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He has experience of over 30 years in public health and has also worked as a family physician. During the mission to UNICEF for over 3 years as National Professional Officer/Health Officer, he made significant contribution with Govt. of Uttar Pradesh in Immunization, creating a network of Health & Nutrition Resource, Japanese vaccination drive, establishing SNCU, NRC, scaling up IMNCI, capacity building and others to strengthen maternal, child survival and development activities.

Dr. Bhatia has been awarded and honoured by UNICEF, MoH&FW, GOI and other organizations. With over 92 publications, authoring and technical advisor of 7 books and contributing 7 chapters, publishing 36 project reports/document, he has made enormous contributions in academics & public health.

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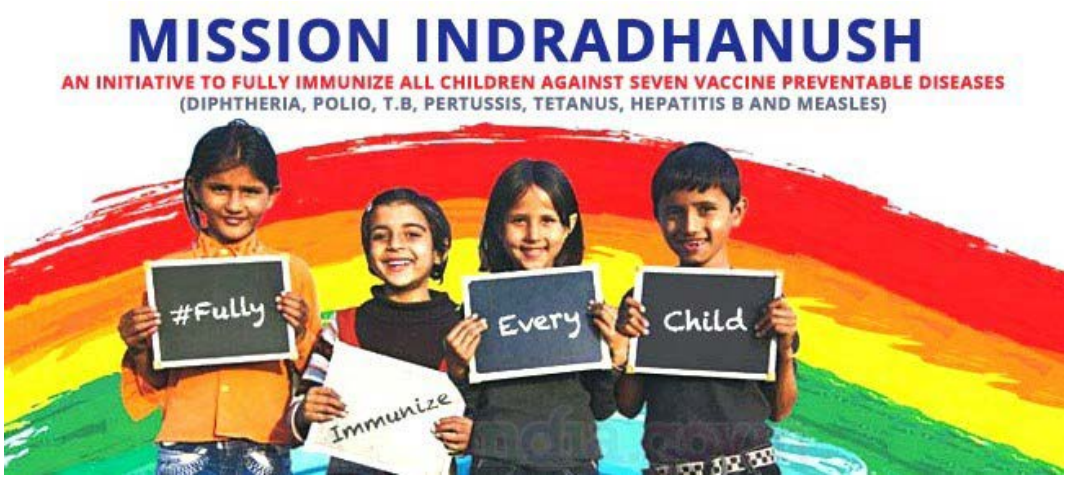

EDITORIAL

Tribal Health Care: The Unaddressed Aspect in Indian Health System

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The tribal communities worldwide and especially in the developing nations, are generally considered as vulnerable sections of the population. One third of the world's tribal and indigenous population i.e over 104 million tribal people live in India. Spread across 705 communities, they account for 8.6% of the country's population .[1] These communities have their own distinct socio-cultural structures and way of life -which represents India's unique cultural diversity. Out of the total ST population, approximately 2.6 million (2.5%) belong to "Particularly Vulnerable Tribal Groups" (PVTGs). This classification is reserved for the most disadvantages of all the ST communities. There are 75 identified PVTGs spread across 18 States and Union Territories in India. The population size and number of particularly vulnerable tribal groups are varying in different states, for example, there are maximum 13 groups are in Odisha, which is followed by 12 groups in Andhra Pradesh, 9 groups in Jharkhand and Bihar and the one each states of Manipur, Rajasthan and Tripura. The Particularly Vulnerable Tribal Groups (PVTG) is considered as a special category in view of their distinctly different social, cultural and occupational practices and traits. Mostly, they are not integrated into the national mainstream of socioeconomic activities. This invariably leads to their lower educational and economic attainment, leading forcefully to their dependence on the traditional occupation of hunting-gathering-subsistence farming; a life often marred by lack of material circumstances and lack of access to public utilities and services. Their geographically isolated habitats, often compound their problems. Moreover, deleterious social beliefs and cultural practices that often remain entrenched in their practices have telling effects on their health and health-seeking behaviour. The tribal community lags behind the national average on several health indicators, with women and children being the most vulnerable. Several studies on maternal health show poorer nutritional status, higher levels of morbidity and mortality, and lower utilisation of antenatal and postnatal services. [2] Approximately three-fourth of India's tribal population defecates in the open and one third does not have access to safe drinking water. [3] As per ICMR report "analysis of health indices of the tribal population in Odisha are worse than the national average: Infant mortality rate is 84.2; under five mortality rate is 126.6, children with dysentery and diarrhoea is 21.1%, children with acute respiratory tract infection is 22.4%. A high incidence of malnutrition is also documented in the tribal dominated districts of Odisha"[4] The tribal population bears a disproportionate burden of communicable diseases, primarily those that are often referred to as diseases of poverty and underdevelopment. The eighty percent of malaria is reported from the tribal area of India constituting the 20% of country's population.[5] The tribal communities constitute only about 8% of the national population, they account for about 30% of all cases of malaria, more than 60% of P. falciparum, and as much as 50% of the mortality associated with malaria.[6] Similarly, A systemic review and meta-analysis of existing studies carried out in 2015 arrived at a pooled pulmonary TB prevalence estimate of 703 per 100,000 for the tribal population. [7] This is significantly higher than the prevalence estimated for the country (256 per 100,000) .[8]

The tribal people are different culturally, socially and environmentally – their terrain, geography and climate are different. They are different economically – their means of production are different than in the other parts of India. The differences are important because they all reflect on the health status and health care. The major issues related to the tribal healthcare are –inappropriate planning and policy related to tribal health care, lack of availability of modern health service in these areas and low utilisation of available services. There is little data available about the health status of tribal population due to lack of quality research from those areas. Hence, it limits the appropriate tribal disease specific planning of modern health care. In the absence of private health care, the public health care facilities are the only ways to access modern healthcare, which remain non-functional most of the time due to vacancies of staff, geographical inaccessibility and

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language barrier. The tribal people have immense faith on traditional healers and large knowledge gap related to diseases and management.

There is a need to strengthen public health facilities in tribal areas. The design of health care in tribal area needs special attention considering the peculiar difference- in their culture, language, inaccessibility and large information gap related to diseases. Healthcare providers need to address it as a priority ensuring that these facilities are provided by qualified and sensitive health functionaries.

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PERSPECTIVE

Harnessing the Potential of Private Sector in Nutrition: A Prerequisite for Meeting goal 2 of Sustainable Development Goals (SDG) 2030

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Abstract

Private Public partnership (PPP) in nutrition has got huge potential for multisector assistance where industry, government, academia and NGOs can work in harmonization for achieving sustainable development goal related to nutrition. It is imperative to identify viable ways in which local as well as transnational business stakeholders may be better involved to scale up nutrition at the country and global levels. The PPP model in improving nutrition of masses may prove itself to be a cost-efficient and effective implementation of (1) Direct nutrition interventions and (2) Nutrition related interventions. The potential of private sector involvement is immense and can be harnessed in providing micronutrients through food fortification, promoting good dietary practices and therapeutic feeding for malnourished children. Other nutrition domains where private sector can be of great help are agriculture, health, education, economic development and last but not the least disaster preparedness/mitigation efforts.

Key Words: PPP, nutrition, SDG

Introduction

Global and Indian scenario of malnutrition

Despite nutritional policies and programs running all over the world, the Millennium Development Goals (MDGs) to halve poverty and hunger by 2015 couldn't be achieved. There remains an unsatisfactorily high number of nutritionally insecure people in some continents and FAO estimates approximately 815 million people suffering from hunger and were chronically undernourished in 2016 which has increased from 777 million in 2015 but still down from the year of inception of MDGs. Another key instrument to measure the food and nutrition insecurity is the stunting and death due to wasting amongst under five children which is alarmingly high. Globally, the prevalence of stunting was 29.5 % in 2005 which fell to 22.9% in 2016, although 155 million children under five years of age across the world are still suffering from stunted growth. In 2016, wasting affected one in twelve (52 million) of all children under five years of age, more than half of whom (27.6 million) reside in Southern Asia.[1] At the other facet of malnutrition spectrum, obesity and overweight are of looming concerns worldwide affecting people of all ages. As a sequel, the risks of non communicable diseases (NCDs) such as Diabetes, cardiovascular diseases, cancer and diet related conditions are escalating amongst the masses. Although they are perceived as separate entities, but are closely linked and co-exist in the same communities and at times in the same households.

Inspite of robust economic growth and being a major producer of food in the world, India is home to about 195 million undernourished persons, accounting for about 24% of the undernourished population in the world as estimated by the Food and Agricultural Organization (FAO) in its publication -"The State of Food Insecurity in the World-2017". Significant proportion of India's growing children suffers from malnutrition.[1-3]

The Hunger Index computed for 17 states accounting for 95% of India's population, revealed that all the states were significantly worse off than the "low" and "moderate" hunger categories and 12 of them were in "Alarming" category.[2] As per the National Family Health Survey (NFHS) a significant proportion (35.7%) of India's growing

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children suffer from being underweight. [3]

Global efforts to curb malnutrition are being hindered by plentiful factors but what needed is a different prospective to sustainably attain food and nutrition security.[4] The triple threat of malnutrition, a larger set of under nutrition (wasting, stunting and underweight), micronutrient deficiencies(vitamin A, iodine, iron, zinc etc) and overweight and obesity leading to NCDs will place immense pressure on resource constrained health systems.[5,6] An estimate shows that to scale up thirteen proven nutrition based interventions in thirty six countries, US $10-12 billion is needed annually and additionally US $ 9 billion is required for implementation of five priority actions to reduce NCD risks globally.[5,7] The involvement of private sector and their active participation is must for achieving the goal. Urgent steps and focused initiatives and interventions in concordance with private sector are needed to be taken. The United Nations has already acknowledged the business community as an essential partner for achieving MDGs and conglomeration between the two has transformed and entered into a phase of maturation.[8,9] This paper tries to unearth the potential of private sector in different sectors of nutritional health. Further engaging private sector in building Public-private partnership/ collaboration (PPP/PPC) will have to face multiple hindrances on the road towards a PPP but there are always the measures to alleviate and overcome these challenges.

Private-Public Partnerships

Nutrition being the mistreated area amongst medical academia, an appropriate attention through Private Public partnership(PPP) for improving nutritional health of the masses is required. The global or local nutrition challenges can only be countered by bringing radical changes in the systems and engaging new stakeholders and governance structures that support public and private sector participation. The help of private sector to government or public authorities dates back to recorded history. This was primarily done to make available the advancements in agriculture, science and medicine to all citizens.[10] However in the past, private and public sectors have been operating independently in most countries and theory was that the private sector provided services to the affluent ones, while the government or public sector provided services to the poor who were unable to pay for services. But the recent evidences have refuted this claim and have argued that this model doesn't accurately represent the reality and poor are more dependent on private sector.[11]

The WHO defines a PPP as alliance between public and private sector actors involving vivid varieties of ventures within diverse arrangements that vary with regard to participants, legal status, governance, management, policy-setting prerogatives, contributions and operational roles for achieving predefined common goals.[12]

The collaboration/partnership between non-profits (public) and business(private) is on rise and is strategically very important in today's context. The interaction between the two can be better understood and envisioned as a Collaboration continuum. The partnership/collaboration may moult from one type or stage to another and the characteristics and functions of each stage is different from other. The stages are philanthropic, transactional and integrative. The philanthropic stage depicts the nature of relationship between a charitable donor and recipient. Most of the relationships today are in this stage but are trending towards the next level. The transactional stage witnesses a great deal of resource exchanges focused on specific actions. The examples are because related marketing, event sponsorships and contractual service arrangements which fall into this category. Some collaboration have optimally reached to the integrative stage where the partner's missions, people and activities begin to join together for collective action and even organizational integration. This alliance stage forms a joint venture and the strategic value increases to the highest level.[13]

Potential capabilities of private sector in PPP

The capabilities of private sector shouldn't be underestimated as their involvement will add specific capabilities and expertise, innovative approaches and technologies to nutrition efforts. The public sector is mainly responsible for targeted provision of the services to the poorest of poor and so working together in tandem a better access to products and services can be provided to the needful. The action and output oriented approaches of private sector adds value to the entire food or product chain starting from sourcing and product development to retail sales. The role and expectations of different stakeholders such as industry, government, academia and NGOs can be different and reasons of pursuing partnership may vary from region to region and time to time. But the basic framework, roadmap and actions must be relevant to the realization of Sustainable development goals (SDGs) no. 2 "End hunger, achieve food security and improved nutrition and promote sustainable agriculture". [14] SDGs envisaged seventeen goals in order to assess the various developmental aspects after the culmination of MDGs. Out of them, Goal 2 mainly attributes to nutrition and hunger. The importance of goal 2 cannot be undermined by the fact that it's the basic element for survival of all beings. But various parts of the world are still facing the menace of malnutrition in different forms. To achieve the goal 2 of SDGs by 2030, a multipronged strategy is needed to set the perfect platform for fighting malnutrition. United Nations has aptly called for collaborations from different stakeholders so that innovative approaches may be devised and adopted to achieve the goals. [1,12,14]

The innovations in PPP can be categorized into developing technologically new products or processes and upgrading

existing ones to suit the present scenario. It can be product enhancing or cost reducing innovation and these innovations are either in practice or form a major potential area.[15] The Private Public partnership(PPP) model in scaling up nutrition can be a cost-efficient and effective implementation of (1) Direct nutrition interventions and (2) Nutrition sensitive interventions.

Providing micronutrients by food fortification, promotion of good nutritional practices for infants and young children and therapeutic feeding for malnourished child with special foods can be achieved to optimum by cooperation of private sector. The potential contribution of private sector can be of worth if used in the right direction. They can share their expertise in quality assurance and management systems. It can be of great help in minimising the ingredient costs through efficient supply chain. They being more close to public can better foresee consumer insights and henceforth can develop appealing and effective behavioural change campaigns through proper communication channels for raising public awareness. The use of information technology in spreading key messages on good nutritional practices and better vocational training can be better provided by private sector. The private sector identifies quality assured fortified products through branding. They can develop and produce reasonable, cost effective fortified foods including supplementary foods. The private sectors have their franchised distribution networks which can deliver Ready-to-Use-Foods (RUTF) to the mass. The private sector are envisaging, developing an innovative conditional cash transfer mechanisms to increase access of low income groups to products and services. The companies are gearing up to demonstrate their progress on ground. The examples are numerous but some deserves to be exemplified. The Global Alliance for Improved Nutrition (GAIN) has brought together food, retail and pharmaceutical companies to tackle micronutrient deficiencies in novel ways. It has pioneered ways of building country specific private-public partnerships. [16]

Apart from the above mentioned direct interventions, there are areas which when acted upon can bear a positive indirect impact on improving nutrition. The potential contribution of the private sector may be sought in developing purification tablets, filters, hygienic and affordable latrines and different tests to detect conditions leading to under nutrition. The use of social marketing in improving accessibility of ORS, impregnated nets, condoms etc is an example of use of fitting technology in health care and can be better performed by private sector. Business could increasingly address the entire range of the agricultural investment climate, including access to micro-credit for small farmers, research on better seeds, and training in efficient and sustainable farming, organization of small-holder farmers, purchasing agreements. Examples being PepsiCo's work with potato farmers in Peru (where it supports the local potato industry), China and South Africa; citrus farmers in Indian Punjab; corn farmers in rural Mexico and oats farmers worldwide include these dimensions. Business could also support local sourcing, use of indigenous foods and promotion of nutrition focus in food security. [17]Private sector can play a fitting role in upliftment of agricultural productivity and creating an enabling environment for investing in agriculture and local food production. Business has an important role to play in developing nutrition, health and hygiene education modules for schools for better access and its dissemination.

Overcoming Challenges

The roadmap and framework in the efforts may face challenges in the form of attitude of scepticism, inflated expectations and lack of authority of partner allies. Although public-private partnerships have become a well-known mechanism to confront nutritional problems but there are barriers to it. The stakeholders involved in PPP are plagued with dilemmas about the identified risks that can undermine the appropriateness, effectiveness and credibility of alliances.[18-20] But there are ways to lessen these challenges and minimise risks to all partners. The key to success is clarity, full agreement on common objectives and demystifying profit making market based solutions. The clarity in roles, responsibilities and resources shall be ensured at all levels for mitigation of risks. Partners must develop mutual understanding and open communication amongst them is must to minimize clashes of interests and biases in various stages of partnerships. There should be full agreement on common objectives and continuous stakeholder management. The mechanisms must be developed for demystifying profit making market based solutions. The strive for mobilizing funds, advocating for research and raising the visibility of nutritional health should be on the partners policy agenda. The world can hasten the process of reducing malnutrition, but this will require robust accountability mechanisms to hold all stakeholders to account.

Way forward

Since the transnational food, beverages and restaurant companies are here to stay, the future lies in global hands and global health partnerships is the key and an established mechanism of global health governance. The international corporates are also banking upon the traditional and indigenous products in the lines to save our heritage. Hence there is an imperative need to smoothen relations between food and pharmaceutical industry, international agencies, institutions of state and civil societies on diet by developing pragmatic mechanisms and measures for governance. The success stories of PPP worldwide can be used as the replica and the lessons learnt from the failure stories will succour in building up more stoic partnerships. The futuristic approach and shared responsibility shall

provide solutions in curbing malnutrition and achieving the sustainable development goals. Understanding the possible linkages at every step of food chain and alleviating challenges in PPP will solve problems of malnutrition at national and global level.

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PERSPECTIVE

Electronic Waste in India: Implications on Health

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Abstract

Increase in production and consumption of electronic goods has resulted in a rapid rise in generation of electronic waste in India. It is the fifth largest producer of electronic waste in the world. Electronic waste is a mine of precious metals and also a sea of hazardous elements. Exposure to electronic waste has the potential to harm virtually any system of the human body. It can affect thyroid function, increased incidence of cancer, skin and lung diseases, damage to the central nervous system, kidney and bone. This paper provides an evidence-based insight into the status of electronic waste and its management in India, its effect on health, and possible control measures. Timely institution of control measures in this area shall prevent deleterious effects of this waste, and improve health of our people.

Key words: electronic waste, India, control, health, environment

Introduction

Rapid economic growth along with urbanization and increased consumer demand has resulted in a hike in production and consumption of electrical and electronic products.[1] As a result, the quantity of electronic waste is also on the rise. It is estimated that a total of 41.8 million tons electronic waste was generated in 2014 globally; this is expected to reach 93.5 million tons in 2016, and 130 million tons in 2018 (at a compound annual growth rate of 17.6 percent).[2,3] United States and China, the top two producers of electronic waste contributed to about 32% of total electronic waste generated globally in 2014.[4]

The increased production and utilization of electrical and electronic equipments has given rise to a larger problem, viz., their recycling and disposal. The discarded electronic products have become a huge source of pollutants for the environment. On one hand, electronic waste is regarded as a resource as it is a mine for many valuable materials such as iron, aluminum, copper, gold, silver and many more.[5] However, on the other hand, only 15% of the electrical and electronic equipments are recycled to extract these materials. These electronic wastes also contain hazardous elements such as lead, mercury, lithium, etc which have harmful effects on human health. In low- and middle-income countries such as ours, the disposal and handling of these waste is mostly unregulated. This increases the magnitude of problem related to electronic waste in our country. Evidence has shown the adverse effect of electronic waste on human health.[6]

Health hazards related to electronic waste

Electronic waste (E-waste) is regarded as a mine of precious metals because of the presence of recyclable elements; however, unfortunately, various components in the electrical and electronic equipments have different health hazards as well. The ecological source of exposure may be soil, water or air which is contaminated at the disposal site. People working and living near the informal electronic waste processing sites are the ones who are affected the most.[6] We have to take into account the occupational hazard faced by the people processing the electronic waste at different recycling and dismantling sites. Children may also work at these sites without adequate protection and safety measures.[7]

It is not just the components of electronic waste that cause harm to people. It has been reported time and again that the level of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans are increasing in the environment as well as in the human body after the recycling of the electronic waste.[8] The concentration of these compounds in human hair, milk and placenta is higher in people living near the electronic waste processing site as compared to those living far from the processing site.[9] Similarly, reagents used in recycling process like cyanide, mercury and other leaching agents also have harmful effects on human beings.[10] Numerous studies

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Table 1: Constituents of electronic waste, their sources and potential hazard to human 8,13,14,15,16

Chemical	Source	Route of exposure	Potential hazard
Polybrominated and polychrominated diphenyl ethers	Lubricants and coolants in generators, transformers; dishwashers, fans, electric motors	Ingestion, inhalation, dermal contact, transplacental	Increased cancer incidence Altered thyroid function
Polyvinyl chloride, polychlorinated dibenzo-p-dioxins, polychlorinated dibenzo furans	Released as byproduct from plastic,	Ingestion, inhalation, dermal contact	Severe skin disease, darkened skin, altered liver function Damage to immune system, nervous system, endocrine system
Polyaromatic hydrocarbons	Released as combustion byproducts	Ingestion, inhalation, dermal contact	Skin and lung cancer
Lead	Printed circuit boards, cathode ray tube, light bulbs, television	Inhalation, ingestion, dermal contact	Damage to central and peripheral nervous system, circulatory system and kidney damage Hinders brain development in children
Beryllium	Power supply boxes, x-ray machines, computer, ceramic component of electronics	Inhalation, ingestion, transplacental	Carcinogenic (lung cancer) Skin diseases Chronic beryllium disease
Cadmium	Switches, springs, printed circuit board, batteries, toner of photocopy machine, cathode ray tubes, mobile phones	Ingestion and inhalation	Teratogenic, Neural damage Kidney, bone and pulmonary damage
Mercury	Thermostat, censor, monitor, cells, cathode fluorescent lamps	Ingestion, inhalation and dermal contact	Damage to brain, spinal cord, kidney, liver Teratogenic
Chromium	Anticorrosion coatings, data tapes, floppy disc	Ingestion and inhalation	Asthmatic bronchitis DNA damage
Barium	Cathode ray tubes and fluorescent lamps	Ingestion, inhalation and dermal contact	Damage to heart, liver and skin
Lithium	Batteries	Ingestion, inhalation and dermal contact	Nausea, diarrhea, muscle weakness, tremors

have demonstrated the harmful effects of electronic waste on human health.[11,12,13,14] The sources and potential health hazards of electronic waste on human health are shown in Table 1.

Scenario of electronic waste in India

The field of Indian information technology is a major contributor to the digital revolution in the world, and it has also been a major force in the economic boom in the last decade.[1] It is a rapidly budding industry in India which includes both export and production. A recent study by The Associated Chambers of Commerce & Industry of India (ASSOCHAM) has estimated the total electronic waste generated in India to be 18 lakh metric tonnes per annum, and the compounded annual growth rate is 30%. This number is expected to increase to 52 lakh metric tonnes per annum by 2020.[3]

According to a survey by the Ministry of Environment and Forest (MoEF) in 2008, 65 major cities have been blamed for about 60% of the E-waste generated in India. Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab are the 10 states which contribute to about 70% of electronic waste. Maharashtra ranks highest on this list.[15] Out of the total electronic waste generated in the country, the largest proportion, viz., 35% is from western India. The southern, northern and eastern region account for 30%, 21% and 14% of the E-waste generated respectively.[16]

The National Waste Electrical and Electronic Equipment

(WEEE) taskforce conducted a study which showed the amount of electronic waste generated in 2005 to be 146,000 tons per year.[17] Another study conducted by Wath et al in 2010 estimated the total electronic waste produced in 2009 to be 4.2 lakh tons.[13] A field study was conducted in Bangalore and Hyderabad by Environment Protection Training and Research Institute (EPTRI) and sponsored by World Health Organization (WHO), New Delhi India. Total electronic waste generated in Hyderabad by 246 surveyed samples was 36,007 kg. Similarly, the total electronic waste generated in Bangalore by 148 surveyed samples was 48,254 kg. The annual electronic waste generated in Hyderabad and Bangalore was estimated to be 3,263 metric tonnes and 6,743 metric tones, respectively.[18]

The United Nations Environment Program (UNEP) published a report in 2010. According to this report equipment-wise electronic waste generation in India amounts to approximately 100,000 tonnes from refrigerators, 275,000 tonnes from TVs, 56,300 tonnes from personal computers, 4700 tonnes from printers and 1700 tonnes from mobile phones.[19] A study by Skinner et al in 2010 showed that 13% of all electronic waste generated in 2007 was imported illegally.[20] Electronic waste is imported from the developed countries for the purpose of second hand use as well, be it for charity, recycling or refurbishing of the equipments.[16] There is a major loophole in the data provided by most of the studies; they do not take into consideration the imported electric and electronic equipment, whether it is legal or illegal. They only concentrate on products generated in our country. But in an economy like ours, the imported products also make a major portion.[20]

In India, the ownership of personal computers has increased by 604% from 1993 and 2000 as opposed to the world average of 181%. The size of electronic market in India is larger than most of the high income countries. But, it is also reported that India has only 16 computers per thousand people. In rural areas, only 9 million out of 168 million households own a personal computer, whereas in urban India 15 million out of 78 million households own a personal computer.[21] About 10% of total electric and electronic equipment items become obsolete at any given time in India. It is mainly because of increasing affluence in our country.[18]

Rules for handling electronic waste in India

Electronic waste has become one of the fastest growing problems in India. The Central Population Control Board (CPCB) drew guidelines in 2003 in accordance with the National Environment Policy (NEP) to address the management of electronic waste. These guidelines were called The Hazardous Wastes (Management and Handling) Rules, 2003. The guidelines were not specifically for electronic waste, but it was included in these rules as hazardous wastes. The guidelines were modified in 2008 and were called Guidelines for Environmentally Sound Management of Electronic Waste.[22] The objective of these Guidelines is to provide guidance for identification of various sources of E-waste and prescribed procedures for handling electronic waste in an environmentally sound manner. The latest modification in handling of electronic waste rules was published in the Gazette of India on 23 March 2016. These rules are finally being called the E-waste (Management) rules, 2016 and are effective from 1 October 2016.[23]

These guidelines apply to all persons who handle E-waste including generators, collectors, transporters, dismantlers, recyclers, etc. According to these guidelines issued by CPCB in 2007, e-waste is included in schedules 1, 2, and 3 of the "Hazardous Waste (Management and Handling) Rules 2003".[22] In these guidelines, E-waste has been defined as electrical and electronic equipment**,** whole or in part discarded as waste by the consumer or bulk consumer as well as rejects from manufacturing, refurbishment and repair processes. As of 2015 there are 149 units of E-waste recyclers/dismantlers in India which can handle 4.6 lakh metric tonnes of total E-waste generated.[24]

T total E-waste generated in India in 2015 was approximately 18 lakh MT out of which only 4.6 lakh MT was processed in these registered recycles and dismantlers.[3] The remaining E-waste is managed informally by the unorganized sectors and scrap dealers who simply dismantle the electronic products instead of recycling it. Though the informal recyclers also want the maximum recovery from the E-waste, unlike formal recyclers, they lack proper technology, equipment and technology to handle these wastes in environmentally sound manner.[25] This leads to the introduction of the hazardous materials in the environment resulting in the pollution and various health hazards. It also results in wastage of various precious metals which can be recovered by the recycling process.

Conclusion

E-waste is one of the most rapidly growing problems in today's world. The urbanized and developed part of India seems to be a bigger victim of this than the underdeveloped part due to rapid economic growth. The increasing amount of these hazardous wastes is creating more problems due to lack of awareness, and limited trained manpower. So an urgent preventive approach is needed in India to tackle this issue.

Reduce, reuse and recycle are the three main ways to manage any kind of waste. Reduction in use is very difficult due to urbanization and increasing economic status of people. We should focus on increasing the durability of the electric equipments which can be done by increasing

their quality. This will automatically decrease the amount of E-waste generated. But this again has its own challenges as the economy in today's world is largely based on information technology and higher the turnover, higher is the economic growth. Recycling plays an important part in dealing with the E-waste. It not only prevents the hazardous chemicals to enter the environment, but also provides precious metals and raw materials for further uses. It also reduces greenhouse gas emission and its effect on global warming. We have strong set of rules for handling of E-waste, but implementation and enforcement of these rules is the major issue.

Recommendations

Efforts should be made to generate awareness in people working in the management of these hazardous wastes to protect themselves from various health hazards. The rules for handling and management of E-waste should be implemented effectively. Illegal dumping and informal handling can only be decreased by strong legislation and public awareness.

Appropriate research and community-based studies are required to fill the gap in knowledge related to the health effects of e-waste. Adequate information on the prevalence of various health hazards due to E-waste in India is required to inform population-based interventions.

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Elderly Depression: A Public Health Dilemma; Challenges and Opportunities

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Abstract:

India is undergoing a demographic transition that has resulted in rapid growth of the elderly population. This enormous growth has mandated an urgent need for the development of mental health services. Elderly depression is a significant contributor to morbidity and mortality in this age group. The Global Burden of Disease report 2015 outlines depression as the third leading contributor to global disability measured as disability adjusted life years (DALYs). Early identification, diagnosis and initiation of treatment can provide the elderly an opportunity to improve their quality of life and a considerable reduction in the morbidity and mortality. This public health challenge can be addressed by social support and engaging primary health care providers in providing patient centred care. The philosophy of geriatric medicine is not only to add years to life but to help the elderly attain the desired life span with minimal distress and disability.

Key words: Elderly, depression, mental health, primary health care

Introduction

Population ageing is an irreversible and imminent demographic reality which is a consequence of the developments in the medical field. India falls under the United Nations' definition of 'ageing' countries[1] (A country is defined as 'ageing' when the percentage of the population aged ≥ 60 years reaches 7 %) and is a conspicuous example of a context in which morbidity and mortality patterns are changing rapidly.[2] In India, life expectancy has increased from 45 years in 1970 to 65 years in 2010.[3] The pace with which the population of elderly in India is growing (1951–5.3%, 1991– 6.8%, 2001–7.4%, and projected for 2026–12.4%) is a foreseeable challenge in the near future.[2-4] At present, the elderly population in India is about 9% of total population.[4] In terms of absolute numbers, elderly population of India is currently the second largest in the world.[5]

Old age and the senility along with heralds a multitude of health problems. Due to normal aging of the brain, deteriorating physical health and cerebral pathology, the overall prevalence of mental and behavioral disorders tends to increase with age.[6] Mental health problems in the elderly, depression in particular have been a neglected entity in its entirety. 17.13 million older adults are suffering from one or the other diagnosable mental health problems in India. This in itself is testimony to the magnitude of the burden.[7] Mental and behavioral disorders are estimated to account for 12% of the global burden of disease which affects approximately 450 million people.[1] But there has been a recent shift in the approach with recognition of depression as an upcoming challenge the world has to face altogether. This is evident by the fact that the World Health Organization (WHO) emphasized on "Depression: Let's talk" as its theme for the year 2017 on the occasion of World health day. Early identification, diagnosis and initiation of treatment can provide the elderly an opportunity to improve their quality of life and a considerable reduction in the morbidity and mortality thereof.

Magnitude

Depression has become apparent, albeit slowly as a public health challenge in Low and Middle income Countries (LMIC's) particularly which are reeling under a shortage of mental health services, or an absolute lack of them thereof. Most countries allocate less than 1% of their total health expenditures to mental health budgets.[8] WHO in 2011, outlined that there are 0·301 psychiatrists, 0·166 nurses, and 0·047 psychologists for every 1,00,000 patients in India. In terms of infrastructure, the number of psychiatric beds per 10,000 patients in psychiatric hospitals is

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1.490, and in general hospitals 0.823.[9] This gives a grave overview of the availability of mental health facilities and the consequent burden and challenges on account of this neglect of untreated mental illnesses. It is estimated that depression affects approximately 350 million people worldwide; constituting a major portion of mental health disorders.[10] The Global Burden of Disease report 2015 outlines depression as the third leading contributor to global disability measured as DALYs .[11] It is projected to be the second most common cause of DALYs ranking worldwide by 2020 and the leading contributor by 2030.[12]

According to a WHO report, patients over 55 years with depression have a four times higher death rate than those without depression, mostly due to heart disease or stroke.[1] Also, depressive disorders contribute a sizeable proportion to suicidal deaths.[13] In community settings, about 5 % of adults aged 65 and older meet research diagnostic criteria for major depression with rates of subsyndromal depression estimated at 8%-16 %.[14,15] The National Co morbidity Study were estimated the projected lifetime risk of major depression to be 23 % by age 75.[16] Older adults in developed countries were reported to have relatively low average depression rates (2.6 %) while those in developing countries it was almost almost three times higher (7.5%).[17] The rates of geriatric depression increase to 12-30% in institutional settings, and up to 50% for residents in long-term care facilities.[18]

Studies in primary care settings point to a higher prevalence of depressive disorders amongst the elderly ranging from 10 to 25% .[19] A meta-analysis of 74 studies, including 487,275 elderly individuals found the worldwide prevalence rate of depressive disorders to be between 4.7 to 16%. This meta-analysis highlighted a higher prevalence of elderly depression in India (21.9%).[20]

Enabling and Barrier factors

In spite of the fact depression being a common problem in older adults, it is more often undetected, undiagnosed, untreated, or undertreated.[21] An ever-growing geriatric population is associated with rising prevalence of chronic non-communicable diseases (NCD's); therefore, the magnitude of depression is also expected to grow.[22] Societal modernization has brought with it a breakdown in family values and the framework of family support. The change in the family structure along with economic insecurity results in the elderly losing their relevance in their own house and an increasing feeling of loneliness. This adversely affects the psychological health of the elderly. Barriers to effective late-life depression treatment can be identified at three levels: individual, caregiver and system level.[23, 24]

Individual level- Elderly individuals may present with somatic rather than emotional complaints, decreasing the likelihood of being diagnosed with depression.[25] Majority of elderly with clinically significant depressive symptoms do not meet standard diagnostic criteria for major depression or dysthymic disorder, but rather have minor or subsyndromal depression. Elderly patients refute a diagnosis of depression and attribute their symptoms to physical causes or to "normal aging" particularly in the backdrop of NCD's. Atypical presentation of geriatric depression in form of unexplained physical symptom(s), agitation, cognitive deficits and anxiety can lead to delayed help seeking and difficulty in making a diagnosis of depression. Delayed care seeking behaviour among certain population groups, stigma, and poor adherence have also been also identified as barriers.

Caregiver- Caregiver barriers include apprehensions about stigmatizing patients with a psychiatric diagnosis, tight time schedules and increased workload, inadequate knowledge about diagnostic criteria or treatment options and a lack of insight into different cultural presentations of mental disorders.[26]

System- System barriers include limited mental health coverage, insufficient mental health specialists, lack of systematic approaches for detecting and managing depression, and inadequate continuity of care. Also policies that regulate providers' practice contexts and patients' access to care can create important barriers to effective treatment.[20]

Risk factors for developing depression in elderly are similar to those in younger individuals and include being female, unmarried, poor, chronic physical illness, social isolation, previous history or family history of depression. Additional risk factors that are of importance in old include loss (especially loss of spouse), grief and loneliness. Other risk factors that increase the likelihood of depression are those on medically support, chronic bed ridden, active alcohol abuse, and lower educational background.[27]

Protective factors include social support and activities such as volunteering, literary works, social welfare and physical activity. Religion and spirituality may play an important part in many older adults' lives. It is possible that the positive effect of religion on mental health is mediated by the social connectivity and the support derived from taking part in religious and associated social activities.[28] Retirement houses and absorbing the elderly into the social system can mitigate their difficulties. Life experience, a sense of humor, affection of others, expressing pain and discomfort readily all work as protective factors against development of late life depression.

What has been done so far?

India was one of the first developing countries to recognize the need to address mental health with its National Mental Health Programme (NMHP) being launched in 1982.[29]

It was supposed to give a direction to the mental health care of the population at large. But it failed in realizing its objectives because of a lack of proper direction and will, with priorities being placed on issues like MCH, poverty and under nutrition and revamping the ailing health system altogether. So the actual service implementation started 14 years later with the launch of DMHP in 1996. Several commentators have followed the history of the programme since its inception and outlined not only the increasing resource allocation by government but also how the essence of the programme's core vision of integrating mental health in primary care (the District Mental Health Programme, DMHP) has largely not been attained.[29] The National Programme for the Health Care for the Elderly (NPHCE) was launched in 2011. Through this programme the government aimed to provide basic health care to the elderly and improve their quality of life by collaborating with health care services, social welfare schemes and rural health development-oriented schemes. Thus this programme makes easy access to preventive, curative and rehabilitative services through a community-based primary health care approach.[30] Recognising the importance of mental health, India announced it as an important NCD at the First Global Ministerial Conference on Healthy Lifestyles and Non- Communicable Disease Control held in Moscow in April 2012.[31]

Way forward

Elderly depression can be addressed by a multipronged approach, involvement of the community for a patient centered care and removal of stigmatization of mental health, taking depression just as any other health problem. In elderly populations, depressive symptoms are likely to be dismissed as `normal' by older persons, their family members and even their health care providers; or to go unreported because of potential stigma. Given the relative ease with which the depressive illness can be diagnosed and treated, there is enormous potential for alleviating this largely neglected public health burden among the elderly in India and other developing countries.

1. Efforts should be made to streamline geriatric mental health in alignment with the NMHP, presently implemented as DMHP and should be an integral part of it. Inclusive policy decisions in mental health with special attention to geriatric mental health should be formulated.

2. The systematic screening of older adults for depression may be a useful first step. Several tools are available to facilitate screening for depression. A single-item screening question is the simplest among all screening tools. A simple question 'Do you often feel sad or depressed?' to which the patient is required to answer either 'yes' or 'no' was tested in a sample of medically ill patients in the community and had a sensitivity of 69% and a specificity of 90% .[32] The Patient Health Questionaire-2 (PHQ-2) asks patient about depressed mood: (a) 'during the past weeks have you often been bothered by feeling down, depressed, or hopeless?' And (b) 'during the past month have you often been bothered by little interest or pleasure in doing things.'[33] This questionnaire is useful in identifying patients at high risk for depression, and it has a sensitivity of 100%, a specificity of 77%, and a positive predictive value of 14% in older adults.[34]

3. In view of maximizing the available resources, sustained efforts are needed to train the primary care physicians in geriatric mental health for early screening, provision of adequate primary medication and timely referral to specialist. Training of non-psychiatrist physicians and general practitioners is required to identify depressive symptoms in general patients as a short-term measure.[35] It requires countrywide teaching and training programmes with districts being the unit of implementation.

4. In addition, supply of effective and affordable drugs in primary health facilities and research on preventive and promotional aspects of mental health should be the priority areas for tackling depression in the elderly. Apart from routine pharmacological interventions, behavioural therapy and physical activity has also been shown to be helpful in late-life depression.

5. The concept of mental health literacy needs to be acknowledged and put into practice. Mental health literacy has been defined as the knowledge, beliefs and abilities that enable the recognition, management or prevention of mental health problems. Enhanced mental health literacy seems to confer an array of benefits: prevention, early recognition and intervention, and reduction of stigma associated with mental illness.[36]

6. Social support system for the elderly needs to be strengthened. Urban local bodies and panchayats in urban and rural areas, respectively, need to be sensitized to the issues of the elderly so that they can be engaged in unskilled and semi-skilled occupations.

7. Establishing Geriatric mental health wings in present psychiatric establishments to train mental health professionals in psycho-geriatrics is a costly and time taking proposal, but it might be a viable option in terms of sustained manpower development for geriatric mental health.

Conclusion

The philosophy of geriatric medicine is not only to add years to life but to help the old attain the desired life span with minimal morbidity and disability, which can be attained by effectively addressing both medical and mental illnesses. The gap between the ever increasing needs of geriatric population and services provided needs to be abridged. Government policies providing social benefits

to the elderly population are in place but the coverage is inadequate. Geriatric mental health issues need to be prioritized by increasing awareness, building capacities of health care providers, strengthening training and research activities and above all developing a holistic primary health care system.

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Perception of Students on Foundation Course conducted for First year MBBS students at AIIMS Bhubaneswar

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Abstract

AIIMS Bhubaneswar has introduced its Foundation course for MBBS students at entry level to sensitize them with requisite knowledge and skills so that they can acquire the attributes of a medical student and finally of clinician. A 10-day Foundation course was designed covering 12 topics by Academic Section of AIIMS Bhubaneswar in consultation with the Director. Various teaching-learning methods were followed for its conduction. On the last day, students' feedback was collected using a validated questionnaire which assessed four aspects of each session: content, teaching-learning methods, relevance and involvement of students. Analysis of data showed that barring a few sessions, more than 70% of students were satisfied to a great extent regarding all 4 attributes of the sessions. However, it was 48% in case of History of Medicine. Around 50% of students did not feel that they were involved in session of study skills and time management and computer knowledge and use of online resources in learning. 60-70 % of students did not feel that they were involved in sessions of History of Medicine, National Health Scenario and Ethics and Professionalism. The reason may be History of Medicine, National Health scenario and Computer skills and use of online resources sessions were conducted as a didactic lecture series which had less scope of student interaction. Students' feedback shows that inclusion of role-plays and small activities can help generate interest in a given topic. Overall students were satisfied with the conduct of foundation course and found it to be a very helpful and empowering start to their professional career.

Key words: Foundation course, students' perception

Introduction

All India Institute of Medical Sciences (AIIMS) Bhubaneswar was created by MOHFW, Government of India along with five other AIIMS in different underserved corners of the country to alleviate the existing gap present in production of quality human resources to provide quality health-care. The selection of MBBS students is through All India level Entrance Examination conducted by AIIMS, New Delhi. The selection criteria gives emphasis on scholastic potential of the candidates. However, the non-scholastic abilities of the students remain largely unknown at the entry level. Moreover, the students enter a different learning environment after completion of schooling. The profession demands the development of professional ethics, etiquettes, communication skills, and awareness of social responsibilities along with acquisition of basic clinical skills by the students. The students usually come from different cultural backgrounds from various corners of country. The Medical Council of India (MCI) also published a document entitled "Regulations on Graduate Medical Education, 2012".[1] The document emphasizes creating Indian Medical Graduate who possess required knowledge, skills, attitudes, values and responsibilities towards society. Few Medical Colleges of India conduct Foundation course for MBBS at the entry level.[2, 3] Taking into consideration the needs of the students as well as society, AIIMS Bhubaneswar has introduced its Foundation course for MBBS students at the entry level for their holistic development. The objective of Foundation course is to sensitize the learners with requisite knowledge and skills so that they can acquire the very attributes of medical student and finally of clinician.

Material and Methods

Academic Section of AIIMS Bhubaneswar in consultation

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Table 1: showing distribution of topics among groups of students

Groups: A, B, C, D
(n = 25 in each batch); whole batch (n = 100)

Topic	Groups assigned
Stress management & healthy lifestyle	A (21/08/2017) B (22/08/2017) C (23/08/2017) D (24/08/2017)
Communication	B (21/08/2017) C (22/08/2017) D (23/08/2017) A (24/08/2017)
Working as a team	C (21/08/2017) D (22/08/2017) A (23/08/2017) B (24/08/2017)
Social Responsibility	D (21/08/2017) A (22/08/2017) B (23/08/2017) C (24/08/2017)
History of Medicine	Whole batch (25/08/2017)
Study skills and time management	Whole batch (25/08/2017)
National Health scenario	Whole batch (26/08/2017)
Computer knowledge and use of online resources in learning	Whole batch (26/08/2017)
Basic Life Support	A (28/08/2017) B (29/08/2017) C (30/08/2017) D (31/08/2017)
First Aid	B (28/08/2017) C (29/08/2017) D (30/08/2017) A (31/08/2017)
Ethics and Professionalism	C (28/08/2017) D (29/08/2017) A (30/08/2017) B (31/08/2017)
Leadership	D (28/08/2017) A (29/08/2017) B (30/08/2017) C (31/08/2017)

with Administrative Head of the Institute (Director) and faculty members from various departments designed a 10-day Foundation course for first year MBBS students. Twelve topics were selected to be included in the course after focus group discussion among faculty members involved in medical education. Faculty members from Pre-, Para- and various Clinical departments expressed their interest to conduct various sessions. Teams of faculty members were formed for conducting each of the sessions except for two topics (National Health scenario and Computer knowledge and use of online resources in learning). Accordingly, faculty members prepared the module for respective sessions in consultation with the Director. Academic Section prepared the schedule for the course as mentioned in table 1.

The module prepared by the respective team consisted of didactic lectures, use of video clips, structured interactive sessions, small group activities, role plays, and hands on experience. On the last day, students' feedback was collected using a validated feedback questionnaire. The feedback questionnaire was designed to elicit the students' response in respect to content of the topics, their appreciation of various teaching-learning methods used, relevance of the topics and whether their involvement was there or not during sessions. An open space was provided at the end of the feedback questionnaire to provide their overall impression of the conducted course and suggestions for improvement.

Results

Total 91 students out of 99 (92%) responded to the questionnaire. The students were instructed to give score on 1-10 scale (1 being minimum and 10 being maximum) on four attributes of each session. The attributes are content, teaching-learning methods, relevance of the topic, and involvement during session. Three students did not score as instructed. Therefore, their response was not included during analysis. The responses were categorised as helpful to a great extent (scores between 7-10), to some extent (scores between 5-7) and to less extent (scores less than 5). Accordingly, the percentage of the students finding a particular attribute of a given session helpful to a great extent was taken into consideration to create the graphs. Figure 1 shows feedback of students on content of individual session. It shows that more than 70% of the students felt all the sessions had adequate content. 48% of students felt that the content present in "History

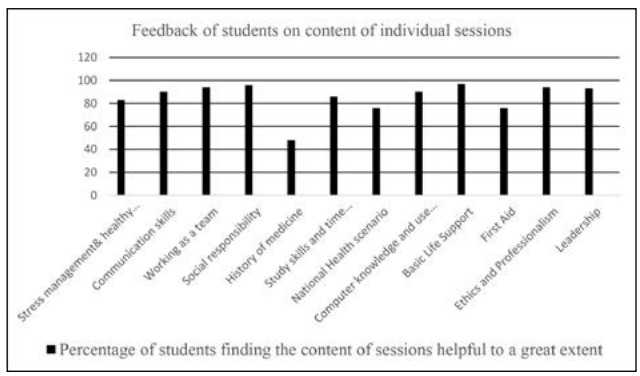

Figure 1. Feedback of students on content of individual session

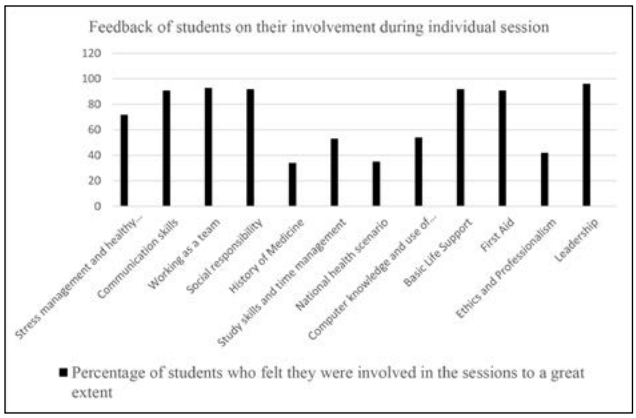

Figure 2. Feedback of students on teaching-learning methods used during individual session

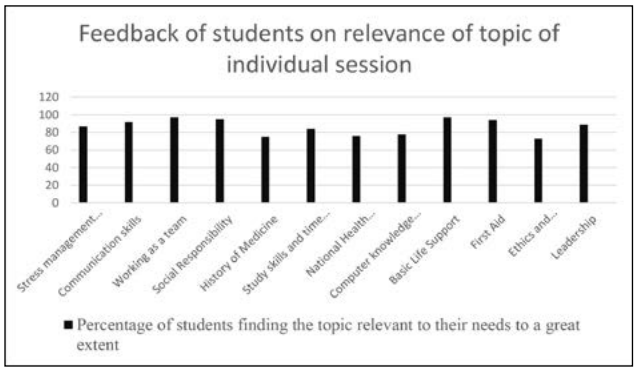

Figure 3. Feedback of students on relevance of topic of individual session

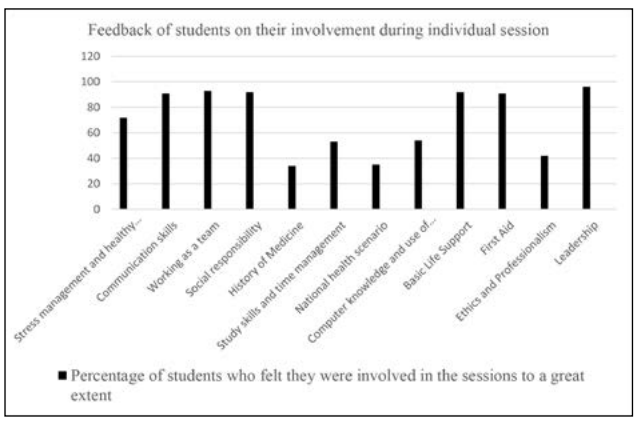

Figure 4. Feedback of students on their involvement during individual session

of Medicine" session was not helpful to a great extent. Figure 2 shows feedback of students on teaching-learning methods used in individual session. It shows that more than 70% of the students were satisfied with the teaching-learning methods used during individual session except in three sessions. Around 50% of the students did not feel that the teaching-learning methods were helpful to a great extent in History of Medicine, National Health Scenario and Ethics and Professionalism sessions. Figure 3 shows feedback of students on relevance of topic in individual session. It shows that more than 70% of the students felt that the topics of individual session were relevant to a great extent. Figure 4 shows feedback of students on their involvement in each session. It shows that more than 90% of students felt involved to a great extent in all individual session except five. Around 50% of students did not feel involved to a great extent in case of Study skills and time management and Computer knowledge and use of online resources in learning. 60-70% of students felt that they were not involved to a great extent in History of Medicine, National Health Scenario and Ethics and Professionalism sessions.

Discussion

Foundation course for first year MBBS students is also being conducted in few other colleges of India. Christian Medical College, Vellore, conducts a short foundation course sensitizing students to the health situation in India, the role of doctors in the community and basic principles of Communication and Ethics.[4] It was reported that a 7-day foundation course is also conducted in Pramukhswamy Medical College, Karamsad, Gujrat. Most of the topics selected for this foundation course were similar to the foundation course designed by AIIMS Bhubaneswar. However, they also included topics like research aptitude, medical Profession in view of common man, community health care and English proficiency.[3]

Analysis of data collected from the feedback questionnaire of the present study showed that barring a few sessions, more than 70% of students were satisfied to a great extent regarding all 4 attributes of the sessions. In case of History of Medicine the percentage of students who agreed that content being helpful to a great extent was 48%. Considering involvement during sessions, the number of students that felt their involvement was less in case of Study skills and time management and Computer knowledge and use of online resources in learning (50%) and in case of History of Medicine, National Health Scenario and Ethics and Professionalism sessions (30-40%). The reason may be History of Medicine was conducted as a didactic lecture series which did not allow much activities to be conducted for the students as compared to other sessions which were conducted in small groups. The same reason can be forwarded for the sessions of National health scenario and Computer skills and use of online resources. Also the students were not exposed previously to the topics like History of Medicine, National health scenario, Ethics and Professionalism which may have accounted for their lack of involvement.

Students' feedback shows that making the sessions more interactive and including role-plays and small activities can help generate interest in a given topic. Suggestion from

students included demand for more interactive sessions and less of didactic lectures and videos. They also felt that the sessions were very informative and useful. Future sessions of Foundation course can be designed in a way that requires more involvement of students. For topics like History of Medicine and National health scenario, which the students felt were very relevant but showed less involvement in the topic, a quiz at the end of the sessions can stimulate students to get involved more.

Conclusion

The foundation course was designed at AIIMS Bhubaneswar for first year MBBS students towards development of communication skills, behavioural competency, coping with stress in a new educational environment, acquiring basic clinical skills, computer knowledge and introduction to History of Medicine, National health scenario and Ethics and Professionalism. The course was well received by the students who felt the sessions were informative and helpful. The encouraging feedback along with relevant suggestion from the students can help the Institute to conduct Foundation course in a structured format for forthcoming years.

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ORIGINAL ARTICLE

Client Satisfaction regarding health care services provided by Auxiliary Nurse Midwives in North India

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Abstract

Introduction: In recent years more responsibility have been added to the work of Auxiliary Nurse Midwives (ANMs) affecting the satisfaction of the users. So need was felt to conduct a study on the satisfaction of clients in study area. The objective of the study was to evaluate the performance of ANMs in terms of client satisfaction in selected health care settings of North India. This cross-sectional study was conducted in two selected health care settings of North India.

Material and Methods: Convenient sampling technique was used to select 7 ANMs and 100 clients from the study area. Data collection was done by using client satisfaction interview schedule. Descriptive and inferential statistics (χ^2 test) was used.

Results: Most (87%) clients were satisfied with the services provided by ANMs. The dissatisfaction in rural area was only 2% as compared to 24% in urban area. Lesser proportion of people were satisfied with family planning, provision of health services and other services. **Conclusion:** Clients in rural area were more satisfied as compared to clients in urban area .More satisfaction was reported in communication, maternal and child health and health education services.

Keywords: ANMs, health care settings, client satisfaction

Introduction

The access to high quality, reliable and affordable health care service is one of the key challenges facing the rural population in India. These days a lot of attention has been given to patient's right for good health care. Client satisfaction is a major component of quality of health care.[1] It also helps to provide need based quality care and thus improve the quality of health care services. The objective of the study was to evaluate the performance of ANMs in terms of client satisfaction as very little data is available on client satisfaction with health workers.

Material and Methods

The study was exploratory cross-sectional in nature. The study was conducted in the area of two selected health care settings of North India. Convenient sampling technique was used to select the clients. Only those clients who availed services from ANMs were selected. List of clients was taken from ANM's records and 100 clients were interviewed at their home setting. The clients were made comfortable before interview. They were informed about the study and written consent was taken from them. Client satisfaction interview schedule was used to interview 100 clients, 50 each from both areas. It was a 5 point likert scale consisting of 61 items under 8 domains i.e. general satisfaction, communication, health services, mother and child health services, family planning services, nutrition, health education and others. Since all the services were not availed by all the clients so the score obtained were converted in to percentages and then grades were given as satisfied (>50) and dissatisfied (<50). It was ensured that clients comprised of all categories i.e. those coming for general checkups, antenatal mothers, postnatal mothers and mothers of under 5 children. Ethical approval for the study was obtained from Institute Ethics Committee. Statistical analysis was done with SPSS Ver.20. χ^2 test was used to know the satisfaction of clients.

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Results

As a part of performance of ANMs 100 clients were interviewed 50 each from rural and urban area for their level of satisfaction regarding the health care services that they received from ANMs. Majority of the clients (82%) were in age group 21-35 years. Most of the clients who came to avail service were females (89%).

So the overall satisfaction of clients showed that 87% of the clients were satisfied with the health services whereas 13% of the clients were dissatisfied with the health services that they received from ANMs

Table 1 : Satisfaction of clients according to place of residence N=100

Level of Satisfaction	Place of Residence		χ^2,df, p
	Urban (n=50)	Rural (n=50)	
Satisfied	38(76%)	49(98%)	**10.698,1,<0.001**
Dissatisfied	12(24%)	1(2%)	

Table 1 shows the level of satisfaction of the clients in rural as well as urban area. The results of Chi-Square test revealed statistically significant difference (p=<0.001) between the level of satisfaction of clients in rural and urban area. In rural area 98% of the clients were satisfied whereas 76 % clients were satisfied in urban area. About 24% clients were dissatisfied in urban and 2% in rural regarding the health services.

Table 2: Satisfaction level of clients according patient category N=100

Client Category	Level of satisfaction		
	Satisfied (%)	Dissatisfied (%)	χ^2, df, p
General Population n=20	15(75)	5(25)	**3.183, 1, 0.74**
Maternal and Child health n=80	72(90)	8(10)	

Table 2 shows the level of satisfaction of clients according to the various categories. People who came to avail general health care services, 75% were satisfied whereas 25% were dissatisfied. Around 90% clients were satisfied and 10% were dissatisfied, with the maternal and child health services provided by ANMs. The data shows no statistically significant difference in the level of satisfaction between the various categories.

Table 3: Satisfaction of clients regarding the various services provided by ANMs in dispensaries

Health Services	Satisfied	Dissatisfied
General satisfaction n=100	96(96%)	4(4%)
Communication n=100	85(85%)	15(15%)
Provision of health services n=100	36(36%)	64(64%)
Maternal and Child health(MCH) n=93	76(81.7%)	17(18.3%)
Family planning n=64	40(62.5%)	24(37.5%)
Health Education n=98	82(84%)	16(16%)
Other services* n=84	39(46%)	45(54%)

*Information about anganwadi services, testing iodine content of common salt, village health nutrition day.

Table 3 depicts the satisfaction level of clients for various health services. Clients who came to avail services in dispensary were satisfied (84%) and dissatisfied (16%) regarding health education provided to them. For maternal and child health services 81.7% were satisfied and only 18.3% were dissatisfied. Whereas 62.5% of the clients who came to avail family planning services were satisfied and 37.5% dissatisfied. Out of the 100 clients who came to dispensary 96% were generally satisfied and only 4% were dissatisfied with the ANMs. About 85% of the clients were satisfied about communication aspect and among the clients who received health services 36% were satisfied and 64% dissatisfied.

Discussion

Auxiliary Nurse and midwives (ANMs) form an important part of the health team. In our health care delivery system primary health care facilities are provided by ANMs through the sub centers. They have to provide a wide spectrum of health services to general public.

The goal of any health service provision is to improve health outcomes in the population. Health services respond to people's expectations, while reducing inequalities in both health and responsiveness. The health care needs of the population should be met with the best possible quantity and quality of services produced at minimum costs. According to the expectation disconfirmation theory client satisfaction is based on the comparison of services

that they expect to be provided and the services which they get.[2] Client satisfaction is also an important tool for evaluating the quality of health care services. Hence, in order to achieve good outcome it is necessary to take into consideration the various aspects of client satisfaction.

In present study, most (87%) clients were satisfied with the health services that they received from ANMs. Similar findings were reported by a study conducted in Bengal on satisfaction of clients which showed that 73.31% clients were satisfied with the health services provided by female health workers.[3] In the same way, a study from Karnataka reported 67.81% satisfaction of clients regarding health services rendered by ANMs. [4]

Our study indicated that in rural area the satisfaction of people with health services provided by ANMs was significantly more than urban area. The reason for high satisfaction in rural area may be due to low expectation, education and awareness of the villagers regarding health care delivered to them. Other researchers have also reported that higher the education more was the utilization of health care services. Similar findings were also given by a study from Scotland which reported that rural population was more satisfied with health service as compared to urban population. [5]

By and large, general satisfaction of clients for all services was good except for family planning, provision of health services or other services. The main reason for such dissatisfaction being that the ANMs were busy focusing on records and devoted less time for focusing on patient satisfaction. Presently under National Rural Health Mission (NRHM) most of the efforts and service of health care facilities are directed towards maternal and child health services with little focus on other general health aspects or on family planning services. Though government has focused a lot on development of health infrastructure, still there is limited availability of basic supplies in health centre like medicines. Other factors which may lead to dissatisfaction are absenteeism of the health personnel and unsuitable timings of health centre. However, a study from Karnataka reported that 90% of the clients were satisfied with health services. [6]

Conclusion

Clients were satisfied with the services provided by ANMs. The clients from rural area were more satisfied than the clients from urban area. The clients were more satisfied for Maternal and child health (MCH), communication and health education. Less satisfaction was reported for provision of general health services, family planning. Hence, it is recommended that Public health Administrators should see that all kinds of services provided at sub centre get equal weightage rather than focusing only on MCH services.

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ORIGINAL ARTICLE

Awareness of Lifestyle, Occupational and Host Factors with respect to Reproductive Health among Students, Western India

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Abstract

Introduction: Generally, students falsely believe that miscarriage/ preterm birth is uncommon and do not understand its exact causes. Students being the future of the society therefore it is worth to assess their knowledge with respect to fertility

Objectives: This study was conducted to find out the awareness about the host, lifestyle and occupational factors among students with respect to pregnancy, miscarriage and outcome.

Material and Methods: Knowledge, Attitude and Practices (KAP) survey was conducted during November 2015 to April 2016 among the students who visited the National Institute of Occupational Health (NIOH) as an observer. A total of 744 students with mean Age of 21.8±0.1 [452 from science and 292 from non-science background (comprising 312 male and 432 female)] were participated.The students were mostly from the state of Gujarat, India.

Results: The results indicated that more than 83% students were aware that lifestyle habits such as smoking, tobacco chewing and alcohol consumption have adverse effects upon fertility and pregnancy. Most of the students (male- 81%; female- 86%) were also aware that depression can affect the fertility and its outcomes. Further, 75% students were knowing that stress affects pregnancy. The awareness of most of the variables was more among the female as compare to male students except only 37% female students know thatsexually transmitted diseases (STD) reduces fertility as compared to 55% male students. However, overall 63% students have correct knowledge of reproductive health variables asked.The data with respect to educational background revealed that science graduates had more knowledge regarding fertility than non-science graduates.

Conclusion

Awareness about the fertility related aspects were more among female and science students as compared to male and non-science students. More knowledge among science students reflects the role of education system in imparting the knowledge about fertility. However, 37% unaware students can't be ignored and it means that awareness with respect to reproductive health still needed.

Keywords: Lifestyle, Occupational factors, Pregnancy, Miscarriage, Depression.

Introduction

General population lacks awareness regarding the fertility and reproductive health and myths are existed with regards to fertility and pregnancy. Some of the studies have explored the population's/ university student's awareness about knowledge on the maternal age to conceive child and awareness of the harmful influence of certain lifestyle and occupational factors on fertility. Numerous lifestyle factors i.e. the age to start a family, weight, nutrition, exercise, psychological stress, environmental and occupational exposures, and certain other factors can have significant effects on fertility and outcome; lifestyle factors such as tobacco smoking, use of illicit drug, consumption of alcohol and caffeine can negatively affect fertility while preventative measure might be beneficial.[1]

A few studies are available on awareness, especially university students, about the association between life style factors and/or maternal age and fertility etc.[2-5] These

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studies indicate that university students of Europe have satisfactory knowledge on the recommended maternal age to pursue child wish[2] and are aware of the negative influence of certain lifestyle factors on fertility.[5] Bunting and Boivin (2006) further reported lack of fertility awareness in the general population especially in relation to the optimal fertile period during the menstrual cycle, occurrence of infertility and period of the reproductive life span. They concluded that young people are aware that the negative lifestyle factors decline fertility but falsely believe in fertility myths and the benefits of healthy life style habits. Very recently, Maeda *et al*.[6] studied people (18-59 years, General group), and subject who had been trying to conceive (18-50 years old, Triers group) for fertility knowledge using Cardiff Fertility Knowledge Scale (CFKS-J). The average percentages of answered correctly were 53.1% in the Triers group as compared to 44.4% in the general group. They suggested that educational interventions, both in schools and in the community, may be needed to elevate fertility knowledge because most people gain fertility knowledge from mass media, which sometime can be inaccurate.However, such study on awareness with respect to life style factors and occupational factors and fertility are scanty from India or abroad. Even some studies on knowledge related to conception, perception about fertility, and awareness and contraceptive practices etc. are available. Very recently, Vetriselvi [7] studied the knowledge on conception among women with primary idiopathic infertility and reported that there is a need of education towards conception among the couple seeking infertility treatment.

Owing to scanty data on awareness with respect to life style and occupational factors and pregnancy outcome and fertility, the present study was conducted to assess the knowledge among students regarding lifestyle and occupational factors with respect to fertility.

Material and Methods

The study was conducted as a cross-sectional study [Knowledge, Attitude and Practice (KAP)] survey between November 2015 to April 2016 at National Institute of Occupational Health (NIOH), Ahmedabad to determine the awareness pertaining to fertility/ pregnancy outcomes among male and female students having science or non-science background visiting institute as well as students visited NIOH's stall at science city exhibition, Science city, Ahmedabad. The questionnaire proforma wasdesigned by investigators in consultation with gynecologist based on fertility knowledge and myth with respect to host factor such as age of women, obesity, lifestyle, occupational, environmental factors and reproductive health and its outcome and the same was pre-tested. The ethical clearance of the study was obtained from the institutional ethical committee of NIOH, Ahmedabad.A total of 744 students with mean age of 21.8±0.10 years [312 males and 432 females (452 Science and 292 non Science) students] were enrolled and about 9% of them were married. Students over the age of 18 years included.The students belonged to different courses such as Nursing, Physiotherapy, Homeopathic Science, Bachelor and Master of Science., Business Administration, Computer Application, Sanitary Inspection, Social Worker, Forensic Science etc. Exclusion criteria were students below 18 years and students who didn't give consent and who didn't fill all the questions.

The students were explained about the purpose of the study before distribution of the proforma and a written consent to participate in the studywas obtained. They were ensured that their personnel confidentiality will be maintainedand authors / contributors were present during the filling of the questionnaire. Pressure was not applied to fill all the questions and the analysis was carried out accordingly. Each question was explained to the students and thereafter they filled the proforma by themselves.

Statistical analysis

The percentage variables were calculated with respect to total number of students participated, gender and educational status of the participants, shown in figure-1, 2 and 3.The level of significance was calculated using chi square test in R software (version 3.2.1) in figures 2 and 3.

Results

Awareness about fertility among students

a) Awareness with respect to lifestyle and occupational factors

The results of different variables among total students are presented in fig-1. Most of the students (83 to 85% students) were aware that a habit of smoking, chewing and alcohol consumption can affect the fertility and also pregnancy; whereas around 60% students consider consumption of excess caffeine might also be accountable for impaired fertility. About 75% of students were aware that age, occupation and stress have adverse effect on the fertility.

b) Awareness with respect to host factors and fertility aspect

About 60% students falsely believed that working in first trimester is safe. Further about 77% students precisely knew that women's most fertile ages are between 23 and 30 years. Whereas about 59% and 53 % students further knew that there is marked and slight decline in the women's ability to conceive after the age of 35 and 31, respectively. Further, about 68 and 64% students believed that obesity and inadequate sleep can affect fertility and sex drive, respectively. Students were in dilemma about sperm production being solely responsible for male's fertility because about 40% students have both the views

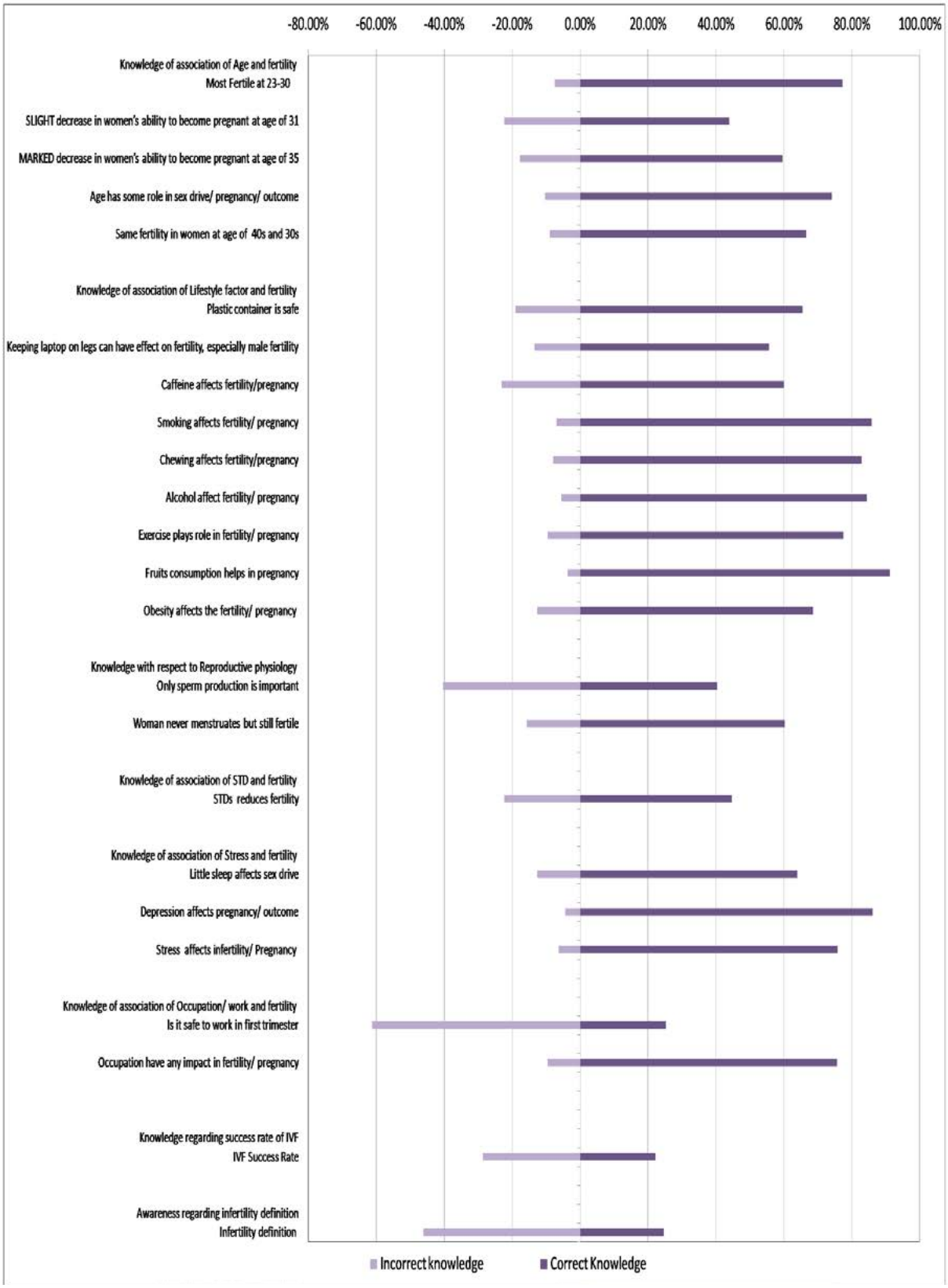

Fig 1: Graphical representation of awareness pertaining to different variables of reproduction among Students

Fig 2: Graphical representation of awareness pertaining to different variables of reproduction in Female and Male Students

and about 20% students did not have any idea about this. Similar situation was observed in case of knowledge with respect to success rate of *in vitro* fertilization (IVF) where around only 25% knew the correct success rate of IVF and same proportion of students also didn't know the correct success rate, whereas around 50% students did not have any knowledge on this issue. Most of the students (91%) knew that consumption of fruits might be useful in pregnancy. Around 55% of students reported that they acquired the awareness/ knowledge regarding fertility/ infertility from their school/ college. The overall 63% of the students were correctly aware regarding reproductive health but a considerable proportion i.e. 37% was not aware about the same.

Awareness among male and female students

The variables were further analyzed with respect to gender and shown in fig 2. The data revealed that female students had more knowledge with regards to most of the variables (role of age, obesity, stress, occupation, exercise on infertility/ pregnancy, IVF success rate, harmfulness ofplastic, definition of infertility etc.) of reproductive health than the male students which was statistically significant with respect to correct knowledge for obesity, occupation, exercise, use of plastic and definition of infertility. However, male students had more knowledge than female only in few aspects such as about 74% male knew that inadequate sleep can affects fertility as compared to 56% female, and about 56% male and 52% female students knew that keeping laptop on legs/ lap may affect male's fertility.

Regarding knowledge with respect to reproductive physiology indicated that about one third female and half of the male students wrongly believe that only sperm production is important for male fertility. Whereas around two third (65%) female and half (52%) of the male knew that a female is not fertile if never menstruates. Both of these variables are statistically significant. Overall, 66% of the female students and 60% male students were having correct knowledge regarding reproductive health.

Awareness among science and non-science students

The data were further analyzed with respect to educational background and depicted in fig 3. The data revealed that science graduates had more knowledge regarding fertility than that of the non-science graduates. In some cases, the difference was observed to be of greater extent as about 84-86% students from science background and about 60-66% from non-science background had correct knowledge with respect to role of stress and obesity on fertility/ pregnancy and these differences were statistically significant. Additionally, about 54% and 80% science students whereas only about 18% and 51% non-science students knew that only sperm production is not important for male's fertility and occupation has an effect on fertility/ pregnancy, respectively ($p<0.05$). More than 75% students in both the groups showed awareness regarding tobacco chewing, smoking and alcohol consumption might affect fertility/ pregnancy which were slightly more among science students.

However, only in few variables, non-science students had more knowledge than science students such as about 50%, 55% and 65% from non-science background and 45%, 50% and 60% from science background knew that STDs ($p < 0.05$), placing laptop on legs/ lap and inadequate sleep might affect fertility/pregnancy, respectively. Overall, around 68% science students and 57% non-science students had correct understanding regarding the reproduction.

Discussion

Data revealed that awareness of lifestyle, occupational and host factors is higher among female than male students. Earlier Delgado[8] reported that females had slightly, but statistically significantly higher awareness scores than males. However, higher awareness among female in the present study might be due to the female students were mostly from Nursing and Physiotherapy courses that belongs to biological science stream. This hypothesis is also supported by the data analyzed with respect to science and non-science students which revealed that science graduates had more knowledge regarding fertility than that of the non-science graduates. In variables such as role of age, stress and obesity on fertility/pregnancy, the awareness difference was observed to be of greater extent between science background and non-science background. This corroborate with earlier findings of Adesiyun *et al.* [9] and Nouri *et al*.[10].Awareness on female reproductive aging was undoubtedly better among medical students compared to non-medical students.[9] Further, Nouri *et al*. also reported that medical students have a higher awareness of fertility issues than non-medical students and choice of academic study, gender, and personal life style are important factors affecting fertility awareness. They highlighted the need to address knowledge gaps among young non-medical students through academics.[10]

Earlier, Hussain *et al*.[11] from neighboring country, Pakistan, mentioned that the accurate knowledge about the risk factors causinginfertilitywas found to be limited. Only 66.9% and 49% of the total respondents recognizedobesityanddiabetesas a threat. While about 43% and 48% of males consider mumpsand smoking respectively as culprits. Earlier studies of Hughes *et al*. [12] and Maheshwari *et al.*[13] also showed limited knowledge of fertility patients with respect to life style factors and reproductive health such as only 47% of infertile women believed that smoking significantly impairs fertility [12] and only 53% of fertility patients knew that being aged 30 or older decreases medically assisted reproduction (MAR)

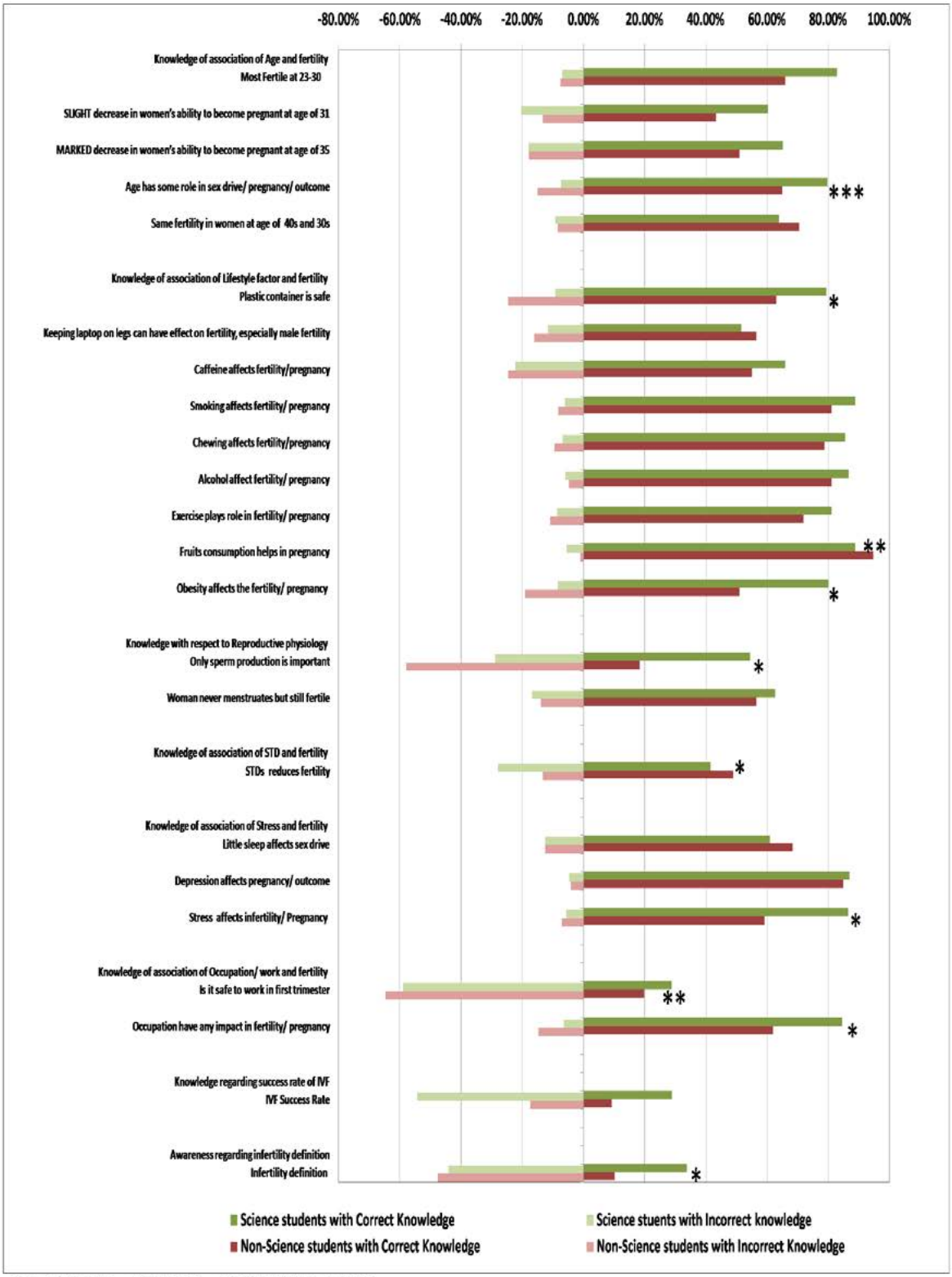

Fig 3: Graphical representation of awareness pertaining to different variables of reproduction in Science and Non Science Students

success rate.[13] However, in the present study a quite large number of students i.e. more than 83% students were aware that a habit of smoking, chewing and alcohol consumption can affect the fertility and also pregnancy. Recently Rouchou[14] proposed that education programmes tailored for society's specific beliefs and grounded traditions must be implemented in order to reverse the social stigma, harmful psychological effects and loss of economic security that results from infertility.

About 68% and 64% students believed that obesity and inadequate sleep can affect fertility and sex drive; respectively. Pandey *et al.*[15] reported that the growing prevalence of obesity has had a profound impact on female reproductive health. Fertilization rates are inferior and the embryo quality is impaired in obese younger women. Pregnancy rate in some studies was lower and there was an increased risk of early pregnancy loss. Weight loss in anovulatory overweight and obese women regularizes menstrual cycles, elevates the spontaneous ovulation and conception. Jamali *et al*.[16] also reported that overweight and obesity had a negative effect on the infertile women's sexual function. Earlier, Kuchenbecker *et al.*[17] also mentioned that women who are overweight are less fertile than women of normal weight. The chances of both spontaneous conception and conception after ovulation induction and assisted reproduction are lower in overweight women. The chance of a live birth is also decreased due to an increased risk of miscarriage. Furthermore pregnancy outcome is compromised by obesity-related complications of pregnancy. Weight loss of 5-15% in sub fertile overweightwomen increases the chance of conception after fertility treatment and spontaneous conception can be attained through a low-calorie diet, elevated work out and behavior modification.[17] Body weight might also have role in fertility of both male and female. Obesity negatively affects natural reproductive potential through interference with hormonal and metabolic mechanisms.

The general knowledge of infertility in young adults is promising and supports the potential uptake for health promotion of fertility preservation. The study underscores the persistent need for complete sexual and reproductive health education and promotion.[18] Earlier study of Esimai and Omoniti[19] reported that lack of information about menstrual issues and necessitate educating female students about menstrual problems to improve health seeking behavior with respect to menstrual abnormalities. It is reported that electronic media play an important role in imparting awareness with respect to reproductive health issues.[20] Earlier Christian *et al.* [21] also mentioned that Television and Health-care personals may be better sources for awareness. In the present study about 55 % students gained knowledge from their school/colleges. This indicates that peer pressure plays an important role in getting the awareness regarding fertility knowledge. However there is a need to provide reliable information through educational/awareness program on reproductive health. Further, lifestyle related diseases could be reduced with alteration in diet, living and working environment etc.It is established that some of the life style factors, occupational and environmental exposure have adverse effect upon fertility and outcome. Homan *et al.*[22] reported that there is strong indication that age, weight and smoking influence on general health and adversely affects the reproductive performance. Later, Sharma *et al.*[23] also mentioned that various lifestyle factors i.e. age at which to start a family, nutrition, exercise, weight, psychological stress, occupational and environmental exposures, and lifestyle factors such as smoking, illicit drug use, and alcohol and caffeine consumption can have considerable effects on fertility. In addition, sub-fertile as well as normal subjects can have some control over their reproductive health by adopting healthy lifestyles.[24] Further, Khosrorad *et al*.[25] emphasized that lifestyle plays vital role in reproductive health. Recently Meena *et al*.[26] also mentioned that poor Sexual Reproductive Health (SRH) knowledge, perceptions and available non-formal, unreliable information sources expose young men to poor SRH outcomes. Detailed Sexual Reproductive Health information provision may have life-long protective benefits to them and their partners. In addition, Chan *et al.*[27] mentioned that occupational and environmental health nurses can make awareness about the personal daily exposures of young women to certain chemicals while conducting risk assessments in the workplace or at a school and can help in developing interventions.

Conclusion

The overall rate of the knowledge pertaining to reproduction with respect to lifestyle and occupational factors was 63%. Based upon the available information, there is a need to impart reproductive health knowledge among young generations periodically to acquaint themselves with respect to reproductive health issue that will be beneficial not only to them but to the society. The reproductive health issues associated with deterioration of reproductive health should be included in the curriculum of graduates irrespective of subject specific.

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ORIGINAL ARTICLE

Estimation of cost of services provided by Urban Health Centre of a medical college in North India

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Abstract-

Introduction & Objective- Rapid urbanization is an emerging problem in India. Urban poor have adverse health indicators when compared to their rural counterparts. There is a need for understanding the allocation of costs for medical services effectively at primary care level. This study was planned to estimate the provider costs of an urban health centre (UHC) of a medical college in North India and was compared with the National Urban Health Mission standards.

Methods- Cost analysis was done for the year 2015-16 using a six step process prescribed by World Health Organization. The costs were divided as capital and recurrent costs; fixed and variable costs and expressed in INR. Unit cost of services was estimated as the total annual cost per number of beneficiaries.

Results- The total annual costs incurred by the urban health centre was Rs. 1,94,23,363.80 for the year 2015-16. Recurrent costs contributed most of the annual costs (57.3%) and capital costs contributed to 42.7% of the total annual costs. Most of the costs incurred by the centre were due to the salaries, land and building costs.

Conclusion- It has been seen that most of the total cost incurred by the centre was not primarily related to health care provision directly. It is necessary to identify the gaps and make the services available by effectively allocating the resources.

Keywords- cost-analysis, provider cost, health expenditure, urban health centre, Indian.

Introduction

Rapid urbanization is an emerging situation in the developing countries. India is experiencing an increase in the urban population, with current percentage decadal growth of the country being 17.7 (12.3 in rural Vs. 31.8 in urban).[1] Within the urban area, large number of the people fall under urban poor population (around 25%) which is fast growing .[2] Urban poor population contributed to around 18.7% in 1973 which increased to 26.8% in 2004-5 i.e. around one quarter of the population .[3] In the last decade, annual growth rate of India was 2% whereas 3%, 4% and 5% in urban, megacities and urban poor population respectively, majorly known as the 2-3-4-5 syndrome of urbanization .[(4)] Urban slum population ranged from 25.1% (Jabalpur) to 54.1% (Greater Mumbai).

Urban poor are known to have adverse health indicators as well as are deprived of health facilities when compared to their urban counterparts. As per the NFHS-3 report, the under 5 mortality rate (U5MR) was 73 per 1000 live births among the urban poor as compared to an average of 48 among all city dwellers in India, highest being in Uttar Pradesh (110 per 1000 live births), which was more than 4 times more than that of the rest of the urban population, and the U5MR in Madhya Pradesh was more than 3 times the rest of its urban counterpart. The children were more undernourished among the urban poor (54% stunted and 47% underweight) when compared to their urban counterparts (33% stunted and 26% underweight). Antenatal care among the poorest quartile (54% of the pregnant women had atleast 3 antenatal visits) was lower when compared to their urban counterpart (83% among rest of the urban population of pregnant women).[5,6]

Health care delivery in the urban area is poorly structured in the country. The existent health systems don't provide quality services and lack referral/linkages with various levels of health systems. National Urban Health Mission (NUHM) was launched for the provision of primary health

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care needs of the population in urban India in the year 2013 .[7] It focused to improve the health services for the poor and needy population in the urban part of India with active involvement of urban local bodies. The primary health services were expected to be implemented across the country but as in most of the urban districts this has not been systematically implemented as done in the rural India.

Major challenge identified was that majority of the urban primary health centres (PHCs) were low performing and were not meeting government standards.[8] 80% of the doctors are known to be residing in the urban India however unavailable to the urban poor population .[9] 30% of the Indian population is constituted by the urban slums and <5% of the health care facilities is catered by the government for the urban poor population, which encourages privatization of medicine and unnecessary crowding in secondary and tertiary centers, where limited and inconvenient timings; increased out-of-pocket expenditure are other challenges faced by the consumers.[10]

Cost analysis study helps in understanding the needs and allocating appropriate monetary resources based on the requirement. It helps in planning a cost effective way to provide quality services to ensure each and every individual receives the basic and essential primary care.

Hence, this study was planned in order to estimate the provider costs of the services provided. The objective of the present study was to estimate the provider cost of urban health centre services at Dakshinpuri extension under the Urban Health Programme of Centre for Community Medicine, AIIMS, New Delhi and to compare the costs with the NUHM standards.

Material and Methods

Study setting:

The Urban Health Programme run by Centre for Community Medicine, All India Institute of Medical Sciences, New Delhi is providing primary health care to the urban poor population since 1973. The program was started to orient the undergraduate and postgraduate students regarding public sector health care delivery system in the urban area. Initially, health services were provided by a mobile health clinic which was then modified to the current urban fixed site health clinic (UHC) since 2013.

Urban Health Programme provides servicesHHealth ProgramH in an urban resettlement colony in Dr. Ambedkar Nagar, Dakshinpuri Extention of South Delhi. These services include outpatient curative services, ante/post natal checkup, immunization and family welfare services along with health education and counseling. These services are provided by a team of resident doctors (1 Senior Resident and 8 Junior Residents), 1 Public Health Nurse, one Medical Social Service Officer, 6 Health Asistants, 1 Lab Assistant and 2 Clinical Attendants, supervised by a Faculty In-charge. These services are provided free of cost. The field practice area is located at a distance of around 8 kilometres from AIIMS, New Delhi. This centre provides the above mentioned services on 5 working days to around 80-120 patients daily (Tuesdays and Sundays are off days). Community based activities such as health talk, health exhibition and street plays are also done on a regular basis by the residents to create awareness about locally endemic and other common diseases.

Study design: Cost analysis was done to estimate the cost of the services provided by the Urban health centre.

Period of data collection: The reference period for the estimation of the cost of providing services through Urban Health Programme was from April 2015 to March 2016.

A. Calculation of provider cost

The cost of providing services was estimated by following a six step process which is prescribed as per the guidelines stated by the World Health Organization : 1) Identification of cost centers, 2) Identification and measurement of inputs, 3) Assigning inputs to cost centers, 4) Valuing of inputs, 5) Allocation of all cost to final cost centers, 6) Computing unit cost of services.[11]

1. Identification of cost centers: Activities in the program were identified and assigned to direct and indirect costs. The three cost centers which were thus identified were overhead, intermediate and final cost centers. Overhead cost centers included administration, maintenance, store and transport costs. Intermediate cost centers included pharmacy and laboratory costs. Final cost centers included cost centers that provided patient care services and training.

2. Identification and measurement of inputs: Various inputs from the programme were identified and classified into capital and recurrent inputs. Capital inputs included the furniture, vehicles, equipment and buildings. Recurrent inputs included the salaries, vaccines, medicines, stationery, building and vehicle operational and maintenance. The cost of the equipment, furniture, salaries of personnel and building operational and maintenance charges were obtained by interviewing the key informants of the department of CCM, AIIMS, New Delhi. The operational and maintenance costs of the vehicle and transport were obtained by interviewing the key informants from the Transport department, AIIMS, New Delhi.

3. Assigning inputs to cost centers: Inputs utilized were assigned to cost centres bases on the criteria in a similar study done 8 years back on mobile health clinic functional under CCM, AIIMS, New Delhi .[12]

4. Valuing of inputs: Annual Equivalent Costs (AEC) were calculated for each capital input with the help of the formula,

AEC = Replacement or Current Cost ÷Annuitization Factor

Annuitization factor was obtained from a standard table which takes into account both discount rate and total number of useful life years of the input. World bank discount rate of 10% was used for calculating annuitization factor .[13]

Useful life years of inputs were calculated with the help of store-in-charge through interview. The information regarding salary was obtained by interviewing the personnel working in the team. Basic medicines like Antihypertensives (Amlodipine, Aquazide), Hypoglycaemic agents (Metformin), Anti-asthmatics (Asthalin, Deriphylline), Antibiotics/Antifungals/Anti-parasitic agents (Amoxicillin, Cefixime, Doxycycline, Azithromycin, Ciprofloxacin, Metronidazole, Fluconazole, Albendazole), Antipyretics/Anti-inflammation agents (Paracetamol, Diclofenac), Gastro-Intestinal drugs (Ranitidine), Nutrition supplements (Becosules, Iron-Folic Acid, Zinc), Central Nervous System Drugs (Phenytoin), Oral Rehydration Salt (ORS) sachets, Anti-Histaminics (Cetrizine) were provided in the centre. The medicines were priced as per the price list from the central store. The total cost also included the VAT tax of 4%. Supplies included registers and stationary used in the centre and the department office, the glucose strips, cotton, hand sanitizer, syringes used for vaccination, bags for waste disposal, batteries. Equipment included were tables, chairs, stools, sphygmomanometer, weighing machines, glucometer, haemocue apparatus. Vaccines were not added as they were supplied free of cost. Others included all other items which did not fall into any of the above mentioned categories. All inputs were analyzed and thus were categorized under the cost centers accordingly.

5. **Allocation of all cost to final cost centers** was done with the help of step down allocation method followed by computing unit cost of services (14). This was calculated by dividing the total cost by number of beneficiaries benefited by the services. The basic socio-demographic details of the people were obtained from the census which is done every year in this field practice area. Hospitals purchase goods like land, buildings, furniture, labor, medicines and laboratory supplies for diagnostics to convert them to services for patient care. Costs were also estimated in terms of fixed and variable costs. Fixed cost was defined as the costs which would not be saved by the hospital if a particular service were not supplied and variable cost was defined as the costs which would be saved by the hospital or centre if a particular service was not provided. [15,16] Fixed costs were calculated by taking into account fixed cost elements like the cost of land and buildings (unlike their maintenance costs), equipment and furniture, and salaries of labor/staff. Variable costs were calculated using the costs incurred due to the medicines, laboratory/ diagnostic/disposable supplies.

6. Computing unit cost of services was done by dividing the total annual cost with the number of beneficiaries. The number of beneficiaries was obtained by the outpatient, Ante/postnatal care and immunization registers maintained at the centre. The number of beneficiaries in three months was multiplied with 4 to get an average value. In this study the number of beneficiaries came to around 28,150 in the study time period (April 2015 to March 2016).

B. Comparing with national standards:

Table 1: Cost of various inputs and the total annual cost during the year 2015-16 in INR (%)

Capital cost	
Land, building	76,20,000 (39.2)
Vehicles	6,00,462 (3.1)
Furniture	64,387.80 (0.3)
Equipments	23,732.40 (0.1)
Total	**83,08,582.20 (42.7)** [6,88,582 excluding land and building costs]
Recurrent cost	
Salaries	1,00,38,000(51.7)
Drugs	9,05,180.10 (4.7)
Electricity	5,000 (0.02)
Supplies	1,15,560 (0.6)
Others	51,041.50 (0.2)
Total	**11,114,781.60 (57.3)** [10,76,781.60 excluding salaries of personnel]
Total annual cost of the UHP- 1,94,23,363.80 (100)	

As per guidelines stated by National Urban Health Mission, Rs 20 lakhs were allotted to Urban-PHC as a recurrent cost support every year. [4] Cost for land and building from this study was added to the salaries of minimum required staff and the cost given for recurrent costs. The minimum personnel required to run an urban-PHC was taken into account and the unit cost of services was calculated by dividing this with the number of beneficiaries. One or two doctors, 3 nurses, 3-5 health workers, 1 pharmacist, 1 lab technician and 2 clinical attendants are required as per IPHS standard guidelines for an Urban-PHC. This was done to compare the costs obtained between CCM-UHP and the minimum standards as per national programme standards.

The costs were then compared with the amount reported in this study.

C. Output variables: Total annual expenditure of the services provided by the Urban Health Centre during the period of 2015-16

D. Data analysis: The data was entered and analyzed using Microsoft Excel 2013.

Results

The total annual cost of the UHP was estimated to be 1,94,23,363.80 INR in the year 2015-16. The inputs were divided into capital and recurrent inputs. The capital inputs included those of land and building space (39.2%); vehicles (3.1%); furniture (0.3%) and equipments (0.1%). Recurrent inputs included those of salaries of personnel (51.7%); medicines (4.7%); general consumables, liquid supplies (0.6%), laboratory supplies (0.2%). As indicated, major share of the total cost (50%) allocated to the UHP is contributed by the salaries of personnel.

The capital costs contributed to 42.7% of the total annual costs. More than 90% of the capital costs were allocated for the land and building charges. The recurrent costs contributed to 57.3% of the total annual costs, of which more than 90% was allocated for the salaries of personnel.

95% of the total annual cost was contributed by fixed cost whereas the remaining 5% was contributed by the variable cost. Variable cost included the cost of medicines, supplies, building and vehicle maintenance charges only. The salaries of personnel were considered as fixed cost in this study (see methods).

Discussion: The study gives an overall estimate of the provider cost of the services provided by the Urban Health Centre catering to a population of up to 30,000 in a year. The total annual cost of providing services was found to be 1,94,23,363.80 INR in this study. On an average, the cost of provider cost per beneficiary per visit was 690 INR in the year 2015-16, when compared to 357 INR as per the national standards. The higher cost could be due to the high capital costs (operational costs).

In a study done in 1995 by Anand K et al (17), per capita cost in a primary health centre in rural Haryana was 86.6 INR per visit, which is much lower when compared to 690 INR in the present study. This high costs in our study could have been due to the high costs of the land and building, the increased salaries of all health care personnel involved in the programme and the high costs in the urban area. Also, in the same study, salaries costed to 62% of the total costs incurred, this finding was consistent with the present study. The budget allocated for health in India is 4.5% of GDP, which is very low when compared to other countries. The global health spending per GDP is 8.3%. Out of India's 4.5% of GDP which goes for health spending, only 31% is contributed by the government. Most of the health spending is by out of pocket expenditure which is 66%.[18] Limited budget is available for the actual service provision due to the high salaries of all health care personnel and building/land costs. This requires an increased consideration to increase the budget allocated for health and/or reconsideration of costs of building/land used for health care provision.

The variable costs accounted to 5% in the present study. Roberts et al, in a similar study, attempted to delineate the overall fixed and variable costs for medical care at an urban public teaching hospital, Chicago, buildings, and equipment. They reported 84% of fixed costs and 16% of variable costs in their study. [19]There study states that their cost per patient treated was higher as lesser patients had to share the high operational costs, which may also be true in the present study. The salaries of the employees contributed to 59% in their study, which implied that costs for the employees need to be also given consideration while allocation of budget. The lower variable costs in the study could also be attributed to cheaper and easily available generic drugs and laboratory supplies which are used for essential health care provision.

In a similar study done in 2016 by Ashlesh P et al (12), the total cost incurred to run a mobile health clinic was 76,91,943 INR for the year 2009. The cost incurred for curative services was 107.7 INR/visit and cost of antenatal/ postnatal services was 388 INR/antenatal visit. This was also less than the amount incurred in our study because it did not include building and land costs.

In another study which involved three states done in 2016 by Prinja S et al public healthcare services are being strengthened in India.[20] However, there is dearth of cost data for provision of health services through public system like primary & community health centres. In this study, we aim to bridge this gap in evidence by assessing the total annual and per capita cost of delivering the package of health services at PHC and CHC level. Secondly, we determined the per capita cost of delivering specific health services like cost per antenatal care visit, per

Table 2: Cost incurred in various cost centers of urban health centre

Cost category	Cost (INR)	Share of total cost
Overhead	8,157,812.79	42%
Intermediate	12,23,671.91	6.3%
Final	1,00,41,879.08	51.7%
Total	**1,94,23,363.80**	**100%**

institutional delivery, per outpatient consultation, per bed-day hospitalization etc.\n\nMethods\nWe undertook economic costing of fourteen public health facilities (seven PHCs and CHCs each, 52.6% of the costs were incurred due to the personnel costs, similar to the present study.

In this study, the recurrent costs was 1,11,14,781.60 INR; which was 5 times higher than the NUHM framework. The main contribution to the high annual cost in our study was the health personnel cost which accounted for 51.7 % in the study. Other reasons included are the land costs and maintenance of land and building in this study.

The personnel costs related to the patient care have been included in the variable cost. The personnel had other job responsibilities too. Therefore only a portion of the salary spent on services provided at Urban Health Centre was included in the personnel cost.

Information about the cost put into running the outpatient clinic in an urban area is not available in literature. This study tries to estimate the cost which provides preventive, curative and promotive services to the increasing urban poor population.

This study does not account for the indirect costs like time spent by the personnel and also the out of pocket expenditure by the consumer and loss of wages due to disease was not estimated. This study also does not consider the cost put into training of medical students and residents. Individual costs incurred for different packages like Antenatal care/Child care/etc were not assessed.

Conclusion

The total annual cost of the UHP in the year 2015-16 was 1,94,23,363.80 INR, out of which around 60% was contributed by recurrent costs of which the salaries of personnel accounted to around 50% of the total recurrent costs. This provokes us to think that the total budget allocated to health cannot be directly converted to provide patient care services and there are many other cost factors which are required to be taken into account while allocating budget for health services. This study also attempts to draw the attention of policy makers to consider the need for increasing the budget allocated for health service provision. Further studies are necessary in order to identify the gaps, to estimate the out of pocket expenditure of patients and ways to make health care provision more cost effective and beneficial to both consumers and the health care givers, and to ensure smooth functioning of the health care system.

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ORIGINAL ARTICLE

Attitude Towards Smoking and Second Hand Smoke Exposure among School going Adolescents in India

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Abstract

Exposure to second hand smoke (SHS) among school going adolescents is a public health problem. It is important to understand the possible sources and the attitude among adolescents which increases the risk of such exposure. The objective of present study was to assess exposure and attitude of school going adolescents towards second hand smoke. This cross-sectional survey was conducted among students of a school in India which is supported by funding from para- military forces to ensure quality education to children of para-military personnel's. Students from class VII to XII were included and data was collected using Global Youth Tobacco Scale. Exposure to SHS in past one week inside home was found to be 45% and in public places 76.6%. Though smoking from other people was reported to be harmful (89%) and discussion about harmful effects of smoking is carried out by school authorities (73.2%) and families (75.9%) yet attitude towards SHS among adolescents is favorable and is considered helpful in enhancing socialization and making personality attractive. Second hand smoke exposure among school adolescents is high and strategies designed to reduce smoking among them need to specially target positive image associated with smokers.

Keywords: *Second hand smoke, India, school adolescents, Global Youth Tobacco Use survey (GYTS), involuntary smoking*

Introduction

The WHO's Framework Convention for Tobacco Control and several national policies and legislation including India's Cigarettes and Other Tobacco Products Act, 2003 were invoked with intent to protect the non-smoker from the harms of second-hand smoke (SHS). It is well reported that ensuring 100% smoke free environments in home, work and public places is necessary to prevent from exposure to SHS. Among SEAR countries, exposure of Indian youth is reported to be lower with 21.9% getting exposed in homes and 36.6% getting exposed in public places.[1] The burden of SHS as per nationwide survey is likely to be underestimated and more region and school specific studies are needed to understand the magnitude of SHS among school adolescents. The current study was planned in an urban school of metro city of India and is catering to families where one or both parents are working in para- military forces with an objective to assess magnitude of exposure and attitude to second hand smoke (SHS) among school adolescents.

Materials and Methods

This descriptive cross sectional study was conducted in a senior secondary school of urban Delhi, India among students of classes VII and XII. There were total 23 sections, of which 5 sections were in class VIII; 4 each in classes VII, IX and X; and 3 sections each in classes XI and XII. Using random table, one section was selected from each class VII to XII and an anonymous, structured questionnaire was administered to all the students of selected section. The tool was adapted from Global Youth Tobacco Survey (GYTS)questionnaire and included three sections: (a) knowledge and attitudes toward tobacco; (b) Exposure to other people's smoking; (c) discussion about smoking in school and families.[2]

Based on prevalence of the exposure to second hand smoke (p) reported to be 36.6% in places outside home and relative precision (d) taken at 20%, the sample size calculated was 177.[3]

Permission from Institutional ethics committee and of school authority including Principal was obtained after explaining the purpose of the study to them.

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Results

Out of 180 students enrolled in sampled sections, 167 students returned completely filled questionnaire. Three students returned incomplete questionnaire's and thus were excluded from the study while ten students were absent on day of investigator visit.

Exposure to second hand smoke:

About 45% participants responded that they were exposed to SHS in their home, while 76.6 % participants were exposed to SHS outside their home for one or more days in past one week. About 15% students reported smoking by either one or both parents while 12% of candidates were unaware about smoking status of parents. More than half of candidates (53.3%) reported that one or more of their close friends smoke cigarettes.

Majority of students (89.3%) were aware that smoke from cigarettes of other people is harmful but only 38.6% favored ban on smoking in all public places.

Attitude and practices regarding smoking

Majority of participants (81.4%) responded that, they will definitely not smoke cigarettes if offered by friends and will definitely not smoke in next 12 months (77.2%) or in next 5 years (80.8%). Only 64.7% subjects responded that cigarette smoking is definitely harmful to health and smoking cigarette make people feel less comfortable (65.3%) and causes loss of weight (85%).

Nearly three-fourth of the respondents were (73.1%) of the attitude that boys who smoke are likely to have more friends as compared to girls who smoke (41.3%). Contrary to this, only about one- fifth of candidates (21.7%) conveyed that women who smoke look more attractive while only 2.4% felt that men who smoke appear to be more attractive.

Role of family and schools

Family role in discussing harmful effects of smoking was conveyed by many students (75.9%). Majority of candidates reported that during past year, dangers of smoking were taught in class (73.2%) and harmful effects of tobacco use were discussed with them (54.9%) but only few students (9.6%) had discussion on reasons why people start smoking at young age.

Discussion

The present study was conducted among school going adolescents supported by para- military forces and are instrumental in providing good education environment to their children. Information regarding exposure to second hand smoking and attitude towards smoking among these children is not reported previously.

As compared to current study where exposure to SHS was 44.9% in home and 76.6% in public places, previous surveys revealed lower exposure in India (16 % to 21% in home and 36% to 39% outside home)and Bangladesh (31.1% in home and 59% outside home).[3,4,5] Hammond has reported that among youth, both the proportion and intensity of smoking rise substantially after the age of 17 and prevalence of smoking among adolescents is found to increase with age.[6,7]

About one-tenth of students were unaware of smoking status of their parents, this is possible as para- military personnel's are required to stay away from their families for long duration. Adolescents in our study experienced higher levels of SHS as compared to previously reported surveys from India. In spite of our extensive literature search, we were unable to find any reported evidence on SHS among adolescents who are staying with extended families and are away from their parents for long duration. This might be one of important contributing factors for high SHS reported in our study and must be considered in future surveys conducted among adolescents.

Reported smoking by all or most of close friends (about 10%) was observed to be similar to national data.

Adolescent's perception regarding role of smoking in enhancing socialization among boys and making personality more attractive among girls is also reported by a study done in Telangana, India. [8] Engagement in risky health behaviors due to influential peers is reported by Loke(9), where risky behaviors like smoking are accepted and adopted as form of social behaviors.

As reported by Raute LJ, our study too confirms most of school youths are well aware about harmful effects of smoking but yet more than 50% of students did not favored ban in public places. Thus, our study contradicts the findings of Zulu, etal. [4,10] who has discussed that increasing awareness about health hazards of SHS may decrease adolescent's acceptance about smoking in public places. Reasons for disapproving ban on smoking in public places in spite of recognizing harmful effects among educated adolescents need to be explored in future research.

During past one year, majority of students were made aware of dangers of smoking and were engaged in discussions regarding harmful effects of smoking either in family (75.9%) or in school (73.2%) but only few conveyed discussing possible reasons regarding indulgence of youth in tobacco consumption. Making adolescents aware of reasons for smoking initiation by their peers and its influence in engaging in harmful health behavior is an unexplored area and may provide useful insight while planning and strategizing adolescents smoking and tobacco cessation program.

Conclusion

Second hand smoke exposure is high among Indian school going adolescents. Role of parent's occupation and associated demands can prove to be an important contributory factor. Strategies for smoking cessation program among them must focus upon acceptance of smoking as social behavior and positive image related to smokers in form of enhanced companionability and attractive personality.

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ORIGINAL ARTICLE

Evaluating Intramural Stillbirths in A Tertiary Care Centre of North India- An Observational Study

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Abstract

Introduction- India shares the highest magnitude of stillbirths among all South East Asian Countries in the world. Along with known preventable causes of still births, there are other associated factors which also plays an important role. The main objective of our study was to find out the causes of Still Births and associated logistic issues in all those pregnant women who were admitted with live fetus in a tertiary care centre but had still birth during their stay in a tertiary care hospital

Material and Methods-This study included all pregnant women who had SB during hospital stay over a period of one year.

Results-The still birth rate during period of study was 63 per 1000 total births. Out of these 376 women, 66(17.5%) were admitted with live fetuses but had still births during hospital stay. The main causes of still births were hypertensive disorder of pregnancy (21), birth defects (18), antepartum hemorrhage (12) and prematurity (7). There were 17 (25.7%) still births attributed to lack of space in Neonatal intensive care unit or lack of funds due to poor socioeconomic status.

Conclusion: The mostcommon preventable causes of still births were hypertensive disorders of pregnancy and iatrogenic prematurity. Other associated factors were limited health facilities, patient related factors, illiteracy, poor socioeconomic status, logistic issues in accessing health care and delayed referral also has a significant role. These could be prevented by improving the premature infant care with strengthening health care facilities and targeting hypertensive disorder of pregnancy at root level.

Key words: Still birth Rate, Intramural Still birth, Hypertensive disorder of pregnancy, Suboptimal care, Prematurity

Introduction

India shares the highest magnitude of stillbirth i.e. 592,100 out of a total of2.6 million each year among all South East Asian Countries in the world.[1]Still birth rate is widely ranging from 20 to 66 per 1000 births in different states of India.[2] However in high income countries it is as low as 1.3 to 8.8 per 1000 births.[3] The various causes of still births are fetal, placental, maternal and unexplained and most of these are preventable. But in lower- middle income countries (LMCI) like India, along with these causes, a woman also faces many logistic issues during pregnancy for utilizing available health care facilities. There is a problem in accessibility, availability, affordability along with insufficient resources resulting in suboptimal care. There are logistic problems like delayed referral, very high load of patients with limited facilities and poor socioeconomic status of people. The main objective of our study was to find out the causes of SB among those women who reached in a tertiary care with a live fetus, still had an Intrauterine fetal death (IUFD) during the course of hospital stay, to analyze the real problems faced during the management of these women so that management strategies can be planned to decrease the prevalence of such intramural preventable SBs.

Material & Methods

The present study was done at PGIMER Chandigarh tertiary care hospital in North India,well equipped with all facilities and expertise. The annual delivery rate is approximately 6000 deliveries per year and more than 50% of them

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are preterm births (<37weeks). In spite of presence of 24 hours of emergency services and availability of multidisciplinary team, still all women reaching with a live fetus did not always have a favorable outcome. This study was done after taking the approval from departmental ethical committee. All those pregnant women who had still births during hospital stay were included in this study. All were admitted in the department of Obstetrics and Gynecology over a span of one year (1st October 2015 to 30th September 2016). After taking the informed consent of each woman, demographic data, gestational age, history of maternal complications, fetal heart status on admission, details of labor, birth weight and baby's details were recorded from the admission file. The logistic issues were also discussed in detail with each patient and recorded. All cases were critically evaluated to find out the causes of still birth. Details of every patient was recorded in excel sheet and descriptive analysis of data was done.

Results

Total number of deliveries during this period (1stOct 2015 to 30thSep 2016) was 5935 and total Still Births were 376. The still birth rate was 63 per 1000 total births **(fig:**

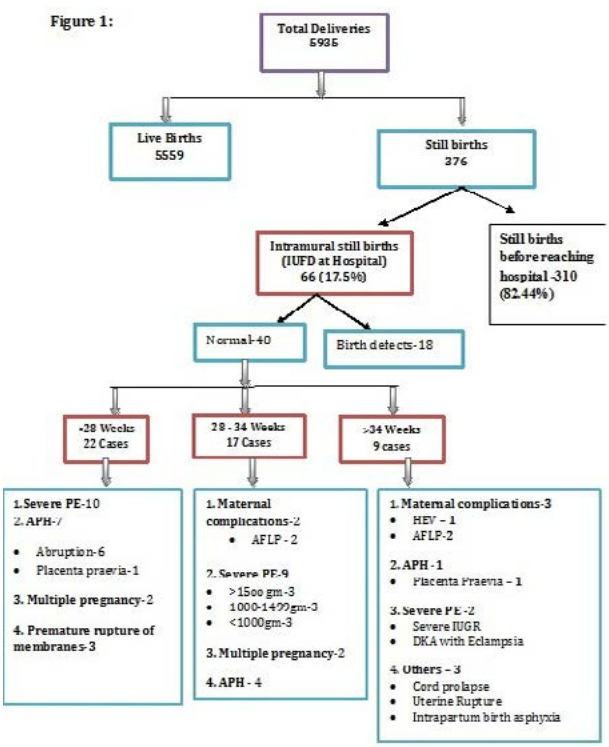

Figure 1: Overview of still birth data

Figure Legend: There were total 5935 births and 376 Still births during study period and still birth rate calculated was 63 per 1000.Only 66 (17 %) of them were Intramural and among them 27% were attributed to birth defects.Rest of the intramural Still births further divided according to period gestation and then Cause wise.

Table 1- Outcome of deliveries

Intramural outcome 1stOct 2015 to 30thSep 2016	
Total Births	5935
Total Live births	5559
Total Still births	376
- Intramural still births	66
Still birth rate	63.3 per 1000 births
- Proportion of Intramural still birth	17.5%
- Proportion of Still births which have occurred before reaching tertiary care	82.44%

Table2 Demographic and clinical details of intramural stillbirths

Category	No. of infants	Proportion
Maternal age	n =66	
<25	33	50
25-29	20	30
30-34	6	9.0
>34	7	10.6
Gestational age	n =66	
<28 week	23	34.8
28-34 week	20	30.3
34- <37 week	12	18.8
≥37 weeks	11	16.6
Parity	n=66	
Primi	32	48.4
Multi	34	51.5
Previous still birth	0	-
Previous abortions	16	24.2
Gender	n=66	
Male	23	34.8
Female	43	65.1
Birth weight	n=66	
>2500 gm	10	15.1
1500-2500 gm	19	28.7
1000-1500 gm	7	10.6
<1000 gm (800-1000gm)	30 (12)	45.4
Singleton/ Multiple	n=66	
Singleton	57	86.3
Multiple	9	13.6
Mode of delivery	n=66	
Cesarean	5	7.5
Vaginal	61	92.4

1). Out of these 376 women with Still Births, 66(17.5%) had live fetus at the time of admission and they all had stillbirth during hospital stayi.e.an intramural stillbirth. During the period of study, the stillbirth rate was found to be very high, 63 per 1000 births and 17.5% of these were intramural **(table:1).** Further evaluation of causes along with associated factors of intramural stillbirths was done **(table :2)**

Mother's age- Younger women of age group less than 25 years had higher still birth rate compared to older age group, with 50% of intramural still births seen in mothers under 25 years of age.

Parity- Out of 66 intramural stillbirths 48% (32) were primigravida with no previous history of stillbirth while nearly one fourth (24 %) had a history of previous abortion.

Gender-Among the intramural stillbirths, 23 (34.8%) were male and 43 (65.1%) were females.

Gestational age– Estimation showed that 55 (83.3%) stillbirths were pre-term (<37 weeks) and only 11 (16.6%) were term.Out of 55preterm,23 (34.8%) were extremely premature (<28 weeks)whereas 32 (48.4%) were having gestational age more than 28 weeks. In stillbirths that occurred at term (37-41weeks), eight(out of 11)had visible birth defects which were diagnosed in antenatal period. The other three had stillbirth due to cord prolapse, intrapartum fetal asphyxia and very poor maternal condition due to acute fatty liver of pregnancy (AFLP).

Birth weight-Most of the stillbirths i.e.56 (84.8%)had low birth weight(<2500gm), only 10 (15.1%) had normal birth weight. Among low birth weightstillbirths,30 (53.5%) were of extremely low birth weight (<1000gm). In extremely low birth weight stillbirths (<1000gm),12 were in a range of 800-1000gm. Out of these 12,nine had pre-eclampsia related still birth and three had premature rupture of membranes. All were delivered vaginally except one who had cesarean (in view of previous two cesareans) with severe preeclampsia.

There were only 4(6.06%) Still Births among multiple pregnancies. Out of these two were extremely premature and two had unexplained intrauterine fetal death (IUFD) at 31 weeks. Almost 90% of these stillbirthswere delivered vaginally. Five patients had cesarean sections withindications such asfetal distress (2), ruptured uterus (1), placenta previa(1) and previous two cesareans (1). Among them four were intrapartum stillbirthsdue to suboptimal care. Analysis of all causes of stillbirths has been mentioned in fig: 1 and table: 3. The causes of still births were hypertensive disorder of pregnancy (21), antepartum hemorrhage (12), prematurity (7), poor maternal condition (5) and others (3). Other associated or contributory factors like patient related/logistic issues which were found to be affecting the final outcome directly or indirectly have also been evaluated (table 3). The main contributory factors werevery low birth weight <1500gm (37), extreme prematurity (22), delayed referrals (22), lack of adequate infrastructure for care of preterm neonates /non willing for neonatal care (17), maternal complications(5) and suboptimal care (4).

The most common cause of intramural stillbirthswas Hypertensive disorder of pregnancy (HDP) which was responsible for all iatrogenic preterm deliveries. All these pregnancies were terminated for saving mothers and their

Table.3 Cause of Stillbirths

Causes of intramural still births	Associated factors	No. of cases	Pro-portion
Maternal causes			
1. Hypertensive disorder of pregnancy	• Lack of adequate number of ventilator and bed in NICU • Non willing for neonatal care • Delayed referral • Poor socioeconomic • Sub optimal care (intrapartum still birth)	**21**	**31.8**
2. Antepartum hemorrhage (APH)	• Lack of adequate number of ventilator and bed in NICU • Suboptimal care due high load of patient • Non availability of Operation theater on time	12	18.1
3. Maternal complications	• Patient related factors • Delay in referring patient to a tertiary care • Lack of transport between secondary & tertiary health levels • Very Poor maternal condition • No cesarean for fetal indication	**5**	**7.57**

Fetal causes			
1. Prematurity	• Inadequate antenatal care • Delayed referral • Poor socioeconomic status • Unexplained	7	10.6
2. Associated birth defect	• Delay in diagnosis i.e. after 20 weeks	18	27.2
Others			
Logistical factors leading to complications	• Sub optimal care • Non availability of Operation theater on time • Delayed referral • Lack of transport	3	4.54

Table 4 Details of still births due to hypertensive disorders of Pregnancy

	<28 weeks	28-34 weeks	>34weeks
<800gms	7	4	0
800-999gms	2	0	0
1000-1499gms	1	4*	0
1500-2499gms	0	1*	2*+
>2500gms	0	0	1*

* lack of ventilator /NICU/ non-willing for care

\+ intrapartum IUFD

fetuses could not be saved due to extreme prematurity, very low birth weight, non-availability of space in NICU/ Nursery, non-willing for NICU care, poor socioeconomic status, suboptimal care and delayed referral. The details of all stillbirths due to HDP has been shown in table: 4.

There were eight still births which were not prevented even with birth weight of>1000 gm with gestational age of >28 weeks. The associated factors were lack of space in NICU and unwillingness of the family for hospital care due to poor socioeconomic status. Two of them had eclampsia which lead to intra partum still births due to delayed referral, non-availability of Operation Theater in time and poor maternal condition. After summarizing all primary causes of still births with contributory factors along with logistic issues the common causes were hypertensive disorders of pregnancy with extreme prematurity, very low birth weight and lack of ventilators/NICU, non-willing for NICU care due to poor socioeconomic status and suboptimal care.

The still birth rate over study period calculated was 63 per 1000 total births and SBR contributed by intramural SB was 11.1 per 1000 birth (17.5%) in which the maximum still birth was in gestation of less than 28weeks.

Discussion

We have critically evaluated all intramural stillbirths and their causes over a period of one year. The main consideration for carefully analyzing each case in such detail was to see whether the stillbirths really were preventable. If preventable then why were they not salvaged despite being in a tertiary care center equipped with all facilities.

Our data showed a very high still birth rate i.e. 63 per 1000 births, which may be due to the tertiary apex referral institute status of the institution for North India where patients come from many surrounding states like Punjab, Haryana, Himachal Pradesh, Jammu & Kashmir and Uttar Pradesh. In spite of the presence of tertiary care hospitals in all these states still there is high load of pre-term fetuses due to non-availability of adequate number of neonatal intensive care units there.

In our study, although we have focused on intramural still births, 82.4% of women had still births before reaching the tertiary health care institute. This is attributed to patient related factors as well as sub optimal care due non-availability of adequate health facilities at the right time and at approachable distances. In India as per the registration of births and death act,1969, it is mandatory to register every birth/still birth and death. But as per census of India the estimate of stillbirths for the year 2010 is as low as (7 per 1000 births) and Karnataka state had highest stillbirth rate i.e. 14 per 1000 births.[4]

It is very difficult to capture the actual number of still births in India and it requires accurate and complete reporting ofdata.[4] In the present study the cause of stillbirths was established in all intramural still births and consent for fetal autopsy for confirmation as well as for any missing findings was offered to the family. Most of the parent refused autopsy due to their religious beliefs, ignorance, grief or superstitions. Overall Autopsy rate for our institute was around 42%.

Only 66(17%) still births could reach tertiary care with live fetuses but during their course of management in the hospital, they had intrauterine fetal death**.** The primary causes of stillbirth were hypertensive disorders of pregnancy, birth defects, prematurity and poor maternal condition. The associated factors other than obstetric complications were patient related factors, delayed referrals, lack of adequate infrastructure for care

Table :5 Details of contributory factors in Stillbirths

Patient related factors	Causes of sub optimal care
• General health of a woman before pregnancy (adolescent health) • Education status of a woman • Gender inequality • Poor socioeconomic status • Never initiated antenatal care • Non compliance • Only received Tetanus toxoid by ANM • Delay in seeking medical care • Inappropriate response to medical advice • Non willing for fetal care	• Staff shortage(doctors as well as nurses) with high load of patients • Lack of adequate health care at approachable distances. • Inadequate facilities in nursery /NICU • Inadequate ICU/HDU facilities for sick women • Delay in referrals from secondary/tertiary health care center • Non willing for medical care due to poor socio-economic status

of preterm neonates/nowillingness for neonatal care, maternal complications and suboptimal care. Inpresent study most of the stillbirths(59%) were preterm and with optimal health care, adequately functioning nursery and NICU facilities, these fetuses could have been saved. This number was very high as compared to high income countries where very few preterm fetuses are at a risk of death.[5]

Globally out of 2.6 million stillbirths, 16% are attributed to HDP and among them only 5% are associated with pre-eclampsia[6].In ourstudy, maternal complications associated with Hypertensive disease of pregnancy was the commonest cause for intramural still births (32%) and among them more than 90 % of women had pre-eclampsia. Five (7.5%) of these still births were due to very poor maternal condition. Among them 4 had AFLP (Acute Fatty liver of Pregnancy) in DIC (Disseminated intravascular coagulation) and one had fulminant Hepatitis E.In all of the cases cesarean section was not done for fetal indications although their gestational age was more than 34 weeks. The most important factor attributed to this was delayed referral from secondary to tertiary care and very poor general conditions of women.

There were 5(7.5%) intrapartum stillbirths due to sub optimal care which was due to delayed referral from peripheral health care center, delay in seeking medical care and transport and poor socioeconomic status. There were also delays in providing appropriate treatment on time due to non-availability of operation theater facilities (due to high load of patients). Ashish Kc et al have also evaluated the causes of all intrapartum stillbirths and found associated factors like poor socioeconomic status, lack of antenatal care, lack of fetal heart rate monitoring protocols, lack of partogram use, prematurity and multiple births[7]. In a study by Bangal Vidyadhar et al, sociodemographic factors were also reviewed along with obstetrics causes and they found illiteracy, rural residence, lack of antenatal care and low socioeconomic status were associated with stillbirths. [8]

In present study we have also found many contributory factors which have played a significant role in causing stillbirths and can be divided into patient related factors and suboptimal care **(table:5.)**

In a systemic review by Upadhyay et al. they have also found factors like delay in seeking care (28%), delayed referrals (18.3%) and delay in receiving appropriate treatment in a health facility (38.7%) which have contributed to neonatal deaths.[9]In this study, 33% of stillbirths were attributed to delayed referrals.

We have focused on all preventable stillbirths which were not prevented in a tertiary care center but the real etiopathogenesis which ultimately led to final event had started much earlier. The most important determinant for the well being of a baby is the health status of the mother before, during and after the pregnancy. And that's why the health of a girl is the most important component which directly affect the survival of a prospective mother and growth and development of her children.[10] In India as per National Family health survey -4 (NFHS-4) there are marked achievementsin health status as well as nutrition when compared to NFHS- 3 but still long way to go.[11] As per NFHS-4 , 50% of all pregnant women are still anaemic (Hb<11g/dl) whereas 22.9% of women are undernourished having BMI less than 18.5kg/ m^2.

So prevention of still births is not inevitable if we could improve the health status as well as the wellbeing of women in society. Health of a women depends upon her rearing since her birth to her education as well as her empowerment. During pregnancy, early detection and management of obstetric complications like hypertension

and diabetes and timely referral to higher center. Optimal care plays an important role in intrapartum period to prevent still births. Optimal health care is feasible only if adequate health facilities and resources are available at right time and at approachable distances. There is a genuine need to improve our health system by providing adequate resources for optimal obstetric and neonatal care. Perinatal mortality and morbidity can be significantly decreased in women who have access to a tertiary care facility even in developing countries.

In conclusion the common causes of stillbirths are hypertensive disorder of pregnancy, birth defects, antepartum hemorrhage and prematurity. Along with pregnancy related medical complications, other causes like patient related factors, illiteracy, poor socioeconomic status, logistic issues in accessing health care facilities and delayed referral has a significant role in causing stillbirths. Most of these causes are preventable if basic health care and quality health monitoring is made accessible and affordable to all women from pre-pregnancy period onward till the delivery of a healthy baby. There is a genuine need to conduct more studies in developing countries to find out the root cause of still births so as to prevent all these preventable stillbirths.

Conflict of interest

The authors declare that there is no financial or nonfinancial conflict of interests.

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ORIGINAL ARTICLE

Factors Causing Stress among Medical Students in a Private Medical College in Puducherry, India

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Abstract:

Introduction: Medical education has been reported to be one of the most stressful academic curricula worldwide, negatively affecting the physical and mental health of medical students. This study therefore has been planned to identify the prevalence of psychological stress and possible factors responsible for it among undergraduate medical students so that, appropriate intervention strategy can be proposed to reduce psychological stress.

Material and Methods:

A cross sectional study was conducted among undergraduate medical students of private medical college, Puducherry using a pre-tested, pre-designed and standard questionnaire to collect data and it is analyzed using suitable statistical methods.

Results:

Out of total 160 students, 86.87% of students have reported stress. Among them 72.50% had mild to moderate stressor experience and 14.37% had severe stressor experience. III[rd] MBBS students were more stressed 95% followed by IV[th] MBBS /CRRI students 85% and II[nd] MBBS students showed stress up to 82.5%. Majority of the students had severe stress because of increased work load towards exams, more self study, required to be more responsible, less time for repeated learning, worried about future & becoming good doctor and habit of postponing work.

Conclusion:

In our study, more than two third of the medical students have reported to be stressed. Hence, we can motivate the students to involve in extra- curricular and co-curricular activities such as yoga, sports, etc., to cope up stress.

Key words: Stress, medical students, India.

Introduction

Stress is a term that refers to the sum of physical, mental and emotional strains or tensions on a person. The term 'stress' was first employed in the 1930's by the endocrinologist Hans selye.[1]

A secondary high school student gets transformed into a doctor in a medical college. However, it is observed that the medical students undergo tremendous stress during their course. [2] Medical education has been reported to be one of the most stressful academic curricula worldwide, negatively affecting the physical and mental health of medical students.[3]By different studies conducted worldwide among medical students it have been reported that the prevalence of stress ranging from 27-73%.[2,4,5,6,7,8]

Studies investigating stress among Indian medical students report wide variations in the prevalence of stress (37.3–97%).[3] Indian children have high regards for their parents and hence need their advice and enroll in professional courses to fulfill the dreams of their parents and well wishers. Majority of students are forced to pursue a career that is not their choice. The professional educational program is highly stressful. Getting into the medical school is a matter of pride in India, but the challenges faced by students of being in medical school are often overlooked. Many studies have described the stressors of medical training and the associated negative consequences on the mental and physical health of medical students. [9, 10, 11, 12]

A Medical student generally faces different kinds of stressors such as vastness of academic syllabus, homesickness,

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high parental expectations & lack of time for recreation etc. [13] Few local factors are like new environment, hard challenging studies, new friends, teachers, the teen tender age.[14] The majority of stressful incidents in traditional curricula are related to medical training rather than to personal problems.[15,16]

The training period for medical students is a constantly changing environment of 5 to 6 years, to ensure that graduates gain sufficient skill which itself is long, exhausting & stressful. Some aspects of the training have been found to have negative effects on the student's life, which manifest in the form of stress, depression and burn out. These students may have poor learning ability and academic performance as they also face social, emotional, physical and family problems. Emotional problems are closely associated with substance abuse, personality changes and even suicide attempt. [17] As a consequence, students have reported feelings of inadequacy and dissatisfaction with clinical practice in the future. This may affect the lives of patients and the health of a community. Moreover, stress has also been linked to medical student suicide,[19]drug abuse[19,20] and alcohol use.[21]Retrieving knowledge about presence of stress is therefore important in itself and if found should be given attention for timely intervention like, changing the syllabus & exam pattern and adding co & extra- curricular activities.[22]

Studies on psychological morbidities are very few in our union territory and not many have been conducted at the medical colleges in Puducherry. This study therefore has been planned to identify the prevalence of psychological stress and possible factors responsible for it among undergraduate medical students. So that appropriate intervention strategy can be proposed to reduce psychological stress and enhance student's abilities as said in a study done by Bansal *et al*.[23]

Material and Methods

A Cross sectional study was conducted among undergraduate medical students of private medical college, Puducherry. The target population was undergraduate students of years (2nd -final phase, 3rd-1st and 3rd-final, Compulsory Rotatory Residential Internship (CRRI)) currently enrolled in private medical college, Puducherry during the study period. Taking into consideration the prevalence of anxiety and depression from various studies conducted previously at approximately 40%, the sample size has been calculated using the statistical formula 4pq/L2 (where allowable error has been assumed as 20%).[4,7,8,24] Thus our sample size came as 160. Then by lottery method, equal numbers of students were chosen from each year as the number of enrollment in first year was the same since last five years in undergraduates. The questionnaire was revised according to results of pilot study.[25] Data collection spanned over the month of August 2017. Verbal consent and ethical committee clearance was obtained from the students and management respectively, before handing over the questionnaire.

The data for present study was obtained through a pre-tested, pre-designed and standard questionnaire related to psychological stress.[25] The questionnaire consisted of 25 item list which was administered to a sample of 160 students for study. The options given were 'strongly disagree', 'disagree', 'neutral', 'agree' and 'strongly agree'. The response strongly disagree had assigned a value of zero and strongly agree the highest score four. Score less than or equal to 2 is considered as no stressor and score greater than 2 is considered as a stressor for individual factor.

Pre – tested, self administered, anonymous questionnaire were provided to the individual students chosen from each year. They were requested to fill the Performa with full assurance about the confidentiality and anonymity that data would be used only for scientific purpose. The questionnaire was then administered in 160 students and analyzed. The total score for all the questions ranged between 0 and 100. A score less than 50 is no stressor experience, a score between 51 and 75 indicates mild to moderate stressor experience and a score between 76 and 100 denotes severe stressor experience.[26] Data were entered in excel worksheets and analyzed using SPSS version 18.

Results

Total 160 students were enrolled for the study. Out of total these 160 students, 86.87% of students have reported stress. Among them 72.50% had mild to moderate stressor experience and 14.37% had severe stressor experience. (refer fig. 1)

FIGURE-1: Distribution of level of psychological stress among medical students (n= 160)

TABLE- 1: Year wise distribution of psychological stress among medical students (n=160)

Year of M.B.B.S.,	No stress	Mild to moderate stress	Severe stress
2nd Year (Final Phase)	7(33.33%)	28(24.14%)	5(21.74%)
3rd Year (Phase I)	2(09.52%)	31(26.72%)	7(30.43%)
3rd Year (Final phase)	6(28.57%)	29(25%)	5(21.74%)
CRRI	6(28.57%)	28(24.14%)	6(26.09%)
TOTAL	21(100%)	116(100%)	23(100%)

(X^2 value: 3.495, df: 6, P- value: 0.745)

TABLE-2: Gender wise distribution of psychological stress among medical students (n= 160)

Gender	No stress	Mild to moderate stress	Severe stress
Male	10(47.62%)	53(45.69%)	10(43.48%)
Female	11(52.38%)	63(54.31%)	13(56.52%)
Total	21(100%)	116(100%)	23(100%)

(X^2 value: 0.077, df: 2, P- value: 0.962)

TABLE-3: Residence wise distribution of psychological stress among medical students (n= 160)

Residence	No stress	Mild to moderate stress	Severe stress	Total
Day scholar	14 (16.87%)	56 (67.47%)	13 (15.66%)	83 (100%)
Hostel	7 (9.09%)	60 (77.92%)	10 (12.99%)	77 (100%)

(X^2 value: 2.641, df: 2, P- value: 0.267)

Among 2nd Year (Final Phase) students 33.33%, 24.14% and 21.74% of them have no stress, mild to moderate stress and severe stress respectively. 3rd Year (Phase I) students 09.52%, 26.72% and 30.43% of them have no stress, mild to moderate stress and severe stress respectively. 3rd Year (Final phase) students 28.57%, 25%, and 21.74% of them have no stress, mild to moderate stress and severe stress respectively. Among CRRI 28.57%, 24.14% and 26.09% of them have no stress, mild to moderate stress and severe stress respectively. (refer table 1)

Among male students 47.62%, 45.69% and 43.48% and among female students 52.38%, 54.31% and 56.52% of them have no stress, mild to moderate stress and severe stress respectively.(refer table 2)

Among day scholar 16.87%, 67.47% and 15.66% of students have no stress, mild to moderate stress and severe stress respectively and among hostel students 9.09%, 77.92% and 12.99% of them have no stress, mild to moderate stress and severe stress respectively.(refer table 3)

Majority of the students had severe stress because of increased work load towards exams (83.75%), more self study (81.88%), required to be more responsible (81.88%), less time for repeated learning (80%), worried about future & becoming good doctor(78.75%), Procrastination(habit of postponing work) (75.63%), clinical demonstrations are inadequate such as materialistic difficulties (73.13%), vast syllabus & Tough topics(68.13%), difficulty in studying portions daily(66.88%), tight schedule(66.25%), problems in memorizing topics(58.13%), not getting enough time for drawing and writing records(54.38%), covering topics very fast(53.75%), even after trying best, not getting expected marks(53.75%), fear of becoming additional or batch out or repeater(53.13%), stressed from parents high expectations(50%) and unable to answer the questions from the teachers(50%).(refer fig 2)

Among Second year (final phase), most common stressor is increased work load towards exams which accounts for 82.5%.Among Third year (first phase) and CRRI, most common stressor is required to be more responsible which

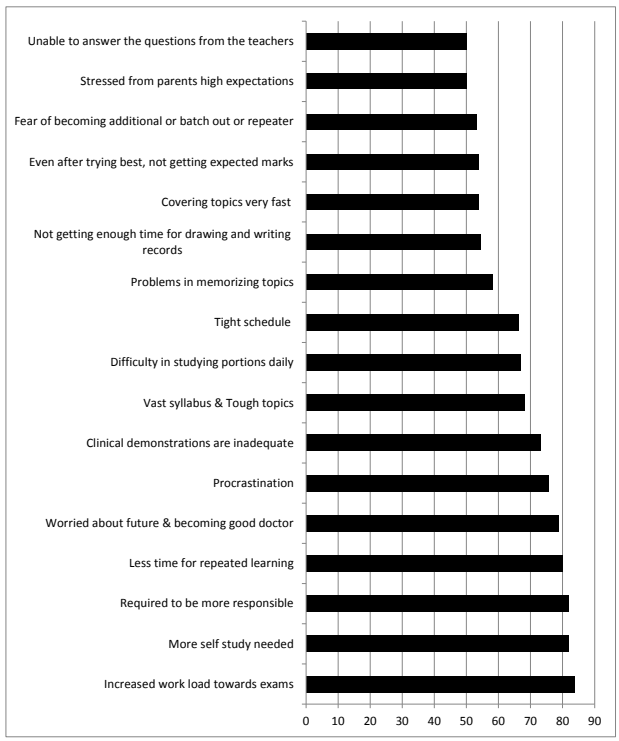

FIGURE-2: Distribution of important stress factors experienced by medical students (n= 160)

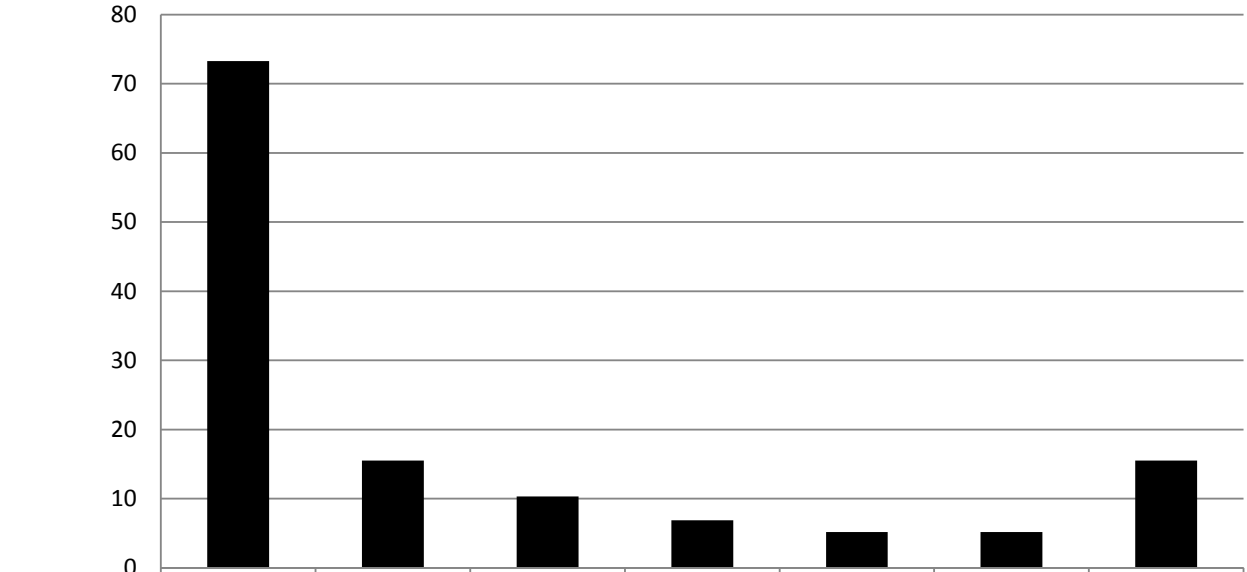

FIGURE-3: Ways to overcome stress suggested by medical students

accounts for 97.5% & 92.5% respectively. Among Third year (final phase) students, most common stressor is more self study needed & Procrastination (habit of post-poning routine work) which accounts for 77.5%.

Among 160 students, 116 (72.5%) of them responded for the question, what do you do to get rid of stress? Multiple responses were given by many students. Ways to overcome stress suggested by students are entertainment, recreation, sleep, using phone, social media, playing mobile games, chatting & outing with friends, exercise and yoga. Other activities are gardening, dancing, singing, writing stories, talking with mother, going out with parents, reading novel, car drive, staying alone, alcohol and smoking.(refer fig.3)

Discussion

Medical education renders significant amount of stress to the students. In our study we found that 139 out of 160 (86.87%) students felt stress during their MBBS course, 23 (14.37%) of students are having severe stress, while 21(13.13%) of students had never felt themselves stressed at all. Shahida et al, [27] found the high prevalence of stress in medical students as 85%.

At the time of our study first year M.B.B.S., students had university examination so, we have excluded them from our study.

In our study IIIrd MBBS students were more stressed 95% followed by IVth/CRRI MBBS students 85%. While IInd MBBS students showed stress up to 82.5%.Shaikh BT *et al,* [28] noted that the senior students of the fourth and final year feel more stressed 95% and 98% respectively.

The percentage of stress in female is higher in our study (mild to moderate stress 54.31% and severe stress 56.52%), when compared to male, but it is not statistically significant. In a study done by Wafaa yousif et al, shows similar findings that female students had more stress compared to male which was significant statistically. [29]

Similar observation has been reported in the study done by H.M. Chauhan et al, where medical students involve themselves in recreational activities to overcome their stressors. [13]

The study revealed that Medical students have stress not only because of medical education but also due to their traditional life style i.e. less time for sports and for recreation, etc. Hence there is a need to intervene in to the causative factors of stress. Medical Council of India also suggests foundation course of 2 months duration after admission in to Medical College to prepare a student to study medicine effectively. [30]

In recent years the concern about stress during tenure of undergraduate medical training has increased. Various published literatures have documented high levels of distress among undergraduate medical students. Stress along with social, emotional, physical as well as family problems may hamper the learning ability and academic

performance of a student. Excessive stress may cause mental and physical problems and may negatively affect the academic achievement of the student. In most of medical students the performance in college and university level examination is the major stressor.[31]

The formative and summative examination forms integral part of evaluation of students. Though examinations are necessary to motivate the students to study and achieve the desired goal of medical education. The vast syllabus, voluminous textbooks, pattern and frequency of examinations leads to stress among medical students. Examinations may precipitate stress in the students who consider it as burden, while it is useful who consider as a tool in taking corrective steps in learning. Studies of other academicians have also reported examinations as common source of stress in medical students.[32] Psychosocial factors may also act as stressor. The quality of parental care and high expectance from parents are also contributory factors to stress.

Student counseling and informal mentorship is need of hour. Stress management workshops, soft skills development techniques at the entry of medical career would be helpful. Relaxation techniques like meditation, yoga and involvement in physical activities like outdoor sports can be recommended as stress busters. Review academic curriculum & exam schedules, changing the exam pattern, adding some recreational activities, better interaction with the faculty and proper guidance, will help them to cope up with stress.

Conclusion

In our study, more than two third of the medical students have reported to be stressed. This observation was confirmed by various other studies, that prevalence of stress among medical students is relatively high. The most common reason for stress was reported to be academic oriented problems. We may suggest the medical personal to have better interaction with the students, giving proper guidance and counseling measures to reduce stress. Family support will be an alternative tool to help the medical students to overcome stress in their life.

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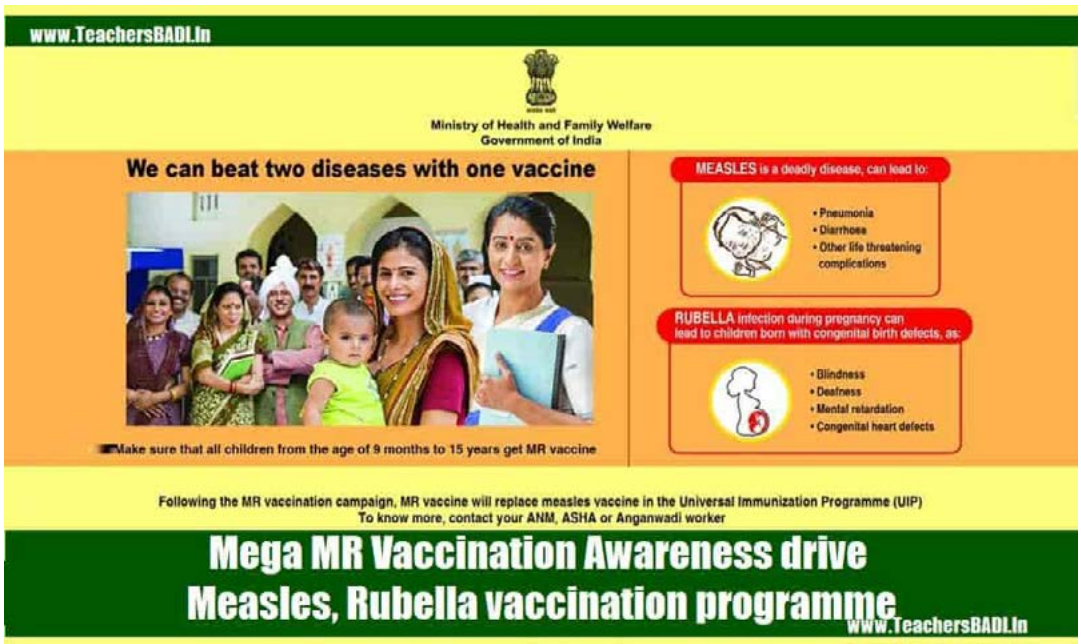

ORIGINAL ARTICLE

Barriers and Facilitators to Seek Treatment for Gynecological Morbidity among Women from Urban Slums in Pune, India

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Abstract

Background: The high burden of gynecological morbidity along with poor treatment seeking practices indicate the need to identify barriers and facilitators for treatment seeking.
Methods: A community based study using mixed methodology was conducted among women in reproductive age group in slums of Pune city. A pretested semi open ended questionnaire was used to record data on sociodemographic variables, symptoms of gynecological morbidity, domestic violence, autonomy and treatment seeking. Data were analysed using logistic regression analysis. Reponses to in-depth interviews were analysed using grounded theory.
Results: Out of the 202 women recruited in the study, 116 (57%) reported symptoms of gynecological morbidity of which 64 (55%) reported to have sought treatment. The factors significantly associated with treatment seeking were: discussing symptoms with husband [p=0.001, OR=6.99 (2.11 - 23.12)]; having a role in decision making for major household purchase [p=0.005; OR=4.36 (1.54-12.32)] and reporting four or more symptoms [p=0.015; OR=4.57 (1.34-15.61)]. In-depth interviews identified barriers and facilitators at individual, family, community and health service levels.
Conclusion: There was a high prevalence of self-reported gynaecological morbidity amongst women in urban slums and only half of symptomatic women reported to have sought treatment for their symptoms. Women empowerment, health education and initiatives planned under National Urban Health Mission such as linkages with health care set up through ASHAs and community based groups and appointment of lady medical officers and gynecologists at Urban PHCs will facilitate treatment seeking.

Key Words: Gynecological morbidity, Treatment seeking, National Urban Health Mission

Introduction

Reproductive health came to the forefront as a basic human right during the International Conference on Population and Development in 1994.[1]Within the gamut of reproductive health, countries have tried to address issues related to obstetric morbidity and family planning while gynecological morbidity remains a neglected issue.

In India, studies have reported a prevalence of reproductive morbidity ranging from 40% to 85% [2-5] and Reproductive Tract Infections (RTIs) ranging from 24% to 69%.[6-10] Some studies which have focused on gynecological morbidity have also reported high prevalence ranging from 45 % to 76%.[11, 12] However there has been a culture of silence for reproductive needs of women in marginalized communities.[13]

Gynecological morbidity includes RTIs, menstrual disorders, prolapse, infertility and Urinary Tract Infections (UTIs). These health conditions can be easily diagnosed and treated and without appropriate treatment, these conditions can have long term serious implications - RTIs leading to infertility and ectopic pregnancy, menorrhagia leading to anaemia, psychosocial effects of prolapse and dysmehorhoea.

The inception of National Urban Health Mission (NUHM) [14] gives an opportunity to reach out to women in urban slums who represent a marginalized community. Our study aims

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to identify barriers and facilitators for treatment seeking for gynecological morbidity in women in urban slums. This will help identify ways of improving treatment seeking for these symptoms under NUHM.

Materials and Methods

Design: Community based study using mixed methodology in which quantitative methodology was used in the first phase followed by the qualitative methodology.

Setting: The study setting were the slums registered under Pune Municipal Corporation. There are 477 slums in 14 administrative wards.

Study population: Ever married women in reproductive age group (15 to 45 years)

Exclusion criteria: Pregnant and puerperal women

Pilot study: A pilot study was conducted among 30 women in Ambedkar Vasahat, Mangalwar Peth to calculate the sample size, pre- test the questionnaire and in-depth interview schedule and identify criteria for selecting women for in-depth interviews. The data collected in the pilot study were not included in the final study sample.

Sample size: In the pilot study, 53% (16/30) women reported one or more symptoms of gynecological morbidity. Of them 8 (50%) reported to have sought treatment from formal health care providers. Considering p=50, a relative error of 20% and 95% confidence interval the sample size for women with gynecological morbidity was calculated to be 100. As the prevalence of gynaecological morbidity in the pilot study was 53%, 200 women would have to be contacted to identify 100 women with gynaecological morbidity. Assuming a non-response rate of 10% the final sample size was worked out to be 220 women residing in urban slums.

Sampling technique: Multistage cluster sampling was used with administrative wards as first stage units, slums as second stage units and households as third stage units of selection. In the first stage ten wards were selected from the 14 administrative wards in Pune city by simple random sampling. In the second stage, two slums were selected from each ward by simple random sampling using the ward-wise list of slums for these ten wards. In the third stage the first household in each slum was selected randomly and each consequent house was approached to identify eligible and consenting women till the required sample size for the slum pocket was met. If a house was found locked, it was skipped and the next house was chosen in the sample. If a house had more than one eligible woman, all were invited to participate in the study. A total of twenty slums were selected and 11 women from each slum were contacted in the survey.

Period of data collection: October 2014 - March 2016

Methodology: The study was done in two phases:

- **Phase 1: Quantitative methodology:**

Tool: A pretested semi open ended questionnaire was used to conduct the interviews.

Study Variables: Data about background characteristics were collected from the respondents. In those reporting gynecological morbidity, data regarding the symptoms, its impact on daily routine and marital relations, discussion with husband and details about treatment seeking were collected.

Gynecological morbidity: This included symptoms pertaining to gynecological morbidity and menstrual problems. The respondents were asked for any symptoms related to reproductive tract infections, menstrual complaints, prolapse, infertility and urinary complaints in the past six months. The study did not include symptoms pertaining to obstetric morbidity and contraceptive morbidity.

Treatment seeking practices:

Women were asked about treatment seeking for each symptom. Women who reported to have visited a formal health service provider for the symptoms of gynecological morbidity were categorized as having 'sought treatment.' Public or private health service providers from allopathic and AYUSH systems of medicine were considered as formal health providers. Those who had taken over the counter drugs or household remedies and not sought any treatment were categorized as having 'not sought treatment.' In case of women with multiple symptoms, those who reported to have visited a formal health service provider for at least one symptom were categorized to have 'sought treatment'. The women who had not visited a formal health service provider for any of the symptoms were categorized as 'Not sought treatment'.

Analysis: Descriptive statistics are presented as proportions. The primary outcome was treatment seeking for symptoms of gynecological morbidity. The association of various variables with treatment seeking were assessed using chi square test. To identify factors independently associated with treatment seeking, multivariate logistic regression model was used. Variables with a p value of < 0.10 on univariate analysis were included in the multivariate analysis. The statistical analysis was done in SPSS version 16. In the multivariate logistic regression model a p value of less than 0.05 was considered to be statistically significant.

- **Phase II: Qualitative methodology**

In the pilot study three categories were identified for in-depth interview:

a. Women who did not think treatment was necessary: Questions to identify reasons for not perceiving the need for treatment

b. Women who thought treatment was necessary but did not seek treatment: Questions to identify barriers for treatment seeking

c. Women who had sought treatment: Questions to identify facilitators for treatment seeking

During the household survey, women from these three categories who were willing to spare one hour for in-depth interviews the next day were invited to participate in the second phase of the study. Appointments were taken after finalizing the timings of the interview and in-depth interviews were conducted on the next day.

Privacy and confidentiality were ensured during the interview. A pretested interview schedule was used to conduct in-depth interviews. One investigator conducted the interview while two investigators noted down the responses. The interviews were conducted in Marathi language, transcribed within 48 hours and translated to English before coding.

Analysis: All the interviews were transcribed and coded. The codes were grouped into subthemes under the three major themes already identified in the pilot study.

Ethical approval: This study was reviewed and approved by the ethics committee of B. J. Government Medical College. Written informed consent was obtained from each respondent. Treatment options were discussed with all symptomatic women and they were referred to Corporation dispensaries and Sassoon General hospital for further management.

Results

A total of 215 women were contacted in the study setting. Of these, 13 (6%) did not give consent to participate in the study.

A total of 202 (94%) women were recruited in the study. Of these, 116 (57%) reported one or more symptoms of gynecological morbidity. A total of 90 (45%) women reported menstrual complaints and 58 (29%) reported symptoms of RTI; 14 (7%) respondents had urinary symptoms; 8 (4%) reported prolapse and 5 (2%) said they had infertility. The common symptoms were pain during menstruation (n=53, 26%) and vaginal discharge (n=51, 25%).

Among the women reporting gynecological morbidity, 32 (28%) women reported one symptom, 48 (41%) reported two to three symptoms, 36 (31%) reported 4 or more symptoms. Twenty nine (25%) women reported that the symptoms had an impact on their routine activities and/or marital relations.

Table 1: Treatment seeking for gynecological morbidity in women from urban slums according to background characteristics

Characteristics	Treatment sought		χ^2 : d.f.	P value
	Yes	No		
Religion (N=116)				
Hindu	47 (53)	41 (47)		
Muslim	9 (50)	9 (50)	2.79; 2	0.247
Buddhist	8 (80)	2 (20)		
Socioeconomic status (N=116)				
BPL	13 (65)	7 (35)	0.94; 1	0.33
APL	51 (53)	45 (47)		
Marital status (N=116)				
Married	53 (53)	48 (47)		
Separated	3 (50)	3 (50)	4.49; 2	0.1
Widow	8 (89)	1 (11)		
Respondents age (N=116)				
15 to 20 yrs	6 (60)	4 (40)		
21 to 30 yrs	32 (50)	32 (50)	5.74 ; 3	0.125
31 to 40 yrs	21 (72)	8 (28)		
41 to 45 yrs	5 (39)	8 (61)		
Respondent's education (N=116)				
Up to lower secondary	59 (54)	50 (46)	0.796; 1	0.372
Upper secondary and above	5 (71)	2 (29)		
Parity (N=116)				
Nullipara	6 (86)	1 (14)	2.81; 1	0.094
≥1	58 (53)	51 (47)		
Husband's age (N=101)				
Up to 45 yrs	48 (55)	40 (45)	1.175; 1	0.278
>45 yrs	5 (39)	8 (61)		
Husband's education (N=101)				
Illiterate	6 (40)	9 (60)	0.78; 1	0.38
Primary and above	47 (55)	39 (45)		
Alcohol – Husband (N=101)				
Yes	26 (68)	12 (32)	6.21; 1	0.013
No	27 (43)	36 (57)		

Table 2: Treatment seeking for gynecological morbidity in women from urban slums according to their status of autonomy, discussion with husband and domestic violence

Characteristics	Treatment sought		χ^2; d.f.	P value
	Yes	**No**		
Respondent's gainful employment (N=116)				
Yes	22 (58)	16 (41)	0.169; 1	0.681
No	42 (54)	36 (46)		
Role in decision making - Purchasing major household items (N=114)				
Yes	41 (64)	23 (36)	5.51; 1	0.019
No	21 (42)	29 (58)		
Allowed to have some money set aside that you can use as you wish (N=114)				
Yes	36 (60)	24 (40)	1.15; 1	0.284
No	27 (50)	27 (40)		
Role in decision making - how the money will be used (N=113)				
Yes	44 (59)	30 (41)	1.83; 1	0.176
No	19 (46)	22 (54)		
Discussed with husband (N=101)				
Yes	24 (80)	6 (20)	12.96; 1	0.00
No	29 (41)	42 (59)		
History of domestic violence in the past one year (N=101)				
Yes	8 (47)	9 (53)	0.24; 1	0.62
No	45 (54)	39 (46)		

Table 3: Treatment seeking for gynecological morbidity according to number of symptoms, impact on routine activities/marital relations and contraceptive use.

Characteristics	Treatment sought		χ^2; d.f.	P value
	Yes N (%)	No N (%)		
Number of symptoms (N=116)				
≥4	27 (75)	9 (25)	8.29	0.004
Up to 3	37 (46)	43 (54)		
Impact on routine activities and/or marital relations (N=116)				
Yes	20 (69)	9 (31)	2.97;	0.08
No	44 (51)	43 (49)	1	
Current contraception (N=116)				
No	23 (66)	12 (34)	2.25;	0.13
Yes	41 (51)	40 (49)	1	
Current contraception (N=116)				
No contraception	23 (66)	12 (34)	2.25;	0.32
	33 (51)	32 (49)	2	
Permanent	8 (50)	8 (50)		
Temporary				

Of the 116 women reporting symptoms of gynecological morbidity, 64 (55%) reported to have sought treatment. On univariate analysis, none of the background characteristics were associated with treatment seeking for gynecological morbidity. Women who reported that their husband's consumed alcohol were more likely to seek treatment for gynecological morbidity. (Table 1) Discussion about symptoms with husband was significantly associated with

Table 4: Logistic regression analysis to identify factors associated with treatment seeking for gynecological morbidity among women in urban slums

Variables	Groups	Treatment sought		Univariate logistic regression analysis		Multivariate logistic regression analysis	
		Yes	**No**	**P value**	**OR (95%CI)**	**P value**	**OR (95%CI)**
Parity	**Nullipara**	6 (86)	1(14)	0.09	5.28 (0.614-45.30)	0.63	2.29 (0.08-66.87)
	≥1	58 (53)	51 (47)				
Alcohol consumption in husband	**Yes**	26 (68)	12 (32)	0.01	2.89 (1.24-6.74)	0.08	2.49 (0.90-6.89)
	No	27 (43)	36 (57)				
Impact on daily routine and/or marital relations	**Yes**	20 (69)	9 (31)	0.08	2.17 (0.89-5.30)	0.21	2.14 (0.65-6.99)
	No	44(51)	43 (49)				
Discussed with husband	**Yes**	24 (80)	6 (20)	0.00	5.79 (2.10-15.94)	0.001	6.99 (2.11-23.12)
	No	29 (41)	42 (59)				
Role in decision making – Major purchase at home	**Yes**	41 (64)	23 (36)	0.02	2.46 (1.15-5.26)	0.005	4.36 (1.54-12.32)
	No	21 (42)	29 (58)				
No. of symptoms	**≥4**	27 (75)	9 (25)	0.004	4.69 (1.84-11.99)	0.015	4.57 (1.34-15.61)
	Up to 3	37 (54)	43 (46)				

treatment seeking behavior. Role in decision making for major household purchase was significantly associated with treatment seeking. Other aspects of women's autonomy and domestic violence were not significantly associated with treatment seeking. (Table 2) Impact on routine activities or marital relations and number of symptoms had a significant association with treatment seeking. (Table 3)

On multiple logistic regression analysis, discussing symptoms with husband, having a role in decision making for major purchase at household level and reporting four or more symptoms of gynecological morbidity were found to be significantly associated with treatment seeking. (Table 4) Women who discussed the symptoms with their husband were seven times more likely to seek treatment compared to women who had not discussed the symptoms. Women who said they had a role in decision making regarding major purchase at home were 3.75 times more likely to seek treatment compared to women who did not have any role in this decision making process. Women who reported four or more symptoms of gynecological morbidity were 4.39 times more likely to seek treatment compared to women reporting three or less number of symptoms.

Qualitative methodology

The analysis of responses during in-depth interviews identified several subthemes under the three major themes.

i. Women who did not think treatment was necessary

In-depth interviews were conducted in seven women who reported symptoms of gynecological morbidity but did not think it was necessary to seek treatment. The key sub-themes identified were perception that symptoms were normal, nature and duration of symptoms and wrong beliefs about cause and impact of symptoms.

Perception that the symptoms were normal

Responses such as *'this is not a problem'; this is normal'; do not pay attention', 'do not think too much about it.'* indicate that women thought it was normal to have symptoms.

On further probing to identify reasons why women thought these symptoms were normal the responses were *'many other women have similar experiences', 'the symptoms do not cause a problem'* and *'I do not feel I am sick'.*

Nature and duration of symptoms

The respondents said that as the symptoms were *'mild and intermittent in nature*', *'occurred for a few days'* and '*regressed on its own'* they did not feel the need to seek treatment. Some women believed that as the symptoms had '*started a long time ago there was no need to worry*'.

Women did not seek treatment when the symptoms relapsed after treatment. A 40 year old woman with vaginal discharge and itching said *'One day I applied the tube and the symptoms were gone. Then symptoms returned. Now I wash private parts with hot water and salt.'*

Beliefs about cause and impact of symptoms

Some women had preconceptions about cause of symptoms**.** A few women felt that the symptoms were caused by the operative procedures they had undergone in the past such as tubectomy, medical termination of pregnancy and caesarean section. A few women attributed the cause of the symptoms to oral contraceptive pills, child bearing and increasing age. These women identified the reasons for the symptoms and did not feel anything could be done for treating the symptoms.

A 30 year old illiterate housewife with excessive bleeding and passage of blood clots during the menstrual cycle who had not discussed symptoms with husband said *'eating tamarind causes this problem, my mother in law got tamarind seeds, I roasted them and ate them which led to this problem, had problem only this time. No need of treatment, if I do not eat tamarind seeds I will not have the problem'*

A few women had wrong notions about the symptoms and its potential impact on health.

A 27 year old housewife with excessive bleeding during menstruation said -*'..... dirty blood goes out of the body, it's a good thing.'*

A 26 year old house wife with irregular menses said *'After child birth is completed, after operation, menstrual problems are not considered important.'*

ii. Women who thought treatment was necessary but did not seek treatment

In-depth interviews were conducted in ten women with gynecological morbidity who thought there was a need to seek treatment but had not sought treatment. The reasons identified at individual level for not seeking treatment were lack of time and money, attitudes (embarrassment, neglect, fears), use of over the counter drugs and household treatment and lack of husbands support. The reasons identified at health care service level were overcrowding, male health care provider and cost.

Lack of time and money

A 30 year old woman who had separated from her husband 5 years ago, working as a laborer in the railways with multiple complaints of watery discharge with itching, prolapse and menstrual complaints said. *'I do not have time and money to visit a doctor. I have holidays only on Sundays. On other days I will lose my daily wages.'*

Attitudes

Some women said they felt embarrassed about the symptoms, while a few said they did not seek treatment due to self-neglect. A couple of respondents reported to feel shy and embarrassed to approach a male doctor regarding their symptoms of gynecological morbidity.

A 30 year old housewife with irregular menstrual cycles when asked the reason for not seeking treatment said – *'I have not gone to the doctor just because I have been very lazy.*'

Fears

Women reported fears of *'side effects of medicine'* and *'they will check me from inside*.'

Role of husband

A 25 year old housewife with vaginal discharge and irregular bleeding expects her husband to accompany her to the doctor but feels '*husband has no time, will not take me.'*

Over the counter drugs

A 45 year old housewife with symptoms of RTI said '*One year ago for similar complaints I had sought treatment. With treatment there was relief but six months later again had same symptoms for second time, brought tube from nearby medical shop.*'

Household treatment

A 20 year old housewife who had RTI and prolapse and had discussed it with her sister in law and had sought treatment from the medical college hospital. She was examined and prescribed a pessary for six days which she did not purchase. She said – '*I apply coconut oil, warm water to wash and use a cream which she purchased from the medicine shop*.'

A 40 year old housewife with menstrual complaints and burning micturition since childhood who had not discussed the symptoms with anyone nor sought treatment said- **'***This happens with age. It's normal. I don't have money to visit a doctor. I drink water with sugar and jeera (cumin seeds).'*

Factors related to health care services

Overcrowding

A 20 year old housewife with vaginal sticky discharge said *'I have not been able to visit the health center, it's overcrowded.*'

Health care provider

A 30 year old housewife with vaginal discharge and menstrual complaints said- '*whom should I tell these symptoms? Two months after delivery symptoms started. Did not tell doctor because he was a male doctor, if female doctor would have told, did not pay attention.*'

Cost

A 32 year old woman with menstrual complaints said *'Even if we visit the government dispensary, there are no tests done there. We will have to spend to get the tests from outside.'*

iii. Women who had sought treatment

Ten in-depth interviews were conducted in women with gynecological morbidity who had made attempts to seek treatment for their complaints. The facilitators for treatment seeking included location of health facility, health care provider characteristics, quality of health services, acquaintance as a link to health facility and workplace related factors.

Location of the health care center Respondents said they visited the health care center as it was '*nearby*'.

Health care provider

The characteristics of health care provider which were mentioned by the respondents were gender, specialization, past experiences and recommendation by others. Women said they had sought treatment from a particular health center as it had a female health care provider. A few women said they chose the doctor as she was a 'specialist' (Gynecologist).Past experiences with the health care provider for sterilization and deliveries also played an important role in the decision to seek health care. One woman said she decided to go to a particular doctor because of the feedback people gave about her.

Quality of health services

Reasons mentioned for choosing a particular health care facility such as '*Good behavior and treatment'; 'Effective' ;'Cheap' 'Good medicines- get relief'* reflect the quality of services provided and affordability.

Acquaintance as a link to health facility

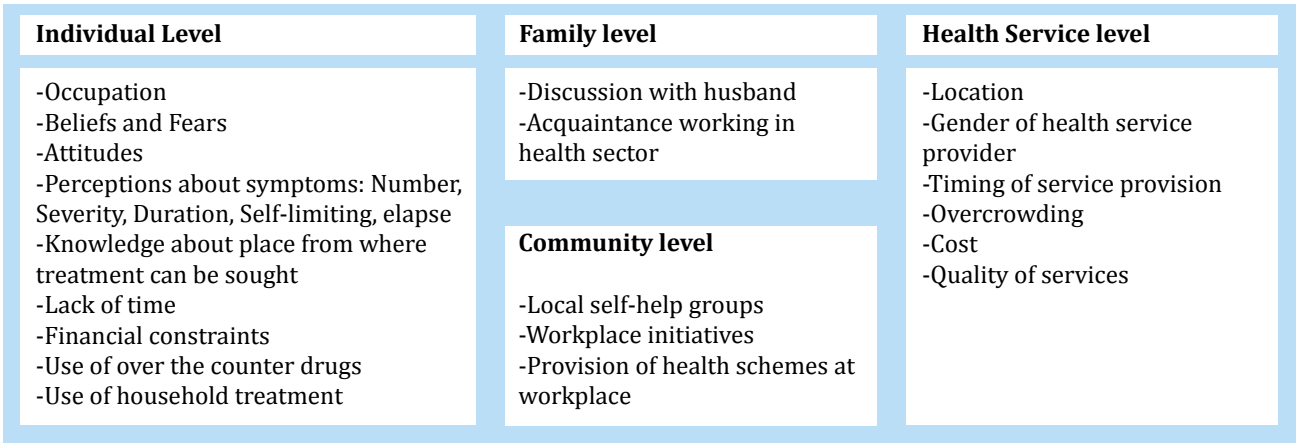
Some women reported a family member or acquaintance working in the health care sector who accompanied them to the health facility.

A 38 year old widow, works as a sweeper with symptoms of RTI and dysmenorrhea said – '*I felt embarrassed. Took treatment from private clinic where my daughter works as a nurse.'*

Workplace related factors

Workplace initiatives like provision of health-cards and health camps acted as facilitators for treatment seeking.

Figure 1: Factors associated with treatment seeking for symptoms of gynecological morbidity among women residing in urban slums in Pune, Maharashtra



A 43 year old sweeper in the municipal corporation reported complaints of prolapse, irregular menstrual cycle and dysmonorrhea. *'I sought treatment from the hospital run by the municipal corporation as I had a health card of the hospital which was provided by the employers.'*

A 38 years old widow who works as a peon in a company reported complaints of dysmenorrhea said *'My Company had organized a camp. A doctor from a private hospital visited our company. I told my complaints there and was treated.'*

The various factors at the individual, family, community and health service levels related to treatment seeking for gynecological morbidity identified in the quantitative and qualitative methodology have been summarized in Figure 1.

Discussion

In our study the prevalence of self-reported gynecological morbidity in the urban slums was 57%. In this study, 55% of the symptomatic women reported to have sought treatment from formal health care providers. A study reported prevalence of 76% of gynecological morbidities among women in urban Nanded, Maharashtra.[12] The prevalence of gynecological morbidities in women of reproductive age group in urban slums of Bhavnagar City was 45 %.[11] A majority of the studies have reported that only 30% of the symptomatic women seek treatment from formal health services. [4, 5, 15-17]

Quantitative methodology identified lack of woman's role in decision making for major household purchase to be a barrier for seeking treatment. Domestic violence, other aspects of autonomy and impact of symptoms were not associated with treatment seeking. In a sub-national representative health survey it was seen that married women's experience of intimate partner violence was negatively associated with seeking treatment. [8] In a study on RTIs in Kerala state it was noted that the acceptance of violence is associated with decreased chance of seeking treatment for ill health.[17] This aspect of acceptance of violence was not included in our study.

Women who discussed their symptoms with husbands were more likely to seek treatment. Other studies have also highlighted the role of husbands as decision makers, escorts or giving permission and money for seeking treatment in women with reproductive morbidity. [18,19,20]

Women with more number of symptoms tend to seek treatment which reiterates the negligent attitude of women which was mentioned during in-depth interviews.

In this study sociodemographic characteristics were not associated with treatment seeking. However in a study based on NFHS (National Family Health Survey) data, factors such as residence, caste, religion, standard of living, education, husband's education, age and parity have been found to be significantly associated with treatment seeking practices.[10] Our study population was largely a homogenous group with respect to many of these characteristics and hence may not have captured the associations.

In-depth interviews identified many barriers and facilitators for treatment seeking. At individual level, perceptions and beliefs about the symptoms, lack of time and money, attitudes and fears and lack of knowledge were identified to be major barriers. Women who had not sought treatment also reported to have taken over the counter drugs and household treatment. Women's perception about their symptoms were major barriers for treatment seeking. Neglecting menstrual complaints after completion of child bearing is a notion which needs to be corrected as it affects their general health status. ASHAs (Accredited Social Health Activists) can educate the women on these issues and facilitate treatment seeking.

An acquaintance who works in the health sector proved to be an important link for symptomatic women to

reach health centers. Under NUHM, ASHAs and self-help groups can be trained to communicate with women and accompany them to the health centers.

Women who were working in health care set up reported to have sought treatment at the place of work. As very few women were working in formal and organized sectors of work, employment was not significantly associated with treatment seeking but workplace initiatives such as health cards and screening camps were identified as facilitators for treatment seeking during in-depth interviews. Women working in formal sectors can be reached through regular screening programs and insurance schemes.

As far as the health services are concerned, long distance, male health service provider, poor quality of services and overcrowding were identified as major barriers. Female health care provider, specialist in obstetrics and gynecology and past experiences with the health care provider for obstetric and family planning services acted as facilitators. In another study, long distance, poor quality of care and no privacy of care were major barriers in treatment seeking.[5] In a study, the commonest reason for not seeking treatment for RTIs was non availability of female doctor at clinic. [18] A study reported that the absence of female providers in the nearby health care centre, lack of privacy, distance from home and cost were the major barriers in seeking health care for reproductive morbidity.[21] In another study limitation of the government health care setup have been described to be long waiting time, distance, poor quality of services, poor attitude of provider, expenses and non-availability of doctor and drugs.[5]

Many of these barriers can be overcome through the initiatives planned to be undertaken in NUHM. Under NUHM it is envisaged to appoint ASHAs and *Mahila Arogya Samitis* (Community Based Women's groups) to promote access to improved health care services.[14] They would act as an effective demand generating link between health facility and urban slum population promoting desired health seeking behavior. Currently ASHA has the function of creating awareness and improving access to Reproductive and Child Health services with a focus on obstetric services and family planning. The topics of RTIs, menstrual symptoms and other gynecological disorders can be included in this package. Under NUHM it is planned to have one U - PHC (Urban- Primary Health Centre) which is to be located within a slum or near a slum within half kilometer radius catering to a slum population of 25000 to 30000 with provision of out- patient services from 12 noon to 8 pm in the evening. [14] Under the mission two doctors will be posted at the U-PHC. Considering the study results one on them could be a Lady Medical officer trained in reproductive health including gynecological disorders. Similarly, under the mission there is a facility to engage services of specialist doctors on contract basis under which gynecologists can be appointed at these health centers. A referral linkage with secondary and tertiary public health services will be needed for management of severe and complicated conditions. The dispensaries and health centers run by local government bodies can be equipped with necessary inputs to provide diagnostic and curative services for management of gynecological disorders.

Conclusion: There was a high prevalence of self-reported gynaecological morbidity amongst women in urban slums and only half of them reported to have sought treatment for their symptoms. This mixed-methods study has identified major barriers and facilitators for treatment seeking among women with reproductive morbidity in an urban slum**. W**omen empowerment, health education and initiatives planned under NUHM such as linkages with health care set up through ASHAs and community based groups and appointment of lady medical officers and gynecologists at Urban PHCs will facilitate treatment seeking.

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SHORT COMMUNICATION

Kiran Clinic: Community Owned Primary Health Care - A Case Study from Rural Wardha

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Abstract

Background: Primary health care is the right of each and every human being. One of the innovations in making primary health care available to the community is the community owned primary health care clinics (Kiran clinics) functional in the villages of field practice area of Department of Community Medicine at Mahatma Gandhi Institute of Medical Sciences (MGIMS), Sewagram. This case study aimed to document the process of formation and evolution of one of such Kiran clinic (KC) with a focus on identifying the facilitating factors for evolution and sustainability of the KC.

Material and methods: In this qualitative study, In depth interview (IDI), observations of Kiran clinic day and meetings of management committee meetings were undertaken. All the IDI were tape recorded, transcript prepared and analysis was done manually.

Results: Facilitating factors for evolution and sustainability of Kiran clinic in Salod village were voluntary participation, community dialogue, capacity building of committee members, knowledge and ownership of committee members, transparency in work/quality monitoring, and quality services responsive to health need.

Conclusions: Kiran clinic is a socially acceptable, feasible and a sustainable model for provision of required health services to villagers.

Key words: Kiran clinic, case study, rural Wardha

Introduction

Primary health care is "essential health care made universally accessible to all individuals with full community participation at a cost that community and a country can afford". Since 1974 we are trying to attain this primary health care for people. This concept of primary health care was started in India with Bhore committee in 1946. This is the goal of public health system and provided in from the village level where health facility exists. The villages which did not have road connectivity had difficult immediate access to primary health care. There are some innovations in India to provide primary health care to people at village level called community based primary health care like in Jamkhed, Gadchiroli.[1,2]

One of the innovation of community owned primary health care is Kiran clinic which was established by Department of community medicine of rural medical college in the period of Community led initiative for Child Survival (CLICS) in the field practice area in 2003.[3] CLICS project ended in 2009. Usually routine services given under any research project collapses after end of project. But these Kiran clinics were continued and sustained over the period of 10 years. It is a collaborative partnership between Department of Community Medicine and the community of village wherein department only provides technical support in the form of doctor and nurse staff. Total ownership lies with members of clinic management committee and community. Kiran clinic in Salod village is one of them it not just sustained but evolved in the form of increased number of basket of services, faith and response of villagers over the period of 10 years. So we wanted to document this study in the form of qualitative descriptive explanatory case study with the following objectives

1) To understand the process of formation and evolution of Kiran clinic in Salod village

2) To understand facilitating factors for evolution and sustainability of Kiran clinic in Salod village

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Methods

We conducted total five In-depth Interviews of Kiran clinic management committee, three key informant interviews and six client surveys. These were complimented by observations of two clinic days and two clinic management committee meetings (Table 1). Purposive sampling method was applied to select the respondents. Tool guide was prepared for interviews which included domains and sub domains of process of formation, human resources, challenges in formation, evolution, services, financing, facilitating factors. Tool guide was also prepared for client survey which included quality of services, fee structure and satisfaction level. IDI were conducted by junior residents in the department of community medicine. The date, time and place were finalized through discussion with the respondents according to their convenience.

All the IDI were tape recorded with the prior permission of the respondents, transcribed and coded. Interviews were analyzed by co-authors. Content analysis was done to obtain basic description of events, sequencing and categorization of data into main themes, facilitating factors in formation and sustainability of Kiran clinic.

Table 1: Study participants

Levels	Study participants	No. of interviews
Clinic management committee	Chairperson	1
	Secretary	1
	Members	3
Key informants	Sarpanch	1
	Auxiliary Nurse Midwife	1
	Community volunteer	1
Client survey	Diabetic patient	2
	Hypertensive patient	2
	Other patient	2

Results

I) Process of evolution of Kiran clinic:

1) Formation of Kiran clinic

Formation of Kiran clinic is depicted in following flow chart. (Fig.I)

2) Generation of revolving fund and its utilization

The fund used for this clinic was raised from

a) Registration fee- The registration fee was decided by the members of the clinic management committee. (Rs. Rs. 5 to Rs. 10 for non members and 2 to Rs.3 for members).

b) Drugs sale- Clinic management committee decides rate of sale of drugs (10% over the cost of drug purchase). Some amount from fund is used for purchase of drugs for next week clinic. The small profit from this clinic is added to the health fund of village. It is utilized by committee members for various health activities at village level e.g Mahila melava, kishori melava, banners showing health massages.

3) Human resources-

Volunteers from community had been given training regarding various diseases, maintenance of stock book and expenditure book for the management of Kiran clinic at department of community medicine every month and

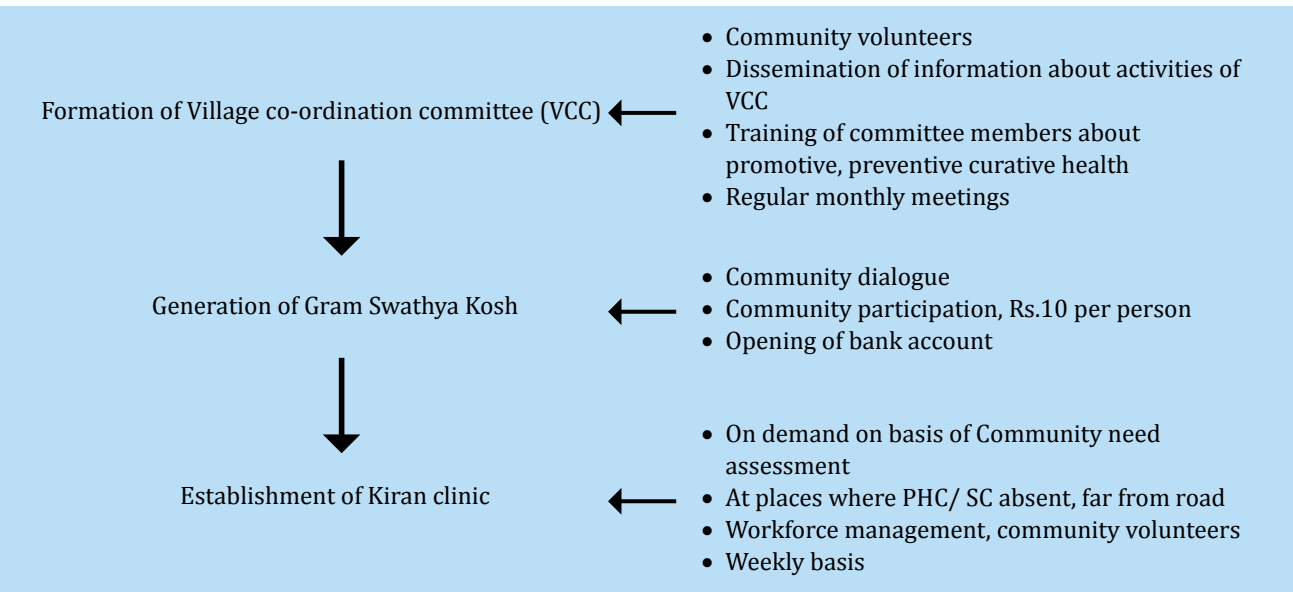

Fig. I Flowchart showing formation of Kiran clinic

these volunteers used to run clinic on one day of a week with no honorarium till 2008. Then afterwards these community volunteers are given minimum honorarium. (Rs. 50 per clinic and Rs. 2 per patient)

4) Services provided:

1. Affordable quality health care services by treating minor ailments & providing first aid

2. Antenatal care, postnatal care, immunization involving government health service provider at village level

3. Evaluation of children for their nutritional, immunization status, dietary & feeding practices

4. Counseling of parents & caretakers regarding current illness, child feeding practices & immunization

4) Expansion of services-

Services provided in Kiran clinic are scaled up with demand of villagers and decision with committee members. Along with treatment of primary ailments, services like blood sugar level checking, HB checking; treatment for diabetes mellitus, hypertension, IFA tablets to adolescent age group girls are also provided.

5) Response of people-

There was initial resistance of some community people while collection of gram kosh. Number of patients visiting clinic increased over a period of time gaining faith in quality services given in Kiran clinic.

II) Facilitating factors:

1) Voluntary participation- Community members volunteered themselves for residential training at department of community medicine and taken responsibility of community health. One of the members expressed the gratitude saying

"It's my pleasure to work for community. It gives nice feeling to me"

Place for working of Kiran clinic was made available without rent by the community member.

2) Community dialogue- Community dialogue served as mechanisms for dissemination of information in the village that helps in establishment of Kiran clinic. It played a vital role in negotiating entry within communities and households while collecting Gram Kosh. One client said that

"Night meeting were taken in village for effective community dialogue."

3) Capacity building- Training of members of VCC under CLICS project on health topics & their sensitization regarding health enabled them in sustaining Kiran clinic. One of the members of clinic said that

"Even if I am non medico person, I will be able to tell people about various diseases, home remedies for some of the minor ailments. I felt one of the leader of the family having responsibility of health of villagers. I got to know my new identity in my own family and in village."

3) Knowledge and ownership of committee members- Committee members have high level of knowledge and ownership about implementation and functioning of Kiran clinic. They have status and decision making power. One member reflect their ownership saying that

"We have our own say and independent power in decision making, so working in this health family is joyful for me."

4) Transparency in work/quality monitoring- The committee members attend meetings regularly & played key role in running the clinic & sustaining its momentum. The clinic management committee is involved in periodic monitoring & evaluation of all the functions of the Kiran clinic.

All the registers like stock book, expenditure book are regularly checked by chairperson of the committee, ANM of department of community medicine. Secretary of committee said that

"I have to give expenditure of one rupee and one tablet in front of committee members to make transparency in work."

5) Quality services responsive to health need- Quality health services are provided in the Kiran clinic. One diabetic patient showed his satisfaction saying

"Doctors and sister give psychological support along with quality treatment. I am 100% satisfied with services given at very low cost."

Discussion:

Kiran clinic is very good example of community participation and community empowerment. Community worked for their own health from establishment through whole journey of Kiran clinic. Views of different stakeholders from department of community medicine involved in whole process of establishment and progress of Kiran clinic were not taken. This is the limitation of the study.

Conclusions:

Kiran clinic is a socially acceptable, feasible and a sustainable model for provision of required health services to villagers.

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CASE REPORT

Antileprotic Medication Induced Psychosis in a Patient of Tuberous Sclerosis: A case report

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Abstract:

Tuberous sclerosis is a rare multisystem neurocutaneous genetic disorder primarily presented with seizures, mental retardation and hamartomas involving multiple systems. Behavioural and psychiatric manifestation of the illness in form of cognitive disabilities, autistic spectrum disorder, ADHD, learning disabilities etc. are present in a large number of cases. We present a case of tuberous sclerosis who developed psychosis after his skin lesions were misinterpreted as leprosy lesions and he received anti-leprotic medication in primary care setting. Risperidone and sodium valproate were used to successfully manage his behavioural symptoms and seizures.

KEY WORDS: Tuberous sclerosis, Dapsone, Rifampicin, Antileprotic, Psychosis, Mental retardation

Introduction

Tuberous sclerosis is a neurocutaneous disorder and associated with neurological and psychiatric conditions. This autosomal dominant genetic disorder is characterised by intellectual disability, seizures and hamartomatous lesions in many organs such as brain, skin, eyes, heart, lungs, and kidney(Lewis, Thomas et al. 2004). Behavioural problems in form of hyperactivity,autistic behaviour and aggressive/disruptive behaviour are commonly noted in most cases(Winterkorn, Pulsifer et al. 2007).

We report a case of Tuberous sclerosis with seizures, intellectual disability with lesions in skin and brain with acute onset of disruptive behavioural symptoms following ingestion of antileprotic medication which was controlled successfully with psychotropic medications.

Case report

A 13year old male patient presented to a tertiary care psychiatric hospital with sub-acute onset of behavioural problems in form of irritability, using verbally abusive language, physically assaultive behaviour, self muttering, and impairment in sleep, appetite and self-care over a period of one week. Patient had history of gross developmental delay during his infancy and childhood. There was history of generalized tonic clonic seizures which had started at 3 years of age and has continued till the time of presentation with an average frequency of 2-5 episodes every month, intermittently treated with antiepileptic medication in past. Family members also gave history of onset of facial erythema at age 3 years gradually evolving in to facial angiofibroma over the years. Patient also exhibited other skin lesions like multiple hypomelanotic patches over back & trunk since last 2 years for which no treatment was sought. One month prior to presentation, his cutaneous manifestation was misdiagnosed as leprosy by a paramedical worker and he was put on Rifampicin 600mg once a month and Dapson 100mg daily. Patient developed behavioural symptoms within a week after taking the antileprotic medication. Patient had his last seizure episode two months prior to the date of presentation and was not on any other medication apart from the antileprotics. Family history of similar illness with seizures, skin lesions and behavioural problems were present in mother and maternal uncle of the patient.

At the time of admission patient was of average built and well nourished. Cutaneous findings included Facial angiofibromas which were multiple angiofibromas, mostly soft in texture, produced no pain upon palpation, spread all over face, but mostly localized to malar area in a butterfly pattern, Ashleaf macules which were Multiple depigmented macules were noted over trunk, each with varying size, largest one measuring 3cm*1.5cm located

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over right back, Shagreen patch which was a raised ,skin coloured, papular patch of size 2cm*2cm, non-tender, hard with a orange peel feel upon palpation was located on back about 2 cm lateral to mid line on left side and Periungal fibroma which was one non-tender nodule of size 0.5*0.5 cm were located around the right big toe those appeared to be non traumatic. Systemic and biochemical examination were within normal limits. EEG revealed generalized slow wave (also during photic stimulation & hyperventilation) suggestive of generalized seizure disorder. NCCT Brain showed Subependymal & Periventricular Calcification & Left frontal lobe calcification- Features which were suggestive of Tuberous Sclerosis. During Mental status examination, patient was in clear sensorium, but he was uncooperative, crying, abusing & shouting with occasional muttering to self during the examination. His speech & mannerism was age inappropriate, similar to those of a much younger child. Lability of mood was present. There was no evidence of any speech deficit or delusions. Hallucinatory behaviour in form of self muttering was detected. He had stubborn, irritable, destructive & aggressive attitude upon attempts of examination. There was poor attention span with no insight to his condition. IQ evaluation after partial stabilization of the patient with VSMS and SFBT indicated the patient to have mild mental retardation. Score on Narajno adverse drug reaction probability scale was 5, which indicated a probable temporal causation of the medications and the behavioural symptoms. A diagnosis of Tuberous Sclerosis with Seizure Disorder & Medication induced psychotic disorder was made. Consultation with Dermatology, Ophthalmology & Neurology department was taken considering possibility of hamartomas in other organs but no anomalies were detected. Antileprotic medication was stopped immediately. Patient was started on Tablet Risperidone 2mg, Tablet sodium valproate 300mg which was hiked to 600mg and Tablet Clonazepam 0.5mg per day.There was significant improvement in his behavioural problems & he was seizure free all through hospitalization period. He was discharged after 12 days of hospitalization . At the time of follow up in 1 month he had returned to his premorbid level. Patient is presently only taking Tablet Sodium Valproate 600mg per day & maintaining well.

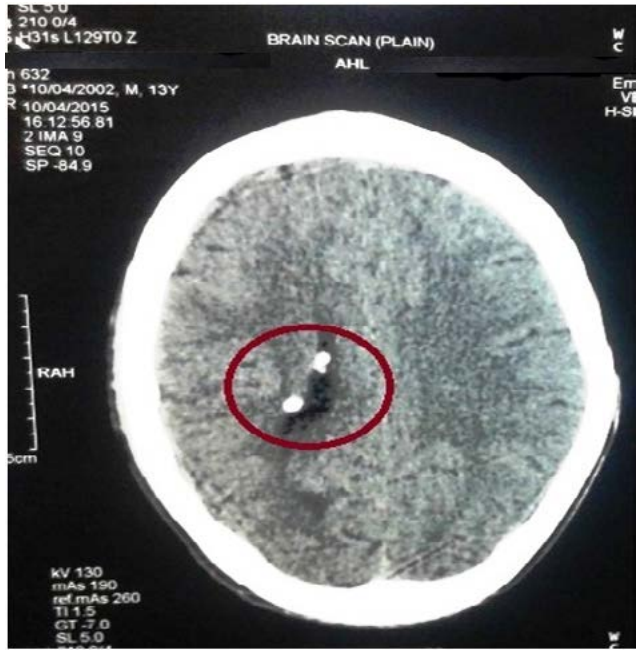

Figure 1 Skin lesions in Tuberous sclerosis

Figure 2: Tomography Brain revealing Tuberous Lesions

Discussion

Tuberous sclerosis (bourneville disorder) is an Autosomal dominant disorder characterised by a clinical triad of Papular Facial Naevus, Seizures & Mental Retardation. The term is derived from two words namely; tuber that means swelling (Latin) & scleros means hard (Greek). The live birth prevalence is 2-10 cases per 100,000(O'Callaghan, Shiell et al. 1998). Common Manifestations include formation of multiple hamartias (malformed tissues) & hamrtomas (benign growth) & rarely malignant hamartoblastomas in different parts of the body, including brain, heart, lungs, eyes, kidney, Skin & other organs.

Seizures are the most common symptom, presenting as infantile spasms or partial seizures and may later develop generalized seizures. Mental function varies greatly but with poor prognosis. One third of the patients may have normal intelligence. Psychiatric manifestations range from having learning difficulty in 50%(Ridler, Suckling et al. 2006), Autism in 25% to 61%, with high prevalence of pervasive developmental disorder (Harrison and Bolton 1997) *and a*bout 10% present with repeated self injurious behavior(Staley, Montenegro et al. 2008)

In this case, direct damage of cortical nodules and frequent epileptic seizures resulting in Brain ischemia may explain the Cognitive decline and putting the patient at risk of developing Psychosis which appeared when an offending agent (Anti-leprotic medication) was given. The strong family history of the patient is more suggestive towards the illness. As literature suggests, among the Anti-leprotic medications, Dapsone, a sulfonamide appears to be most relevant in causation of behavioural symptoms(Bhatia, Singhal et al. 1988).Rifampicin has also been reported to cause toxic psychosis(Salafia and Candida 1992). Postictal Psychosis and Psychosis due to another medical condition (tuberous Sclerosis) can be considered as differential diagnosis in this case.

To conclude, whatever may be the cause, we suggest clinicians should be aware of this condition and a detailed work up in case of acute psychotic presentation in this population should be done, so that it should not be misdiagnosed and appropriate treatment can be instituted.

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Predictive Validity of Derived Clinical Adiposity Parameters in the Assessment of Type 2 Diabetes Mellitus among Adults

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Abstract:

Background: Body Mass Index (BMI) is a standard universal method of assessing clinical adiposity risk. Several studies have shown that obesity as defined by BMI criteria is a risk factor for type 2 diabetes. However, among Asian Indians there is an increasing incidence of thin-fat phenotype where BMI fails as a clinical risk predictor for diabetes. So, there is a need for alternate clinical adiposity parameters.
Objective: To assess the predictive validity of derived clinical adiposity parameters in the assessment of Type 2 Diabetes Mellitus among adults attending a tertiary hospital.
Methods: A cross-sectional comparative study was performed in which 100 diabetic adult men and women attending the diabetic Out Patient Department were enrolled. As a comparison group, 53 non-diabetic adults attending the OPD and other non-diabetic relatives of patients were enrolled. Anthropometric measurements such as height, weight, waist and hip circumference were measured and derived adiposity parameters such as Body Mass Index, Waist-Hip Ratio, Waist-Height Ratio, Body Adiposity Index and Conicity Index were calculated. Receiver Operating Characteristic curves was plotted for each adiposity parameter with diabetes status as a dependent variable to assess predictive validity of the adiposity parameters in assessing diabetes risk. Age and gender-segregated analysis were also performed.
Results: Waist-Hip ratio cut-off=1.009 (AUC=0.956; 95%CI 0.927-9-0.985) sensitivity=90%, specificity=81.1% had the best predictive ability for diabetes. Body adiposity index cut-off=30.5285; (AUC=0.568 95%CI 0.470-0.665) sensitivity=52%, specificity=50.9% was the least predictive. Waist-Height Ratio cut-off=0.5889 (AUC=0.708; 95%CI 0.624-0.792) sensitivity=62%, specificity=62.3% and Conicity Index cut-off=1.5393 (AUC= 0.692; 95% CI 0.603-0.781) sensitivity=61%, specificity=60.4% had moderate predictive ability and finally Body Mass Index (BMI) cut-off=26.25 (AUC=0.585; 95% CI 0.491-0.679) sensitivity=56%, specificity=54.7% had a poor predictive ability. Gender segregated analysis showed that BMI and Body Adiposity Index were poor predictors of diabetes in women.
Conclusion: Waist-Hip Ratio has the best predictive validity in the assessment of risk of type 2 diabetes. This must be confirmed using longitudinal studies.

Key words: obesity, diabetes, thin-fat phenotype, clinical adiposity parameters, waist-hip ratio

Introduction

Diabetes mellitus is a major global disease with India having a very high prevalence of diabetes.[1] India has approximately 69 million people with diabetes. A major risk factor for diabetes is obesity. Obesity, the excess amount of fat deposition in the body, damages the homeostatic functioning of the body and its wellbeing.[2] Not only the disease, but also the complications of diabetes increase with increase in body weight.[3]

Obesity can be generalised or central. The importance of central abdominal obesity as a risk factor for diabetes was established as early as in the 1940s.[4] Nowadays, evidence shows that visceral fat is more associated with diabetes than fat deposition in peripheral subcutaneous tissue.[5] Obesity leads to diabetes due to various reasons. One being the inflammatory mediators released from visceral fat leading to insulin resistance.[6] The other factor is the excess fatty acids which lead to impairment of beta cell function and activation of protein kinase C isoforms by fatty acid

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metabolites leading to insulin resistance.[7]

There are various measures of central obesity most commonly used in research is anthropometry and body fat measurement through investigations. Studies show that obesity parameters like Visceral Adipose tissue (VAT) perform better than waist-hip ratio in predicting the risk of diabetes.[8] But they are not cost effective and hence, anthropometry acts as a proxy for VAT measurements.[9] In anthropometry, there are various parameters such as waist circumference, waist-hip ratio, waist-height ratio, body adiposity index, conicity index and others. Among them waist-hip ratio has an advantage that it includes waist circumference which is directly associated with metabolic complications and hip circumference which is protective from metabolic risk.[10]

Waist-Hip ratio has previously been studied to be a good predictor of type 2 diabetes.[11] Alleles that increase waist-hip ratio is found to increase insulin resistance and lead to diabetes.[12] Waist-hip ratio has also been proved as a best predictor of cardiovascular disease than the other anthropometric parameters.[9] But, there are opposing evidences to prove that waist-hip ratio is not superior to other anthropometric parameters but is equal or sometimes even poor in predicting the risk of diabetes.[6]

The use of central obesity in predicting the risk of diabetes mellitus is important in people from South Asian countries because, at any given BMI, they have lower amounts of lean fat and higher amount of fat in the abdominal organs as well as in the compartments as indicated by increased waist circumference, waist hip ratio and trunk skinfold thickness.[13] Incidence of diabetes is earlier in south Asians compared to others.[14] And also with a given cut-off of waist circumference and waist-hip ratio, the risk of diabetes in more in south Asians compared to others.[15]

The objective of this study is to access the predictive validity of derived clinical adiposity parameters such as body mass index, waist-hip ratio, waist-height ratio, body adiposity index and conicity index in predicting the risk of type 2 diabetes mellitus among a typical set of patients attending a tertiary care hospital in Chennai.

Material and methods

The study was conducted using a cross-sectional comparative design in ESIC Medical College & PGIMSR, Chennai from May 2017 to June 2017. The sample size for the validation study was calculated using the formula for sample size calculation to estimate the sensitivity and specificity as in a previous study.[16] With a 95% confidence level, the calculated sample size was 62 patients with diabetes and 62 without. Since in the OPD it was easier to sample diabetic patients than non-diabetic patients, a case to control ratio of 2:1 was applied and 100 patietns with diabetes and 53 without diabetes were sampled. Inclusion criteria for diabetic group was type 2 diabetes mellitus patients attending the diabetes OPD and taking anti-diabetic medications with a minimum of one-year duration of the disease. For the non-diabetic group, the patients were self-reported as non-diabetic and were not on any anti diabetic treatment. Exclusion criteria for both the diabetic and non-diabetic groups were people with physical disabilities or who had undergone leg injuries who could not undergo the measures of anthropometry. The data consisted of a patient's demographic details, self-reported diabetic / non-diabetic status and anthropometric measurements. A written informed consent from all the participants was obtained before conducting the study.

Height, weight, waist circumference and hip circumference were measured following the guidelines of NHANES March 2012 and October 1988.[17,18] For height, the participant was made to stand erect in Frankford horizontal plane with their heel, buttocks, shoulder and head touching the wall. The height was measured to the nearest 0.1 cm. For weight, the participant was made to stand in the centre of the weighing machine and was measured to the nearest 0.1kg. For waist circumference, the iliac crest was identified and inch tape placed at this level passing through the umbilicus, measuring the circumference to the closest 0.1cm. Waist circumference was measured at the end of inspiration. For hip circumference, the inch tape was held at the level of maximum level of buttocks passing through both the greater trochanters, and read to the nearest 0.1 cm. Each measurement was taken twice and the average of the two measurements was taken for analysis. Body Mass Index was calculated as weight in kilograms divided by square of height in meters. Waist-Hip Ratio was calculated as waist circumference in centimetres divided by hip circumference in centimetres. Waist-height Ratio was calculated as waist circumference in centimetres divided by height in centimetres. Body Adiposity Index and Conicity Index were calculated as follows:

Body Adiposity Index= [Hip circumference (cm) / (Height in m) ^1.5] -18(19)

Conicity index = waist circumference (m) / √ [0.109√weight (kg)] / height (m)(20)

Data were entered in Microsoft Excel Spreadsheet and analyzed using SPSS Software version 21.0. Descriptive statistics was used for the demographic details. The significance of difference in the means of the parameter in diabetic and non-diabetic persons was assessed using t test. Receiver Operating Characteristic Curves (ROC curves) were plotted for each derived adiposity parameter with Diabetes as reference variable. The area under the curve (AUC) with 95% confidence intervals was obtained for each parameter. It showed the predictive accuracy of the parameter in assessing diabetes risk with a value closer to one, meaning higher accuracy and a value ≤0.5, meaning

poor accuracy. Cut-off points were obtained from the ROC curves, which had optimal sensitivity and specificity. Using this, Positive Predictive Value (PPV), Negative Predictive Value (NPV), Positive Likelihood Ratio (LR+), Negative Likelihood Ratio (LR-), False Positivity Rate (FPR) and False Negativity Rate (FNR) were calculated. The study was reviewed and approved by the Institutional Ethics Committee of ESIC Medical College & PGIMSR, Chennai.

Table 1: General characteristics of study population.

S. No	Parameters	Categories	Diabetic - group I	Non-diabetic – group II
			Frequency (Percentage)	
1	Age in years	31-40	12 (12%)	8 (15.1%)
		41-50	29 (29%)	16 (30.2%)
		51-60	31 (31%)	15 (28.3%)
		61-70	25 (25%)	12 (22.6%)
		>70	3 (3%)	2 (3.8%)
2	Education	Illiterate	19 (19%)	13 (24.5%)
		Primary	21 (21%)	15 (28.3%)
		Middle	16 (16%)	18 (34%)
		High	38 (38%)	2 (3.8%)
		Graduate	6 (6%)	5 (9.4%)
3	Occupation	Unemployed	34 (34%)	21 (39.6%)
		Unskilled	36 (36%)	16 (30.2%)
		Semiskilled	7 (7%)	8 (15.1%)
		Skilled	15 (15%)	6 (11.3%)
		Clerk, shopowner	8 (8%)	2 (3.8%)
4	Income	Not earning	22 (22%)	5 (9.4%)
		<1600	3 (3%)	4 (7.5%)
		1600-4000	2 (2%)	17 (32.1%)
		4000-8000	22 (22%)	15 (28.3%)
		8000-12000	24 (24%)	8 (15.1%)
		12000-16000	18 (18%)	3 (5.7%)
		16000-32000	9 (9%)	1 (1.9%)

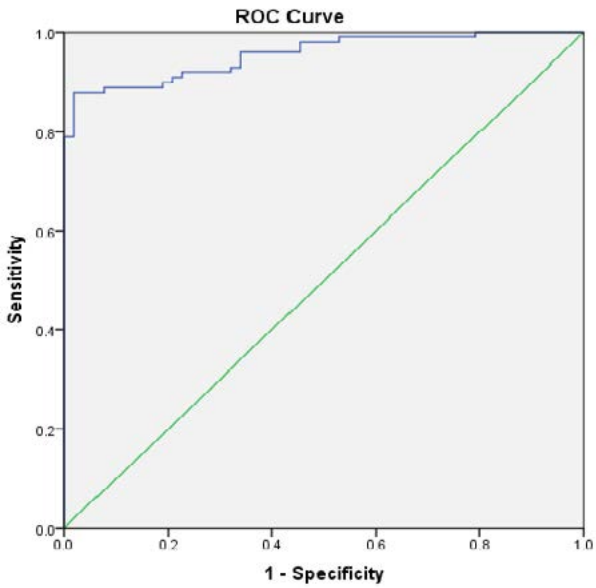

FIGURE 1: Receiver Operating Characteristic curve of Waist-Hip ratio with Diabetes as reference variable.

Results

Table 1 shows the general demographic characteristics of the study population. The mean age of diabetics was 52.88±10.5 years and mean age of non-diabetics was 51.77±11.6 years.

Waist-hip ratio has the highest Area under the curve in the ROC curve plotted for the derived anthropometric parameters. Figure 1 shows the Receiver Operating Characteristic curve (ROC curve) of waist-hip Ratio with diabetic status as the reference variable. The Area under the Curve (AUC) is 0.956 with a 95% confidence interval of 0.927-0.985. The cut-off point for waist-hip ratio in predicting diabetes risk is found to be 1.00 with optimal sensitivity and specificity.

The cut-off points for other parameters were established using the ROC curve in predicting the diabetes risk and the sensitivity, specificity, PPV, NPV, LR+, LR-, FPR and FNR were calculated. Table 2 showed that waist-hip ratio had the highest sensitivity, specificity, PPV, NPV and LR+ and lowest LR-, FPR and FNR.

Waist-hip ratio was analysed separately for males and females and cutoff, sensitivity and specificity was mentioned in table 3. When cutoff was made separately for males and females, the sensitivity and specificity was not higher than that of the sensitivity and specificity where a common cutoff value was used.

Discussion

Their study shows that waist-hip ratio has high accuracy in predicting the risk of diabetes (AUC=0.956) followed by

TABLE 2: Area Under the Curve (AUC), sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV), Positive Likelihood Ratio (LR+), Negative Likelihood Ratio (LR-), False Positivity Rate (FPR), False Negativity Rate (FNR).

DERIVED ANTHROPOMETRIC PARAMETERS	CUT-OFF	AUC	SENSITIVITY (%)	SPECIFICITY (%)	PPV (%)	NPV (%)	LR+	LR-	FPR (%)	FNR (%)
Waist-Hip ratio	**1**	**0.956**	**89**	**90.6**	**94.7**	**81.4**	**9.4**	**0.1**	**8.5**	**11**
Body Mass Index	26.25	0.585	56	54.7	70	39.7	1.2	0.8	32.9	44
Waist-Height ratio	0.58	0.708	62	62.3	75.6	46.5	1.6	0.6	28.2	38
Body Adiposity Index	30.53	0.568	52	50.9	66.7	36	1.1	0.9	34.7	48
Conicity Index	1.53	0.692	61	60.4	74.4	45.1	1.5	0.6	29.6	39

Table 3: Sensitivity and specificity of cut-off points established for waist-hip ratio common for gender, males and females.

CUTOFF	**SENSITIVITY %**	**SPECIFICITY %**
COMMON	89	90.6
MALE	89.7	88.5
FEMALE	90.5	90

waist-height ratio and conicity index. Body adiposity index has the least accuracy in predicting the risk. (AUC=0.568) Body mass index which is now commonly used in our clinical setting is also less accurate in predicting the risk of diabetes mellitus. (AUC=0.585)

The cut-off point of waist-hip ratio established in this study is 1. The study published by Qiao has suggested a cutoff of waist-hip ratio of 0.96 and 0.85 for males and females respectively which has a sensitivity and specificity of 61% and 66% in males and 66% and 54% in females.[21] But, this study has established a single cutoff point common for males and females because, there are only minute differences in the sensitivity and specificity when the cutoff was made separately for males and females as shown in table 3. Though there are differences in adipose tissue deposition between males and females, clinically this study has shown that different cutoff points for different sex do not have an increased benefit than a single cutoff point for predicting the risk of diabetes mellitus using waist hip ratio.[22]

A study on Taiwanese population shows that waist-hip ratio has the highest area under the curve and hence, higher accuracy in predicting the risk of diabetes mellitus.[23] Another study by Huxley et al showed that when analysed both Asian and Caucasian population together, there were no differences in the relative risk of incident diabetes between BMI, waist circumference and waist-hip ratio categories. When analysed in Asian population and gender separately, the relative risk in men for diabetes was higher for waist circumference than waist-hip ratio but the RR for women was equal. And for men the confidence intervals of RR of waist circumference and waist-hip ratio was overlapping with each other showing there are minimal differences in their accuracy of assessment of risk assessment of diabetes.[24]

There are studies which show that waist-height ratio and body mass index are better than waist-hip ratio in risk assessment for diabetes mellitus.[25,26] In contrast to these studies, this study had shown that waist-hip ratio is way more superior than body mass index and waist-height ratio in predicting the risk of diabetes. No other study had proved such differences between these anthropometric parameters in predicting the risk of diabetes.

The implications of this study are that it confirms these findings, establishes cutoff points for risk prediction of diabetes mellitus in a typical south Indian population and screening of general population either in health setups or even in their houses.

The strength of this study was the usage of diabetic and non-diabetic groups to compare the anthropometric measures of obesity in assessing the risk of diabetes. The less commonly used anthropometric measures of adiposity are used in this study. The research was able to establish the weakness of commonly used BMI in predicting the risk of diabetes.

The weakness of this study was the cross sectional design because of which the temporal association between anthropometry-defined obesity and diabetes could not be established. Therefore the validity reported in this study is not exactly a prospective predictive validity. The sample was a hospital based sample and hence, Berksonian bias is possible. There was also a possibility of other risk predictors acting as confounders that are not matched during sampling or analysis. There were difficulties in measuring hip circumference especially in females as they could not be disrobed in the OPD for the purpose of the study. An attempt was made to overcome this problem by measuring the thickness of the cloth at the level of hip circumference measurement. This value was multiplied by 2 and was

subtracted from the value of hip circumference measured. The analysis with this modified hip circumference did not reveal any change in the predictive validity assessments.

Conclusion:

Waist Hip ratio is an accurate predictor of risk of type 2 diabetes. There is a need for prospective studies to overcome the temporal bias in this study. Such prospective studies will establish waist-hip ratio as a regular clinical diabetes risk assessment parameter.

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Instructions for Authors

About the Journal and its scope

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

Objectives of the journal

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

IJCFM will to cater to the needs of

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

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

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4. Short Communication
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6. Perspective
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8. Continuing Medical Education
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14. Public Health Success stories
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Forthcoming Events

SL NO	TOPIC	DATE
01	62nd Annual National Conference of Indian Public Health Association,IPHA 2018	Feb 9-11,2018
02	45th National IAPSM & 19th Maharashtra State Joint Conference of. IAPSM & IPHA - 2018,Pune	March 9-11, 2018
03	"4th World Congress on Public Health, Epidemiology and Nutrition" at Osaka, Japan	May 24th -25th , 2018
04	The International Conference of Public Health and Preventive Medicine (PHPM 2018). Bangkok	5th - 7th January 2018
05	Global Public Health Conference 2018, Kuala Lumpur, Malaysia	Feb 6th-7th , 2018
06	ICPHS 2018: 20th International Conference on Public Health Systems, Mumbai, India	Feb 22nd- 23rd , 2018
07	15th World Sustainable Development Summit (WSDS),New Delhi, India	Feb 2018
08	International Conference on Public Health (Health Conf 2018), Sri Lanka	March 22nd -23rd , 2018
09	15th WONCA World Rural Health Conference (WRHC 2018) to be held in New Delhi	26 - 29th April 2018
10	4th International conference on Public Health 2018, Bangkok, Thailand	19th- 21st July 2018
11	4th World Congress on "Health Economics, Health Policy and Health care Management". Zurich, Switzerland	September 13-14 | 2018
12	13th Annual National Conference of Indian Association for Geriatric Mental Health, Chandigarh	15-16th Sep 2017

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