EFI Bulletin

Bulletin of Epidemiology Foundation of India

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EDITORIAL

Digital Fast: Pressing Priority for Existential Mandate

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The best of all medicines is resting and fasting. Benjamain Franklin

Fasting came into existence in 5th Century BCE, when Greek physician Hippocrates recommended abstinence from food or drink for patients who exhibited certain symptoms of illness. (1) Fasting is a detox mechanism which cleanses multiple systems of the body and enhances health at physical, emotional, psychologial and spiritual facets.

From BCE to 21st century CE, there has been a dramatic evolution of human civilization with paradigm shift in flow of cognizance and erudition. The most recent with unparalleled domination has been the emergence of digital era. Digital revolution embarked the utilization of computers and smartphones for easy accessibility of knowledge and services round the clock at the remotest of the domains. This has all the more intruded the continuance of humankind during the onset of disastrous global pandemic of COVID during 2020.
A recent report titled "DIGITAL 2022 – Global Overview" offers insights into digital trends, including daily time spent on the Internet and social media platforms. Across all devices, the average Internet user aged 16 to 64 spends six hours and 58 minutes online per day. South Africans top the list with working-age Internet users being online 10 hours and 46 minutes daily. Japanese, on the other hand, spend the least amount of time being on internet daily for four hours and 26 minutes average. (2)

Digitalization with internet usage for professional and personal concerns has become a continual and habitual mandate with its pro and con. The populace worldwide irrespective of gender, age and cadre have contracted in their nutshells of virtual world with multiple social media applications skimping the values of relationships and societal norms. This has adversely effected individual's mental well being.

Digital Fast is one such initiative towards abridging addiction of the virtual era which is flooding with easy, accessible and approachable informations from various arenas regardless of the authenticity. The terminology, known by myriad terms "Digital Detox," "Digital Sabbath," and "Unplugging" refers

to refrain using all connected devices voluntarily and deliberately – smartphones, computers, tablets, and so on – that plug you to the internet for a pre-specified amount of time.(3) Unplugging implies being fleetingly disconnected bestowing you sterling time with self and your clans and kins. This ensures transcending from nomophobia which is an uneasy feeling of being left out in absence of phone to an immense true sense of eudemonia.

Fasting needs to be in graded manner with few hours of abstinence to begin with (2-4-6-8) hours for persistent and enduring acceptance. Night is the resting time for physique as well as mind. The thoughts before sleeping as well as on waking should be the most positive inputs to the neurons rather than technological firings. So, Nocturnal Internet Fasting (NIF) similar to Overnight Oral Fasting (OOF) needs to be imbibed and practiced by one and all. Unplugging does not imply tardiness and backlogging of progress. Digital fasting incorporates one more quintessential aspect of smartphone usage while feeding your body during meal times as studies have proved screentime exploitation during eating lowers metabolism and distraction leads to flawed satiety progressing to overeating. It is one of the reasons of concerning obesity levels in America. (4)

Digital fasting is mandated as a speed-breaker on the highway of virtual world of artificial intelligence. Driving is an enjoyable process in the journey of life which is another crucial and must occasion for unplugging primarily for safety concerns. Weekend Digital Fasting is an upcoming platitude which ameliorates vacation mood and strengthens both physical, mental and spiritual well-being.

The dictum is that wise and judicious use of technology is an asset but overuse, misuse and disuse becomes an ailment which needs heed. The author is of the opinion that digitalization with diverse social media applications is a unique metamorphosis with its boons and banes and public health experts ought to generate community awareness towards optimum utilization of technological gadgets and social media for astute influx and efflux of information during pertinent times with consistent fasting to begin with self.

Celebrate few hours daily with Digital Cheat Phenomenan.

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OPINION

COVID: How to Prepare this time "India & the world must know what variant is causing China's COVID wave"

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After China suddenly opened its doors widely to the SARS-CoV-2 virus, a flood of Covid cases and deaths are being reported by global media, even though official counts from that country are low. While all reports need verification, there is little doubt that China has many vulnerable people who were unexposed to the virus earlier or had not been fully vaccinated. Low vaccination rates among the elderly in China are of particular concern. Taking cognisance of rising case counts in China, Japan, South Korea and the US, GoI has issued new advisories.

What are the pathways that this fresh spurt of Covid cases can take to endanger the world? How will India be affected?

Within Covid's cauldron of complexity, there is a churning variability in virus evolution, policy response, public behaviour; evolving science and emerging technologies. As that mix changes, answers to our questions too will change over time. For the present, we need clarity on the following questions.

- Is the surge in China due to the ancestral virus or a Delta variant, either or both of which were locked within a closed society and now find sudden release into a highly susceptible population?
- Or is it due to members of the Omicron family, which are currently dominant globally?
- Countries other than China are witnessing a rise in cases due to new Omicron sub-lineages, which are emerging with surprising speed of evolution.
- The dangers that China faces, and therefore the rest of the world might too, will be partly determined by whether China is now being haunted by past zombies let loose or is witnessing the air race of young Omicron variants flying fast.
- Or will a totally new variant emerge from China that may find the whole world vulnerable?

We await that information from China, based on genomic analysis of new cases and their clinical outcomes.

While current versions of Omicron have acquired superpowers of high transmissibility and immune evasion, they have exhibited lower virulence than the ancestral virus or the Delta variant. This is possibly due to a trade off guided by evolutionary biology which requires that the virus should not decimate its host when the number of susceptible individuals is diminishing due to acquired immunity. However, when the virus finds a population where the levels of such immunity are low, the virus may have no such restraint. If it stays long in the body of an immune compromised person or an elderly person with weak immune defences, the virus has time to mutate several times. Some of them can

spread as dangerously virulent variants. That is China's problem and the world's worry.

In the current scenario, genomic surveillance becomes vital.

- Are new variants landing?
- Based on their structure, do they have the potential for rapid spread?
- Will they evade previously acquired immunity?
- Does the new variant have structural features which have been associated with high virulence in previous versions?

But even in high virulence, our bodily defenses are probably better prepared now to counter those weapons than when it hit immunologically naive populations.

Recent scientific reports caution that new Omicron variants are increasingly capable of evading the neutralizing effect of a variety of monoclonal antibodies prepared against earlier variants. However; we also know that there is a strong backup defense from T-cells, which have long memories and a strong capacity to capture the virus and eliminate the danger: So, even when the antibody defenders are incapacitated. trust the T-cell goalkeeper to save the penalties.

India may still be in a relatively safe zone with its hybrid immunity. People may get infected but experience only mild illness. Persons who have weak immune defences due to serious pre-existing health conditions or advanced age will be vulnerable and must be protected.

Since all penalties cannot be saved all the time even by capable T-cells, we must depend on strong defences not to open the field for the virus to enter the guarded box of our airways.

- We need to ensure that masks are worn in indoor locations and closed public transport if case counts rise rapidly.
- We should use the protective power of ventilation which will prevent high viral loads from massing troops for bodily invasion, as air currents dispel viral clouds.
- The need for boosters is unproven, as new bivalent vaccines too have not convincingly demonstrated protective effects against infection by new Omicron variants.
- However: elderly persons and immune-compromised individuals may be given a heterologous booster for possible protection.
- If information from China and other countries indicates that there are no dangerous new variants, a general population advisory for fresh vaccination is avoidable.

India's strategy should be a combination of vigilance through clinical and genomic surveillance, scenario-based planning, keeping all systems on alert for a rapid, scaled up public health response when needed, getting people to follow sensible Covid-appropriate behaviours attuned to changing levels of threat and constantly gathering global intelligence on the patterns of infectivity, immune evasion and virulence of currently circulating variants.

This requires solidarity and team play at both national and global levels. If we play to that game plan, all countries can win the World Cup against Covid, despite a poor start.

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Highlight: If the virus stays long in the body of an immune compromised person or an elderly person with weak immune defences, it has time to mutate several times.

Some of the mutations can spread as dangerously virulent variants. That is China's problem and the world's worry

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OPINION

COVID 2023: Reengineer The Response "Next year, instead of hype or fatigue, let's focus on R&D & collecting good data"

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2022 was not easy. We started the year with the uncertainty of Omicron, but the situation settled and as countries slowed and stopped their pandemic control measures, we began to go back to life no longer on hold.

We end the year with the end of the Chinese zero-Covid policy, the last of the bastions to fall in the face of one of the most infectious viruses the world has ever known. While expressing concern about the situation in China, WHO's director general has said that Covid's status as a global emergency will end in 2023.

- So where do we stand now, with Covid or the next epidemic?
- Given the size of our population, the high burdens of both communicable and non-communicable disease and the low expenditure on public healthcare, how much should we be worrying about Covid?
- What have we learned about what we need to do about infectious disease threats?
- Can we apply those lessons and move on to our other pressing, lately neg. lected, problems?

The key is experiential learning and application for future preparedness, even as we place Covid as part, not the whole, of the landscape of population health. In India, despite the current situation in China, the threat of Covid has receded to a level where cases have been largely stable or declining, at a level that can be easily dealt with by the healthcare system.

In the past week, we have seen a hyping of the potential threats and recommendations for interventions that are not matched to ground realities. But neither hype nor fatigue is helpful three years into a pandemic. The virus has changed so much in the past 36 months that it would be foolhardy to ignore its potential for change. Therefore, tracking of the virus is essential, but needs to be mindful of strategy and resources.

For 2023, the critical elements of future preparedness can be broken down into four areas: surveillance,

The key is experiential learning and application for future preparedness, even as we place Covid as part, not the whole, of the landscape of population health. Globally it is clear that Covid is here to stay, and we need to move from campaign mode to integrating Covid immunization into primary care treatments and prevention, research and development, and policymaking.

Surveillance: A baseline surveillance for severe respiratory infections hospitals encounter will measure total cases over time and identify all causes of respiratory hospitalisations to allow stable tracking for all pathogens including SARS-CoV2.

The clinical data from these cases in chosen public and private hospitals needs to be linked to the pathogen and sequence data for finer level tracking.

Surveillance also needs public health and clinical care in linked data systems that track patients at the level of the individual and do not lump all cases together: When outbreaks occur or if there are new bugs or variants circulating outside the country, this system can be ramped up, possibly to include imported cases (although for viruses that can infect asymptomatically this has less value), and then ramped down again when the threat declines.

It is wasteful of resources, people and their skills and of institutions to build new systems for each new threat and allow them to wither with neglect once disease declines.

Treatment: Readiness to treat and prevent infection needs engagement of multiple stakeholders and systems.

From clinical expertise and protocols to supply chains and drugs and vaccines, healthcare providers, industry and government need strategies for impro ving quality of care and getting the most out of preventive tools.

Inappropriate care led to the 'black fungus' of 2021, a problem created by steroid abuse and not encountered at the same scale anywhere else in the world.

Not just for SARS-CoV2, rational practice of medicine requires training and regulation across domains.

Analysis of cost and benefit should underpin the use of preventive tools. For example, booster vaccination for SARS-CoV2 provides greatest bang for the buck when the elderly are boosted, not the young and healthy Globally it is clear that Covid is here to stay, and we need to move from campaign mode to integrating Covid immunisation into primary care.

R&D: Our ability to develop and manufacture vaccines made India stand out among low- and middle-income countries but that capacity was decades in the making. We have a long way to go with the latest technologies for product development.

Building research, development and manufacturing is an insurance policy for the future but the low margins of public markets make it difficult for companies to invest as substantially in research as we need. Our academic research environment is also fraught with difficulties of small, short grants and delayed payments that make researchers reluctant to take on high-risk or long-term goals.

Policymaking: None of these are insurmountable goals, we need policies that support the building of systems that enable India to protect and manage the health of its people. We need to be connected to the world and coordinate with international agencies to ensure that we are among equals in deciding our policies based on our data and our science, led by our government, business and scientific leaders, instead of always being one step behind the global north.

We have a long way to go to recover and rebuild. From measles to tuberculosis, from diabetes to ischaemic heart disease, we have unmet needs that have accumulated over the last three years, and the urgency to close the gaps in care grows every day.

We know from our experience and that of others that healthcare systems that are stressed perform badly, Stronger, prepared healthcare requires reengineering of systems and policies so that we can face the challenges that tomorrow and next year can bring. We can do this, with consultation, strategy and investment, together.

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COMMENTARY

The COVID-19 wave in China: What, Why and What next for the pandemic?

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BACKGROUND

The COVID-19 pandemic had started in China at the end Dec 2019. Since then, many countries including China, Singapore, New Zealand and Australia adopted the 'Zero COVID strategy' to control the SARS CoV2 spread. As part of zero-covid strategy in these countries, stringent measures including lockdowns and harsh restrictions were imposed even in one or a few COVID-19 cases in those settings. However, with the emergence of the Omicron variant of SARS CoV2 in late 2021 with transmissibility, it became amply clear that zero-covid is not a strategy for COVID-19 response. Thereafter, most countries abandoned the zero-covid approach. However, despite epidemiological evidence of its ineffectiveness and abandoning of the Zero covid strategy by other countries such as Australia, New Zealand and Singapore, China continued this strategy. It was only in November 2022, when Chinese citizens started to protest and civil unrest- something otherwise unusual for China- that country decided to relax the curbs and move away from zero covid approach.

Implications of three years of zero covid approach in China?

First, for nearly 35 months of zero-COVID strategy essentially meant that with a reported low infection rate, of around 1.4 billion people in China, only a small proportion of the population developed immunity through the natural infection. With low reported COVID-19 confirmed cases and even if we factor in asymptomatic infections, nearly 80% or even more (around 1.1 billion people) have not developed natural infection in China before Dec 2022.

Second, though China has vaccinated a vast majority of the population; the efficacy of the COVID-19 vaccines used in China is the lowest amongst all approved COVID-19 vaccines. This would however still mean that while infection may rise in China, the proportion of moderate to severe disease would remain relatively low. Yet, considering the large population, the absolute numbers can still be very high.

Third, China had started COVID-19 vaccination nearly two years ago, and completed it at a fast pace. We know that the vaccine induced immunity declines with time. In other settings with natural infection, the vaccine induced immunity got boosted by circulating SARS CoV2 infection, that is not the case for China. Thus, even with high vaccine coverage, the protected population in the best case scenario- remained just half of total eligible population and in the worst case scenario (considering decline in protective immunity over time), to even a smaller proportion. More important is that since vaccination does not protect from natural infection, with a high

level of susceptible population, the current and the biggest ever wave in China would affect the largest number of people infected till now in the country.

Fourth, the protection and the immunity developed after natural infection lasts longer than the vaccine induced immunity. However, the population in China has only vaccine induced immunity which wanes off with time.

Therefore, in early December 2022, when China made a tectonic policy shift from zero-covid strategy, the country—arguably—had an estimated 850 million to 1,120 millions of susceptible people, most of whom had not been exposed to any variant of SARS CoV2.

On an expected line

With Omicron being the current dominant variant of concern, which spreads fastest amongst all of SARS CoV2 variants, the current surge in China is not something we should be surprised about. Rather, what is more surprising is that China did not prepare a 'zero-COVID' exit strategy in a nuanced and meticulous way. Afterall, in December 2022 , the world has a far better understanding of how to respond and how to take care of those who get infections. There are vaccines which protect from moderate to severe diseases and there are COVID-19 drugs which work best in population groups such as in China- no past infection and no vaccination.

With sudden relaxation in the COVID-19 curbs, especially when vulnerable population groups such as elderly remain unvaccinated, the surge in China is what an epidemiologist would say unavoidable.

There could be similar surge in other countries as well

In fact, in the time ahead as immunity wanes, the similar though localised surges might be reported from other countries and sub-national settings. All countries should be prepared and should have mechanisms in place for responding to such eventualities.

The weak footing of Disease modelling

Soon after the current wave started in China, a few estimates were released, which projected a very high number of cases, hospitalization and deaths due to COVID-19 in China. The lack of official information from China and unverified videos of overburdened hospitals in social media has given space for the estimates and mathematical projections and fuelled the misinformation. Yet, those who have worked in disease modelling know that COVID-19 situation has become far more complex and factoring in all of those determinants and variables- in absence of granular data is not possible. And even if whatever multiple variants are available, if those are used by various sub-groups, it makes any mathematical models unstable and thus unreliable. Therefore, a simplified mathematical model with multiple assumptions generates estimates with very wide confidence intervals, which may not be any better than the guesstimates. Alongside, China with a population of 1.4 billion and death rate of 7.4 per 1,000 has an estimated 28,000 deaths in a day and or around 850,000 deaths in a month. When 80% of the people are susceptible, all those who would die due to old age or other causes would also be tested positive. However, at this stage of pandemic, it should not be assumed that they died because of COVID-19. Rather, they died and also had COVID-19 would be the scenario. A few estimates for COVID-19 deaths for China over a period of four months project 300,000 to 900,000 deaths. In any four month period, China reported around 3.4 million deaths. Clearly, the approach at three years of pandemic and in vaccinated people about COVID-19 deaths has to be more granular and focused upon excess deaths. Alongside, the response has to be focused on planning for timely care and ensuring that people get access to health services. That scenario is unlikely to be for China.

Should the world worry?

The world is in the middle of a pandemic. Therefore, the COVID-19 surge in any part of the world is a reason for attention by every other country. However, it is not a reason to panic or worry for India or any other country. Three years into the pandemic, no two countries are comparable, because of the differences in the rate of natural infection, in the efficacy and coverage with the COVID-19 vaccines used, also due to the factor whether vaccines were administered before or after natural infection in those settings and the time elapsed since the completed vaccination.

Can it result in a fresh wave in China?

There are some key differences between India and China.

One, India has high natural infection (after three large waves). As per some estimates, by the end of the second wave in 2021, around 90% of India's population – across all age groups including children -- were infected. Two, India has high adult vaccine coverage at 90% of all adults receiving two shots of COVID-19 vaccines and 97% receiving at least one shot. Three, the COVID-19 vaccines used in India have higher efficacy at around 80%.

Four, the population in the country has what is scientifically called. a hybrid immunity (which is far superior than vaccine induced immunity). Fifth, the majority of India's population had already been exposed to the SARS CoV2, by the time they received their COVID-19 vaccines. In fact, most of the people received their second COVID-19 vaccine shot after the second wave. The situation for India is very unique with either; Vaccine natural infection-vaccine (those started on COVID-19 vaccination before the second wave). or the natural infection vaccines and then natural infection again in Omicron induced third wave in January 2022. This kind of immunity is considered stronger and long lasting.

Not a new variant

Therefore, the surge in China is unlikely with very low probability to give rise to a fresh wave in India or any other country. The only unknown is whether it is the Omicron variant which is circulating in China or if it is a new variant. However, the available information indicates that COVID-19 surge in China is being led by the BF.7 sub-lineage of the Omicron variant. This sub-variant was first reported from France in January 2022- nearly a year ago and has also been reported from nearly 100 countries. India also reported this variant in October 2022. Clearly, if this sub-lineage was so highly transmissible, it would have replaced other sub-lineage. However, that is not the case.

No Knee jerk response

The surge in China is a reminder that the world cannot drop its guard against the virus. However, the response should not be knee jerk. There is no role of flight bans or other travel restrictions as the sub-lineage variant is already in most settings. The flight ban would not achieve anything.

Essentially, just because cases are rising in China, it is not a reason to bring back the mask mandate either. At this stage of pandemic in India, there is no role of mask mandates, no role of physical distancing etc.

One real and biggest challenge in the ongoing wave is rumours and misinformation. It is possible that soon -in India and other settings- there would be talks and suggestions to implement preventive measures such as bring mask mandates back, consider moving to hybrid mode of schools and other unscientific measures which gives governments a semblance of doing something.. Any of these measures have no role as of now, in any setting outside China.

There are few people who have already started arguing that 'lets prepare for the worst case scenario'. This idea of worst case scenario is illogical and on weakest footing. Three years ago, when the virus was novel, no vaccine and the entire world was susceptible, the 'worst case scenario' was understandable. However, now we are empowered with epidemiological understanding, vaccines, and even medication, the worst case scenario and preventive restriction is not the approach.

What should be done in India?

The surge in China has not changed anything in India and there is no need to change people-related approaches in COVID-19 response in India. At an individual level, there is nothing to worry about for people in India. They need not to change their plans for anything. The get together can continue, the travel can go on. There is no need to panic or worry.

However, a few steps should be done at policy level. All countries other than China, Including India, need to urgently step up Genomic surveillance, sewage surveillance and monitor any early trend in clinical symptoms and outcome of infections. Government authorities need to keep a close watch on trends in China and other countries.

A response guided by data and science

The epidemic and pandemic response need nuanced, evidence guided strategies derived from the ongoing learning and not dogmatic response. 'He who rides a tiger is afraid to dismount' is a famous saying. China's zero -COVID strategy was like riding a tiger. As China has dismounted, the policy maker there urgently needs to bring granularity in response, adopt calibrated steps, remove restrictions and implement steps to protect the vulnerable. More importantly, it is a moral responsibility of the government in China to report

COVID-19 specific data (cases, deaths and data for genomic surveillance) with the international community and health organizations.

CONCLUSION

As the rest of the world has already faced natural infection to a larger extent, It is very likely that the ongoing COVID-19 surge in China would be the last major COVID-19 wave in the world. Every cloud has a silver lining. It is possible that three years later, China- where the pandemic started- In an ironic twist, would become the country where the pandemic would also end.

COMMENTARY

e-Health in India: Opportunities and Challenges

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e-Health in India has been emerge and discussed more during Covid era. The term digital health encompasses all applications emerging from different section of health care and technology. WHO defines digital health as a broad umbrella encompassing e-Health including use of genomics and artificial intelligence.(1)

The country comprise of 137 million population and inadequate skilled Human Resource is looking forward to use e-Health technology to make healthcare available and accessible in the last corner of the country. In recognition to this idea the government of India launched the flagship program in 2015 with objective of adoption of digital technology to penetration of health care services in rural area. Subsequently in 2017 national health policy was envisioned to have a fully digitalized health care system in India under the umbrella of digital health mission. More than 50 medical colleges and institutions were given the status of regional and nodal center to connect with rest of health care delivery systems to provide online consultations to needy areas.

Telemedicine is used as telecommunication technology to connect with primary health centers, Community health centers and district hospitals to guide and facilitate medical services of the areas to include treatment outcomes. This is essential to effectively bridge the gap between health care provider an health care seeker.

The irony is that 75% countries health care infrastructure is concentrated in urban areas while more than 75% of population livres in rural areas. The government of India is thinking to expand telemedicine services to all public healthcare sectors.(2) The need of telediagnostic facility specially in radiology and pathology. Government of India ministry of health and family welfare has launched Ayushman Bharat Digital Mission (ABDM) for creating India's Digital Health Ecosystem. Under ABDM, ABHA - Ayushman Bharat Health Account will be created for all citizens of the country. This initiative would empower citizen about their health rights and privileges. AT the same time this will help the government to achieve Health for All.(3,4)

Technology always comes with challenges and health care technology is not an exception to it. There are issues related to internet connectivity, software, virtual portal and interpretation images. It has been observe that safety, security and privacy of the data is always debatable. Though there are law and regulation to prevent any kind of misuse. Medications which can be prescribed through e-Health, are limited as per the current prevailing drug policy, which need to be revised or amended.(5)

Knowledge and awareness about the benefits of telemedicine in specially rural and tribal part of India is a great challenge in the current scenario and one of the great barrier in effective implementation of e-Health.

e-Health do have limitations in emergency situation and other critical medical health condition, which need surgical intervention.(6)

Yes, there are challenges, but looking in to the benefits of e-Health ecosystem of the country, it can be visualized that each citizen will be able to access health care delivery system at least for day to day medical problems Though the concept is emerging in India, services has been started in couple of years, still the data suggest the more than 8 corers of Indian citizen are benefitted with e-Health services.(7)

Robust networking system, public health awareness, wide dissemination of information in local language through electronic or print media, establishing more nodal and regional centres of telemedicine, mapping of PHC/CHC and district hospital, training of manpower, are few recommendations to ensure effective health care delivery through e-Health.

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PERSPECTIVE

Revisiting anaemia control through transformative leadership-fitting missing piece in jigsaw puzzle

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Anemia is a significant public health issue of worldwide, with around one- third of the global population continues to be anemic. According to the WHO, the prevalence of anemia in children aged 6-59 months and women of reproductive age (15 to 49 years) was 39.8% (95% UI 36.0%, 43.8%) and 29.9% (95% UI 27.0%, 32.8%) respectively which equates to 269 million children and half a billion women globally (1). In India, according to the MoHFW's fifth round of the National Family Health Survey (NFHS), 57 percent of women aged 15 and 49 years, 52.2 percent pregnant women and 67.1 percent of children aged 6-59 months have anaemia, making it as the most common preventable causes of maternal and child deaths (2).

Keeping into account the huge burden of anemia in India, the first initiative for anemia control in India, dates back to 1970 as India's National Nutritional Anemia Control Program (NNACP). The main aim of program was to provide iron and folic acid (IFA) tablets to all vulnerable groups. After several changes in the terminology, National Iron Plus Initiative (NIPI) was launched in which decentralization of IFA supplies to states was done (3). Despite repeated changes, the prevalence of anaemia did not alter noticeably across different age and sex groups. In a large evaluation round, inadequate last-mile delivery ,a broken supply chain, lack of awareness reading the beneficiaries, Improper orientation of the health functionaries towards the programme were among the important shortcomings (4).

In order to address these gaps, the anemia control programme was redesigned in 2018, using lessons from the past and best practices from other countries, where it was re-launched as the AMB (Anemia Mukt Bharat or Anemia Free India) (5). This strategy aims to address key issues like program financing, implementation, and last-mile and focuses primarily upon adopting a holistic strategy to address systemic difficulties through better budgeting and planning. AMB works at all levels of care and service delivery and proposes a 6 6 6 strategic approach, focusing on 6 beneficiary groups, 6 institutional processes, and 6 interventions.

The six beneficiary includes the children (6-59 months), children (5-9 years), adolescents (10-19 years), women of reproductive age (15-49 years), pregnant women, and nursing women; whereas six institutional mechanisms which are thought to improve programme execution and accountability includes intra-ministerial coordination, national AMB unit, convergence with other ministries, strengthening of supply chain and logistics and development of AMB dashboard

(www.anemiamuktbharat.info) and digital portal. Finally, the six main initiatives under the AMB are prophylactic IFA supplementation, deworming, intensified year-round behaviour change communication campaigns, digital anaemia testing and point-of-care treatment, mandatory provision of IFA fortified foods in public health programmes and addressing non-nutritional causes of anaemia in endemic pockets (5). After the implementation of the AMB strategy, studies were carried out to evaluate the Iron and Folic Acid (IFA) supplementation coverage between 2017–18 and 2019–20, which has increased for all beneficiary groups [pregnant women from 78% to 90%; lactating mothers from 34% to 49%; school-attending adolescent girls (boys) from 23% to 40% (21% to 42%); out-of-school adolescent girls from 6% to 23%; children (6).

However, as per recently conducted National Family Health Survey 2019-20, the situation of anemia is still grim with an increase in prevalence of anaemia among all categories i.e. 58.6% of children in the 6- to 59-month age range were reported to be anaemic in NFHS-4, whereas 67.1 percent were reported to be anaemic in NFHS-5, a startling increase of 14.5 percent. The percentage of anaemic women between the ages of 15 and 19 also increased from the previous round (NFHS-5: 59.1%; NFHS-4: 54.1%—a jump of 9.24%) (7).

Despite Anaemia Mukt Bharat being a very comprehensive programme, I believe that we need to look the problem from different perspective. Looking at the problem whose prevalence is more or less constant from last 70 years and increasing trends of anaemia, there is a need to incorporate transformative leadership in the implementation strategy. Transformative leadership approach inspires and motivates the health care professionals, inculcates a strong sense of values, culture and ownership, and independence at workplace. A shared vision should be prepared in consultation with all health care staff, especially the field level workers, support them for working at higher standards. Positive re-enforcement mechanisms in the form of praise, awards, link to godliness (you will go to heaven on saving so much lives!) should be used. (9,10) All should be encouraged to come up with innovative ideas rather than just evidence based solutions from other countries. There should be transformational leaders who believe in transformation or change and be creative in their thinking. The staff at field level should feel involved and 'own' the program for better results (8,9).

The studies also suggest that information-motivation and behavior skills model can be used by the health care providers to instill good nutritional behaviors among beneficiaries. The information constructs can be used to provide a detailed information on preventive strategy (why it is necessary to prevent iron -deficiency anemia), iron rich foods (how to inculcate the desired behavior), simultaneously addressing the various misconceptions and assumptions. The motivation construct can be used in the form of personal motivation (i.e., daily consumption of iron tablet) and social motivation/social protection (sharing of iron rich foods in the family food basket), which in turn will affect the behavior, by increasing the ability to engage in building a healthy behavior by identifying and selecting the iron rich food for self (10). We also need to adapt the concept of root cause analysis, which lies on the idea to find out what happened, why did it happen and what do you do to prevent it from happening again. RCA is interdisciplinary in nature and uses a structured process. The first step is to defining the event/problem. (intake? absorption? Socio-cultural issue?) followed by collecting the evidence-based data regarding the defect (100 patients----30% given medications---30% consumed------30% absorption (merely 3% effectively treated) which in turn helps in identifying the root cause of the defect (11).

The transformative leader looks at the problem from wider angle i.e. he/she not only focuses upon the nutritional element but also from the lens of the socio-ecological determinants of health. The Transformative leader also ensures multi-stakeholder participation from a variety of departments, including agriculture (technology for growing iron-rich crops), educational institutions (school canteens instilling nutritional habits at a young age), excise and taxation (lowering the tax on iron-rich foods), and so forth for increasing the reach, coverage, which in turn will decrease the burden of anaemia.

As anemia is a multifaceted issue, it is right time to adopt a holistic transformative leadership approach in current Anemia Mukt Bharat program. We need to

fill in the gaps in the jigsaw puzzle of comprehensive solutions under the Anaemia Mukt Bharat initiative in light of the rising and persistent trends of anaemia in India. Incorporating positive reinforcements, teamwork, ownership, shared vision, and multi-departmental, multi-stakeholder participation into the program is essential for reducing the prevalence of this public health problem.

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ORIGINAL ARTICLE

Household coverage with adequately iodized salt and practices affecting iodine content of salt at household level in two sub-Himalayan districts

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ABSTRACT

Background: The gap between manufacturing level of iodine in salt and utilisation level of salt persists. **Objectives**: To estimate the uptake of adequately iodized salt at the household level and to assess the practices with respect to storage and use of iodized salt, as well as to evaluate the knowledge related to health benefits of iodine. **Methods**: The study was conducted in the two districts of Himachal Pradesh, i.e., Hamirpur and Una. Three blocks from rural areas; one Municipal Committee and three Nagar panchayats were surveyed. 390 households from both the districts were selected using multi stage random sampling techniques. The data collection team obtained consent from the head of family and asked questions regarding salt purchasing and consumption habits, benefits of Iodine, and iodized salt awareness. Salt iodine content was tested by using rapid salt iodine testing kit in front of family and the results were conveyed to them. **Results**: The study results depicted that 97.4% of households in District Hamirpur and 96% of households in District Una were using iodized salt. The household coverage of adequately iodized salt in Hamirpur was 91.0% and 89% in Una. More than half the respondents either don't have much knowledge or had wrong knowledge about iodine or iodized in Hamirpur. Only half the respondents were aware of importance of iodine / iodized salt and its role in normal growth and prevention of diseases in Hamirpur and Una. Practice of adding salt at the start and during cooking was common (>90%) in both districts. **Conclusion**: The coverage of adequately iodized salt in Sub Himalayan region was high although knowledge of importance of iodine was poor.

KEYWORDS

Goitre; Himachal Pradesh; Salt; Iodine

INTRODUCTION

One of the major modifiable causes of mental retardation which strikes especially during the early stages of pregnancy and in early childhood is iodine deficiency [1]. Iodine is a vital component of thyroid hormones, which are needed for optimal mental and physical development and regulation of body metabolism. Iodine deficiency disorder (IDD) is recognized as a public health problem in India. According to Indian council of medical research survey conducted among 414 districts in 2014 prevalence of IDD was more than 5% in 337 districts.

[2] Majority of these suffer from goitre, cretinism, and neurological deficits [3]. Surveys conducted in various states showed that no state in the country is free from IDD [4]. Globally, IDD suffering population also inherit real risk of coronary artery diseases, autoimmune disorders, psychiatric disorders, cognitive impairment, and cancer [5,6,7].

Iodination of table salt (salt for table use) is one of the best methods to eliminate iodine deficiency disorders (IDDs) and associated thyroid diseases. Iodate and iodide levels in table salt may vary for many reasons. There are no studies of the concentration of iodine in salt packs on the shelf and in use (open packs).

In Asia, the cost of iodized salt production and distribution at present is in the order of 3-5 cents per person per year. This must be considered cheap in relation to the social benefits that have already been described. However, there is still the problem of the iodine in the salt reaching the iodine-deficient individual.[8] There may be problems with distribution or preservation of the iodine content; it may be left uncovered or otherwise exposed to heat and moisture. To reduce the loss of iodine, salt should be added only after cooking. As per the Coverage Evaluation Survey, 2009, universal salt iodization was made mandatory in the country from the year 2005, however, only 71% of households were consuming adequately iodized salt. [9] This gap in the utilization of adequately iodized salt could be due to various reasons such as non-availability in the rural areas, poverty, poor knowledge of iodine deficiency diseases, and faulty storage practices.
The aim of the present survey is to estimate the uptake of adequately iodized salt at the household level and to assess the practices with respect to storage and use of iodized salt, as well as to evaluate the knowledge related to health benefits of iodine.

Objective

1. To find the percentage of households consuming adequately iodized salt in District Hamirpur.
2. To assess the knowledge regarding benefits of iodized salt use, iodine deficiency diseases.
3. To assess the storage and cooking practices with respect to the current use of iodized salt.

MATERIAL & METHODS

Study design and setting: A cross section descriptive study was conducted in rural and urban areas of District Hamirpur Una, Himachal Pradesh located in the south-western ranges of the Himalayas. Three blocks; Bhoranj, Taunidevi and Barsar were selected as rural areas; one Municipal Committee and three Nagar panchayats were surveyed from Hamirpur. Three blocks; Bangana, Haroli and Una were selected as rural areas; and one Municipal Committee and three Nagar panchayats were from Una district. Total population of Una is 5,21,173 with around Male -92% and Female- 81%. Literacy rate of the district is 86.5%. population of district Hamirpur is 4,54,768 with 47.7% males and 52.3% females. the literacy rate is 88.15%.

Study period: The study was conducted between February 2019 and January 2020.

Study population: Population residing in rural and urban areas of Districts Hamirpur and Una.

Sample size: Sampling unit was households in rural and urban areas of both Districts. Sample size was estimated to be 384 expecting 80% of household in selected area are consuming adequately iodized salt with 95% confidence level, design effect 1.5 and 5% permissible error. It was rounded off to 390. Hence 390 households were samples from each district.

Sampling design: Multi-stage random sampling was done for the selection of 390 Households for survey. Districts were divided into six rural blocks, one Municipal Committee and three Nagar panchayats. First the three rural blocks and three urban areas were selected randomly. 312 households were taken from rural area i.e., from randomly selected 24 villages and 78 households from six urban wards. First household was selected randomly after starting from centre of village or ward.

Data collection: Before the data collection, the survey team consisting of health educators of department of Community Medicine were given training regarding the testing of salt with the help of rapid test kits (MBI kits, India) and interview schedule. The data collection team obtained consent from the head of family and the respondents were asked questions regarding salt purchasing and consumption habits, benefits of Iodine, and iodized salt awareness etc. Salt iodine content was tested by using rapid salt iodine testing kit in front of family and the results were conveyed to them.

Assessment of adequately iodized salt:

S. No.	Color of salt after adding regent of MBI Kit	Interpretation
1	White	No iodine
2	Purple blue	Adequate iodine
3	Grey/light blue	Inadequate iodine

Data analysis: The collected data was thoroughly screened and entered in Microsoft Excel spreadsheet 2007. Statistical analysis was done by using Epi Info 7 software. Descriptive statistics, frequency percentages were determined for categorical variables with 95% confidence interval.

Ethical aspects: Prior permission was taken from Institutional Ethics Committee Dr. Radhakrishnan Govt. Medical College, Hamirpur. Objectives of study were explained to the participants during the visit. Informed consent was taken from the participants in the study. Participants were fully assured regarding the confidentiality and anonymity of the information provided by them. Confidentiality of information gathered from study subjects was maintained in accordance with the principles embodied in the declaration of Helsinki and International guidelines for ethical review.

RESULTS

As shown in this table 1, most of the respondents in Hamirpur were in the age group 41- 60 years and females (90%). Around 96% of respondents were having education of secondary level and above. Around 70% were homemakers. Most of the respondents in Una were in the age group 31- 60 years and were females (93%). Around 96% of respondents were literate. Around 65% were homemakers (Table-1)

The study results depicted that 97.4% of households in District Hamirpur were using iodized. The study results depicted that 96 % of households in District Una were using iodized salt (Figure 1)

Table 1: Demographic profile of study population residing in Districts Una and Hamirpur

Age Distribution	**Hamirpur**	**Una**
Age groups (years)	Frequency (percentage)	Frequency (percentage)
18-30	62 (15.8)	35 (9.0)
31-45	176 (45.2)	138 (35.4)
45-60	115 (29.5)	124 (31.8)
> 60	37 (9.5)	93 (23.8)
Gender		
Female	350 (89.7)	363 (93.0)
Male	40 (10.3)	27 (7.0)
Socio-economic Status (Modified KS Scale 2019)		
Class I	46 (11.8)	51 (13.0)
Class II	142 (36.4)	152 (39.0)
Class III	128 (32.8)	137 (35.2)
Class IV	53 (13.6)	29 (7.4)
Class V	21 (5.4)	21 (5.4)
Educational status		
Illiterate	06 (1.5)	16 (4.2)
Primary	10 (2.5)	78 (20.0)
High school	35 (9.0)	133 (34.1)
Secondary education	142 (36.4)	97 (24.8)
Senior secondary	96 (24.6)	41 (10.5)
Graduate or above	101 (26.0)	25 (6.4)
Occupation		
House maker	268 (69.8)	254 (65.1)
Government job	76 (19.4)	80 (20.5)
Private job	56 (11.8)	56 (14.4)
Type of family		
Nuclear	156 (40.0)	166 (42.5)
Joint	234 (60.0)	224 (57.5)

Figure 1: Type of salt used by households of district Hamirpur and Una (N = 390)

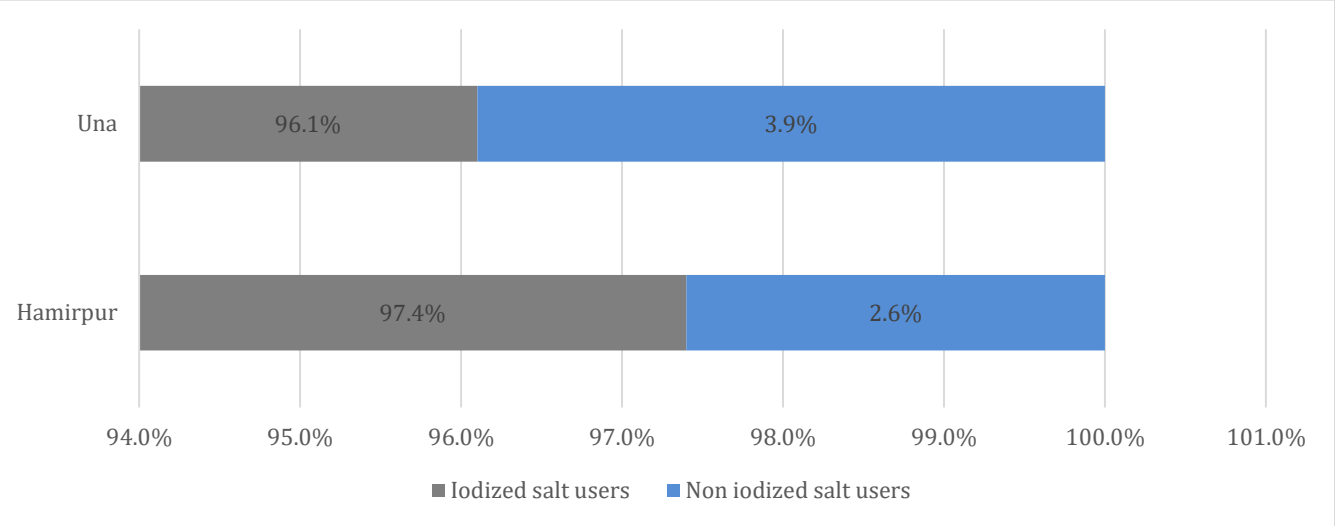


Table 2: Amount of Iodine (in ppm) in the samples salt of selected households of District Una and Hamirpur

Iodine content	Interpretations	Hamirpur (390) N (%)	Una (390) N (%)
0 ppm	No iodine (White colour)	12 (3.0)	15 (3.8)
1-15 ppm	Inadequate iodine (Grey/light blue)	23 (6.0)	28 (7.2)
15-30 ppm	Adequate iodine (Purple bluish)	355 (91.0)	347 (89.0)

The household coverage of adequately iodized salt in Hamirpur was 91.0%. The household coverage of adequately iodized salt in Una was 89.0%.(Table 2)

In the present survey 95% of the respondents of Una were using air tight container for storage of salt. Most of them were using wide base container and never experienced dampness in salt. Around 92.0% respondents never exposed damp salt to heat and light. Most of them were consuming salt within 2-8 weeks after opening of packet. Boiling was the most common cooking practice found in survey followed by frying and steaming. Only 5% were adding salt at the end of cooking in Una.

In the present survey 77.3% of the respondents were using air tight plastic container for storage of salt in Hamirpur. Most of them were using wide base container and never experienced dampness in salt. 95.0% respondents never exposed damp salt to heat and light. Most of them were consuming salt within 2-8 weeks after opening of packet. Boiling 67% was the most common cooking practice found in survey followed by frying and steaming. Only 5% were adding salt at the end of cooking in Hamirpur.(Table 3)

Table 3: Storage and cooking practices of households of District Una and Hamirpur

Storage practices of salt	Hamirpur N (%)	Una N (%)
Type of container		
Airtight glass container	31 (7.9)	18 (4.6)
Open glass container	01 (0.2)	00
Airtight steel container	35 (9.0)	37 (9.5)
Open steel container	10 (2.6)	9 (2.3)
Airtight plastic container	301 (77.3)	311 (79.8)
Open plastic container	12 (3.0)	15 (3.8)
Shape of container		
Wide base	281 (72.0)	290 (74.3)
Narrow base	109 (28.0)	100 (25.7)
Dampness/moisture observed in salt		

Storage practices of salt	Hamirpur N (%)	Una N (%)
Never	260 (67.0)	280 (71.8)
Some time	121 (31.0)	106 (27.2)
Often	09 (2.0)	04 (1.0)
Exposing moisturized salt to light or heat		
Never	370 (95.0)	280 (71.8)
Some time	15 (3.8)	106 (27.2)
Often	05 (1.2)	04 (1.0)
Average duration needed to consume salt after opening of packet		
Less than 2 weeks	13 (3.3)	08 (2.0)
2 – 4 weeks	153 (39.4)	181 (46.4)
5 – 8 weeks	182 (46.6)	149 (38.2)
More than 8 weeks	42 (10.7)	52 (13.4)
Distance of salt container from stove/gas Chulha		
Less than 2 feet	106 (27.2)	86 (22.0)
2-4 feet	268 (68.7)	283 (72.5)
More than 4 feet	16 (4.1)	21 (5.5)
Most common cooking practices		
Frying	118 (30.0)	110 (28.2)
Steaming	12 (3.0)	04 (1.0)
Boiling	260 (67.0)	276 (70.8)
Timing of Salt added to food		
At the start	192 (49.2)	211 (54.1)
During cooking	178 (45.6)	158 (40.5)
At the end of cooking	20 (5.2)	21 (5.4)

More than half the respondents either don't have much knowledge or had wrong knowledge about iodine or iodized in Hamirpur. Only half the respondents were aware of importance of iodine / iodized salt and its role in normal growth and prevention of diseases in Hamirpur and Una. (Table 4) & (Figure 2), (Figure 3)

Table 4: Knowledge of head of household regarding iodized salt

	Hamirpur			Una		
	Yes	**No**	**Don't Know**	**Yes**	**No**	**Don't Know**
Every salt doesn't contain iodine	162 (41.5%)	52 (13.3%)	176 (45.2%)	171 (43.8%)	48 (12.3%)	171 (43.9%)
Iodine reduces if salt not stored properly	117 (30%)	30 (7.7%)	243 (62.3%)	96 (24.6%)	36 (9.2%)	258 (66.1%)
Iodine deficiency causes Mental retardation in children	112(28.7%)	25 (6.4%)	253 (64.9%)	103 (26.4%)	11 (2.8%)	276 (70.8%)
Iodine deficiency causes Growth retardation in children	167 (42.8%)	23 (6.0%)	200 (51.2%)	146 (37.4%)	34 (8.7%)	210 (53.9%)
Taste of iodized salt is same of common salt	118(30.2%)	80 (20.5%)	192(49.3%)	162 (41.5%)	47 (12.0%)	181 (46.5%)

Figure 2: Knowledge about Importance of iodized salt

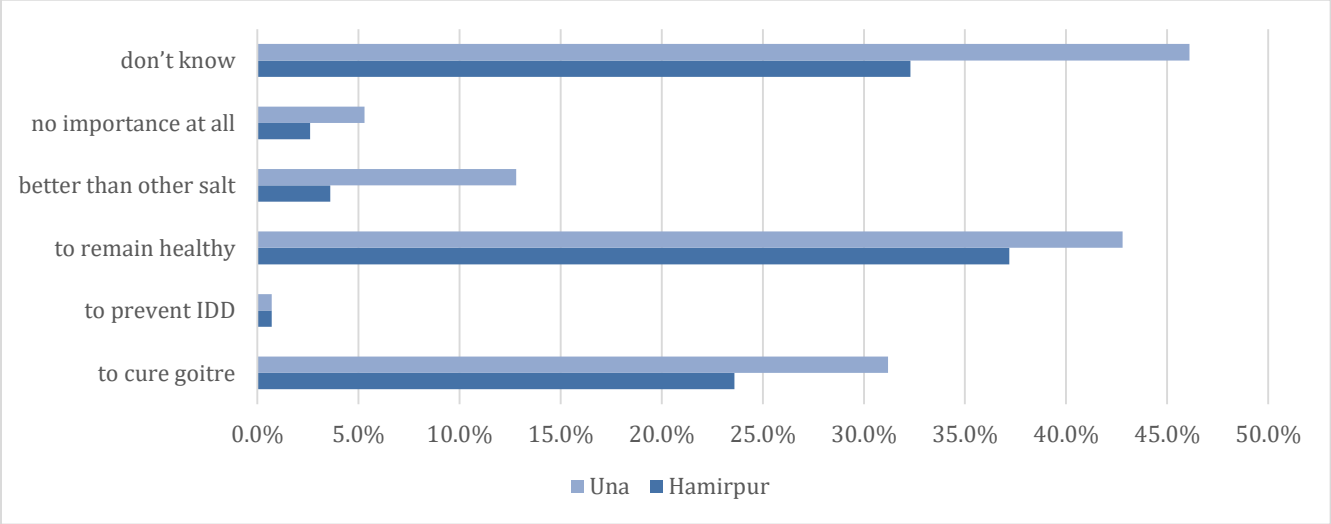
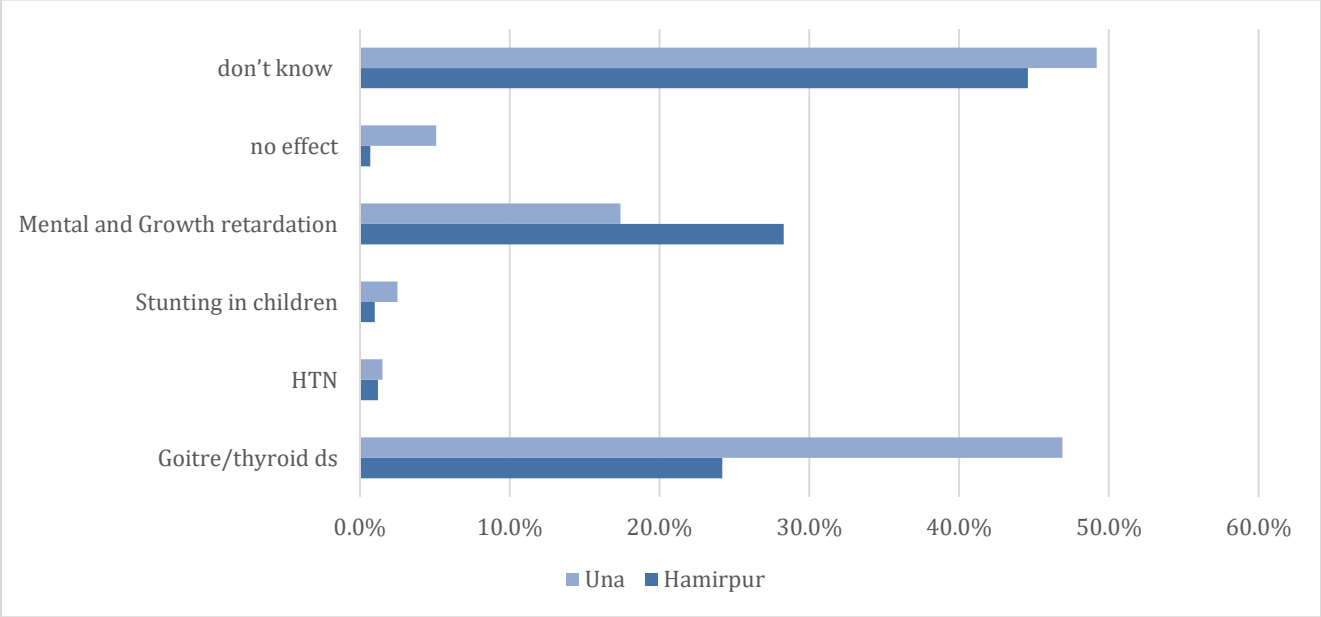


Figure 3: Knowledge about effects of Cooking with non-iodized salt



DISCUSSION

Availability and consumption of adequately iodized salt must be granted for sustainable elimination of IDD. According to WHO and International Council for Control of Iodine Deficiency Disorders (ICCIDD) standard, elimination of IDD will be possible if more than 90% of the households consume adequately iodized salt. This community-based household survey was conducted to estimate the iodized salt intake among residents of district Hamirpur and Una situated in south west ranges of Himalayas.

Socio demographic profile: The respondents in majority of the surveyed HH (45.2% in Hamirpur and 35.4% in Una) were in age group 31-45 years. Similar was included by Lohiya et al., in their HH survey. Females constituted the major part (89.7% in Hamirpur and 93% in Una). 74.2% of HH in Una belonged to Class II and III socioeconomic status while 69.2 % belonged to same in Hamirpur as per Modified Kuppuswami scale. Most of the households belong to high and upper middle class in a similar study by Roy et al., in Gautam Budh Nagar, Uttar Pradesh.[10] Karmakar et al., in their survey on rural women from Tripura reported that their study constituted women from lower and upper lower class.[11] Education status of Hamirpur respondents was higher (majority were secondary and above) as compared to that of Una (majority were between primary to secondary school). Lohiya et al., in their study reported majority of females were illiterate and males were educated high school and above.[12] Since majority of respondents were female; more than two thirds in both districts were homemaker.

Similar trend was reported by Karmakar et al. [11] Majority of HH had joint families in both the districts.

Salt and iodine content: The iodine content of household salt is an important indication of iodine intake from salt iodisation, however, there is now a large body of evidence indicating that industrially-processed food salt is an increasingly important source of, potentially iodised, salt.[13,14] Majority of HH in Hamirpur and Una were using iodized salt (97.4% in Hamirpur and 96.1% in Una). However 91% HH in Hamirpur and 89% in Una were using adequately iodized salt (15-30 ppm iodine). A similar study conducted in Ethiopia revealed that 28.9% of households had adequately iodized salt at household level. [15] Similar study conducted in India in 2009 showed that 51% of households have adequately iodized salt. Studies conducted in Tanzania, South Africa, and Egypt, reported 58.4%, 62.4%, and 68.3%, respectively national coverage of iodized salt consumption at the household level. In South Sudan, Ghana, Malawi, Benin, and Uganda, adequately iodized salt consumption at household level ranges from 72.9% to 96%. [16-19] 82.8% of HH from slums of north east Delhi consumed adequate amount of refined iodized salt. A study conducted by Srivastav et al., in 2012 from Faridabad demonstrated that 62.5% HH which increased to 73.4% as demonstrated by Lohiya et al., in 2015 consuming salt with adequate concentration of Iodine.[12,20] Similar low (62.4%) HH were using adequately iodized salt from Gautam Budh Nagar as reported by Roy et al.[10] Kumar et al., in their evaluation of National IDD Control Programme in India for five states reported that the use of adequately iodized salt is high (72 percent or higher) throughout the Northeast Region, in most states in the North Region, and reaching as high as 94 percent in Manipur. This was lowest (less than 40 percent) in Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, and Orissa. [21] The states in which the use of adequately iodized salt has deteriorated substantially from NFHS II to NFHS III survey are Haryana (from 71 percent to 55 percent), Himachal Pradesh (from 91 percent to 83 percent), and Assam (from 80 percent to 72 percent).[22] This was contradictory finding as compared to current study, probably due to methodological differences.

Knowledge: The knowledge about facts of iodized salt was low in both districts. Similar findings were observed from slums of north east Delhi (6.5%).[23] Although around 80% in both districts in current survey have heard of iodized salt and television and radio was the major source. Karmakar et al., in their study on rural women of Tripura found that 68.9% of participants heard about iodized salt. [11] Sen et al., in their study from 24 Parganas, West Bengal reported that 39.5% had heard about iodized salt.[2] Kumar et al., in their evaluation of National IDD Control Programme in India that among urban HHs 76% were aware about iodised salt as compared to rural HHs (69%).[21] The source of knowledge in majority of states was television. [21] 46.1% from Una and 32.3% from Hamirpur did not have any knowledge about importance of iodine in prevention of iodine deficiency disorders. Similarly 49.2% from Una and 44.6% from Hamirpur did not know about consequences of deficiency of iodine. The knowledge about ill effects of iodised salt was less (54%) in rural areas as compared to urban areas (61%) as quoted by Kumar et al.[21] Similar low awareness about ill effects was reported by Sen et al., from 24 Parganas, West Bengal.[3]

Practice: Airtight container to store salt was practiced by 93.9% of Hamirpur HH and 94.2% of Una HH. Majority used wide base containers. Sen et al., also reported 92.6% storage of salt in covered pot. [3] More than two thirds of HH never observed dampness in salt. 2.6% from Una and 1.2% from Hamirpur often exposed moistened salt to light/heat. A study conducted in Delhi documented that there was about 31% iodine loss from iodized salt when exposed to sunlight.[24] Most of them in current study were consuming salt within 2-8 weeks after opening of packet. Duration of salt storage at home was significantly associated with availability of adequately iodized salt. Study from west showed that duration of salt storage had an impact on the level of iodine. According to them iodized salt will lose 24% of iodine when stored for 10 weeks. [25] This is probably because of physical or environmental factors like moisture in salt, humidity, light, heat, and weather conditions. A similar study conducted in Colombia showed that the effect of longer storage beyond 2 months aggravated losses of iodine from the salt due to different environmental conditions during storage and distribution [26] Karmakar et al., reported that almost 52.6% of women in their study from Tripura stored salt for a period of half to one month and 24.1% store less than or equal to half month. [11]

Gidey et al., from Ethiopia reported that nearly 51.7% stored salt for more than 2 months after purchase.[27] Boiling (67%-70%) was the most common cooking practice found in current survey followed by frying and steaming. Around 5% were adding salt at the end of cooking in both districts. Storage practice was correctly reported and duration of usage was similar to studies across the globe but cooking practice was incorrect.

Daily salt consumption: The per capita daily consumption of salt in this survey was around 9.8 grams in Una district and 9.1 gram in Hamirpur which was much higher than world health organization recommendations of 5 grams per day. In across all areas (urban, urban slum, and rural), the largest source of salt intake was from salt added during the cooking process or at the table. Salt intake in India is about 11 g per day. [27] Mathematical modelling suggests that without any decrease in dietary salt intake, Indians in the 40- to 69-year-old age group will experience an annual rate of approximately 8.3 million new and recurrent myocardial infarctions, 830,000 new and recurrent strokes, and 2 million deaths from either cause on average during each of the next 30 years. [28] Hence it becomes a double edged sword of increasing iodized salt intake leading to hypertension and decreasing may be a factor of low iodine intake.

CONCLUSION

The iodine content in the salt of majority of households in both sub-Himalayan districts was between 15-30 ppm. The storage practices in majority of houses were satisfactory while the knowledge about importance of usage of iodized salt was low. Hence any intervention done at policy level which has to be by default used by the population can bring in the desired change in outcome to be achieved. However, the most cost effective intervention of knowledge and behaviour change is the most difficult one.

AUTHORS CONTRIBUTION

All authors contributed equally.

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SHORT ARTICLE

Fungal Infections and Public Health: Beyond the usual

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ARTICLE CYCLE

INTRODUCTION

WHO recently (October 2022) published the first-ever fungal priority pathogens list. This includes 19 fungal species that are a hazard to public health.(1) This list is the first time that WHO has highlighted significance of fungi as important human pathogens, seeing the fact that fungal have been neglected all these years. Fungal pathogens have over the years become more common and also resistant to the available antifungal agents. With the ever-increasing population of immunocompromised patients and those who are critically ill, invasive fungal infections like candidiasis, aspergillosis, mucormycosis etc. are very commonly reported. On the other hand are the neglected infections of the superficial and subcutaneous tissue that affect immunocompetent individuals also with a high prevalence rate viz. fungal keratitis, mycetoma, sporotrichosis, vulvovaginal candidiasis etc.. Global Action Fund for Fungal Infections (GAFFI) estimates that approximately one million eyes lose vision each year due to fungal keratitis. Almost one billion individuals across the globe have some type of cutaneous mycoses. Fungi in the environment also lead to various airway diseases and account for approximately ten million cases. Overall, the GAFFI puts forward an approximate figure of around 300 million individuals being affected from life threatening fungal infection each year globally and over 1.5 million deaths.(2)

Recent evidence suggests that the both the geographic range and incidence of fungal diseases are rising worldwide mainly due to urbanization, life style changes, global warming, international travel etc. Invasive fungal infections due to Candida, Aspergillus, Mucorales, Cryptococcus and Pneumocystis jirovecii are more often highlighted as these occur in immunocompromised patients. However, in this article we will be laying focus on the fungal infection that affect a large population of healthy hosts and have a chronic indolent course. Early recognition, diagnosis and treatment of all these infections is a challenge.

Dermatophytosis due to T. indotineae

Currently, there is an epidemic of dermatophytosis going on in the Indian subcontinent. The causative organism, T. indotineae (earlier called T. mentagrophytes genotype VIII) has replaced T. rubrum, which used to be the most common pathogenic dermatophyte species earlier. This organism is easily transmitted between individuals and often causes recalcitrant dermatophytosis.(3) Patients present with lesion that involve larger body surface are, spread faster, are very inflammatory and pruritic. These forms of tinea infections that are difficult-to-treat.(4) One of the major reasons for its emergence is the use of over-the-counter antibiotic-antifungal-steroid combination creams. As patients get symptomatic relief due to the steroid present in

these creams, usually they don't finish the complete course which leads to drug resistant infections. Of the currently used antifungals for treating dermatophytosis, resistance to terbinafine is the most commonly encountered due to mutations in the squalene epoxidase gene. Due to globalization and international travel, this organism has been isolated in many countries across the globe.(5,6) As a part of the public health intervention, prevention of such infections would be very important, this would include awareness of the disease, avoiding sharing of clothes within family members of affected individuals, early diagnosis and completing treatment regimens and follow up.

Fungal Keratitis

Corneal infections are the second most common cause of blindness next only to cataract. Of all the infectious causes of keratitis, fungi contribute to almost half then cases in India.(7) Rates of fungal keratitis may vary not only between countries but also among different regions of the same country. In India, important fungal pathogens causing keratitis are Fusarium, Alternaria, Curvularia, Aspergillus, Candida etc.. The most important mode of acquisition of this infection is through trauma, that too mostly with vegetable matter in farmers and those involved in agriculture. One of the important studies published from South India estimated the annual incidence of fungal keratitis to be approximately 11 cases per 10,000 population.(8) The early diagnosis and prompt initiation of treatment of fungal keratitis is a constant challenge for all ophthalmologists. The prognosis is poor due to late diagnosis, limited armamentarium of antifungal agents and the disease being non-responsive. To summarize, fungal keratitis affects mostly the poor, especially the farmers and labourers, This clinical entity requires attention from public health experts so that awareness is generated in the community so that appropriate preventive measures can be taken specially by the at risk population and diagnosis and treatment are sought in time.

Mycetoma

Mycetoma is a destructive infection involving primarily the skin and subcutaneous tissue characterized by tumor formation, sinuses and grains. Both bacteria or fungi are implicated in its causation infection. Mycetoma was first reported in the mid-19th century in the Indian town of Madurai, and hence was initially called Madura foot. The morbidity associated with mycetoma is huge and if left untreated, may even result in amputation. Individuals who are active outdoors are mostly affected with children and young adults being the most at risk. Traumatic implantation is the most common route of infection. Feet and hands are the most affected sites in mycetoma. The infection may produce large bulky masses with invasion of the bone if not treated early. Eumycetoma (fungal form of the disease) is very difficult to treat with the available anti-fungals and surgery. Only one-third of the patients get cured. WHO recognized it as a neglected tropical disease (NTD) in 2016, however, it is still not a notifiable disease in most of the countries except Sudan.(9) Mycetoma may have such profound effect on mobility that many patients can't complete their education or even lose their jobs thus becoming a burden on their families and also the community. Educating people, especially the rural population, regarding this disease with focus on prevention is the need of the hour.

Recurrent Vulvovaginal Candidiasis

Vulvovaginal candidiasis (VVC) is characterized by inflammation of the vulva and vagina due to Candida species like C. albicans, C. glabrata etc.. Almost two thirds of women develop VVC at least once in their lifetime. Whereas, recurrent VVC (RVVC) is defined as a condition where the patient experiences four or more episodes of confirmed VVC within the span of one year.(10) Major predisposing factors for VVC include use of local or systemic corticosteroids, diabetes mellitus, high carbohydrate diet, sexual activity, antibiotic use, etc. It is not rare that no predisposing factor can be recognized. RVVC usually occurs during the reproductive ages (25 and 34 years of age), although rarely it may also be associated with hormone replacement therapy (HRT) in post-menopausal females. RVVC may have significant impact on an individual as it may interfere with sexual relations and also recurrent episodes haved the additional burden of treatment costs due to expensive antifungals. It important to note that there have been several reports of azole resistance in C. albicans in women with vulvovaginal candidiasis.

It is estimated that approximately 20 million females are suffering from RVVC condition in India with approximately 3500 cases/1,00,000 females. However, there are limited number of studies on the

risk factors of VVC/RVVC and resistance profile of Candida sp. causing VVC. Indian studies have shown a prevalence varying from 5 to 50 % of VVC in females attending gynaecology OPDs.(11,12) It is important to recognize VVC as a public health problem.

Future perspectives

To understand the impact of fungal diseases in the community, it is imperative to initiate studies that would establish their true burden, recognize their geographic distribution, and ascertain the actual effect of climate change on them. Another major challenge is not only to improve methods for earlier diagnosis of fungal diseases but also to have improved access of the available methods. As a public health initiative, it would be prudent to identify individuals who are at a very high risk of developing these infections and to help focus on preventive strategies. Another important role of our public health experts would be to educate all the healthcare providers at different healthcare levels and to raise awareness among the general public about the perils of fungal infections.

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SHORT ARTICLE

An Unusual Outbreak of Epidemic Dropsy in An Indian Hilly State of Himalayas

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ABSTRACT

Epidemic dropsy is an acute non-infectious disease, caused by consumption of mustard oil contaminated with argemone oil. It usually occurs in outbreaks with clinico-epidemiological manifestations of vomiting, diarrhea, nausea, swelling of limbs, erythema, pitting edema, breathlessness, etc. In extreme cases, glaucoma and even death due to cardiac arrest have been encountered. Here we report an unusual outbreak because of its gradual onset, clustering in a single family, and with major manifestation of gastrointestinal illness mimicking acute gastroenteritis, hence leading to delayed diagnosis and high mortality. Thus, when there is clustering of cases in a single family with on and off gastrointestinal symptoms of vomiting and diarrhea in a mustard oil consuming areas, the diagnosis of epidemic dropsy should be considered as a strong possibility.

KEYWORDS

Epidemic Dropsy, Argemone Mexicana, Outbreak, India, Himachal Pradesh

INTRODUCTION

Epidemic dropsy results from ingestion of edible Mustard oil adulterated with Argemone mexicana (Mexican poppy) oil.[1] While harvesting, the mustard seeds become contaminated with the wild seeds of *Argemone mexicana* (Mexican prickly poppy) that commonly grows alongside mustard plantations[2]. Its ingestion causes a progressive leg edema, also known as epidemic dropsy.

In India, the first case of dropsy was reported from Calcutta and has been reported from different regions, generally sparing South Indian States where the predominant cooking oil is coconut oil [3]. It is an acute non-infectious disease, clinico-epidemiological manifestations of which include vomiting, diarrhea, nausea, swelling of limbs, erythema, pitting edema, breathlessness, etc. In extreme cases, glaucoma and even death due to cardiac arrest have been encountered. Histopathological studies suggest that liver, lungs, kidney, and heart are the target sites for argemone oil intoxication. Nitric acid test and paper chromatography test are used in the detection of argemone oil. The paper chromatography test is the most sensitive test [4]

In India, most of the episodes and outbreaks of dropsy occur during the months of July–September, as newly extracted oil from agricultural produce is sold during these months in the market. There is no specific therapy. Removal of the adulterated oil and symptomatic treatment of congestive cardiac failure and respiratory symptoms, along with administration of antioxidants and multivitamins, remain the mainstay of treatment.[5-6]

The outbreak of dropsy was reported in Kangra district, one of 12 districts of Himachal Pradesh, spread out over the western region of the state and by far the largest region of the Himachal Pradesh. The main aim of this report was to present the unusual manifestations of epidemic dropsy mimicking gastrointestinal illness leading to delayed diagnosis and treatment.

MATERIAL & METHODS

In the month of November 2022, a Private Medical Physician of the district Kangra, made the differential diagnosis of epidemic dropsy after exploring the history of consumption of self-milled mustard seeds oil and informed the District Surveillance Officer (DSO) that there were suspected cases of epidemic dropsy in a single family of village Lahru in Jawalamukhi Health-block of the district. The DSO immediately informed the Chief Medical Officer, Kangra and State Nodal Officer, Integrated Disease Surveillance Project (IDSP), Himachal Pradesh Health authorities of district also informed district administration and constituted a rapid response team to investigate the disease. District Assistant Commissioner, Health and Food Safety was contacted to provide technical and laboratory support for the outbreak investigation. The district rapid response team carried out the investigations to determine the cause of outbreak. The detailed history of the affected family was obtained as per the performa. A survey of the surrounding area was conducted to identify any similar cases. An in-depth personal and medical history like present illness, and clinical features of each patient was recorded. Prior to the data collection the written informed consent was obtained from all the study participants.

Mustard oil samples were taken from the affected family and from the shop from where the family had purchased crude mustard oil . These seeds were firstly examined with naked eye for the presence of argemone seeds followed by laboratory tests; Nitric Acid Test and Paper chromatographic method.

The oil samples were tested for contamination of argemone oil using the Nitric acid test and thin layer chromatography (TLC) under UV light. The oil samples were analyzed by Food Analyst at composite testing laboratory, Kandaghat, Himachal Pradesh. In *Nitric acid test:* 5 ml oil was shaken with an equal volume of nitric acid. On standing, the acid layer turned yellow, orange-yellow or crimson, depending upon the amount of *Argemone* oil. The test was sensitive to a concentration of >0.25%. It has a high false-positive rate and a positive test must be confirmed and confirmed by the *Paper chromatographic method which is* the most sensitive method; can detect down to 0.0001% *Argemone* oil adulteration; The raw mustard seeds collected from the shop were physically examined and argemone seeds were absent and followed by the test for argemone oil in extracted oil.

RESULTS

During the epidemiological investigation, it was found that the family bought mustard seeds for oil extraction from a local shop and was consuming self milled mustard oil for last 3 months.. Those mustard oil samples tested positive for argemone oil contamination by Nitric acid test (Figure 1) and confirmed by thin layer chromatography (TLC) under UV light. All other samples from neighboring households and from the oil extraction machinery shop tested negative for argemone oil contamination.

Figure 1: Ring formation in Nitric Acid Test for Argemone Mexicana

The outbreak affected 8 persons of a single joint family out of which two were children. There was no such similar case amongst the persons living in the neighboring households. The family belonged to a lower middle class and age of affected members ranged from 1.5 to 53 years. There was gradual onset of signs and symptoms. Symptoms initiated after a month of consuming oil, and out of 8 persons affected, only 4 were symptomatic and one patient succumbed to death (Table 1). Case fatality ratio of 12.5% was recorded in the study.

Table 1: Socio-demographic characteristics

S.No.	Age (years)	Gender	Occupation	Symptoms	Duration of Onset of Symptoms after consumption (Month)	Treatment received or not	Treatment received after onset of symptoms (Days)	Outcome
1	29	F	House wife	Loose stools, vomiting	1	Yes	1 to 2	Recovered
2	30	M	Defense	Loose stools, vomiting	1-1.5	Yes	1 to 2	Recovered
3	31	M	Defense	Loose stools, vomiting	1-1.5	Yes	1 to 2	Recovered
4	27	F	House wife	Loose stools, vomiting	1-1.5	Yes	1 to 2	Recovered
5	6	M Ch	Student	nil	-	-	-	-
6	1.6	M Ch	.....	nil	-	-	-	-
7	53	F	House wife	Loose stools, vomiting, pedal edema	1	Yes	10 to 15	Recovered
8	59	M	Farmer	Loose stools, vomiting, Pedal edema, erythema legs	1	Yes	10 to 15	Death

A 57 years male resident of Village Lahru, P.O. Khundian, Health Block Jawalamukhi, District Kangra Himachal Pradesh, India experienced symptoms of loose stool and vomiting. Patient was known case of type 2 Diabetes Mellitus. Patient visited private health institutions after the onset of symptoms where he was admitted and provided symptomatic treatment. The initial symptoms were misinterpreted to be caused by acute gastroenteritis and were provided with symptomatic treatment .Post discharge from the same hospital, patient continued the consumption of same self milled mustard oil and again started experiencing similar symptoms. He was again admitted to the same private hospital with add on symptoms of bilateral pedal edema with redness of the overlying skin. Further investigations revealed pancytopenia, cellulitis and severe anemia. However patient didn't recover and was managed at higher institutions where after two days of clinical management he was discharged and later on succumbed to death at home.

During this period, rest of the four family members started experiencing similar mild symptoms of gastro-enteritis and pedal edema. Following this family members visited private medical physician in District Kangra who made the differential diagnosis of epidemic dropsy after exploring the history of consumption of self milled mustard seed oil in the family members. All of them were managed conservatively as per symptoms. However, remaining 3 family members didn't experience any symptom. There was no involvement of the nervous system. There were no ocular manifestations among the patients. Most of the patients were found to have been almost fully recovered in the follow-up examination. Two patients complained of persistent mild skin discoloration and also complained of generalized body aches.

The District Surveillance Unit (DSU) had filed the full investigation report on Integrated Health Information portal-Integrated Disease Surveillance Programme Portal (IHIP-IDSP). All the health functionaries were educated on this unusual presentation of the epidemic dropsy for early identification to reduce the high case fatality rates in the future.

DISCUSSION

Epidemic Dropsy as name says is a disease that occurs in epidemics or in outbreaks; isolated cases are rarely seen and reported. Review of scientific literature could yield only two case studies reporting outbreaks restricted to a single family, however the rest of the outbreaks affected more than one family.[7]

Due to low-middle socio-economic background, family was not aware of mustard seeds

contamination with argemone seeds, which led to the outbreak. Previous studies also concludes that that the families with low socio-economic status favors the use of home extracted oils, which has more chances of contamination rather than commercially available tested oils having an AGMARK sign, which is considered as the sign for purity as per Indian standards [8-9]. In our study of this outbreak, the main clinical manifestations reported were gastrointestinal, i.e., diarrhea and vomiting mimicking food poisoning which is in contrast to the other studies where the classical picture of dropsy with bilateral pitting edema, erythema, and breathlessness were reported. The onset of the symptoms was also insidious in contrast to acute onset, which is the most common presentation. However various studies across India and globally reported other manifestations like skin pigmentation, excessive loss of hair and cardiac symptoms where long term use of contaminated oil is observed.[6] In our study we reported the mortality of a 59 years old member of same family at home after discharge from the hospital, however the cause of death was not ascertained in this case. There are limited follow-up studies to document long-term consequences of Argemone oil. Most of the patients in our study were almost fully recovered in the follow-up examination. Previous studies conclude recovery period between 2-5 months .[8]

To the best of our knowledge this was the first case presented and identified by surveillance team in this hilly district which implies strong surveillance by health system in identification of such unusual outbreaks and concerted efforts by food safety and health departments in management. However the study findings couldn't be thoroughly recorded due to lag in final diagnosis and non availability of sale and purchase records.

Such outbreaks of dropsy can be prevented with extensive public awareness campaigns and by early identification of source of infection. Sale of loose-unpacked cooking oil should be monitored for contamination with argemone oil. The mustard seeds and milled oil should be regulated and tested in laboratory as per FSSAI regulations before sale and the milled cooking oil should be used in moderation. Sensitization of farmers about accidental contamination of edible oil with argemone seeds; its consequences and prevention by de-weeding of argemone plants grown along with mustard plants should be encouraged.[10]

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BOOK REVIEW

BOOK REVIEW - 'Foundations for changing health behavior'

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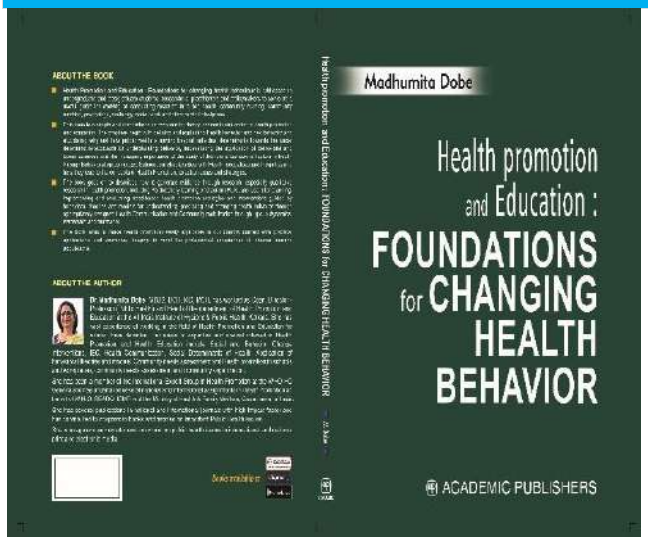

Behaviors within and between people have immense potential to influence health and changing human behavior for better population health is a magnanimous task. The book titled 'Foundations for changing health behavior" succinctly, yet comprehensively, acts as a guidebook for students and researchers to understand research methods and theories for successfully analyzing health behavior and planning for effective implementation and evaluation of interventions targeted at behavior change. Although there are many books on Health promotion and education, but this book is probably first of its kind in Indian context making it a welcome addition to the existing catalogue.

The book has been penned by Prof Madhumita Dobe who has spent more than three decades of her career dedicated to health promotion and education, mentoring a wide range of health professionals, researchers, academicians, front line workers as well as policy makers. The book comprises of ten chapters and the contents have been meticulously crafted bridging the linkage between behavioral, social sciences and epidemiology. The first chapter deals with the basic concepts of behavioral epidemiology. Complex topics like health inequities, social determinants of health, health promotion concepts, behavioral theories and models have been explained in simple language with ample examples. Another important field addressed in this book is the different research modalities applicable in behavioral epidemiology with emphasis on qualitative methods and PLA techniques which will be enormously useful for researchers. The knowhow of communication planning using specific scientific approaches has been dealt in details which are of utmost importance for formulating public health interventions targeted at behavior change.

The format of the book is reader friendly and ideal for master's level or doctoral graduate students in the behavioral sciences, epidemiology or public health, as well as researchers interested in population based research of behavior and health. As one navigates through each chapter, the lucid language with schematic diagrams, and numerous examples to simplify difficult terminologies really

helps to understand not only the complexity of behavioral epidemiology, but also the different theoretical frameworks in health promotion. A crisp summary is provided at the end of each chapter which adds to the uniqueness of the book. The addition of evaluative questions to check the reader's understanding and bibliography for further reading makes it appropriate to be adapted as a textbook for relevant academic courses in the field of public health, community nursing, community nutrition, psychology, sociology, social sciences to name a few.

EFI NEWS & UPCOMING EVENTS

EFICON 2022 - Report

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BACKGROUND

The Department of Community and Family Medicine, a clinical science department within the All India Institute of Medical Sciences (AIIMS), Patna, has an enthusiastic and dynamic environment where faculty, staff, and students are engaged in learning, scholarship, collaboration, and commitment to improving the health of Bihar. The Department offers educational and research opportunities for individuals pursuing careers in the Patient-care professions, Public Health, and the Biomedical Sciences, advancing knowledge through epidemiological, biostatistical, behavioral, socio-clinical, ethical, and legal research.

The department took immense pleasure in successfully organizing the Epidemiological Foundation of India's third national conference, EFICON 2022, at its premises in Patna, Bihar, India, from 3rd to 5th November 2022.

EPIDEMIOLOGY FOUNDATION OF INDIA (EFI)

The Epidemiology Foundation of India (EFI) is a scientific consortium consisting of epidemiologists, medical teachers, biostatisticians, researchers, and scientists from other related disciplines registered under the Societies Registration Act XXI of 1860. The broad objectives of the foundation cover development of human resources in epidemiology and biostatistics, networking of the various institutes at the national level for epidemiological purposes, and consultancies. The Foundation provides a common platform for those practicing epidemiology to interact and benefit mutually towards sharing the development and applications of statistical techniques. EFI provides e-courses on basic epidemiology, research methodology, hospital management, and various issues of public health concern. There are over 2800 life members of EFI spread all over India and abroad, contributing to the development of epidemiology in the country.

EFICON 2022

EFICON 2022, the 3rd Annual Conference of Epidemiology Foundation of India, was held at AIIMS Patna between the 3rd to 5th of November 2022 in a hybrid mode. The Theme of EFICON-2022 was "**Evidence-based medicine for promoting Health in India**".A total of **585** delegates, including **267** offline and **318** online delegates, attended the conference.

The kick-off to the conference started with a pre-conference workshop held on 3rd November 2022 on "Economics of Health and Healthcare". The resource faculties included Dr Shankar Prinja (Professor, Department of Community Medicine and School of Public Health, PGIMER Chandigarh and Executive Director, National Health Authority, Ayushman Bharat - PMJAY) and his team Dr Gaurav Jyani and Dr Neha Purohit. Around 50 delegates benefitted from the Pre-Conference Workshop.
Subsequent to the Pre-Conference workshop, the Final round of the EFICON Mind-Benders Quiz was organized with four finalist teams. The Prelims of the quiz was conducted online, where 40 teams across the country participated.

INAUGURATION OF PRE-CONFERENCE

Inauguration of Pre-Conference workshop by Prof Dr C M Singh (Organizing Chairperson - Medical Superintendent, AIIMS Patna), Prof Dr G K Pal (Chief Patron, Director - AIIMS Patna), Dr Umesh Kapil (Patron - President, Epidemiology Foundation of India), Dr Neeraj Aggarwal (HOD, Department of CFM, AIIMS Bibinagar), Dr Shankar Prinja (Resource Person) and Prof Dr Sanjay Pandey (Organizing Chairperson).

Inauguration of Pre-Conference

Finalists of EFICON Mind-Benders Quiz with the organizing team

Pre-Conference workshop resource faculties and organizers with delegates

SCIENTIFIC SESSIONS

The conference started with various scientific sessions, including plenary sessions, orations, AIIMS Jodhpur young scientist award paper session, free oral papers, and e-posters.

On Day 1, three plenary sessions were held. The first plenary session was on "**Anemia Mukt Bharat**'', where Dr Sonu Goel (Professor, Community Medicine and School of Public Health, PGIMER) spoke on "**Revisiting anemia control through transformational leadership- fitting missing piece in jigsaw puzzle**". This was followed by Dr SS Reddy's (UNICEF) talk on "**Anemia Prevalence in Bihar**''. Subsequently, Dr Ravi Parhi (UNICEF) spoke on "**Opportunities for reducing Anemia Prevalence"**.

Succeeding the first plenary session was the Dr Abhay Indrayan Oration by Dr Meenu Singh (Executive Director, AIIMS Rishikesh). Subsequent to it, the second plenary session was held on "**Paradigm Shift Towards One Health Approach: Why and How?**". Dr Pankaj Bhardwaj (AIIMS Jodhpur) delivered a talk on "**COVID-19 and the Paradigm Shift towards One Health**", which was followed by Dr Sandul Yasobant's (IIPH- Gandhinagar) "**Inching**

towards One Health System Approach" and Dr Deepak Saxena (IIPH - Gandhinagar) "**Strengthening One Health Education in India"**.

The last plenary session of Day 1 was on "COVID-19", where Prof Dr Sanjay Kumar Rai (AIIMS Delhi) delivered a talk on "**COVID-19 Vaccination and the way forward**". This was followed by Dr C K Lahariya's (Founding Director, Foundation for People-Centric Health Systems, New Delhi) talk on "**COVID-19 pandemic and the future of epidemics & pandemics**" and Dr Ajeet Singh Bhadoria(Associate Professor, AIIMS Rishikesh) talk on "**Impact of COVID 19 on Liver Disease Progression**"

The conference has been graced by the presence of Hon'ble Minister Shri Ashwini Kumar Choubey and Dr G K Pal (Executive Director- AIIMS Patna and Chief Patron of EFICON 2022) and Prof Dr Umesh Bhadani for theinauguration ceremony. The Guests of Honor were Prof C S Pandav, Prof Dr P K Singh, Prof Dr Ramji Singh, Prof Dr Surekha Kishore, Prof Subratha Sinha, Dr Nafisa Binte Shafique, patron and EFI President Prof Dr Umesh Kapil, Prof. Ajit Sahai,Dr Sanjay Pandey, and Dr Pragya Kumar.

A cultural event was organized in the Auditorium for one hour, followed by the Inauguration Program. The souvenir for EFICON 2022 was also released during the Inauguration. The Award Paper presentation was heldin the E-classroom, while the oral and poster paper presentations were held in different halls of the Administration building in the afternoon. The first day of the conference ended with the Gala dinner in the evening.

The various themes for oral papers and e-poster presentations were as follows:

- Communicable diseases and occupational health
- Maternal & child health and Nutrition
- Non-communicable diseases including Mental Health & Geriatric health
- Miscellaneous topics including Health system strengthening, Evidence-based medicine for promoting health, Digital Health and Health technology

A total of 147 scientific papers were presented during the conference including 12 award papers, 75 oral papers, and 60 e-posters.

On the 2nd day (5th November 2022), the session started with Dr V K Shrivastava oration by Prof G K Pal, Executive Director, AIIMS Patna, on the topic "**Effects of yoga on cardiometabolic risks and feto-maternal outcomes and association with serum nitric oxide in gestational hypertension: a randomized control trial"**.

The first plenary session was on the topic "**Role of Causal Linkage in Public Health Program Effectiveness**", in which Dr Artira Das (CARE India) spoke on "**Assessment and Programmatic Interpretation of Neonatal and Maternal Mortality and Morbidity**". This was followed by Dr Tanmay Mahapatra's (CARE India) talk on "**Maternal Health and Family Planning**" and Dr Sridhar Srikanthiah's (CARE India) talk on "**Newborn Health and Communicable Diseases"**.

This was followed by a plenary session on "**Front of Package Labeling**", where Dr Umesh Kapil (President, EFI) spoke on "**Diet as risk factor for NCDs**". Dr Pankaj Bhardwaj (AIIMS Jodhpur) added to the topic by talking on "**Growing consumption of packaged food and establishing appropriate nutritional profile models for India**". Dr Omprakash Bera (Global Health Advocacy Incubator, USA) spoke on "**Global status on FOPL and food industry interference"**.

The second day of the conference ended with the distribution of awards for different categories of scientific presentation in the Valedictory function. There were a total of three awards each for four main categories for both best oral paper and e-poster, accounting for a total of 24 awards.

Conference inauguration by Hon'ble Minister Shri Ashwini Kumar Choubey,Prof Dr G K Pal (Director, AIIMS Patna), Prof Dr Surekha Kishore(Executive Director, AIIMS Gorakhpur), Prof Dr Ramji Singh (Executive director, AIIMS Kalyani), Dr P K Singh (Vice Chancellor, UPUMS), Prof Dr Umesh Kapil (President, EFI), Prof Dr C M Singh (Organizing Chairperson) and Dr Pragya Kumar (Organizing Secretary)

Cultural event following the inauguration of the conference

Photo from Day 1 Plenary Session of the Conference

Prof Dr CM Singh felicitating Prof Dr Ashok Bhardwaj and Prof Dr BL Verma

Judges and organizers of AIIMS Jodhpur Young Scientist Award Paper Presentation Session

Photo from Day 1 Plenary Session of the Conference

Prof Dr Sanjay Pandey, Prof Dr C M Singh, Prof Dr Umesh Kapil and Prof Dr B L Verma honoring Prof Dr G K Pal for Dr V K Shrivastava oration

Photo from Poster presentation session

Photos from Oral presentation session


EFICON
2022
4th -5th November 2022
EFICON 2022
3RD ANNUAL NATIONAL CONFERENCE OF EPIDEMIOLOGY FOUNDATION OF INDIA
We Welcome Our Honourable Chief Guest
Shri Ashwini Kumar Choubey
AIIMS PATNA

Organizing team of EFICON 2022

EFI Bulletin

Bulletin of Epidemiology Foundation of India