprises 8% of total population which is expected to increase to 12.7% by 2025.[1,2]

The World Health Organization (WHO) has defined quality of life (QOL) as "an individual's perception of life in the context of culture and value system, in which he or she lives and in relation to his or her goals, expectations, standards, and concerns."[3] It is a broad concept covering the individual's physical health, mental state, level of independence, social relationships, spiritual beliefs, and the environment.[4]

The share of elderly population in Haryana is 8.7% as per census 2011; higher proportion is present in rural areas as compared to urban area.[5] During the past decade, there are numerous studies describing the QoL in different geographical areas of India, but only one study has been

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/ijcfm.ijcfm_32_21

How to cite this article: Gupta E, Goswami S, Aggarwal V, Singh M, Agarwalla R. Assessment of quality of life and its determinants among the elderly residing in a rural area of Faridabad: A cross-sectional survey. Indian J Community Fam Med 2021;7:130-4.

conducted in Haryana in 2013.[6] There is no recent literature on elderly of Haryana region. Hence, this study was conducted to assess different domains of QoL and its determinants among the elderly population of a rural area of Faridabad.

MATERIAL & METHODS

The study was conducted among the rural elderly population residing in the field practice area of the rural health training center attached with the Department of Community Medicine of a Medical College of Faridabad, Haryana, over a period of 4 months from October 2018 to January 2019. The total rural population served by the center is about 9600 and geriatric population is about 800 (approximately 8%). A community-based cross-sectional design was adopted to study the QoL and its sociodemographic and health-related determinants among the elderly population. All elderly aged 60 years and above were included in the study, while elderly with severe illness not able to answer the questions and those who did not give consent to participate in the study were excluded from the study. Considering expected standard deviation of QoL score among elderly to be 10.97%[7] and tolerable error of 1.5% at 95% confidence interval, sample size was calculated as 206. After accounting for nonresponse and rounding off, 300 elderly were included for study. A list of elderly was obtained from the records of health workers beforehand, and subjects were selected using simple random sampling.

The WHO-QOL (BREF) is one of the best-known instruments for assessing QOL of life which has been adopted in number of countries including India. It contains 26 items covering four domains of QOL.[8,9] A predesigned and pretested structured questionnaire in local language related to the QOL of elderly people devised by the WHO (WHOQOL)[1] was used for the study. It took into consideration four domains of QOL, i.e. physical, psychological, environmental, and social relationships.

Data collection was done by undergraduate medical students after being explained the purpose and objectives of the study. The study subjects were interviewed at their homes. For comparison of mean scores, *t*-test and ANOVA were applied. Level of significance was set at 5%. Multiple linear regression (MLR) model was run to identify predictors of QOL. There was no outlier and autocorrelation in our regression data, and the assumption for normality and homoscedasticity were met. Statistical analysis was done using the Statistical Package for the Social Sciences software version 21 (IBM Inc., Chicago, IL, USA).

The study was conducted following approval from the Institutional Ethical Committee (134/A/11/16/Academics/MC/2016/125), and informed consent was obtained from study participants after explaining the objectives of the study.

RESULTS AND DISCUSSION

A total of 300 elderly were interviewed with a mean age of 67.1 ± 6.9 years. Females (56%) outnumbered males. Similar findings have been observed in the studies carried out in Tamil Nadu by Sowmiya and Nagarani,[10] Jacob *et al*.[11] and Shah *et al*.[12] in Gujarat. It is because the life expectancy among women is more than males. Majority of geriatric population were either illiterate or just literate (can read and write) in current study. More than half of population was reported to be illiterate by studies conducted in rural Ambala[6] (63.9%) and rural Dehradun[7] (60.5%), rural Etawah[13] (66.5%), rural Wardha[14] (74.75%) and rural Dakshina Kannada[15] (62.9%). Other studies also reported majority of their population to be illiterate but not among more than 50% of population.[7,12,14,16,17] Major part of our study population was retired (78%) and 42% were homemaker. Shah *et al*., from Ahmedabad[12] reported 20% retired and Karmakar *et al*., from Tripura[17] had 18.4% retired geriatrics in their study which was much lower compared to our study. Contrastingly 90.8% of study population in a study by Joseph *et al*., were not working[16]. More than two third were currently married in current analysis. Around two thirds (66%) were living with spouse and children similar to majority of studies from rural parts of country. Studies from urban Gujarat[12] and Pondicherry[18] reported a lower proportion of elderly living in joint families. One third of elderly was economically dependent in current study. This was reported to be 34% by Krtika *et al*., and 49% by Bansal *et al*., in their study from Dehradun and Etawah respectively.[7,13] Majority of population belonged to lower middle class of socio economic status similar to those reported from studies of Tripura and Ambala.[6,17]

The mean total QOL score among the elderly in the current study was 61.45 ± 14.78. Mean QoL score was highest in psychological health domain and lowest in social relationships. Rural elderly probably tends to enjoy the power and have positive feeling about future due to traditional rituals hence scoring well on psychological domain in the current study. Similar findings were reported in a study from Puducherry.[14] Low social domain scores in our study points toward changing scenario of social structure of country with increasing number of nuclear families and decreasing interpersonal interactions.

However, Karmakar *et al*.[17] in their study conducted in a rural area of Tripura found that mean QoL scores were maximum for social relationship domain and lowest mean score was seen in psychological domain. This difference may be due to difference in the sociodemographic profile of their study population having majority of males and 45% of their population were in 60–70-year age group.

The QoL scores were excellent in 11 (3.7%) subjects, good in 91 (30.3%) subjects, fair in 156 (52%) subjects, and poor in 42 (14%) subjects. Higher number of males had excellent/good QoL as compared to females, and this difference was found to be statistically significant ($P = 0.002$) [Figure 1]. However, community-based studies conducted in North Indian states by Qadri *et al*.,[6] and Kamra[18] reported a higher number of elderlies enjoying a good QoL (68.2%) with <15% elderly having a fair and poor QoL. They also reported better QoL among males, those who were currently married and graduates which is similar to our study findings.

According to our study the distribution of four domain scores in different age groups shows that the mean physical, psychological, social and environmental score was highest

Table 1: Multiple linear regression model to identify predictors of overall quality of life

	Standardized coefficients (β)	*t*	*P*
Age	0.02	0.50	0.62
Sex	−0.05	−0.71	0.48
Education	0.15	2.28	0.02
Marital status	−0.03	−0.48	0.63
Dependence	0.04	0.65	0.51
BPL	0.09	1.69	0.09
Substance use	0.02	0.35	0.72
HTN	0.07	1.25	0.21
DM	0.03	0.62	0.54
Musculoskeletal disorder	0.14	2.51	0.01
CNS disorder	0.18	3.09	<0.001
Preferred health facility in case of illness	0.01	0.22	0.83

CNS: Central nervous system, DM: Diabetes mellitus, HTN: Hypertension, BPL: Below poverty line

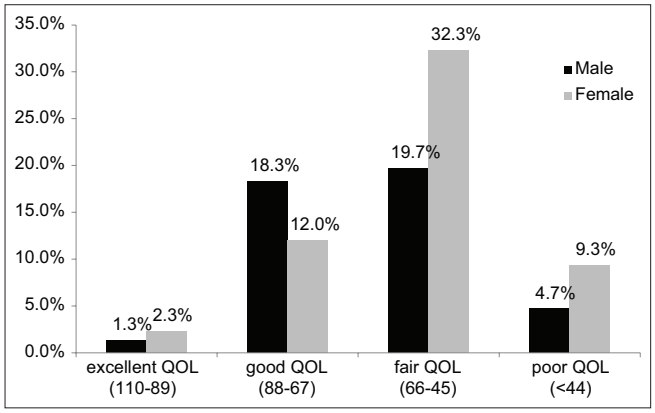

Figure 1: Quality of life among male and female elderly subjects

in >80 years of age group whereas the lowest was observed in 71-80 years age group. Findings are non -concordant with the studies by Hameed *et al*.,[15] and Mudy *et al*.,[14] and Kumar *et al*.,[19] wherein they found an association between increasing age and reduction of QOL but similar findings to our study were reported by Ghosh *et al*.,[20] and Shah *et al*.,[12] where they found no significant association with age. A higher social relationship QOL score was reported among illiterate or just literate and no other trend was noticed. Which is non concordant with the studies by Qadri *et al*.,[6] Kritika *et al*.,[7] and Shah *et al*.[12] But similar to our study again no relation was reported by Bansal *et al*.,[13] and Karmakar *et al*.,[17] in their studies in rural areas of Etawah and Tripura respectively. Contrary to the fact that literacy brings better understanding of life and better opportunities of livelihood of elderly the population of our study did not rely on education to improve their QOL. Our study states the mean psychological score was highest for people in business or self-employed (currently) and lowest among homemakers in all domains while the physical health score was highest among retired population and social relationship was best in agricultural workers. The present study reported the mean score in all domains was lower among divorced/separated/widowed population as compared to currently married population. Concordant to our study results Kritika *et al*.,[7] from rural Dehradun also reported higher score in all domains among married elderly. Studies by Ghosh *et al*.,[20] and Mudey *et al*.,[14] conducted in rural areas of India reported a higher psychological domain score among married elderly. The study in rural Gujarat by Shah *et al*.,[12] reported a significant association between currently married and environmental domain score. Elderly living with their spouse are more cared and take interest in social activities hence a better score in all domains. In our study results mean scores were highest among the geriatric population who were economically independent in all domains except social relationship domain. In social relationship domain the mean score was highest in partially dependent population and lowest among independent population. It is obvious that those who are economically independent are currently working and living on their own. In both these scenarios the elderly tends to spend less time in social circle. Various other studies had a similar finding where financial independence was significantly associated with high QOL score for instance those of Kritika *et al*.,[7] Ghosh *et al*.,[20] and Bansal *et al*.,[13] in rural areas of Dehradun, Etawah and Bihar respectively.

The demographic and morbidity variables were subjected to Multiple Linear Regression, and it was found that only education, musculoskeletal, and central nervous system (CNS) disorders are significant predictors with QoL as dependent variable. CNS disorders had a higher impact

as compared to education and musculoskeletal disorders by comparing standardized coefficient (beta) (0.178 for CNS disorders, 0.148 for education, and 0.145 for musculoskeletal disorders) [Table 1].

The current study revealed that age and financial dependence were not found to be associated with QoL while better socio economic status (above poverty line) had better quality of life in all domains. Similar findings have been reported by Praveen and Rani[21] in Tamil Nadu, wherein age, marital status, and occupation did not have a significant association on QoL. Thadathil *et al*.[22] in their study in rural Kerala found that occupation, higher income, 60–69-year age group, staying with partner, and absence of comorbidity were found to be the determinants of better QOL score. Studies by Ghosh *et al*.[20] and Mudey *et al*.[14] conducted in rural areas of India reported a higher psychological domain score among married elderly similar to results of the current study. Elderly living with their spouse are more cared and take interest in social activities hence a better score in all domains.

Education was found to be the determinant of overall QoL among the elderly with literate elderly enjoying better QoL as compared to illiterate ones. This finding is concordant with findings of Hameed *et al*.,[15] Raj *et al*.,[23] Kritika *et al*.,[7] Qadri *et al*.,[6] and Kumar *et al*.[19] Literacy brings better opportunities of livelihood and better understanding of life processes, thereby leading to better QoL among literate elderly.

The present study had certain limitations. The study involved dealing with elderly population and assessment of QoL using a qualitative scale; hence, there are chances of recall and response bias. The study was confined to a small rural area of Faridabad; hence, generalizability of results may be an issue. Furthermore, QoL is a multidimensional parameter, and hence, its results might have been affected by some unknown confounders.

CONCLUSION

The QoL scores among elderly of Faridabad were found to be suboptimal with scores in social relationship domain to be lowest. Periodic health checkups and strengthening of community care need to be done for early detection and control of the morbidities among the elderly. Various health promotion measures including recreational activities and environmental modification may help in improving QoL among the elderly. However, QoL is a multidimensional concept and more extensive research into the factors having a direct bearing on QoL needs to be undertaken.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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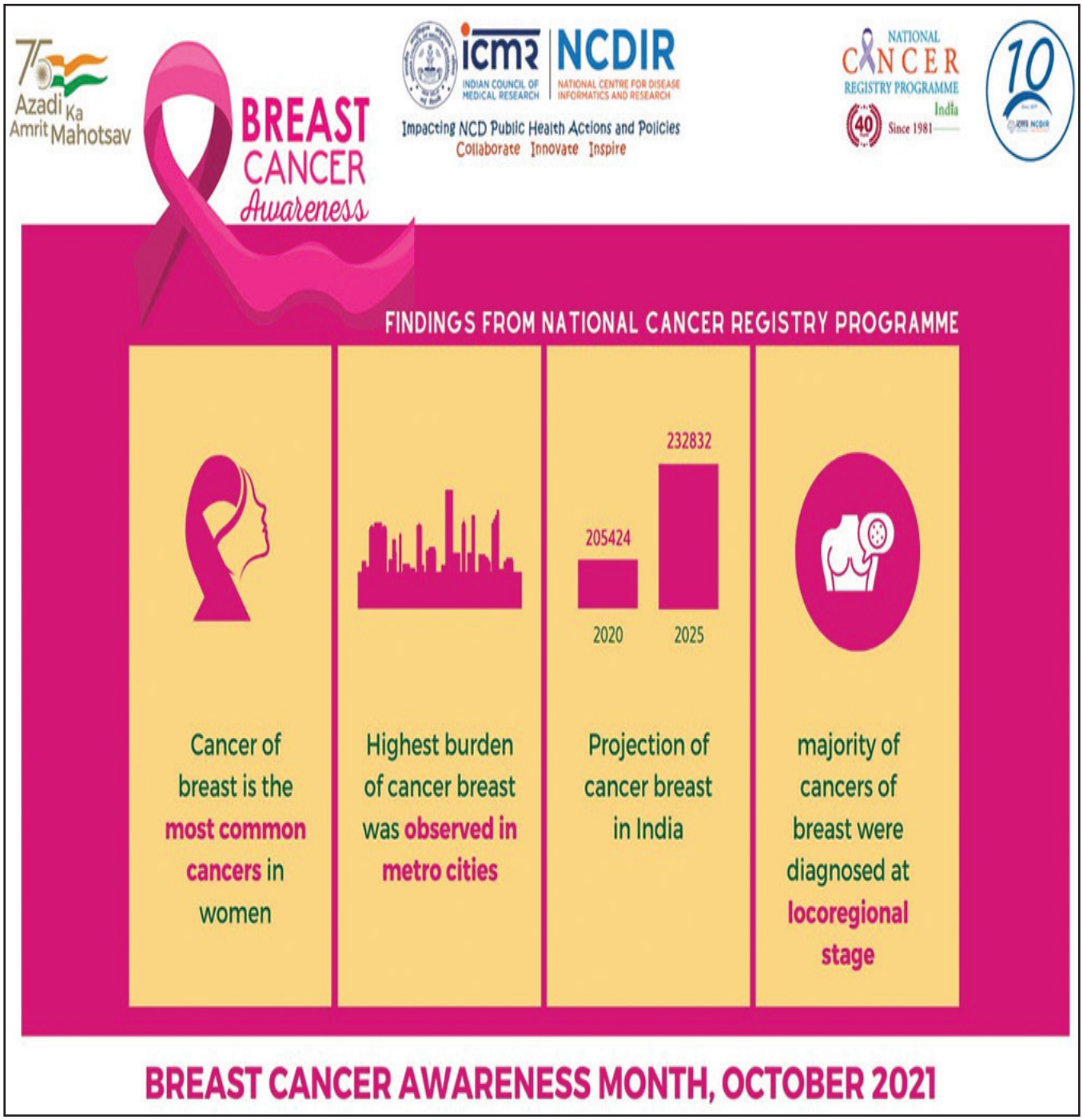

Short Communication

Strengthening home-based postnatal care of rural area of two districts of Haryana using mobile phone technology: A pilot study

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Abstract

Introduction: Home-based postnatal care (HBPNC) plays an important role in improving the survival of mothers and newborns by complementing facility-based care. In India, HBPNC was initiated in 2011 under National Rural Health Mission, but the coverage and quality of postnatal care still remain a challenge. In the present study, we describe the methodology used in strengthening the existing HBPNC by utilizing mobile phone technology.

Material & Methods: The study was conducted in the rural population of two districts of Haryana in collaboration with the National Health Mission Haryana and Survival for Women and Children (SWACH) foundation. The Accredited Social Health Activists (ASHAs) in the study area were provided a mobile phone and training related to the use of mobile technology, their roles, responsibility, and the information to be shared through phone and its purpose.

Results: Along with providing home-based post-partum care, a total of 120,654 births (from May 2015 to August 2019) with detailed outcomes of pregnancy have been reported to SWACH. Population-based birth defect surveillance, stillbirth surveillance, and investigation of neonatal deaths are being done successfully using the same platform. Deaths are also being investigated by verbal autopsy. Age- and stage-specific participatory learning groups for action have been created on mobile phones for pregnant women, postnatal mothers to provide support, and interactive education to improve the maternal, newborn, and child health.

Conclusion: It is feasible to strengthen the existing HBPNC with mobile phone technology to improve maternal and child health further. Vital events can be captured on an ongoing basis through ASHA as a key informant.

Keywords: Home-based postnatal care, maternal mortality, neonatal mortality, stillbirth

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Submitted: 20-Oct-2020 **Accepted in Revised Form:** 08-Oct-2021 **Published:** 24-Dec-2021

INTRODUCTION

Home-based postnatal care (HBPNC) is the provision of maternal and newborn care from 1 h after the delivery of placenta to 42 days following birth.[1] The postnatal period is the most critical phase for mother and newborn as it is the time of physiological transition for both.[2] Almost 50% of maternal mortality occurs in first 24 h of birth and 66% in first 7 days of postnatal period.[3] As reported in 2013, 2.8 million babies died in the first month out of which 1 million died on the first day of their life.[4,5]

Increases in institutional deliveries and care of small and sick newborn have led to increased burden on the

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/IJCFM.IJCFM_121_20

How to cite this article: Sharma B, Raina A, Kumar V, Mohanty PN, Sharma M, Gupta A. Strengthening home-based postnatal care of rural area of two districts of Haryana using mobile phone technology: A pilot study. Indian J Community Fam Med 2021;7:135-9.

institutions, leading to early discharge of mother and babies. Therefore, the rationale of HBPNC is to ensure evidence-based continuum of care after delivery and to provide care for home deliveries as well. HBPNC focuses on the provision of preventive and promotive maternal and newborn care services such as counselling for breastfeeding, immunization, family planning, and referral of complications. In the community, HBPNC can be provided by the professional health-care provider or community health worker or community worker with referral or health-care support.[6] In India, HBPNC is introduced under the National Rural Health Mission (NRHM) in 2011and being provided by community-based volunteers known as Accredited Social Health Activists (ASHAs).[7]

Although substantial gains have been made in reducing maternal and child mortality, the decline in neonatal mortality and stillbirth is slower.[8] The adverse outcomes of pregnancy also include miscarriages, stillbirths, babies born too soon or born too small, and congenital anomalies and maternal near miss which far outnumbers the maternal deaths.[8] All these key indicators are underreported in the system even though considerable efforts are being made for improvement. Moreover, sturdy systems are needed to understand population-based events to take policy decisions based on evidence and best practices as the civil registration or vital statistics system is weaker in low-middle income countries.[9,10]

The present study was conducted with the objective to strengthen the existing HBPNC using mobile phone technology and use same platform to capture the population-based events (miscarriage, stillbirth, birth defects, maternal death, and near miss) from a defined geographical area to know the actual burden which is usually missed or underreported.

MATERIAL & METHODS

Study area:

Survival for Women and Children (SWACH) Foundation experimented with the idea of m-health using mobile phone technology in Bilaspur Community Development Block in district Yamunanagar in Haryana in 2012 to promote the newborn and maternal health and care for Child Development. This experience was shared with the NRHM under the leadership of Mission Director NRHM in 2013, and a decision was made to develop a collaborative project to strengthen HBPNC to be implemented in the study area. The modus operandi, details of the plan, funds required, and issues relating to all concerned in NRH for two districts and providers were worked out. The tools to be used and the guidelines to be distributed were developed and field tested. It was agreed that, since this is an innovative collaborative project involving multiple stakeholders in geographically dispersed population, it should be implemented in phases and expanded based on experience and capacity of all the stakeholders, i.e. the staff in community processes, child health division, IT wing of NRHM, the officers concerned in the district, ASHA block coordinators, ASHA facilitators, ASHAs, ANMs, and LHVs.

Preparatory phase

ASHAs had been trained for a period of 5 days to provide HBPNC by NRHM as per state norms. Following the completion of training, there were periodic refresher trainings by the district authorities in collaboration with primary health center (PHC) staff and auxiliary nurse midwife (ANM). ASHAs were supported by ASHA facilitators and block coordinators at the community development block level as well as by the ANM at the village level in their day to day work.

Implementation phase

Implementation was started in June 2013 in Khizrabad (Chhachhrauli) block of Yamuna Nagar district. After consolidation of work in this block, the project was extended to Bilaspur block and then it was progressively introduced in the other eightblocks of the two districts. The whole rural areas of two districts with an estimated 16.67 lakhs of rural population have been covered since June 2015 and sustained till date. The time of initiation of the strengthening of HBPNC project is summarized in Figure 1.

Key steps and processes in implementation

A 1-day orientation of district level officers (maternal health and child health), senior medical officers, medical officers, lady health visitors, and ANMs to apprise them about the project and seek their support after approval by NRHM. Subsequent meetings were held to update progress on the project.

One-day PHC-wise orientation of ASHAs was done by staff from NRHM, district and SWACH. During the orientation meeting, name, address, and telephone number of each ASHA and all support staff at the block and district

Year	2013		2014			2015			
Block	June	Sept.	January	May		January	March	April	May
Kbd.		.							
Bilas.									
Sadh.									
Nahar.									
M Bad									
Radh.									
Mulla.									
CMPur									
S Pur									
Barara									

Figure 1: The timeline of the strengthening of the HBPNC project and area covered

staff and their e-mail contacts were collected to facilitate ongoing communication by phone and electronically. Roles and responsibilities were explained to all concerned parties. A simple format was given, and ASHAs were explained about the information to be reported by them and its purpose. All the ASHAs were given (1) MCP (Mother Child Protection) cards; (2) simple formats to guide reporting on the phone on pregnancy registration, pregnancy outcome, and status of the mother and the baby at 28 days and 42 days, respectively, See Annexure-A; (3) three one page illustrated flyers that were printed in four colors were distributed to be shared with families to empower them. One flyer was on birth preparedness (Annexure-B), one on care of the mother and the new born baby at home (Annexure-C), and one on special care of low birth weight baby (Annexure-D). One phone number was given, and this was printed on the flyers so that ASHAs and families are able to maintain their communication on the same phone and talk to the same person at SWACH. This has helped to ensure ongoing communication and maintain a sturdy data base. All ASHAs and project staff members have been provided CUG SIMs free by NRHM. Phone communication between ASHAs and SWACH staff was therefore not inhibited because of cost considerations.

Reporting All ASHAs reported each pregnancy and provide details of pregnancy on the phone. They report all outcomes in each pregnancy, i.e. abortion/miscarriage termination of pregnancy, stillbirth, and live births with details of each birth. They also report the outcome for the mother and the baby at 28 days and 42 days of age. These details are entered on a computer at SWACH. The information on each family is recorded daily on a web-based system to facilitate follow-up and analysis. This web-based system has been developed by the IT wing of NRHM Haryana. For each PHC, data are retrieved once every week to identify those ASHAs who have not reported any event and they are contacted by SWACH supervisor in order to ensure completeness of the reporting. The system alerts the staff about each mother infant dyad who has reached 28 days and 42 days. A track is kept of these and if information is incomplete then it is completed and updated. Information from the family is obtained independently to validate the information provided by ASHAs.

RESULTS

A total of 1650 ASHAs were enrolled, trained, and provided feature phone by NRHM. Approximately 40% of ASHAs owned an android phone and around 5%–10% of ASHAs dropped their job or replaced annually. Key variables have been used, and the system enables quick analysis of up-to-date information and generate graphics on the following (1) number of pregnancies registered trimester wise, (2) outcome-abortion/miscarriage, stillbirth, neonatal death, and maternal death, (3) place of birth, (4) type of delivery, (5) early initiation of breast feeding, (6) presence of visible birth defect, (7) birth weight, (8) gestational age, (9) possession of phone number by the family, and (10) status of breast feeding at 28 days of age. These indicators are reviewed by the team on a weekly basis and then a monthly report is prepared and shared with all the stakeholders. The ASHA facilitators and ASHAs who do not have e-mail are provided a feedback by their supervisors at the PHC during the monthly meetings. This report includes action points that need to be considered by each stakeholder. From May 2015 to August 2019, total 120,654 births have been reported out of which 2031 were stillborn with still birth rate of 16.8/1000 births. The neonatal mortality rate was 19.5/1000 live births. Under population-based birth defect surveillance, 1060 cases of one or more birth defects have been reported and verified. The most common birth defects were musculoskeletal followed by defects of central nervous system. Birth weights were recorded in 98% of cases. The rate of low birth weight (below 2500 g) was 15%. Institutional deliveries took place in 98% of cases, and early initiation of breastfeeding occurred in 70%.

Using the same platform SWACH foundation has also started participatory learning for action (PLA) group under various categories – pregnancy support group, postpartum group (42 days), 1–3 months, 3–6 months, 6–12 months, and 12–24 months of age for continuum of care. At present, there are around 2200 active participants in these PLA groups who are exchanging information daily. These groups are being moderated by health-care providers at SWACH who are also providing targeted education and support to pregnant as well as postnatal women to improve care seeking, compliance, and family-centered care.

DISCUSSION

In this study, mobile phone technology is being used to strengthen the HBPNC at community level using frontline workers (ASHAs) to capture the real-time data of vital statistics for the action. This system has helped in identifying the target population for follow-up which further facilitated communication with ASHAs and targeted families. It has been feasible to capture vital statistics irrespective of place of birth or death after getting the coverage of all the community blocks. Each death, i.e. stillbirth, neonatal death, and maternal death was investigated by verbal autopsy, and other associated

factors were also captured. Before this, the information on adverse outcomes had been obtained from ASHAs on monthly basis, but with the help of mobile technology, they are providing live information which is helping to find out the current gaps and constraints at home or at system level both in the private as well as in the public sector. Population-based house hold surveys are a useful method to capture the complete data on vital statistics, especially in countries with poor coverage of civil registration system. With this innovative method, it is feasible to capture the adverse outcome such as stillbirths, birth defects, neonatal death, and maternal deaths of a defined geographical area completely.[11,12] The main achievements of this effort are:

- A population-based count of vital events relating to pregnancy and its outcome through a system of data collection, data entry, and analysis on a day-to day basis has been established and sustained
- Complete information that includes abortion, stillbirths, live births, birth defects neonatal, and maternal deaths is available, and live system has been developed, in which the information can be used for initiating action at the earliest on a day-to-day basis
- Regular phone calls to ASHAs and contact with family are helping to improve accountability of ASHAs and bring improvement in quality of information and its completeness
- PLA groups are engaging and empowering the families to strengthen family-centered care and enhance the timely utilization of the health system for preventing and curative care
- Timely guidance to the family for early referral and appropriate treatment seeking to reduce preventable deaths is now done although there is considerable effort required to move the process of changing family behavior forward
- Reduction in irrational use of drugs and reducing out-of-pocket expenses of the family by solving the common concerns of the mother and the new-born by resolution of problems by phone through PLA groups. This will also reduce the use of unwarranted medication for minor concerns and problems.

There is an ongoing dialog with the state NRHM (NHM) and district authorities to audit the deaths and stillbirths so that decisions can be made to improve (1) the family and community interventions to strengthen the demand side, (2) upgrade the care during referral, and (3) strengthen the quality of care at the point of delivery (PHC, CHC, district hospital, and tertiary facilities). A monthly audit and review process are being evolved to provide policy guidance so that the problem of high still birth rate, neonatal mortality rate, and maternal mortality rate can be addressed nationally. Messages have been developed to guide the families during different phases of pregnancy for birth preparedness as well as to be able to render essential home-based post-natal care. The system has the capacity to transmit age/stage specific action-oriented messages for use by application of digital technology. The evolution of this system can take the effort one step further in the strengthening process.

Population-based birth defect surveillance data have highlighted the public health problem of neural tube defects. This has helped the state government to take policy decision on fortification of wheat flour with folic acid. State-wide expansion is under consideration.

There were many constraints such as low response, incomplete or delayed information, or fear of being reprimanded, non-possession of smart phone, but over the time, we were able to sustain the participation of almost 95% of ASHAs and could improve the quality of data further.

CONCLUSION

Strengthening HBPNC by community health workers with the help of mobile phone technology is an example of innovative health workforce approach where along with providing postnatal care, data on vital events such as live births, stillbirths, births defects, maternal deaths, and near miss in a defined geographical area have been captured completely. This robust data base would help in planning intervention and tracks its impact to strengthen the maternal and child health.

Acknowledgment

We would like to acknowledge Managing director NRHM Haryana for supporting and making this pilot study successful. We also thank DD child health, DD maternal health, ASHA coordinators, facilitators, and ASHAs of Ambala and Yamuna Nagar for participation and cooperation.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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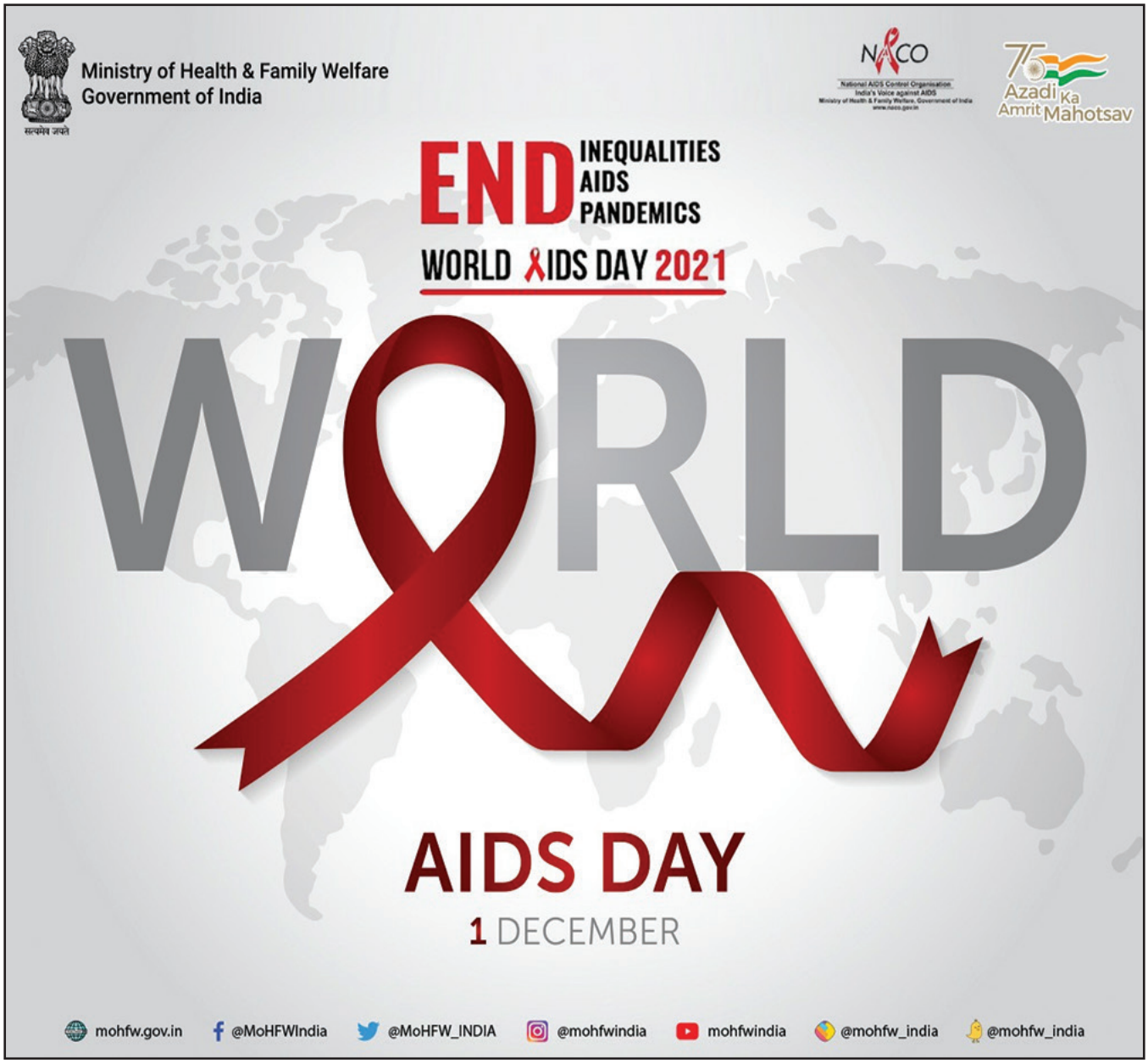

Case Report

Germ cell tumor of anterior mediastinum: A rare case in young adult

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Abstract

A 30-year-old diabetic male, urban resident, nonsmoker with Karnofsky performance score 80 was diagnosed with germ cell tumor of 13 cm × 9 cm with Stage I at right anterosuperior mediastinum after short duration of cough and hemoptysis. He did not have any difficulty in breathing or weight loss. The effort tolerance of the patient was up to four floors. The case received VIP-based chemotherapy with etoposide, ifosfamide, and cisplatin at a center of excellence. Thereafter, the surgical excision of the solid mass may be the optional line of treatment.

Keywords: Anterior mediastinal mass, giant cell tumor, yolk sac tumor

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Submitted: 20-Aug-2020 **Accepted in Revised Form:** 03-Apr-2021 **Published:** 24-Dec-2021

INTRODUCTION

Mediastinal neoplasms are uncommon tumors. They usually pose diagnostic and therapeutic challenge for treating oncologist.[1] Germ cell tumors (GCTs) are rare neoplasms affecting gonads although observed in alternative body sites also in structures of median line, such as endocrine gland, retroperitoneum, anterior mediastinum, and sacrococcygeal region.[2] Ten percent to twenty percent of all mediastinal cancers are GCT. Yolk sac tumor, a subtype of germ cellular tumor, is malignant.[3]

CASE REPORT

A 30-year-old unmarried male, northern India, did not have any physical ailments during earlier years. His X-Ray chest was normal 2 years back [Figure 1]. His body mass index was 26.03 kg/m^2. His blood pressure was 130/86 mmHg and 97% SpO_2. He has no history of any tumor, chest pain, breathlessness, heaviness, fever, sickness, or behavioral risk factors except for last few weeks complaint of cough with increasing severity. The cough was, however, off and on. The case immediately sought medical expert opinion after observing cough in the morning which was associated with blood-tinged sputum, who after seeing X-ray chest advised for computed tomography (CT) scan thorax. As a routine, the chest X-ray of the patient was done by local medical expert, and an oval X-ray opaque region was seen in the right middle mediastinum as space-occupying lesion [Figure 2]. Considering it suspected case of pneumonia, the treatment with ciprofloxacin was initiated to which the patient was nonresponsive. He has no history of smoking but occasionally takes alcohol. The patient, however, did not report to any emergency department at that time and was taken by his relatives to get appropriate treatment for the inconvenient cough. The patient was recently diagnosed Type-II diabetes mellitus and was started on oral

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	DOI: 10.4103/IJCFM.IJCFM_99_20

How to cite this article: Kumar S, Gumashta R. Germ cell tumor of anterior mediastinum: A rare case in young adult. Indian J Community Fam Med 2021;7:140-3.

hypoglycemic agents. He was operated for inguinal hernia at the age of 6 years. The effort tolerance of the patient was up to four floors. It is also noticed that the chest X-ray of the case taken during health assessment for new job was in the preceding 2 years [Figure 1]. He is happily employed for his technical expertise at electrical department located at site office of a large infrastructure, construction, and development company.

As per his reports of treatment, care, and support at a highly sophisticated specialized center of excellence, "Contrast-enhanced CT (CECT)" performed for thorax, abdomen, and pelvis on a multidetector CT scanner revealed that there is a large heterogeneously enhancing anterior mediastinal mass measuring 10 cm × 13 cm × 9 cm (anteroposterior mediolateral caudocranial) [Figure 3]. No fat density or calcific areas were seen within it. The mass was seen abutting pericardium along right atrium and right ventricle showing more than 180° angle of contact with ascending aorta and main pulmonary trunk. However, the right main coronary artery was reported as encased by the mass at the origin, which was seen displacing right lung parenchyma with resultant volume loss of right hemithorax. Right middle lobe collapse was also noticed with subsegmental atelectasis seen in posterior segment of right upper lobe. Traces of pleural effusion were also noted on the right side. No evidence of any suspicious pulmonary nodule was seen. Few enlarged paratracheal prevascular nodes were seen, largest measuring 20 mm × 12 mm. No abnormality was seen in the liver, biliary tree, gall bladder, pancreas, spleen, kidney, adrenals, gastrointestinal tract, urinary bladder, prostate, and seminal vesicles. No significant retroperitoneal lymphadenopathy was seen. There were no ascites. The visualized bones were unremarkable. Electrocardiogram was normal. The echocardiographic report impression showed anterior mediastinal mass with mild pulmonary hypertension. The left ventricular ejection fraction was 55%. Bilateral ultrasonography testis depicted microlithiasis.

Fasting blood glucose (163 mg/dL), postprandial blood glucose (192 mg/dL), serum globulin (3.96 g/dL), and serum lactic acid dehydrogenase (LDH) (307 U/L) were raised, whereas serum creatinine (0.60 mg/dL) and serum albumin (3.41 g/dL) were low. The biochemical investigation of serum urea (15.9 mg/dL), serum uric acid (5.77 mg/dL), serum sodium (135 mmol/L), serum potassium (4.82 mmol/L), serum chloride (101.8 mmol/L), serum bicarbonates (25.1 mmol/L), serum protein (7.37 g/dL), serum alkaline phosphates (84 U/L), total bilirubin (0.51 mg/dL), serum aspartate aminotransferase (22 U/L), and serum alanine aminotransferase (38 U/L)

Figure 1: Chest skiagram 2017

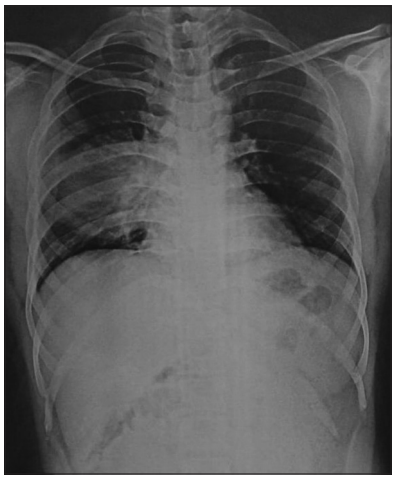

Figure 2: Chest skiagram 2019, showing mediastinal mass

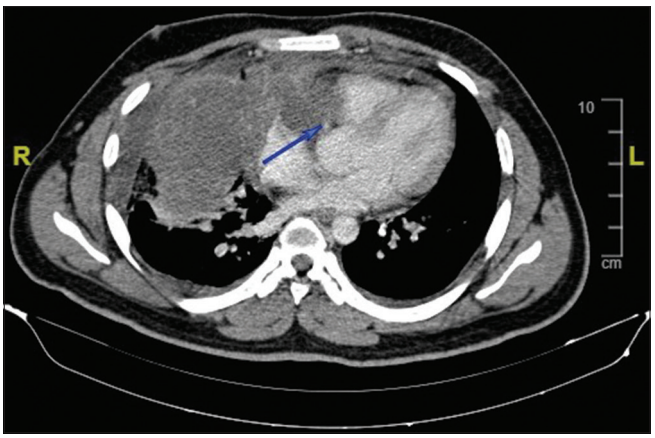

Figure 3: Computed tomography thorax, showing anterior mediastinal mass

were normal. The biochemical LDH (283 U/L) and alpha-fetoprotein (AFP) (1468 ng/ml) were high.

Beta-human chorionic gonadotropin (19.7 mIU/mL) was mildly raised, whereas serum carcinoembryonic antigen

(1.71 ng/mL) was normal. Serum ferritin (428.43 ng/Ml) was high. CT biopsy showed malignant GCT. Semen analysis did not show any spermatozoa in centrifuged deposit. Prothrombin time (16.400 s) was high. Red blood cell distribution width in complete blood count report was 15.00% CV (high). Hepatitis B surface antigen, hepatitis C antibodies (anti-HCV), and HIV antibodies were nonreactive. The histopathology report showed malignant GCT, the yolk sac tumor. Renal cortical functions of all the kidneys are shown as normal, done by gates method. Dynamic images of both kidneys were acquired with camera placed posteriorly after injection of 5.5 mCi of 99 mTc-DTPA.

The case underwent chemotherapy twice as per the treatment protocol at a centre of excellence. PET-CT scan showed irregular poorly circumscribed lesion in anterior mediastinum infiltrating the right atrium and ascending aorta. Resection of anterior mediastinal mass was done for lesion measuring about 5.3cc cm × 7.7TR cm × 4.9AP cm standardized uptake value max 3.0. The AFP level fell to normal level (5.9 ng/mL). However, thereafter, it raised to 353 ng/mL after a week and 1102.06 ng/mL in subsequent week. The biopsy of pericardial margin did not show any residual viable tumor. No obvious abnormality was seen in CECT scan of the neck and abdomen.

The patient has been advised by the treating oncologist to consider undergoing four cycle of chemotherapy, and thereafter, the option of radiotherapy may be exercised if AFP remains still on the raising trend. The case is rare because the AFP is still increasing despite no viable tumor detection postoperatively.

DISCUSSION

A 30-year-old male, urban resident, Karnofsky performance score 80, nonsmoker having predominant symptoms of cough and hemoptysis with GCT Stage I of 13 cm × 9 cm at right anterosuperior mediastinum was advised by the treating oncologist that the surgery may be done after 4 sessions of chemotherapy, so that tumor markers return back to normalcy.[1] As has been observed in 25% of the cases, our case did not show any lymphadenopathy or lymphadenitis. He also did not have any difficulty in breathing or weight loss. The patient is receiving standard treatment of systemic chemotherapy with VIP [etoposide (VePesid), ifosfamide, and cisplatin (Platinol)]-based chemotherapy comprising of etoposide, ifosfamide, and cisplatin. The patient is responding to the treatment, and further, therapy shall be provided to him as per the protocol of the treating hospital.[2] Germs cell tumors have been reported to occur generally in the age group of 21–30 years. However, the studies have revealed that majority of the cases are benign tumors with preponderance of thymic epithelial regions followed by lymphoma, GCT, and sarcoma in the anterior mediastinum.[4]

The alpha-fetoproteins of the patients are usually found elevated, which were also observed to be high in our reported case.[5] The tumor-induced compression and therefore total lung collapse as observed in similar cases of sudden reporting of chest pain and cough have been observed, however, no such findings have been seen in the chest X-ray of herein reported case.[6] Since our case has been asymptomatic with minimal symptoms at the time of the first diagnosis, it is unlike the other cases of mediastinal masses presenting with evident symptoms due to compromised lung function.[7] As has been reported elsewhere, the diagnosis of GCTs made by histopathology reports in our case is in resonance with radiological findings.[8]

There are cases where the patient got bilateral pulmonary hemorrhage within couple of days postneedle biopsy suggestive of progressive lesions, however, the present case showed it infiltrating right atrium and enhancing to ascending aorta.[9] As surgical excision of mediastinal teratoma is recommended, the same was done the present case but the AFP, the indicator of tumor, is still on the rising trend despite biopsy being normal.[10]

Declaration of patient consent

The case has given his written consent for the images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published.

Financial support and sponsorship

Nil.

Conflicts of interest

There is no conflict of interest.

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Changes in undergraduate medical education practices during COVID-19 pandemic

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Abstract

Introduction: The countrywide lockdown in response to COVID-19 pandemic necessitated a shift from conventional teaching to online teaching. This study aimed to find the issues and challenges faced by medical teachers on the virtual platforms of teaching during lockdown.

Material and Methods: A cross-sectional survey was conducted among the medical teachers of a tertiary care hospital between august to october 2020. A google form with study questionnaire was circulated among participants.

Results: Online live lectures were major mode of online teaching. 36.5% of teachers felt that they were successful and only 19.2% felt, they were unsuccessful in engaging most of the students. Discrepancies between efforts and outcome (20.54%), absence of definite guidelines (20.54%), unwanted disturbances (19.17%), lack of technical expertise (19.17%), absence of uniform format (10.95%), and lack of knowledge (6.84%) were the challenges faced. A change in the content of slides (52.8%), increased use of videos, charts, and figures (41.5%), changes in lesson plan (32.1%), including assessments after each class (28.3%) and division of content into sub-topics for better understanding and easy upload (22.6%) were the modifications made by faculty for online teaching. Around half of the faculty members disagreed that teaching can be conducted online postlockdown.

Conclusion: The pandemic is a situation that should encourage all medical educators to be trained and adapt to online teaching methodologies.

Keywords: Medical education, online teaching, problems and solutions, virtual classroom

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Submitted: 16-Nov-2021 **Accepted in Revised Form:** 17-Nov-2021 **Published:** 24-Dec-2021

INTRODUCTION

The medical curriculum demands many face-to-face interactions between teachers and students and patients. The COVID-19 pandemic has thrown an unforeseen challenge to medical educators worldwide. Medical educators have responded to this challenge by bringing about a change in their teaching practices.[1] With lockdowns becoming a norm during the pandemic, virtual teaching-learning (TL) practices replaced the regular classes. The focus shifted from real-life lecture theatres and bedside teachings to technology-driven virtual platforms.[2] This change brought about issues in many aspects of teaching and learning in medicine, like participation of students, interaction, and assessment.[3] Furthermore, the over-reliance on technology entailed a certain amount of digital fluency among medical educators.

Access this article online	
Quick Response Code:	Website: www.ijcfm.org
	DOI: 10.4103/ijcfm.ijcfm_92_21

How to cite this article: Sable M, Sarkar S, Hallur V, Mishra P. Changes in undergraduate medical education practices during COVID-19 pandemic. Indian J Community Fam Med 2021;7:144-8.

There was a complete lockdown for 5 months in India (March to August 2020) announced by the government on account of the COVID-19 pandemic.[4] This included a complete cessation of all face-to-face TL activities at all educational institutions. Higher educational institutions were allowed to open for students only from September 2020 as part of Unlock 4.[5] During this period of 5 months, all educational activities were conducted online in the institute. Faculty had a varied experience with online TL processes. This study was conducted in a tertiary care hospital to find the issues, challenges, and strategies adopted by teachers while using the virtual platforms during the lockdowns due to the pandemic.

MATERIAL AND METHODS

This was a cross-sectional observational study conducted between August and October 2020 in our medical college. All medical and nursing faculty of the institution were included as participants in this study. A self-administered, pretested questionnaire was constructed on Google Form® (Google LLC, Mountain View, CA). The questionnaire had an introductory paragraph, which included information regarding the survey's aim, assuring confidentiality of participants. The questionnaire's main structures were four sections to identify the general information, teaching methods used, experience, and future perspectives for online teaching. The questionnaire included 21 questions. Nine were close-ended questions, six were open-ended questions, and the rest were a mixed type of questions. The questions probed the experience of faculty in online teaching, the methods employed by them, their feedback of experiences, and the future possibility of integrating online teaching into the regular schedule of classes.

An e-mail invitation was sent to all faculty of the institute through institutional E-mail. All responses received in the time period of the study were analyzed. No incentives were offered to get responses, and participants voluntarily responded to the survey.

Statistical analysis

The responses were tabulated and analyzed in Microsoft Excel version 1909. Descriptive statistics were employed to assess the responses.

RESULTS

Participants information

Out of 202 medical faculty, 55 (27.2%) responded to the questionnaire. Twenty six (47.2%) of the respondents had more than 10 years of teaching experience, 22 (39.6%) had teaching experience between 4 and 10 years, and only 7 (13.2%) had a teaching experience of <4 years. Out of all faculty members, 35 (64%) were from clinical branches and 10 (18%) were from preclinical and para-clinical subjects. All the respondents were involved in both undergraduate and postgraduate teaching. The number of classes conducted by individual teachers were ranging from 1 to 21 classes with the median of 6 classes during the study period. Less than 5, 6–10, and >10 classes were conducted by 32%, 12%, and 11% teachers, respectively.

As per participants' responses, before COVID-19 pandemic the major TL method for theory classes to undergraduate medical students was didactic lecture (41.17%), followed by seminar (23.52%), tutorials (20.16%) and flipped classroom (4.2%). Other methods (10.92%) used were bedside teaching, case-based discussions, demonstrations, and Unconventional Learning Experience. During the COVID-19 pandemic, 43/53 (81.1%) teachers conducted theory classes via online live lectures. Furthermore, 26/53 (49.1%) and 9/53 (17%) circulated pdf copies of PowerPoint slides and recorded videos to the students, respectively. Only 13/53 (24.5%) conducted webinars.

Fourty nine (88.7%) of teachers did not have any formal training in online teaching. The leading online teaching platforms used were Google Meet (82.4%), Zoom (43.1%), and Google Classroom (17.6%). WhatsApp-based video meeting, Go To Meeting, and YouTube Live were conducted by 6 (11.8%), 1 (2%), and 1 (2%) teachers, respectively. None of the participants used other platforms like Facebook live, Twitter, Blogs, etc., [Figure 1].

Out of 52 respondents, 32 (61.5%) were comfortable, and 9 (17.3%) were uncomfortable with online teaching, while 11 (21.25%) were noncommittal. Although 44.2% of teachers were unable to give an opinion about the success in engaging most of the students, 36.5% of teachers felt that they were successful, and only 19.2% felt as they were unsuccessful.

The challenges reported during online teaching during the COVID-19 pandemic compared to conventional teaching were discrepancies between efforts and outcome (20.54%), absence of definite guidelines (20.54%), unwanted disturbances (19.17%), lack of technical expertise (19.17%), absence of uniform format of teaching (10.95%), and lack of knowledge (6.84%). To ensure the participation of the students during online classes, the most common method applied by the teachers were asking a question in between (53%), sharing of the class link beforehand (10.63%), chatbox discussion (8.5%), and assessment (8.5%) [Table 1].

The modifications that the faculty made in their teaching style for the conduct of online classes were changes in the content of slides (52.8%), increased use of videos, charts, and figures (41.5%), changes in lesson plan (32.1%), including assessments after each class (28.3%), division of content into sub-topics for better understanding and easy upload (22.6%) [Figure 2].

Faculty perspectives about the advantages of online teaching included exposure to more comprehensive content, the flexibility of conducting classes, greater freedom of structuring the content, the scope of more interaction with students, better student compatibility, and no time-bound classes [Figure 3].

While 47.2% were noncommittal, 34% of faculty responded that they would prefer to continue with online classes postlockdown, and 18.9% were not interested in continuing online teaching. 64.2% felt that online classes should be a part of the regular teaching schedule in the future. 55.3% of the faculty felt that online classes should comprise up to 25% of the teaching schedule [Figure 4]. 54.7% of faculty disagreed that practical and bedside teaching can be conducted online, and only 17% felt that this could be done online. Suggestions for conducting the same were through the use of video demonstrations with or without interaction, simulation platforms, role-play, and google glass. 69.2% of faculty assessed students during the online classes. The methods employed by majority of the faculty to evaluate students were MCQs and SAQs. [Figure 5].

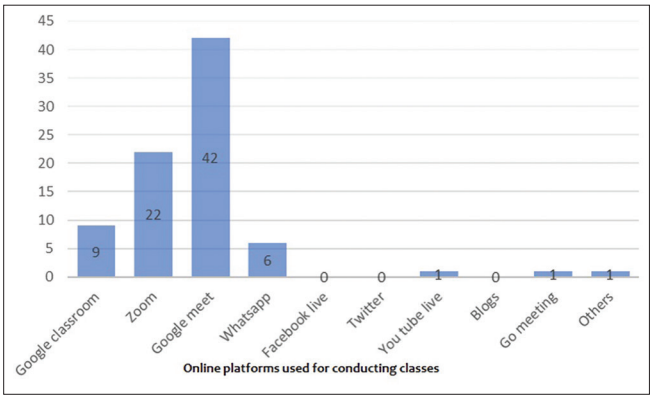

Figure 1: Distribution of online platforms used for conducting online classes (*n*=51)

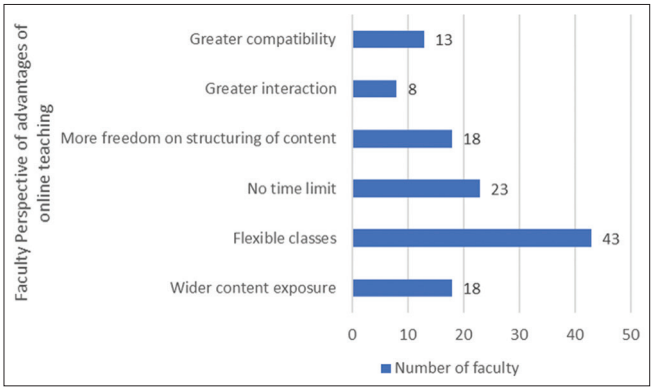

Figure 3: Faculty perspectives of advantages of online teaching

DISCUSSION

Pandemic transgresses international boundaries and affectes a large number of people[6] The current pandemic of COVID-19 has forced governments worldwide to implement stringent measures to prevent transmission. The sudden implementation of these preventive measures in the recent pandemic caught the medical educators worldwide unawares. These challenges have compelled medical colleges to change their existent strategies for teaching and learning.[3,7] It has also created opportunities to explore newer forms of teaching and learning strategies using virtual platforms.

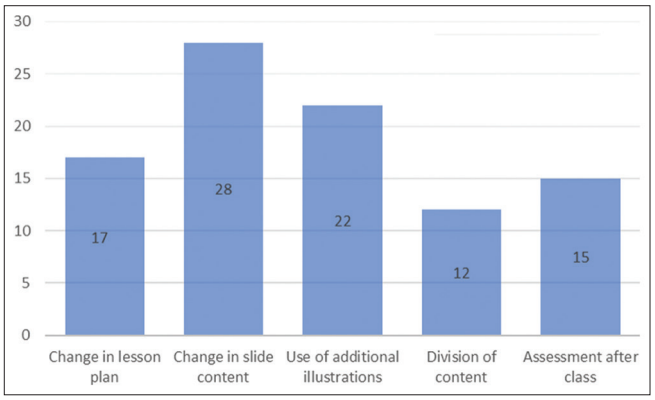

Figure 2: Distribution of different modifications performed by the faculty while conducting online classes (*n*=53)

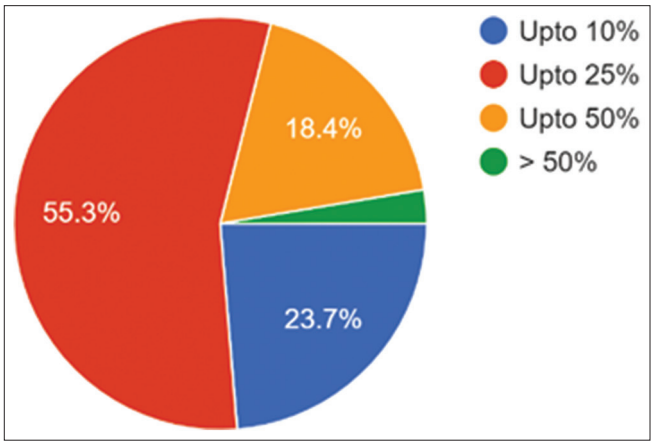

Figure 4: Percentage of faculty who agreed for online teaching with its extent into to the regular curriculum (*n*=53)

Table 1: The distribution of difficulties faced and methods applied to ensure the participation of student during online teaching

Difficulties faced	*n* (%)*	Methods applied to ensure participation of students	*n* (%)*
Discrepancies between efforts and outcome	15 (20.54)	Asking questions	26 (55.3)
Unwanted disturbances	14 (19.17)	Chatbox interactions	4 (8.5)
Lack of knowledge	5 (6.84)	Feedback	1 (2.12)
Absence of uniform format of teaching	8 (10.95)	Inviting discussions	1 (2.12)
Absence of definite guidelines	15 (20.54)	Online attendance	3 (6.38)
Lack of technical expertise	14 (19.17)	Assessment	4 (8.5)
		Email reminders	3 (6.38)
		Sharing of class link beforehand	5 (10.63)

*Multiple responses

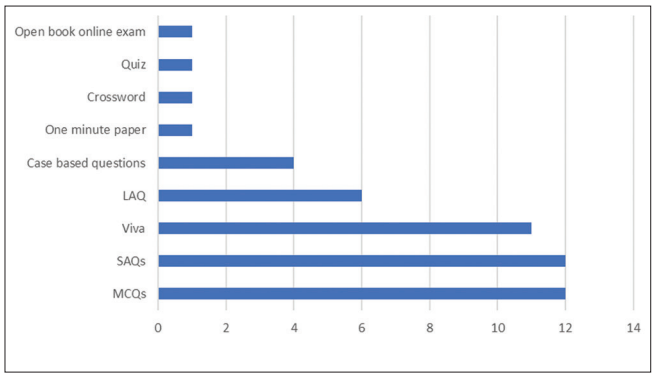

Figure 5: Distribution of various methods of assessment used by faculty during online teaching

Just above one-fourth of the faculty members responded to the survey. The poor response from faculty could have been due to their engagement in multiple COVID care activities in the institute. It could also have been due to the numerous online surveys being conducted by various institutes and educational groups and continuous engagement of faculty in other online activities (webinars, online conferences, and CMEs) apart from coursework. Google Meet was the most common online platform used for TL activities by the faculty, followed by Zoom and Google Classroom. Though there are many web-based learning management systems like Moodle, Blackboard, WebCT, ECollege, etc,[8] the Google classroom was the only learning management system used by the faculty.

The google classroom has been adapted to middle and low-income countries as it is cost-effective and easy to navigate.[9] It involves no additional cost to the institute concerned or individual user. Lack of formal training and a certain degree of digital literacy can impede the successful implementation of online learning and achievement of learning objectives.[10] Majority of the faculty members did not have any formal training in online teaching.

Limited direction and poor communication were reported as a barrier to online teaching and learning.[11] Lack of skills and time, inadequate infrastructure have also been implicated as causes of poor implementation of online teaching.[12,13]

There may be a problem with interactivity with students during the conduct of online classes. To counter this issue, the faculty of our institute employed various strategies to ensure the Student's participation during online classes. In contrast, McSmith *et al*.,[14] used the Blackboard as a learning management system and included postassignment discussions and exchange of Student's viewpoints with the faculty, which was facilitated through the use of probing questions, prompts for clarifications and summarising[14]

Online teaching has its advantages like it promotes asynchronous learning, where the student learns at his/her own pace[15] Other advantages are that students learn more than just the course, newer technical adaptations, and awareness and access to more online resources.[16,17] Assessment forms a significant challenge with online teaching during the lockdown. There is a tendency to rely too much on the objective type of questions like MCQs, true/false, etc which was also seen in the present study. However, these methods may not be sufficient to assess the in-depth knowledge of the students.[18]

CONCLUSION

Despite challenges, medical education continued in institutions opening up newer horizons in online teaching and learning methodologies, as seen in the present study. This pandemic is an eye-opener that should encourage all medical educators to get trained and adapt to online teaching methodologies.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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Forthcoming Events

1. International Research Conference on Covid-19 and Its Impact on Mental Health, organised by Researchconferences, on 12–13 January 2022 at Nashik, Maharashtra. http://researchconferences.in/Conference/1225/IRCCIMH/

2. The 39th Annual Conference of IAPSM(Odisha State Branch), organised by Department of Community Medicine, VIMSAR, on 22 January 2022 at Burla, Sambalpur.

3. The 29th International Conference of Indian Association of Palliative Care (virtual), organised by Department of Palliative Medicine, Bhagwan Mahaveer Cancer Hospital, Jaipur, on 11-13 February 2022. https://iapcon2022jaipur.com/

4. The 5th National Conference on Family Medicine and Primary Care, organised by Academy of Family Physicians of India in collaboration with AIIMS, Bibinagar, on 11-13 February 2022 at Apollo Institute of Medical Sciences and Research, Hyderabad. https://fmpc2022.com/

5. The 5th Global Public Health Conference GLOBEHEAL (virtual), organised by The International Institute of Knowledge Management, on 24-25 February 2022. https://healthconference.co/online-registration/

6. The 49th Annual National Conference of IAPSM and 23rd Joint IAPSM & IPHA Conference, Maharashtra Chapter, organised by Government Medical College, Nagpur, on 3-5 March 2022. https://iapsmconnagpur2022.com/

7. International Public Health Conference (Hybrid event), organised by Magnus Group, on 21-23 March 2022 in Singapore. https://public-health.magnusconferences.com/register

8. International conference on Future of Preventive medicine and Public Health, organised by Peers Alley Scientific Committee, on 24-25 March 2022 in London, UK. https://healthcare.peersalleyconferences.com/

9. The Global Summit on Public Health and Preventive Medicine, organised by The Scientistt, on 26-28 May 2022 in Munich, Germany. https://www.thescientistt.com/public-health-preventive-medicine/2022/

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