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CONTENTS

Editorial

Depression

Naveen Krishan Goel, Ravi Rohilla

Original Articles

An emerging disease with pandemic potential: Zika Virus

Raj Kumar, Ravi Rohilla

Measles Rubella campaign in India

Anup Dewanand Salve, Deepak Sharma

Factors affecting treatment adherence among hypertensive patients in Indira colony, Manimajra, Chandigarh

Saurabh Gupta, JS Thakur, Suman Mor

Analysis of drinking water quality of the rural community of district Sirmaur, H.P., India

Suchpreet Kaur, N.L.Gupta

Community Medicine, Public Health and Family Medicine: Many facets of a single discipline"

Dinesh Kumar Walia

Zoonoses and Public Health

Simranpreet Kaur, Asima Zehra

Editorial

Depression

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World scenario

With more than 300 million people affected, depression is the leading cause of disability worldwide. Depression affects people of all ages and at its worst, depression can lead to suicide. Depression has lifetime prevalence varying from 3% in Japan to 17% in the United States[1]. In most of the countries the number of people who would suffer from depression during their lives falls within 8-12% range[2]. The estimated DALY loss due to depression is projected at 15% by 2020[3].

Usual mood fluctuations and short lived emotional responses do not constitute depression. Depression is defined as persistent sadness with loss of interest or pleasure, disturbed sleep and appetite and poor concentration for at-least two weeks. Depression can impair the individual's capacity to cope with the daily life or to function at work. Mild form of depression needs psychotherapy but moderate and severe forms of depression need medications and psychotherapy both. Depression is one of the priority conditions by WHO's mental health gap action program (mhGAP) which aims to help countries to increase services for people with mental, neurological and substance abuse disorders through primary care workers which are trained to provide mental health services[3].

India

In 2015, India had 56 million people with depressive disorders constituting about 4.5% of the entire population[4]. Much needed attention to the problem was drawn by Indian Prime Minister in his radio broadcast for managing depression. National Mental Health Survey was taken by NIMHANS in 2015-16 across 12 selected states from 39,532 individuals. NMHS 2015-16 revealed that about 15% of Indian adults are in need of active interventions for one or more mental health issues. Mental health disorders and substance abuse often co-exist with middle age working populations are affected most. Among adolescents and elderly the problem is a serious concern and in urban metros, there is huge growing burden of mental health disorders. The life time prevalence in the surveyed population was 13.7%. The prevalence of schizophrenia and other psychoses (0.64%), mood disorders (5.6%) and neurotic and stress related disorders (6.93%) was nearly 2-3 times more in urban metros. Nearly 1 in 40 and 1 in 20 suffer from past and current depression, respectively. Depression was reported to be higher in females, in the age group of 40-49 years and among those residing in urban metros. Equally high rates were reported among the elderly. Nearly 1% of the population reported high suicidal risk which was more in females and those residing in urban metros.The current prevalence of severe mental disorders in most states was less than 1% except in Manipur and West Bengal. The prevalence of epilepsy (Generalised Tonic Clonic Seizures) was 0.3% with nearly 2 million persons requiring care. Mainly out of pocket expenditure, families had to spend nearly 1000-1500 INR a month for treatment of mental illness and travel to access care[5]. In studiesdone among college students[6]and teaching

staff[7]in Chandigarh city, prevalence of depression was found 59.3% among students in year2014 and 61% among teaching staff in year 2016respectively. Another study done among employees of Panjab University, Chandigarh revealed that 52% were suffering from workplace stress[8]in year 2014.

Challenges

From a cultural standpoint, mental disorders mainly depression carry a considerable amount of stigma in Indian society. This stigma leads to neglect, social marginalization and loss of economic productivity. Also, poor awareness and limited resources about mental disorders including depression causes poor health seeking behavior and need for treatment. Mental health disorders are often associated with chronic conditions such poverty, unemployment, poor environment and living standard and also with non-communicable diseases such diabetes, cancer and hypertension etc.

Way ahead

India recently announced its mental health policy and action plan. Along with the mental health bill it attempts to fill the gaps in mental health. Mental health including depression is on low priority in national public health agenda. Until this priority changes, it would be too difficult to address the current situation. Also, existing public health facilities must be engaged to deliver the mental health care services. Moreover, for deliverance of mental health services, the capacity of primary care worker needs to be strengthened. Public awareness regarding mental health also needs to be increased in lines with current WHO theme "Let's talk". Funding for existing mental health program needs to be timely allocated and justified. A set of clear mechanisms and guidelines needs to be made for adequate release of funds and activities.

References

1. Andrade L, Caraveo A. Epidemiology of major depressive episodes. Results from the International Consortium of Psychiatric Epidemiology (ICPE) Surveys. Int J Methods Psych Res 2003;12(1):321.
2. Kesslar RC, Berglund P, Demler O. The epidemiology of major depressive disorder: Results from the National Comorbidity Survey Replication (NCS-R). JAMA 2003; 289(203):3095-105
3. World Health Organization. Depression: factsheet [document on the Internet]. Geneva: WHO; 2017 [updated February, 2017; cited 2017 May 11]. Available from: http://www.who.int/mediacentre/factsheets/fs369/en/.
4. World Health Organization. Depression: factsheet [document on the Internet]. Geneva: WHO; 2017 [updated February, 2017; cited 2017 May 11]. Available from: http://www.searo.who.int/india/topics/depression/en/.
5. Gururaj G, Varghese M, Benegal V, Rao GN, Pathak K, Singh LK, et al. National Mental Health Survey of India, 2015-16: Summary. Bengaluru, National Institute of Mental Health and Neuro Sciences, NIMHANS Publication No. 128, 2016.
6. Singh M. Prevalence of Depression, Anxiety and Stress among students of Panjab University [MPH thesis]. Chandigarh: Panjab University; 2014.

7. Menka. Prevalence of Depression, Anxiety and Stress amongst teaching staff of Panjab University, Chandigarh. MPH [thesis]. Chandigarh: Panjab University; 2016.
8. Jaswal L, Goel NK, Sharma VL, Singh N, Dhiman A. Prevalence and correlates of workplace stress in the employees of Panjab University at Chandigarh, India. Asian Acad Res J SocSci Hum. 2015; 1(33):53-62.

An emerging disease with pandemic potential:Zika

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Introduction

Emerging Infectious Diseases (EIDs)

Globally, Infectious diseases remain the leading cause of death and disability. Emergence of new and old infectious diseases against the constant presence of established infections,greatly enhance the global burden of infections.[1]Infectious organisms reproduce, mutate, cross the species barrier between animal hosts and humans, and adapt to their new environments. Because of these characteristics, infectious organisms are able to alter their epidemiology, their virulence and their susceptibility to anti-infective drugs.[2]

Increasingtrends in national and international travel, urbanisation leading to raised population density, changing bio-diversity, land use change and increasing mankind contact with zoonotic reservoirs coupled with weak public health systemsand deficiencies in water and sanitation are some of the factors associated with emergence of infectious diseases. Additionally, lack of competence to detect and respond to disease outbreaks make developing countries more vulnerable.[3]

Emerging diseases are the diseases of infectious origin whose incidence in humans has increased in recent past or threatens to increase in the near future. These include new, previously undefined diseases as well as old diseases with new features, which include introduction of a disease to a new location or a new population, new clinical features, including resistance to available treatments or a rapid increase in the incidence and spread of the disease. Emergence may also be due to recognition of an infectious agent and realization that an established condition has an infectious origin.Reappearance of a disease which was once endemic but had since been eradicated or controlled, would classify it as a re-emerging infectious disease.[4]

A report published by the United States Institute of Medicine called attention to emerging and re-emerging infectious diseases emphasizing that despite great advances in the development of anti-infective drugs and vaccines, fight against infectious diseases was far from won.[5]

All forms of infectious organisms—bacteria, viruses, parasites, and prions—are able to emerge or re-emerge in human populations, and it is estimated that up to 70 per cent or more of all emerging infections have a source in animals (zoonotic infections).[2]

ZIKA VIRUS (ZIKV) Disease

Zika virus diseaseis one such emerging disease, which is currently focus of attention and cause of great concernfor global health. WHO declared Public Health Emergency of International Concern (PHEIC) on Feb 1,2016 in view of more than 4,000 microcephaly cases and neurological disorders in some areas affected by Zika virus (ZIKV).[6]

Zika virus is single-stranded RNA arbovirus of Flavivirus genus first identified in 1947 from a febrile rhesus macaque monkey in the Zika forest of Uganda through a network that monitored yellow fever.Zika virus infection in human was first recognised in Nigeria in 1953. Historically Zikavirus produces mild febrile illness, limited to sporadic cases or small clusters of

patients. This pattern changed in 2007,when the first major outbreak of Zika virus infection occurred on Yap islands, Federated States of Micronesia, where about 73% of the population were infected and 18% developed symptomatic disease.[7,8]Since then, Zika virus infection has spread rapidly with reported outbreaks fromFrench Polynesia, Cook Islands, Easter Island, New Caledonia, and the Americas, with sporadic exportation of cases to Europe.[9,10,11,12]

The recent Zika outbreak, in 2016, was largest of its kind, cases reported from more than 33 countries with more than 1.4 million cases in Brazil alone,followed by 20,000 cases from Colombia and Cape Verde.[6] India reported threelaboratory confirmedcases of Zikato WHOin May 2017 from state of Gujarat.[13]

Epidemiology of Zika virus

Zika virus is mostly maintained in a sylvatic transmission cycle within non-human primates, with humans being incidental hosts. Transmission mainly occurs after bite of infected mosquito of Aedes (Stegomyia) genus within theCulicidae family, such as Ae. *aegypti*, Ae. *albopictus*, Ae. *africanus*, Ae. *apicoargenteus*, Ae. *luteocephalus*, Ae. *vitattus*, Ae. *furcifers*, Ae. *polynesiensis* and Ae. *hensilli*. Although Aedes*aegypti* is the principlevector for human-to-human transmission but recent trend shows that Aedes*albopictus* have started to replaceit in many urban areas.Ae.*aegypti* is largely confined to tropical and sub-tropical regions, while Ae. *albopictus* can be found in tropical, sub-tropical and temperate regions.[14,15]

The geographical distribution of ZIKV includes Eastand West Africa, South Asia (mainly the Indian subcontinent)and South East Asia, Micronesia, French Polynesia and South America. Geographicalspread of most Aedes species is limited by cold temperatures but Ae.*albopictus* can survive and multiply in more temperateregions. Moreover, global warminghas affected the vectors' survival, the viralreplication and infective periods, increasing the geographicdistribution of the mosquitoes, increasing their biting rateand decreasing the extrinsic incubation period of the pathogen.[16]It is now evident that ZIKV has successfully spread outside of Africa and Asia, the two primary regions to which the virus was originally confined.[17]Othernon-vector modes of Zikatransmission have also been identified.There is a potential risk of ZIKV transfusion-derivedtransmission. Perinatal transmissioncan occur by trans-placental transmissionor during delivery when the mother is infected; ZIKVhas been found in placenta, amniotic fluid and braintissues of foetuses and newborns. A high Zika virus RNA load is found in semenmore than two weeks after recovery which support thehypothesis that it can be transmitted by sexual intercourse and the cases of sexual transmission of ZIKVhave been reported.[18,19,20]

Clinical manifestations

The manifestation of human infection varies from asymptomaticto self-limiting acute febrile illness, like an influenzalikesyndrome, with symptoms and clinical findings similarto illness resulting from infection with DENV('Dengue-like syndrome') and CHIKV, including fever(from 37.8 to 38.5°C), malaise, headache, maculo-papular rash, myalgia, arthralgia (especially of the small jointsof hands and feet), and conjunctivitis.Also, therehave been reports of chills, dizziness, anorexia, vomiting, diarrhoea, constipation, abdominal pain, mucousmembrane ulcerations, pruritus, lymphadenopathy, hypotension,and post-infection asthenia that may be present.[21,22] The viremia period lasts approximately threedays, between the third and fifth day after the onset of theclinical symptoms, while the mean duration of the symptomsranges from 3–6 days up to two weeks.[23] However,it is estimated that 80% of the

individuals infectedwith ZIKV are asymptomatic.Since,viral RNA has been detected in the mothers and amnioticfluid samples from the foetuses, it may have the potentialto cause neurodevelopmental dysfunction in the foetus, including microcephaly[24]. Although the causal link between ZIKV infection inpregnancy and microcephaly has not been establishedyet.[25] However, a 20-fold annual increase in the numberof newborns with microcephaly, associated with cerebraldamage during congenital infection, indicates a possiblerelationship with the ZIKV epidemic in Brazil[26,27]The most common findings that havebeen reported include widespread calcifications, cell migrationabnormalities, cortical and sub-cortical atrophy,excessive and redundant scalp skin, indicating acute intrauterinebrain injury.[26] Ocular findings have been reported in infants including fundoscopic alterations in the macular region.[27]Additionally, the infection may be associated withother severe outcomes, such as Guillain-Barre syndromedue to an unspecific immunological mechanismwhich was first reported during the large epidemicin French Polynesia. It was characterized by quadriparesis, paraesthesia of the extremities, diffuse myalgia, and a bilateral but asymmetricfacial palsy, with abolition of deep tendon reflexes.[28]

Diagnosis

Complete blood count inZika virus infection is normal or show nonspecific changes (e.g., mild lymphopenia, mild neutropenia, mild-to-moderate thrombocytopenia).Diagnostic testing for flavivirus infections include an acute-phase serum sample collected as early as possible after onset of illness and a second sample collected 2 to 3 weeks after the first.Serum sample should be collection within the first 7 days of illnessand/or urine sample collected≤21 days of illness.Other samples that may be tested using Polymerase chain reaction (PCR)are: cerebrospinal fluid, amniotic fluid, birth cord blood, and tissues.Reverse-transcriptase PCR (RT-PCR) used to detect the Zika virus during the first 1 week (in blood and serum) to 2 weeks (in urine) of the illness.

An Enzyme-linked immunosorbent assay (ELISA) has been developed at the Arboviral Diagnostic and Reference Laboratory of the Centers for Disease Control and Prevention (Atlanta, GA, USA) to detect immunoglobulin IgM to ZIKV.[29,30]Several serological assays have also been used forthe detection of specific anti-Zika IgM antibodies. However, serological tests have limited specificity and Zika virus IgM and IgG have reported cross-reactivity with those against other flaviviruses, particularly with dengue virus (DENV). High diagnosticspecificity has been observed by the Plaque Reduction Neutralization Test (PRNT), in which titers of specific neutralizingantibodies to ZIKV may be determined with a cut-off value of 90% ($PRNT_{90}$). According to the case classification schemeof the CDC during the epidemic in Yap, a case was consideredconfirmed if ZIKV RNA was detected in the testedserum using RT-PCR or if all of the following were present: IgM antibodies detected by ELISA, $PRNT_{90}$titer of at least 20,and a ratio ZIKV $PRNT_{90}$titer to dengue or heterologous flaviviruses $PRNT_{90}$titer of at least 4. [31,32]

Treatment

No specific treatment or vaccine is available for Zika virus infection. Management is supportive and includes rest, fluids, antipyretics, and analgesics. Aspirin and other non-steroidal anti-inflammatory drugs should be avoided. Mainstay of management is bed rest and supportive care by drinking plenty of fluids to prevent dehydration.

Prevention and control strategies

The public health approaches forprevention of ZIKA should be formulated and implemented, recognising some prevalent facts such as theurbanization of diseases,

spreading through animal associatedwith population explosion, international trade andintercontinental transportations. Weaver[33]purported five clear strategiesdefined according to the level at which interventions bypublic health authorities are desired. The first strategy is tointercept the enzootic life cycle. In this strategy, it is advisedto stop the vector growth in its native environment; which is not a feasible approach in case of ZIKA. Another limitation to the strategy is thatthere is no available vaccine for ZIKA that could be inoculatedin primates. The second strategy is to reduce the exposure ofvulnerable subjects to the vector, in case of humans, applying bednets and mosquito repellents that can decrease the exposure. Thethird technique that can reduce the disease burden is to limitthe vector/source to the urban population. This could be donethrough control via modulating the vector capacity of the Aedesmosquito. Limiting the travel to infected areas also minimizesthe risk of ZIKA. Fourth strategy could be the most helpful aswell as it is an active strategy where the vector reservoirs are limited. In the case of ZIKA, proper drainage can reduce thestagnant water reservoirs to inhibit uncontrolled reproduction ofmosquitoes. Adequate garbage management could also be used tohinder the vector proliferation. The fifth intervention that can behelpful is to avoid the recurrence of the disease where humans canact as the source of the virus for infection in non-human primateslike monkeys. Avoiding mosquito bites to infected humans couldbe the aiding strategy for the prevention of spill over.[33]The intervention of public health authorities is important,because now it is evident that ZIKA is not confined to single geographiclocation. Despite vector-based transmission, blood transfusioncould also be a cause of the spread among the patients having comorbidities.In the recent past, 3% of the blood donors in FrenchPolynesia were screened positive for ZIKA using PCR.It has also been reported that the ZIKA was present in thetherefore leading to a possibilityof transmission through the sexual intercourse. The approaches used to avoidsexual transmitted diseases should also be employed to avoidthe transmission. The contact tracing used in other sexualtransmitted disease can be used to identify the other infectedpatients.[34,35]

Beside these strategies few others approaches are considered. First is, using bacteria known as Wolbachia, which is present in approximately 60% of insects, commonly known as world's most common reproductive parasite in the world. Wolbachia reduces the mosquito-to-human transmission events, ultimately reducing the transmission of virus to the humans from mosquito. When the males with Wolbachia mate with normal female mosquitos, females fail to hatch eggs while on other hand, the infected Wolbachia females will hatch eggs and produce offspringthat will carry the Wolbachia effect.[36]Another technique under consideration is to genetically modifythe mosquitoes and giving rise to the population of mosquitoeswhose offspring are not able to survive (genetic tailoring of the mosquito). Reducing the population of mosquitoes, ultimately will reduce the mosquito's bites tohumans as well as the vulnerable primate.[37]

Vaccine research is undertaken by multiple firms such as Takeda Pharmaceutical, Co. Ltd, Japan, Bharat Biotech, India and Johnson and Johnson, Pfizer Inc.and Merck & Co. Inc., USA has created a team toinvestigate the propensity for creating a vaccine.

Action taken by WHO regarding Zika

As mandated in International Health Regulations (IHR) 2005, WHO and partners have set out the strategic response to Zika, which places a greater focus on preventing and managing medical complications caused by Zika virus infection. The Response Plan outlines 4 main objectives to support national governments and communities in preventing and managing the complications of Zika virus and mitigating the socioeconomic consequences: which

include Detection, Prevention, Care & support. Complying with the framework of action WHO remain in continuous communication with national focal points and WHO collaborating centres, disseminates information and prepares technical guidelines and recommendations for the member states.

Conclusion

Zika virus infection has been recognised as a global threat, changing its manifestations from anendemic mild disease to an epidemic scale, associated with neurological complications, such as microcephaly and Guillain-Barré syndrome. Considering the fact that the majority of the humanpopulation lives in areas infested by mosquitoes of theAedes, with rise in globalization andincreased air travel,the potential of a ZIKV pandemic is of immense concern.Molecular and serological methods have been successfullyestablished for the laboratory diagnosis of thedisease; however, since in most cases there are no typical clinical symptoms or laboratory findings, ZIKV diseasemay be misdiagnosed or confused with other flaviviral diseases. Therefore, more effective vector control andsurveillance measures are required along with the developmentof effective drugs and vaccines for controllingthe infection.

References:

1. David M. Morens, Gregory K. Folkers& Anthony S. Fauci. The challenge of emerging and re-emerging infectious diseases. Nature, 2014; 430: 242-249.
2. David L. Heymann and Vernon J. M. Lee. Emerging and re-emerging infections. In: Oxford Textbook of Global Public Health,6 ed. Oxford University Press; 2015.
3. LaxminarayanRamanan, Kakkar Manish, Horby Peter, MalavigeGathsaurieNeelika, Basnyat Buddha. Emerging and re-emerging infectious disease threats in South Asia: status, vulnerability, preparedness, and outlook BMJ 2017; 357 :j1447.
4. Dikid T., Jain S.K., Sharma A., Kumar A. andNarain J.P. Emerging & re-emerging infections in India: An overview. Ind J Med Res. July 2013; 138:19-31.
5. Lederberg, J., Shope, R., and Oaks, S.C.J. Emerging Infections: Microbial Threats to Health in the United States. Washington, DC: National Academy Press. 1992.
6. Public Health Emergency of International Concern (PHEIC) declared for Zika and clusters of microcephaly and neurological disorders.[document on the internet]. Geneva: WHO; 2017 [updated on May 2017; cited on August 3, 2017]; at: (http://www.who.int/mediacentre/news/statements/2016/1st-emergency-committee-zika/en/
7. Duffy MR, Chen TH, Hancock WT et al. Zika virus outbreak on Yap Island, Federated States of Micronesia. NEJM 2009; 360: 2536–2543.
8. Petersen L. R., Jamieson D. J., Powers A. M., and Honein M. A. Zika Virus. NEJM. March 30, 2016.
9. Roth A, Mercier A, Lepers C, Hoy D, Duituturaga S, Benyon E, et al. Concurrent outbreaks of dengue, chikungunya and Zika virus infections - an unprecedented epidemic wave of mosquito-borne viruses in the Pacific 2012-2014.
10. Tognarelli J, Ulloa S, Villagra E, Lagos J, Aguayo C, Fasce R, et al. A report on the outbreak of Zika virus on Easter Island, South Pacific, 2014. Arch Virol. 2016;161:665–8.

11. Dupont-Rouzeyrol M, O'Connor O, Calvez E, Daurès M, John M, Grangeon JP, et al. Co-infection with Zika and dengue viruses in 2 patients, New Caledonia, 2014. Emerg Infect Dis. 2015;21:381–2.
12. Fauci AS, Morens DM. Zika virus in the Americas—yet another arbovirus threat. NEJM. 2016;374:601–4.
13. Zika virus infection – India, Emergencies preparedness, response. WHO. May 26, 2017. http://www.who.int/csr/don/26-may-2017-zika-ind/en/ [Accessed on: August 3, 2017]
14. Gatherer D, Kohl A. Zika virus: A previously slow pandemic spreads rapidly through the Americas. J Gen Virol 2016; 97(2): 269–73.
15. Ioos S, Mallet HP, LeparcGoffart I, Gauthier V, Cardoso T, Herida M. Current Zika virus epidemiology and recent epidemics. Med Mal Infect 2014; 44(7): 302–7.
16. Howard C.R. Aedes mosquitoes and Zika virus infection: an A to Z of emergence? Emerging Microbes & Infections 2016; 5(16).
17. Musso D, Cao-Lormeau VM, Gubler DJ. Zika virus: following the path of dengue and chikungunya? Lancet. 2015 Jul 18; 386(9990):243-4.
18. Marano G, Pupella S, Vaglio S, et al. Zika virus and the never-ending story of emerging pathogens and transfusion medicine. Blood Transfus 2015 Nov 5:1-6.
19. Besnard M, Lastère S, Teissier A, et al. Evidence of perinatal transmission of Zika virus, French Polynesia, December 2013 and February 2014. Euro Surveill 2014;19:20751.
20. Musso D, Roche C, Robin E, et al. Potential sexual transmission of Zika virus. Emerg Infect Dis. 2015;21:359-61.
21. Zanluca C, de Melo VCA, Mosimann ALP, dos Santos GIV, dosSantos CND, Luz K. First report of autochtonous transmission of Zika virus in Brazil. MemInstOswaldo Cruz 2015; 110(4): 569–72.
22. Oehler E, Watrin L, Larre P, Goffart-Leparc I, Lastere S, Valour F, et al. Zika virus infection complicated by Guillen-Barre syndrome— Case report, French Polynesia, December 2013. Euro Surveill 2014; 19(9): 20720
23. Kwong J, Druce J, Leder K. Zika virus infection acquired during brief travel to Indonesia. Am J Trop Med Hyg 2013; 89(3): 516–7.
24. Tetro J. Zika and microcephaly: Causation, correlation, or coincidence? Microbes Infect 2016; 18(3): 167–8.
25. Torjesen I. Zika virus outbreaks prompt warnings to pregnant women. BMJ 2016; 352: i500.
26. Faccini-Schuler L, Ribeiro E, Feitosa I, Horovitz D, Cavalcanti D, Pessoa A, et al. Possible association between Zika virus infection and microcephaly — Brazil, 2015. MMWR 2016; 65(3): 59–62.
27. Ventura C, Maia M, Bravo-Filho V, Gois A, Belford R. Zika virus in Brazil and macular atrophy in a child with microcephaly. Lancet 2016; 387(10015): 228.
28. Alera MT, Hermann L, Tac-An I, Klungthong C, Rutvisuttinunt W, Manasatienkij W, et al. Zika virus infection, Philippines, 2012. Emerg Infect Dis 2015; 21(4): 722–4.
29. Foy BD, Kobylinski KC, Chilson Foy JL, Blitvich BJ, Travassos da Rosa A, Haddow AD, et al. Probable non-vector-borne transmission of Zika virus, Colorado, USA. Emerg Infect Dis 2011;17:880–2.
30. Hayes EB. Emerging Infectious Diseases. www.cdc.gov/eid;2009; 15(9).
31. Lanciotti RS, Kosoy OL, Laven JJ, Velez JO, Lambert AJ, Johnson AJ, et al. Genetic and serologic properties of Zika virus associated with an epidemic, Yap State, Micronesia 2007. Emerg Infect Dis 2008; 14(8): 1232–9.

32. Duffy M, Chen TH, Hancock T, Powers A, Kool J, Lanciotti R, et al. Zika virus outbreak on Yap Island, Federated States of Micronesia. NEJM 2009; 360(24): 2536–43.
33. Weaver, S. Urbanization and geographic expansion of zoonotic arboviral diseases: mechanisms and potential strategies for prevention. Trends Microbiol 2013;21:360–363.
34. Aubry, M., Finke, J., Teissier, A., Roche, C., Broult, J., Paulous, S., et al. Seroprevalence of arboviruses among blood donors in French Polynesia, 2011-2013. Int J Infect Dis 2015; 41:11–12.
35. Musso, D., Roche, C., Robin, E., Nhan, T., Teissier, A., Cao-Lormeau, V. M., et al. Potential sexual transmission of ZIKA. Emerg Infect Dis 2015; 21:359–361.
36. Nguyen, T., Nguyen, H., Nguyen, T., Vu, S. N., Tran, N. D., Le, T. N., et al. Field evaluation of the establishment potential of wmelpopWolbachia in Australia and Vietnam for dengue control. Parasit 2015; 8(1).
37. Alphey, L., and Alphey, N. Five things to know about Genetically Modified (GM) insects for vector control. PLoSPathol 2014; 10:e1003909.

Measles Rubella campaign in India

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Introduction

Measles and rubella both are acute childhood infections endemic in India. Both the diseases are caused by RNA viruses belonging to paramyxoviridae and togavirus family [1]. The complications of measles are the leading cause of deaths in children under 5 years of age while rubella in pregnant ladies leads to congenital rubella syndrome in children[2]. The MR campaign launched by government of India gives a ray of hope for elimination measles and rubella from India.

Burden of Measles and Rubella in India

Measles is one of the major killer diseases in children accounting for 3% deaths in age group 0-5 years [3]. The case fatality ratio (CFR) ranges from (0.1 – 10) %. In the year 2015, out of the total global deaths due to measles, 37% were from India.[4] Data regarding burden of rubella is scanty. A systematic review has reported 17% susceptibility rate among pregnant ladies in India [5, 6]. Rubella infection during early pregnancy may result in spontaneous-abortion, still birth, serious birth defects. Complications of rubella though rare include arthritis, thrombocytopenic purpura (1/3000 cases), encephalitis (1/6,000 cases). In congenital rubella syndrome there can be hearing impairment, cataracts / Glaucoma, heart defects, microcephaly, mental retardation and hematological disorder.

Measles Rubella elimination strategy in India

South East Asian Regional WHO has resolved to eliminate measles and rubella/CRS control in the South-East Asia Region by 2020. Achieving this goal requires the following strategies:

- Strengthening routine immunization (> 95% vaccination coverage): Expanded Program for Immunization (EPI) to protect children against common childhood illness was launched in India in the year 1978. EPI did not include administration of measles vaccine. Tamil Nadu was the first state in India to introduce measles vaccine in 1980s after which this vaccine was introduced throughout India in the year 1985 as a part of Universal Immunization Program (UIP)[7]. Single dose measles vaccine was administered till the year 2008 after which second dose of measles vaccine was introduced in the year 2010-11. The reason for including the second dose was that the efficacy of measles vaccine when given at 9 months-12 months is 85-90 %, which increases to 95-99 % when given >12 months.
- Developing and sustaining a case-based measles and rubella surveillance system.
- Establishing an accredited measles and rubella laboratory network to support case based MR surveillance across the country.
- Rapidly responding to measles outbreaks and managing measles cases.

Measles Rubella Elimination Campaigns:Elimination has been defined as no more transmission of measles endemically as well as through imported case. The purpose of the Measles-Rubella campaign is to eliminate transmission of Measles and Rubella from the community by vaccinating 100% target children with MR vaccine. The target age group is children from 9 months to <15 years. After this campaign, MR vaccine will replace the measles vaccine given at 9 months and 18 months.

The average duration of MR campaign will be 4-5 weeks. MR teams will be formed comprising of health worker, anganwadi worker, ASHA and volunteer. The anganwadi workers will assist ANM to set up and manage the session sites; arrange local village leader to inaugurate the session site and mobilize children to the session site. ASHA and volunteers can assist ANM in welcoming families to the session site, generally assist in crowd control, assist in left thumb marking and tally sheet marking in coordination with ANM.

In the initial week school based campaign will be held. The vaccination will be coordinated considering school timings and holidays. Skilled vaccinators will be assigned to complete the vaccination in the schools.School leads comprising of Principal and one nodal officer MR campaign will be appointed in each school. School leads will be responsible for identification and training of class leads (teachers). They will help in setting up vaccination site in school, display MR related paintings in vaccination rooms and motivate teachers and children for high coverage. Ensuring maximum attendance of students on vaccination day is the key for success of school based campaign. It should be ensured that on the day of vaccination children are not on empty stomach. The class lead will tick name based attendance register for children that get vaccinated and fill the MR card. Each child left thumb will be marked with indelible ink. On the day of vaccination smiling and pleasing interaction with children just before, during and immediately after vaccination will help reduce anxiety.

In the subsequent weekscommunity based campaign for non-school going children and missed children will be held. The last week will be sweeping activity based on monitoring. During the campaign children are to be immunized regardless of the previous immunization status. Children with minor illnesses such as mild respiratory infection, diarrhea, and low grade fever can be vaccinated in this campaign. Malnutrition is not a contraindication; in fact it is an indication to immunize. Initially the MR campaign was launched in the states of Tamil Nadu, Karnataka, Goa, Lakshadweep and Pondicherry. Subsequently, this campaign is being rolled out in other states across India.

References

1. Park, K. Park's Textbook of Preventive and Social Medicine. 23rd ed. Jabalpur: M/sBanarsidasBhanot, 2015.
2. Sachdev S, Gupta P. Time target to rubella elimination. Indian Pediatrics.2014;51:872-874.
3. Annual report of department of health and family welfare 2016-2017.Ministry of Health and Family welfare.[Internet].2016 [cited 2017 June 8] Available from: www.mohfw.nic.in/sites/4201617.pdf
4. Sachdev A.An appeal to all pediatricians and members of Indian Association of Pediatrics for measles rubella campaign.IndianPediatrics.2017;54:269-270.

5. Vashishtha VM, Yewale VN, Bansal CP, Mehta PJ. IAP perspectives on measles and rubella elimination strategies. Indian Pediatrics. 2014;51(9):719–22.
6. Dewan P, Gupta P. Burden of congenital rubella syndrome (CRS) in India: A systematic review. Indian Pediatrics. 2012;49(5):377–99.
7. Chaturvedi UC, Tripathi BN, Mathur A, Singh UK, Mehrotra RML. Role of rubella in congenital malformations in India. Journal of Hygiene. 1976;76(1):33–40.

Factors affecting treatment adherence among hypertensive patients in Indira Colony, Manimajra, Chandigarh

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Abstract

Introduction: - Non-adherence to hypertension treatment leads to poor blood pressure control and increases the risk of disease complications. The prevalence and factors associated with non-adherence should be determined so as to lower the impact of a disease that is on the increase, on the health systems which are already overburdened with communicable diseases. The study was conceived to measure patients adherence to prescription, determine factors responsible for non-adherence and health belief affect treatment adherence among hypertensive patients.

Methodology: -A cross sectional Study was carried out at field practice area of Urban Health Training Center (UHTC) Indira colony, Manimajra, Chandigarh. The participants were 100 selected using systematic sampling. Data was collected by using 8 point Morisky scale for adherence and Self-structured Questionnaire and health beliefs model questions.

Results: -The prevalence of non-adherence was 68%. Age ≤ 55yrs showed highest adherence (40%) as compared to >55yr (23%).Female showed high adherence (59.4%) to treatment than male (29.4%). Perception of benefit and self-efficacy is interconnected to high adherence.

Conclusion: - Adherence to hypertension treatment was suboptimal. There is need to improve it through strategies helping patients understand their drug regimens, always availing drugs in the hospital so that they do not have to buy them and giving shorter time between visits to health worker. Further studies should be done to find out why males were not adhering to treatment so as to improve their adherence.

Key words: - Hypertension, Adherence, Antihypertensive Drugs, Morisky scale, health belief model

INTRODUCTION

Chronic non-communicable diseases are posing a serious threat to public health throughout the world, irrespective of whether developed and developing, and thus deserve to be treated as a global health priority in this new millennium. By 2030, reduction by one third of premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being, is one of the targets of the sustainable development goals (Goal3).(1)

Compliance to therapy has a strong positive influence on health outcomes. Adherenceand persistence are the two common measures of compliance.(2)Persistence to medication may be defined as "the duration from the time of initiation todiscontinuation of therapy" that refers to the act of continuing the treatment for theprescribed duration.(3)World Health

Organization (WHO) defines adherence as ''the extent to which a person's medication taking behavior, following a diet and/or executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider" [4]. It is imperative that patients adhere to their prescribed regimens to minimize the burden of the disease on the health systems. Non-adherence in chronic diseases has been described as taking less than 80% of the prescribed treatment [1].Poor treatment adherence is a roadblock to better quality of life. Hence, most health promotion interventions in some way or another tend to change health behavior by changing health related knowledge, attitudes, barriers and facilitators.[5]This is the reason that this study has been undertaken to know the pattern ofadherence to anti-hypertensive treatment and the factors affecting this adherence among people in Indira colony, Manimajra, Chandigarh (U.T.).

Material &Methods

A Cross Sectional study was conducted for 4 months from 15th January to 15th April 2016 in the Indira colony of Manimajra, Chandigarh. Sample size was calculated by using a formula $n= 4PQ/d^2$ [13]

Taking the prevalence of adherence for treatment in India is 25% from various studies[6][27] and margin of error as 10% (with 95% confidence interval), required sample size came out to be 75 considering 10% as non-respondent and missing patients in two consecutive visits so sample size was taken 100. The study population comprised of the patients who were already diagnosed with hypertension or were on anti-hypertensive drugs one year ago.

Systematic sampling technique was applied to list of hypertensive patients that has been already generated by the health workers from their respective field areas in Indira colony through house to house survey. The list comprised of 300 hypertensive patients (target population). [{K^{th}= N/n} K= interval between two sample unit, N= total target population, n= sample size i.e.-100, (300/100 = 3rd interval)] this formula was used for sample unit interval, First patient was selected by simple random sampling from the registered 300 patients (according to house number) then consecutive patient was selected at the 3rd interval i.e. every 3rd patient was included in sample. It was planned to include only permanent residents of the colony, as in some cases the occupants of rented houses are migrants who are subjected to change their accommodation frequently, hence may lead to difficulty in tracing.

The Independent variable for our study includedage, sex, literacy status, marital status, income, occupation, past history of disease, co-morbidity, type of physical activity, habits (alcohol or smoking or tobacco chewing) and health belief of patients like perceived susceptibility, perceived seriousness, perceived benefit and barriers. The dependent variable was the adherence to treatment.

Data was collected by using following tools:

1. Check lists for adherence to treatment prescription (8 point Morisky scale was used)
2. Self-structured Questionnaire related to socio-demographic profile of patient including pretested STEPS questions and health beliefs model questions.

During this period, all the patients with hypertension living in these areas, who were selected, were interviewed at their residence. Each of these respondents was provided the details of the objectives of the study. All interviews were preceded by an informed consent. The consent form was read out to them and was explained to them. Respondent gave consent, interviews were conducted. The information obtained was tabulated. All information was based on self-reporting. It took approximately half an hour to complete an interview. All interviews were followed by some health education imparted to the respondent as per the situation and referral to nearby health facility where required.Data were checked, entered and analyzed as per the objectives of the study using Microsoft office Excel 2010 and SPSS version 21.0. Data was presented in percentages and proportions of the study subjects, in context to a particular response. Chi-square test was applied to compare the two proportions. Multiple logistic regression analysis was used to measure the risk of non-adherence among study population.

Operational definition:-

1. Hypertension - JNC(viii) classification of hypertension and patient who are taking antihypertensive drug

Table: 1 JNC (viii) guidelines of hypertension.

Age (yr.)	Hypertensive population	Blood pressure goal
≥60	General	<150/<90
<60	General	<140/90
≥18	CKD	<140/90
≥18	DM	<140/90

Health belief model: - the following four perception serves as the main constructs of the model:-[14]

Perceived seriousness: - the construct of perceived seriousness speaks to individual beliefs about seriousness or severity of disease.

Perceived susceptibility:-personal risk or susceptibility is one of the more powerful perceptions in prompting people to adapt healthier behaviors. Greater the perceived risks, greater the likelihood of engaging behavior to decrease the risks.

Perceived benefits: - People tend to adopt healthier behavior when they believethat the chances of developing disease decreases.

Perceived barriers: - Obstacles in the way of him or her adopting a new behavior.

RESULTS

Out of the 100 respondents with mean [±Standard Deviation (SD)] age of 55.6(±12.03) years, more than two third (67.0%) were females with a mean age of 54.2 (±12.6) years and less than one third were (33.0%) males with a mean age of 58.4 (±10.2) years. Among those 73.75% have a spouse, 84.8% were males and 62.7% were females and among the rest 25.5% without any spouse, 7.6% were males and 17.9% were females. The proportion of widows was high up to 34.3% among the females.

Table 2 Socio-demographic characteristics of respondents

Variable	Male (n=33) n (%)	Female (n=67) n (%)	Total (n =100)
Age of patients			
20-39	04 (12.1)	09(13.4)	13
40-59	21(63.6)	43(64.2)	64
>60	08(24.2)	15(22.4)	23
Type of family			
Joint family	21(63.6)	34(50.7)	55
Nuclear family	12(36.4)	33(49.3)	45
Marital status			
Single	03(9.1)	01(1.5)	04
Married	28(84.8)	42(62.7)	70
Separated	2(6.1)	01(1.5)	03
Widowed	0	23(34.3)	23

Socio-economic characteristics of the respondents (Kuppuswami scale)

Nearly half of the sample (43%) was found to be illiterate among whom some could sign their names but could not read or write. The proportions of illiterates were high 53.7% among the females compared to males with 21.2%. Nearly two third of the population was not engaged in formal work. They were either unemployed or retired persons or homemakers. The proportion of formal unemployment was double among the females compared to males.

Table 3 Socioeconomic Characteristics of respondent's gender wise

Variable	Male (n=33) n (%)	Female (n=67) n (%)	Total (n =100)
Income			
>36,997	0(0)	03(4.5)	03
18,498-36,997	07(21.2)	08(11.9)	15
13,874-18,498	12(36.4)	19(28.4)	31
9,248-13,874	09(27.3)	21(31.3)	30
5,547-9,248	05(15.2)	16(23.9)	21
Occupation			
Profession	01(3.0)	01(1.5)	02
Semi profession	4(12.1)	02(6.0)	06
Clerical, shop owner and farmer	4(12.1)	04(3.0)	08
Skilled worker	12(36.4)	02(3.0)	14
Semiskilled worker	04(12.1)	04(6.0)	08
Unskilled	06(18.2)	8(11.9)	14
Unemployed/homemaker	02(6.1)	46(68.7)	48
Education			
Graduate/PG	03(9.1)	02(3.0)	05
Higher secondary	03(9.1)	03(4.5)	06
High school	09(27.3)	07(10.4)	16
Middle school	05(15.2)	08(11.9)	13
Primary school	06(18.2)	11(16.4)	17
Illiterate	07(21.2)	36(53.7)	43

Table 4 Hypertension and anti-hypertensive treatment related characteristics of the respondents.

Variable	Male(n=33) n(%)	Female(n=67) n(%)	Total (n =100)
Family history of hypertension			
Yes	10(30.3)	16(23.9)	26
No	09(27.3)	17(25.4)	26
I don't know	14(42.4)	34(50.7)	48
Routine blood pressure checkup			
Daily	02(6.1)	01(1.5)	03
Weekly	23(69.7)	36(53.7)	59
Fortnightly	02(6.1)	06(9.0)	08
Monthly	06(18.2)	24(35.8)	30
Taking all your prescribed medicines regularly			
Yes	27(81.8)	45(67.2)	72
No	06(18.2)	22(32.8)	28
Your prescribed medicine free of cost			
Yes	23(69.7)	40(59.7)	63
No	10(30.3)	27(40.3)	37
Types of medicine			
One type	25(75.8)	56(83.6)	81
Two types	08(24.2)	10(14.9)	18
>Two types	0(0)	01(1.5)	01
How many times/day			
Once in a day	21(63.6)	56(83.6)	77
Twice in a day	11(33.3)	11(16.4)	22
Thrice in a day	01(3.0)	0(0)	01

Table 5 Personal habits and healthy life style characteristics of respondents

Variable	Male (n=33) n(%)	Female(n=67) n(%)	Total (n =100)
Smoking			
Yes	13(39.4)	01(1.5)	14
No	19(57.6)	66(98.5)	85
Taking alcohol			
Yes	12(36.4)	0	12
No	21(63.6)	67(100)	88
Taking extra salt(≥5gm/day)			
Yes	04(12.1)	12(17.9)	16
No	29(87.9)	55(82.1)	74
Doing exercises regularly			
Yes	18(54.5)	17(25.4)	35
No	15(45.5)	50(74.6)	65

Table 6: Co-morbidities among hypertensive respondents

Co-morbidities	Male(n=33) n(%)	Female(n=67) n(%)	Total (n =100)
DM	10(30.3)	28(41.8)	38
Heart problem	05(15.2)	05(7.5)	10
Stroke	01(3.0)	02(3.0)	03
Poor vision	03(9.1)	15(22.4)	18
No	14(42.4)	17(25.4)	30

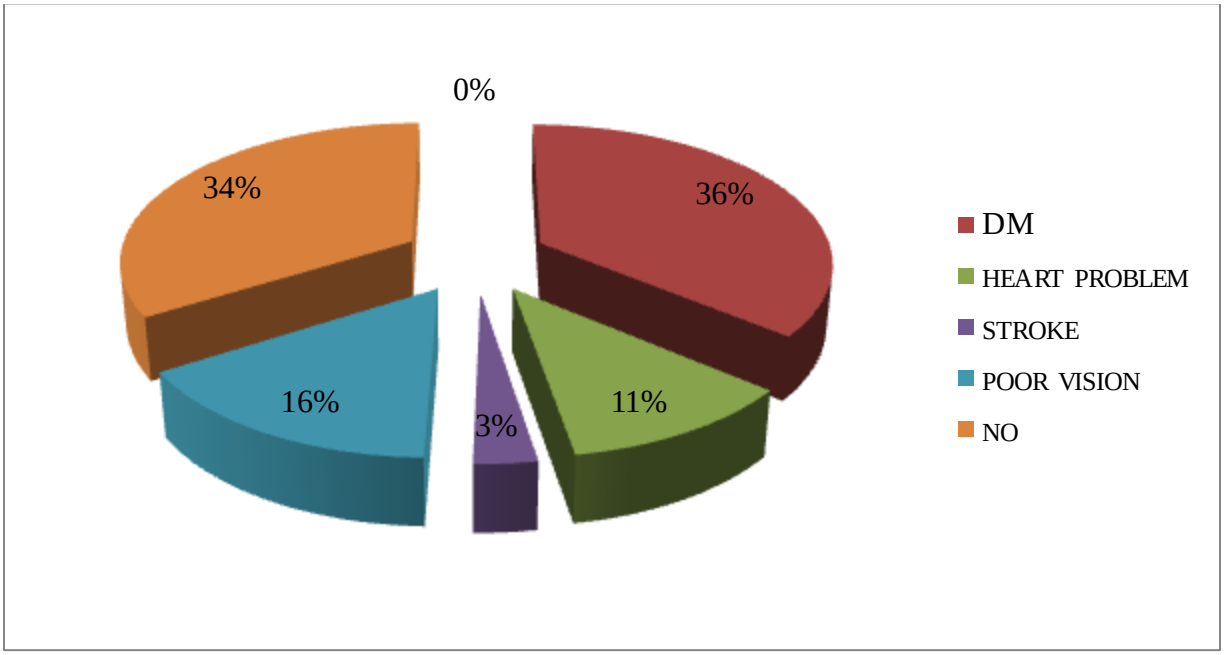

Figure 1 Co-morbidities among hypertensive patients

DETAILS OF PATTERN OF ADHERENCE

Results show that the prevalence of the non-adherence to medication is the 68%. Low adherence (medium and poor adherence) among the female 71.6% is more than the male 60.6%. Percentage of high adherence among male and female is 32% as compared to low adherence 68%.

Table 7: Prevalence of adherence among male and female

Variable	Male (n=33) n (%)	Female(n=67) n (%)	Total (n =100)
High adherence	13(39.4)	19(28.4)	32
Low adherence	20(60.6)	48(71.6)	68

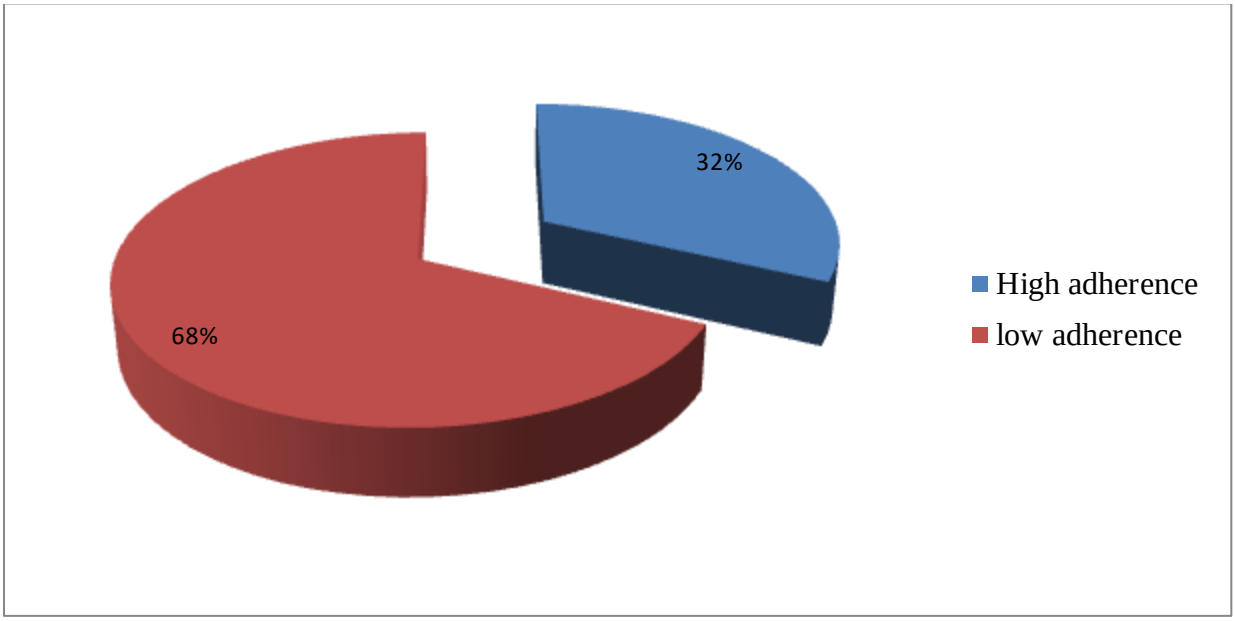

Figure 2: Prevalence of adherence to medication

Discussion and Conclusion

The current study shows that, participants who were ≤55yr of age had higher level of treatment adherence compared to those with >55 years of age. The result also shows that the female have more adherence (60%) than the male (30%). These results are comparable to a study done at atertiary care hospital in Guntur, Andhra Pradesh by Hemak.[9], which could be due to fact that the young people have higher income since they are able to work and thus can afford to buy medication as compared to older people. Another possible reason is that older people might be suffering from more than one disease due to aging, which led them to stop taking drugs, leading to poor compliance

Other factors which were found to be significantly associated in the bivariate analysis need to be mentioned.The patient who resides in joint family showed high adherence (51.5%) than the nuclear family patients (38%). This relationship also showed positive correlation with socio-economic status and health believes of patients. The health care system related factors including easy availability of the prescribed medications locally and a good relation with the health care provider was also significantly associated with increased adherence. This study shows multifactorial nature of the problems of non-adherence is evident. No single factor can be solely held responsible for influencing non-adherence among patients.

In conclusion, non-adherence to hypertension management remains a major limiting factor among hypertensive patients of Indira Colony in the effective control of hypertension and subsequently in the prevention of cardiovascular diseases. The interventions planned to combat the problem should be targeted keeping in view the social, economic, medical, behavioral and health system related factors.

References

1. Excellency. Permanent Mission of the Republic of Kenya To tie United Nations. 2015;(August).
2. Cramer JA, Benedict Á, Muszbek N, Keskinaslan A, Khan ZM. The significance of compliance and persistence in the treatment of diabetes, hypertension and dyslipidaemia: a review. Int J Clin Pract. 2007;62(1):76–87.
3. Bhandari S. Adherence to anti-hypertensive treatment and its determinants among the urban slum dwellers. in Master of Public Health Achutha Menon Centre for Health Science Studies. 2009 (MPH Thesis)
4. Navya CJ, Naveen R, Ashwini GS, Manu A, Steve J, Singh J, et al. Adherence to Medication among patients with Hypertension and Diabetes Mellitus in selected Tea Estates in South India. J Int Med Scien Academy 2015;28(1):16–7.
5. Natarajan N, Putnam W, Van Aarsen K, Lawson B, Fred Burge. Adherence to antihypertensive medications among family practice patients with diabetes mellitus and hypertension. Can Fam Physician. 2013;59(2):93–100.
6. World Health Organization. STEPS Instrument for NCD Risk Factors: WHO STEP wise approach to Surveillance of noncommunicable diseases (STEPS) [document on the internet]. Geneva: WHO; 2015.[updated on Amy 2016; cited on August 2017]. Available from: http://www.who.int/ncd_surveillance
7. Oliveira-filho AD, Barreto-filho JA, Joany S, Neves F, Pereira D, Jr DL. Association between the 8-item Morisky Medication Adherence Scale (MMAS-8) and Blood Pressure Control. Arq Bras Cardiol;99(1):649–58.
8. Venkatachalam J, Abrahm S, Singh Z, Stalin P, Sathya G. Determinants of patient's adherence to hypertension medications in a rural population of Kancheepuram District in Tamil Nadu, South India. Ind J Comm Med. 2015;40(1):33.
9. Hema K, Padmalatha P. Adherence to medication among Hypertensive patients attendinga tertiary care hospital in Guntur, Andhra Pradesh. Int J Basic App Med Res 2014(December);4(1):451–6.
10. Mohan V, Deepa M, Farooq S, Datta M, Deepa R. Prevalence, awareness and control of hypertension in Chennai--The Chennai Urban Rural Epidemiology Study (CURES-52). J Associat Physician Ind 2007;55(May):326–32.
11. Okken VS, Niemeijer MG, Dijkstra A, Baars MW, Said S, Hoogenberg K, et al. The effect of physical, social and psychological factors on drug compliance in patients with mild hypertension. Netherlands Hear J 2008;16(6):197–200.
12. Bowry ADK, Shrank WH, Lee JL, Stedman M, Choudhry NK. A systematic review of adherence to cardiovascular medications in resource-limited settings. J Gen Intern Med. 2011;26(12):1479–91.

13. Lwanga S.K., Lemeshow S. Sample size determination in health studies A practical manual. 1991;38.

14. Stretcher V, Rosenstock IM. The Health Belief Model. Heal Behav Heal Educ Theory, Res Pract. 1997;31–6.

15. Kumar N, Unnikrishnan B, Thapar R, Mithra P, Kulkarni V, Holla R, et al. Factors Associated With Adherence To Antihypertensive Treatment Among Patients Attending a Tertiary Care Hospital in Mangalore. Int J Curr Res Rev. 2014;06(10):77–85.

16. Hashmi SK, Afridi MB, Abbas K, Sajwani R a, Saleheen D, Frossard PM, et al. Factors associated with adherence to anti-hypertensive treatment in Pakistan. PLoS One 2007;2(3):e280.

17. Ramli A, Ahmad NS, Paraidathathu T. Medication adherence among hypertensive patients of primary health clinics in Malaysia. Patient Prefer Adherence 2012;6:613–22.

18. Ahmed N, Abdul Khaliq M, Shah SH, Anwar W. Compliance to antihypertensive drugs, salt restriction, exercise and control of systemic hypertension in hypertensive patients at Abbottabad. J Ayub Med Coll Abbottabad 2008;20(2):66–9.

19. Behnood-Rod A, Rabbanifar O, Pourzargar P, Rai A, Saadat Z, Saadat H, et al. Adherence to Antihypertensive Medications in Iranian Patients. Int J Hypertens. 2016:1508752.

Analysis of drinking water quality of the rural community of district Sirmaur, H.P., India

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Abstract

Introduction: Access to safe and clean water is important as a health and development issue at national, regional and local levels (World Health Organization 2006). The present study was planned to analyse the drinking water quality of rural community of district Sirmaur through selected parameters (physical, chemical, bacterial).

Methods: A cross sectional study was carried out in between March to April, 2015 wheresystematic and simple random techniques were used with sample size of 122. Water testing kit and Questionnaire were used as tools to collect data. Data were entered and analysed using SPSS version 21.0.

Results: The study results revealed that that physical and chemical parameters were found within acceptable limits prescribed by Indian Standards (IS: 10500), indicating excellent water quality (WQI-1 of 45±17.4 with index ranging from 26 to 172 and WQI-2 of 89±6.4 with index ranging from 56 to 96). For biological parameters, it was analysed that in most of the samples (60%) coliform bacteria were present.

Conclusion: The fact of having access to improved source of sanitation and no open defecation found by government agencies has been proven to be of low importance after considering the biological results of the present study (coliform presence in 60% and free chlorine absence in 63%). Observations were also made regarding water sample collection from the households indicating open defecation in the field area during visit.

Keywords: Drinking Water; Water Quality; Water quality index; Physical parameter; Chemical parameter; Biological parameter

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INTRODUCTION

Water is most vital liquid for maintaining the life on the earth. About 97% water exists in oceans and only 3% is fresh water wherein 2.97% is comprised by glaciers and ice caps and remaining little portion of 0.3% is available as a surface and ground water for human use. [1] Access to safe and clean water is important as a health and development issue at national, regional and local levels (World Health Organization 2006). [2] The classical water borne diseases are carrying a heavy burden in developing countries, the heaviest being the diarrheal diseases. [3] The low-income communities are supposed to be at the greatest risk from water-related diseases. [4] Water quality is an important parameter touching on all aspects of ecosystems and human well-being such as the health of a community, food to be produced, economic activities, ecosystem health and biodiversity. Therefore, Water quality takes on a broad definition as the ''physical, chemical, and biological characteristics of water necessary to sustain desired water uses'' (UN/ECE 1995). [5]Despite the achievements of the Millennium Development Goal (MDG) period, huge discrepancies in access of water remain. As of 2012, 748 million people still relied on unimproved water sources (lakes, rivers, dams, or unprotected dug wells or springs) for their drinking, cooking,

and personal hygiene.[6] Discrepancies between urban and rural area can be pointed out, i.e., 96% of the urban population now uses improved drinking water sources, compared with 84% of the rural population. In India, according to WHO/UNICEF JMP Report 2015, about 94% of population get improved water supply but great discrepancies do exist between rural and urban population. [7] India has only 11% of the rural population supplied by a household water connection. The study conducted in Hyderabad and Madhya Pradesh revealed that 50% of water sample 33% boreholes were positive for fecal coliform respectively. As per WHO estimate, 80% of all diseases in developing countries, including India, are related to unsafe drinking water and poor sanitation. [8] Another survey, NFHS-2 reported that Himachal Pradesh population suffers from 3 major groups of communicable diseases out of whichwater and food borne diseases such as diarrhea, dysentery, amoebiasis, worm infestation, hepatitis, enteric fever are common.[9] Around 82% of the rural population of Himachal Pradesh doesn't treat drinking water at household level. [10]As water diseases are found to be common particularly in rural areas of Himachal Pradesh, therefore, there is reasonable need to analyse the water quality. No study is available on survey of water quality in district Sirmaur, Himachal Pradesh. So, in view of abovementioned points, a study was planned to analyze the drinking water quality of district Sirmaur through selected parameters (physical, chemical, bacterial).

Materials and Methods

The present study was conducted in the rural areas of district Sirmaur which is south-eastern district of Himachal Pradesh, India. It was a cross sectional research study. It is one of the 12 Districts of Himachal Pradesh, India. This district has total 146 sub centers divided into 5 blocks (Pachhad, Dhagera, Sangrah, Rajpora, and Shillai). The total area of district is 2825 sq.km.

The list of all sub centers, primary health centers and community health centers was obtained from the CMO office at Nahan, Sirmaur, H.P. As per the list, out of 146 health centers, 29 were selected through systematic sampling. Household of the rural area of district Sirmaur (H.P.) was the sampling unit.

Inclusion Criteria

- Any of the family members present in the house at the time of data collection.
- Family member who gave consent after being informed about the study.
- Those who were able to understand Hindi and English.

Exclusion Criteria

- Family members unwilling to participate in the study.
- Those who were mentally challenged or mentally ill.
- Those who were seriously ill.

Sample size calculation was done using the following formula:

$$n = \frac{\quad}{\quad}$$

Where,n = sample size
Z = standard normal deviation with 95% confidence interval = 1.96

d= degree of accuracy = 5%

P= Proportion ofpopulation of India using improved sources of drinking-water in 2012; That is 93% or 0.93; [Source: WHO/UNICEF] [7]

$$n = \frac{\quad}{\quad}$$

= 99.9~ 100

Considering the non-response rate (22%), around 122 respondents were included in the study. Thus, the final sample size was 122.

Sampling technique adopted was Probability proportional to size sampling (PPS). The probability of selection into the survey sample for each block was made proportional to its relative size. It is calculated as follows

$$\text{Probability of Selection (Sub centers in specific block)} = \frac{\quad}{\quad}$$

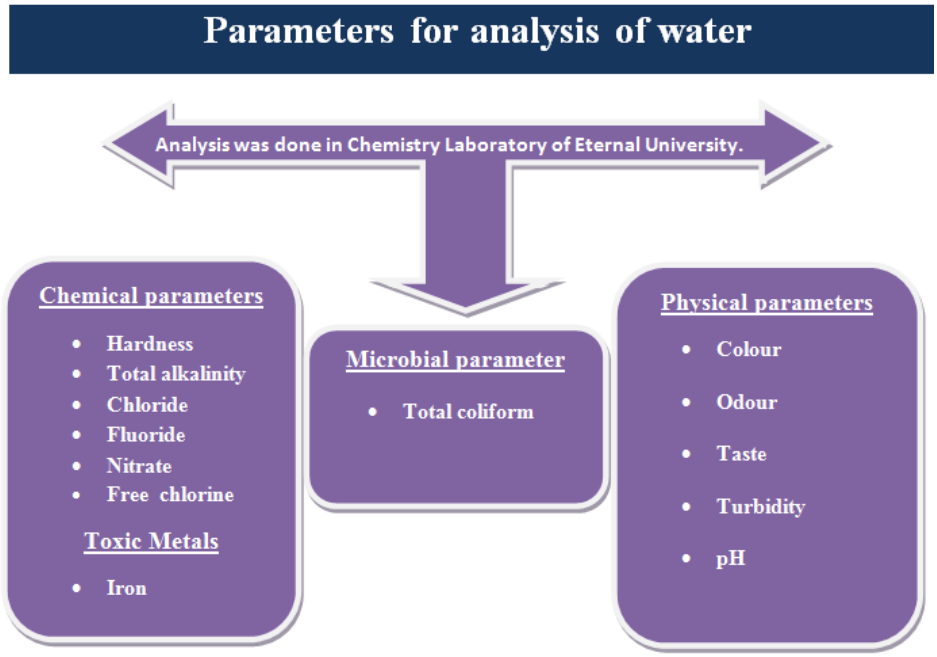
Table 1: Probability proportional to size sampling (PPS)

Blocks	Number of Sub centers	Probability of selection	Sample Sub centers	Sample households	Actual Sample
Dhagera	28	0.193	6	23	26
Rajpura	41	0.282	8	34	29
Shillai	15	0.102	3	12	11
Pachhad	35	0.239	7	29	36
Sangrah	27	0.184	5	22	20
Sum	146	**=1.000**	**n=29**	**N=120**	**N= 122**

A sample was systematically drawn from all the 5 Blocks according to its relative size as shown in Table 1. For example: Sample size = probability of selection*total sample sub centers (n) i.e. for block number 1, sample sub-centre was 6 and sample household was 23, where probability of selection was 0.193. Likewise for other blocks the sample size was calculated. To select a systematic sample of n units, the first unit was selected with a random start r from 1 to k sample, where for each blocks, k = 146/29= 5 (sample interval). Consequently, after the selection of first sample, every 5 sub centers were skipped and the next sub centre was taken (where $1 \leq r \leq k$ i.e. $1 \leq r \leq 5$). Similarly, 122 households were selected systematically.

Questionnaire tool for demographic data was developed to collect the back ground of information.The Water testing kit was sealed and valid as claimed by the manufacturing company. Combination Kit Drinking water, Aquasolve, a product of Labard Company was used to analyze drinking water quality.

Figure 1: Data collection tool: Water Testing Kit



Data processing and analysis

Collected data was verified and coded daily after completing the field activities. Data entry and analysis was done in Statistical Package for Social Sciences (SPSS) version 21.0. Descriptive statistics such as frequency distribution, proportions and means were calculated to describe the demographic characteristics of the sample population. Water Quality Index was calculated to categorize the water quality depending upon the values of parameters. Secondary data was primarily collected from three sources: socioeconomic data sourced from the census of India 2011; water quality data from National Rural Drinking water Program (NRDWP), Ministry of drinking water and sanitation.

Two types of water quality indices, i.e., WQI-1 and WQI-2 were applied to ensure the accuracy of the water analysis and to minimize the errors and bias which could have occurred while analysing the water quality.

Water Quality Index (WQI-1)

Water quality index is defined as a technique of rating that provides composite influence of water quality parameter on the overall quality water. The concept of indices to present gradation in water quality was first proposed by Horton (1965). In this method the weight age for various water quality parameters is assumed to be inversely proportional to the recommended standards for the corresponding parameters. For computing WQI, three steps are followed.

In the first step, each of the 7 parameters has been assigned a weight (wi) from 2 to 5 according to their relative importance in the overall quality of water for drinking purposes. The maximum weight of 5 is assigned to the parameters that have a major negative impact in water quality assessment. The weight of 3 is assigned to those parameters that have

moderate negative impact on water quality and minimum weight of 2 is assigned to the parameters that may be not harmful and have positive impact on health.

In the second step, the relative weight (Wi) is computed from the following equation

$$\mathbf{Wi} = \frac{wi}{\sum_{i=1}^{n} wi} \quad ;$$

Where Wi is the relative weight,
wi is the weight of each parameter,
n is the number of parameters.
Calculated relative weight (Wi) values of each parameter are given in Table 2.

Table 2: Unit weights based on the Indian drinking water standards

Physio Chemical Parameter (mg/L)	Indian Drinking Water Desired Standard IS: 10500	Weight (wi)	Relative Weight (Wi)
PH	6.5-8.5	4	0.18
Total hardness	300	2	0.09
Alkalinity	200	2	0.09
Chloride	250	3	0.14
Nitrate	45	5	0.23
Fluoride	1	2	0.09
Iron	0.3	4	0.18
Total		∑wi=22	∑Wi= 1

In the third step, a quality rating scale (qi) for each parameter is assigned by dividing its concentration in each water sample by its respective standard according to the guidelines laid down in the BIS and the result multiplied by 100.

$$\mathbf{qi = (Ci / Si) \times 100}$$

Where qi is the quality rating, Ci is the concentration of each chemical parameter in each water sample in mg/L, and Si is the Indian drinking water standard prescribed by Bureau of Indian Standards (BIS) for each chemical parameter in mg/L according to guidelines of BIS: 10500:1991.

For computing the WQI, the SIi (sub index of ith parameter) is first determined for each chemical parameter, which is then used to determine the WQI as per the following equation.

$$\mathbf{SIi = Wi * qi}$$

$$\mathbf{WQI = \sum}$$

Whereas, SIi is the sub index of ith parameter;
qi is the rating based on the concentration of ith parameter;
n is the number of parameter.
The computed WQI values are classified into five types; "excellent water to unsuitable for drinking" as given in Table 3. [11]

Table 3: Water quality classification (Ramakrishnaiah et. al. and Lateef)

WQI value	Class	Water quality
<50	I	Excellent
50-100	II	Good
100-200	III	Poor
200-300	IV	Very poor
>300	V	unsuitable for drinking

WQI-2: NSF Water Quality Index

Water quality index is a 100 point scale that summarizes results from a total of nine different measurements like dissolved oxygen, fecal coliform, pH, biochemical oxygen demand, temperature change, total phosphate, nitrates, turbidity and total solids.

According to the book FieldManual for Water Quality Monitoring, the National Sanitation Foundation surveyed 142 people representing a wide range of positions at the local, state, and national level about 35 water quality tests for possible inclusion in an index. Nine factors were chosen and some were judged more important than others, so a weighted mean is used to combine the values.

Table 4: Water Quality Factors and Weights (WQI-2)

Factor	Weight
Dissolved oxygen	0.17
Fecal coliform	0.16
pH	0.11
Biochemical oxygen demand	0.11
Temperature change	0.10
Total phosphate	0.10
Nitrates	0.10
Turbidity	0.08
Total solids	0.07

In the present study, WQI-2 includes the 3 factors i.e., turbidity, nitrates and pH. The index was calculated through consideration of weight of these factors. [12] The computed WQI values are classified into five types; "excellent water to very bad" as given in Table 5.

Table 5: Water quality classification (WQI-2)

WQI value	Class	Water quality
90-100	I	Excellent
70-90	II	Good
50-70	III	Medium
25-50	IV	Bad
0-25	V	Very bad

Approval was taken from Akal School of Public Health and Hospital Administration and Akal College of health and allied sciences, Eternal university for conduction of the research. Approval was also taken from Chief Medical Officer (CMO), Nahan, Sirmaur. Written Informed consent was taken from the household respondent. Purpose of the study was explained to the respondents prior to data collection. Privacy of the information was maintained and used only for the aim of the study.

RESULTS

This chapter deals with the analysis and interpretation of data obtained from households of rural areas of district Sirmaur. The data was analysed and interpreted by descriptive and inferential analysis to make the data meaningful and conclude the results.

Table 6: Demographic characteristics of respondents

<20 years	5	4
21 to 30 years	41	34
31 to 40 years	45	37
41 to 49 years	20	16
>50 years	11	9
Gender		
Female	96	79
Male	26	21
Occupation of family		
Business	6	5
Government Service	15	12
Private services	9	7
Daily wages	1	1
Religion		
Hindu	115	94
Sikh	4	3
Muslim	2	2
Buddhist	1	1
Caste		
SC	31	25
OBC	17	14
General	74	61
Annual Household Income		
Rs.1000 to Rs. 33000	26	21
Rs.33001 to Rs. 55000	19	16
Rs.55001 to Rs. 88800	41	34
Rs.88801 to Rs. 150000	25	20
> Rs.150000	11	9
Economic Status		

Below Poverty Line	26	21
Above Poverty Line	96	79
Highest Education status in the household		
Literate without formal schooling up to primary	2	3
Primary to Secondary	35	28
Secondary to Higher Secondary	43	35
Above Higher Secondary	42	34
Type of family		
Nuclear	24	20
Joint	98	80
Family Size		
<5	42	34
6 to 10	66	54
>11	14	12

Table 7: Chemical composition of drinking water of District Sirmaur

Physico Chemical parameter (mg/L)	Drinking Water Standards IS: 10500	Weight (wi)	Relative Weight (Wi)	Ci (Mean value)	Qi	Sli
PH	6.5-8.5	4	0.182	7.7	90.60	16.49
Total hardness	300	2	0.091	181.54	60.51	5.51
Alkalinity	200	2	0.091	186.22	93.11	8.47
Chloride	250	3	0.136	10.33	4.13	0.60
Nitrate	45	5	0.227	2.32	5.16	0.56
Fluoride	1	2	0.091	0.63	63	5.73
Iron	0.3	4	0.182	0.12	40	7.28
SUM	22	1.000	**WQI= 44.64**			

Figure 2: Water quality index (WQI-1) of district Sirmaur

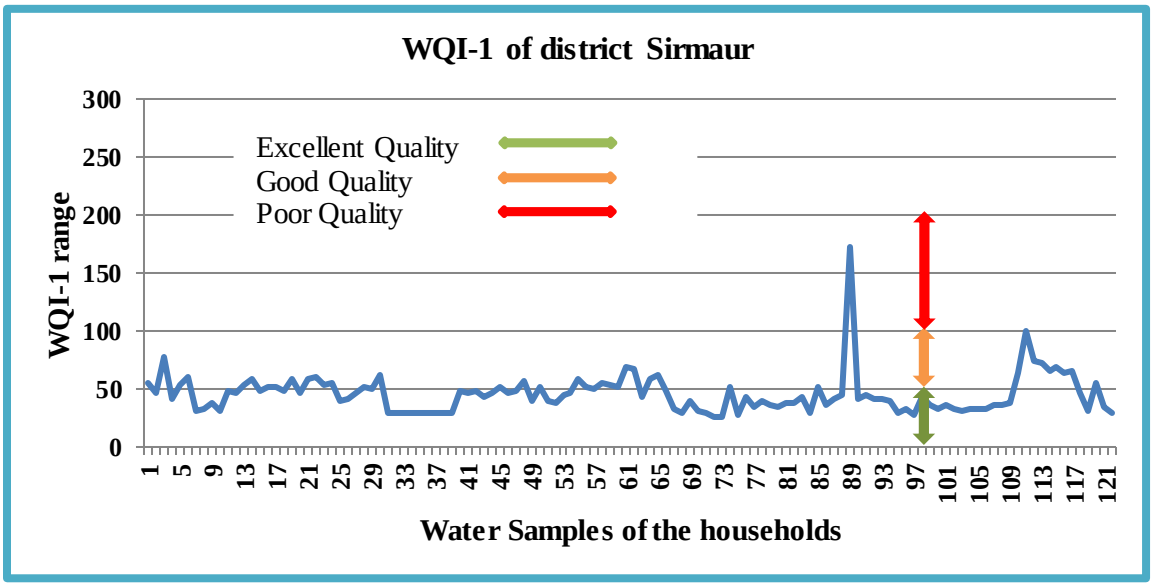


Figure 3: Water quality index (WQI-2) of district Sirmaur

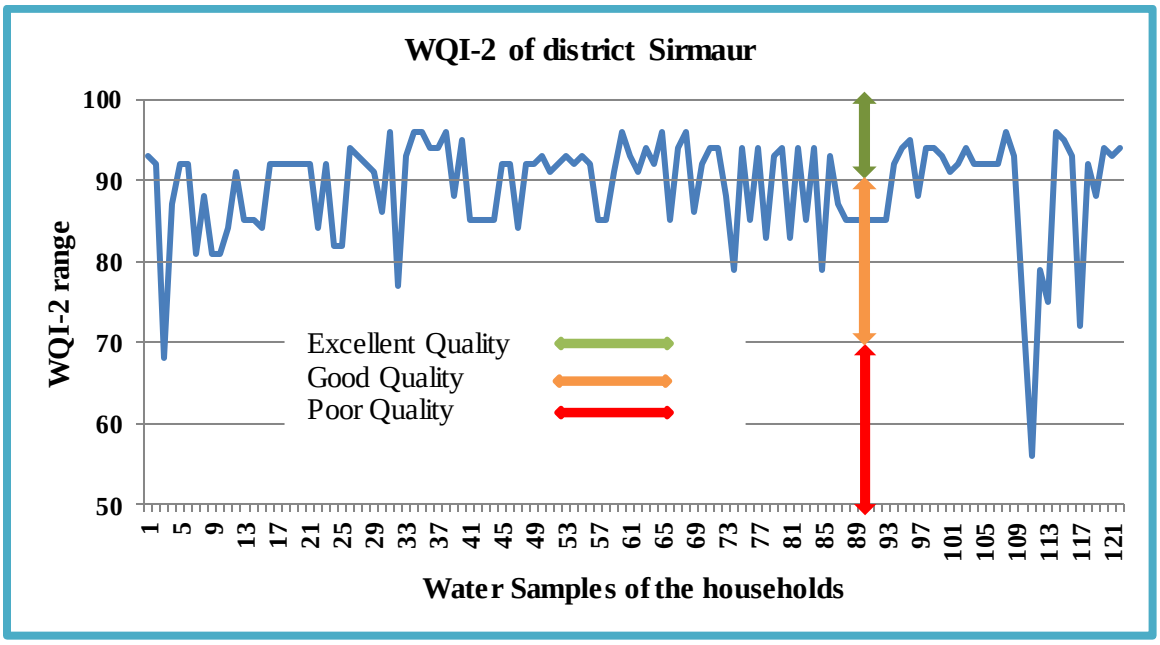


Figure 4: Relative distribution of WQI-1 and WQI-2

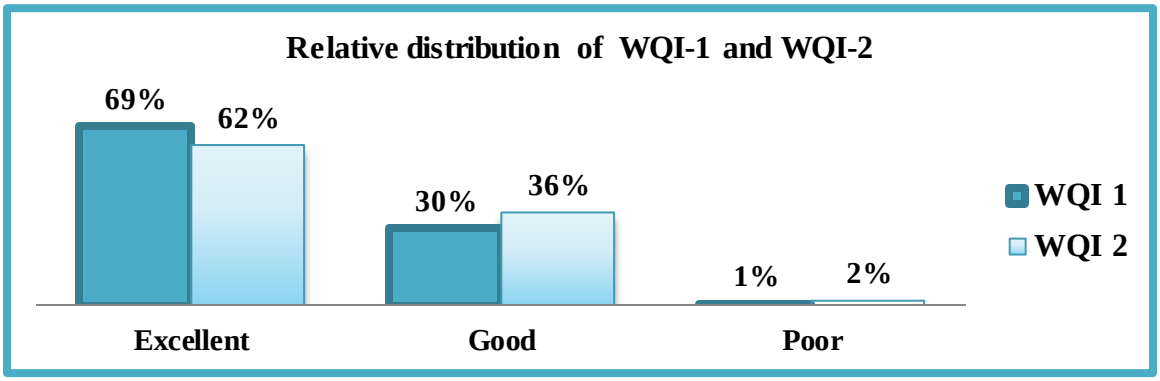


Table 8: Standard deviation of chemical composition of water

Parameter (mg/L)	Indian Standards IS: 10500	Minimum	Maximun	Mean	S.D.
pH	6.5-8.5	6	8.5	7.7	0.66
Total hardness	300	20	425	181.54	108.2
Alkalinity	200	30	500	186.22	142.8
Chloride	250	10	30	10.33	2.55
Nitrate	45	0	50	2.32	5.75
Fluoride	1	0.2	2	0.63	0.29
Iron	0.3	0	2	0.12	0.19
WQI-1		25.53	172	45.40	17.40
WQI-2		56	96	89	6.4

Table 8 shows that standard deviation of chemicals varied widely in the range of 0.66 to 142.8, which indicated dispersion of salts in drinking water above their arithmetic mean values.

Figure 5: Distribution of physical parameter: Turbidity

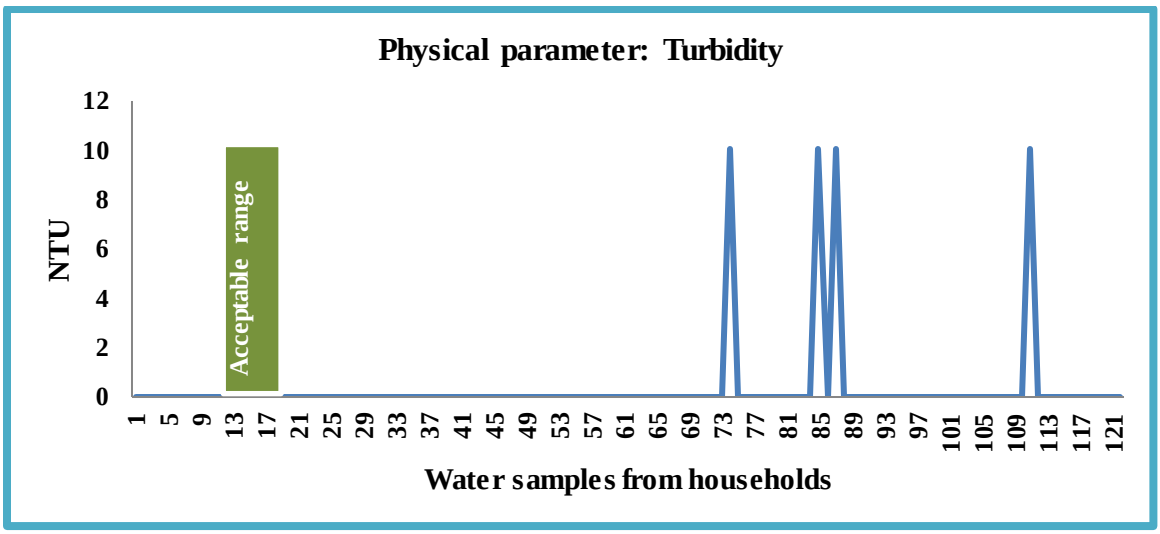


Figure 6: Distribution of Biological parameter: Coliform bacteria

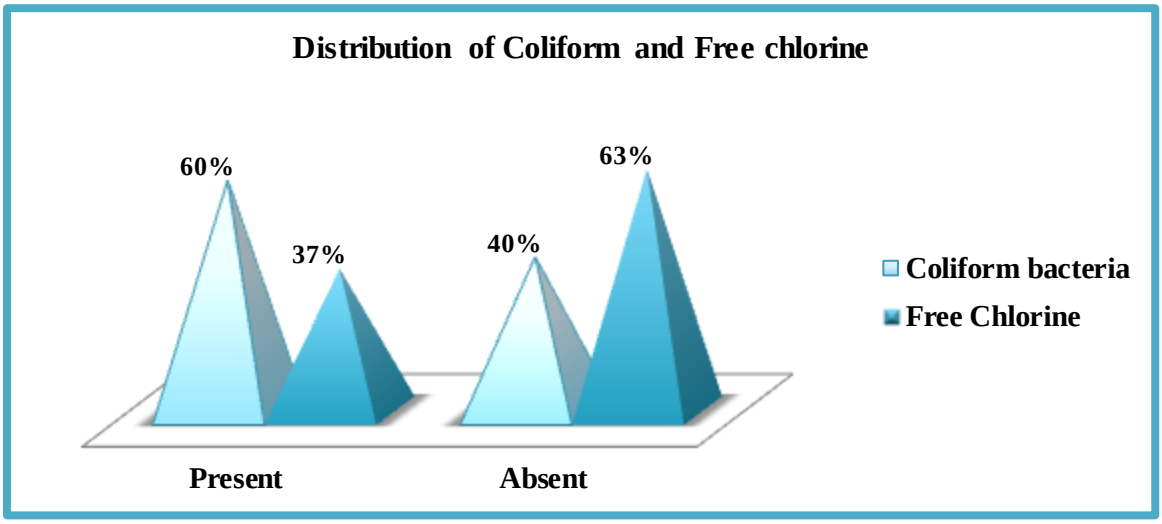


Table 9: Health implications concerned with chemical composition of water

Parameter (mg/L)	Indian Standards IS: 10500	Range	O D ratio**	Health Implications
pH	6.5-8.5	6-8.5	Within limit	-
Total hardness	300 mg/L	20-425	0-1.41	-
Alkalinity	200 mg/L	30-500	0-2.5	Taste become unpleasant
Chloride	250 mg/L	10-30	Below limits	-
Nitrate	45 mg/L	0-45	Within limit	-
Fluoride	1 mg/L	0.2-1	Within limit	-
Iron	0.3 mg/L	0-1	0-3.3	Taste and Adverse effect

**observation value/desirable limit

The above table 4-9 indicates the health implications associated with chemical composition of drinking water of district Sirmaur.[13] Three parameters (pH, nitrates, fluoride) were found to be within range. The concentration (mg/L) of Chloride (10–30) is below the recommended value of 250. The values (mg/L) of total hardness (20 to 425), and Alkanity (30–500) and Iron (0-2)in the study area exceed one to three fold the limits of the prescribed values of 300, 200, and 0.3 respectively. The higher concentrations of these chemical species much over prescribed limits have cumulative effects on human health.

Discussion &Conclusion

In the present study, mean WQI-1 was found to be 45, which is very much similar to the finding of NRDWP which reported mean WQI-1 as 44. It indicates the excellent quality of

water of district Sirmaur. This study's finding of 1% samples having poor water quality also got supported by finding of NRDWP where no water sample were found to have poor water quality. However, 69% water samples had excellent water quality in the study in contrast to 92% water samples in NRDWP.

Considering physical, biological and chemical parameters, 3% were found as turbid, 60% were found to be contaminated with coliform bacteria and free chlorine was present only in 37% of the water samples in the study. These results are in contrast to the findings of NRDWP that had found turbidity in 40%, no coliform bacterial contamination in 100% water samples and free chlorine in only 49% water samples.

Physico-chemical analysis of the water in the present study found all the parameters within acceptable range of Indian drinking water standards (IS: 10500). This finding gets supported by finding of the study done in Madhya Pradesh where all the parameters reported within portability range of WHO. [14]

Physical and chemical parameters in all blocks were found within acceptable limits and most of the water samples (60%) were contaminated with coliform bacteria in the present study. These findings were similar to the finding of the study conducted in Kangra district of Himachal Pradesh which reported that water samples were not highly turbid. Chemical parameters like pH indicated the low drift in pH values and biological parameters indicated bacterial isolates viz. Staphylococcus *aureus*, Pseudomonas *aeruginosa*, Proteus *vulgaris*, Clostridium *tetani*, Alcaligenes*faecalis*, Shigella*dysenteriae*, Salmonella *sp*., Micrococcus *sp*. and E. *coli* were pathogenic. [15]

The finding of Water quality for physical, chemical and biological parameters in the present study is supported by the research done in Bolivia. [16]

Strength and limitations:

The study question was "What was the water quality index of drinking water for people in district Sirmaurin the study period?" which was accurately answered by the present study. All three parameters (physical, Chemical, and biological) were analyzed appropriately. Data collection in the form of questionnaire and water samples from households was done with the desired sample size of 122. As quantitative research design was used in the present study but mixed method research design could be used in order to have more exploratory results.

REFERENCES

1. Mohsin M, Safdar S, Asghar F, Jamal F. Assessment of drinking water quality and its impact on residents health in Bahawalpur city. Int J of Hum Soc Sci. 2013; 3(15):114-28.
2. Mudundulu P.Water Borne Diseases: A Cry of a Trapped Community [internet]. 2011 [updated december 5, 2011; cited on July 8, 2017]. Available from: http://digitalcommons.unl.edu/arch_crp_theses/9/
3. Park K. Textbook of preventive and social medicine. 22nd edition. New Delhi: Bhanot Publishers;2013.Chapter 13, Environment and Health;655-674
4. Rajagopalan V. Air quality assessment: National Air Quality Assessment Programme. Central Pollution Control Board (CPCB). 2005 Mar [cited on 18 July, 2017]. Available from http://164.100.107.13/Highlights/highlights2004.pdf
5. United nations. Step by step methodology for monitoring water quality [internet]. UN water. [updated on 18 January, 2017; cited on July 18, 2017]. Available from:

http://www.unwater.org/publications/step-step-methodology-monitoring-water-quality-6-3-2/

6. World Health Organization. Global health observatory (GHO) data.Geneva: World Health Organization; 2015 May [cited on 20 July, 2017]. Available from:http://apps.who.int/gho/data/node.resources
7. UNICEF. WHO (2015) Progress on Sanitation and Drinking-Water: 2015 Update and MDG Assessment WHO. World Health Organization and United Nations Children's Fund Monitoring Programme for Water Supply and Sanitation (JMP). UNICEF, New York and WHO, Geneva.
8. J.Kishore. National Health Programs of India. 11th edition. New Delhi: Century Publications; 2014.
9. Territories U. Government of India. Ministry of Statistics and Programme Implementation. National Sample Survey Office. Key indicators of drinking water, sanitation, hygiene, housing conditions in. Nss 69th round. 2013;(Dec):1–84.
10. Panwar S, Srivastava RK. Assessment of groundwater quality in contiguous of integrated industrial estate–Pantnagar, Uttarakhand. Int J Env Sci. 2012; 3(3):1130-40.
11. Holt S. A Survey of Water Storage Practices and Beliefs in Households in Bonao, Dominican Republic in 2005 [M.S. Thesis].Atlanta, Georgia: Georgia State University; 2009. Available from:http://scholarworks.gsu.edu/iph_theses/116
12. Eshcol J, Mahapatra P, Keshapagu S. Is fecal contamination of drinking water after collection associated with household water handling and hygiene practices? A study of urban slum households in Hyderabad, India. J water health. 2009 ;7(1):145-54
13. Mishra S, Nandeshwar S. A study to assess water source sanitation, water quality and water related practices at household level in rural Madhya Pradesh. Nat JComm Med. 2013 Oct 1; 4(4):599-602.
14. World Health Organization & United Nation's Children Fund (UNICEF). Global water supply and sanitation assessment 2000 report. World Health Organization (WHO); 2000. [cited on July17,2017]. Available from http://www.who.int/water_sanitation_health/monitoring/jmp2000.pdf

Community Medicine, Public Health and Family Medicine: Many facets of a single discipline"

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Changes are laws of nature and some changes are for betterments. PSM/SPM departments established on the basis of recommendations by Bhore Committee (1946), which came into existence in 1954, have undergone several changes with different names. Are these changes in concordance with health needs of the community? Whether corresponding changes in administrative and academic set-ups were also made or not? What are the threats and confusions associated with such changes? Whether there is some identity crisis among experts in different fields? Whether undermining importance and ruling out any one specialty will not narrow down career opportunities? These are some burning questions, this debate may explore answers.

I would like to advocate some arguments **in favour of the topic.** In my opinion, we should be progressive and flexible enough to cope with current and future needs for potential betterments. Our approach should not be narrow imposing unwanted restrictions on newer ideas. No doubt, there are some overlaps as well as differences between Community Medicine, Family Medicine and Public Health. In spite of differences in the levels/types of care, human resource trained, expertise and qualifications in different areas of specializations, the three approaches are complementary to each other. Gaps existing between these three fields should be minimized for providing better community health care. Without active collaboration of experts in different sub specialties desired outcomes can't be attained. Community Medicine is a broader concept involving: teaching, training, research and practice; health management, health promotion and Epidemiology. It provides an excellent opportunity of integrating efforts by experts from statistics, social sciences and others. Clinical expertise alone can't serve the purpose of catering health needs of the community. Multidisciplinary nature of Community Medicine and growing needs of community health suggest adoption of a holistic approach with judicial mix of different fields under the umbrella of Community Medicine. No need of frequent changes in names, all these subspecialties /approaches must co-exist for better sustainability. We should not forget "**diversity is our strength"** and "**unity in diversity".** All the three subspecialties under one roof as facets of single disciplines may provide multi-tasked experts adopting a cost effective approach. Integral and appropriate strategies with mutual respects among experts in different fields will certainly transform into a successful, viable and sustainable model.

ZOONOSES AND PUBLIC HEALTH

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Zoonotic diseases are those infections that can be transmitted between animals and humans under natural environmental conditions. Zoonoses may derive fromalterations of the ecological balances, natural or artificialmutations of infectious agents, wildlife migrations, introductionof allochthonous species, trade globalisation,and movements of people from distant areas of the planet.There are approximately 1500 pathogens, which are known to infect humans and 61% of these cause zoonotic diseases (Tayloret al. 2001). Over 30 new infectious agents have been detected worldwide in the last three decades as emerging pathogens; of which 60 per cent are of zoonotic origin (Bhatia et al. 2012). Nowadays some factors such as new productiontechnologies, trade globalisation, movements of people, changes in working conditions, are generatingnew zoonotic and occupational risks, some of which are considered emerging and re-emerging. Emerging zoonotic infections are the diseases that are newly recognized or newly evolved, or that has occurred previously but shows an increase in incidence or expansion in geographical, host or vector range (WHO 2006).

Besides health, zoonotic infections also present a grave economic, developmental and security challenge. A systematic analysis on economic losses due to brucellosis revealed that brucellosis in livestock is responsible for a median loss of US $ 3.4 billion (5th-95th percentile 2.8-4.2 billion). The disease in cattle and buffalo accounted for 95.6% of the total losses occurring due to brucellosis in livestock populations. The disease is responsible for a loss of US $ 6.8 per cattle, US$18.2 per buffalo, US $ 0.7 per sheep, US $ 0.5 per goat and US $ 0.6 per pig. These losses are additional to the economic and social consequences of the disease in humans (Singh et al. 2015).

Zoonotic diseases like brucellosis, rabies, human African trypanosomiasis, bovine tuberculosis, cysticercosis, echinococcosis, and anthrax are listed as seven endemic zoonoses of concern (WHO 2006). In developing countries, they constitute an important threat to human health (Wastling et al. 1999) especially for societies that domesticate and breed animals for food and clothing. The Indian subcontinent has been identified as one of the four global hot-spots at increased risk for emergence of new infectious diseases. The latest high-resolution climate change scenarios and projections for India forecast the likely increase in annual mean surface temperature by the end of the century from 2.5°C to 5°C and with warming more pronounced in the northern parts of India and a more than 20% rise in summer monsoon rainfall is projected which indicates a pronounced impact of zoonoses in future (Singh et al. 2011).

Companion Animal-Borne Zoonoses

Companion animals are known to play an important role in increasing burden of zoonoses among urban population. The most commonly suffered zoonotic infections via companion animals in humans are transmitted via animal bites and scratches. Hundreds of different pathogenic bacteria are present in the oral cavity of dogs and cats (Goldsteinand Richwald, 1987). There are ten times higher *Pasteurellamultocida* infection risks after a cat

bite than a dog bite (Morgan2005). *P. multocida* infected bite wounds appear usually within 8 h.Cat-scratch disease is a clinical syndrome that has been reported in people for over 100 years. Yet, the etiological agent *Bartonellahenselae*which was transmitted by cat scratches and bites, was only identified in 1992 (Stechenberget al. 2011). However, contact with cat saliva on broken skin or sclera can also cause Bartonellosis.

Infectiousdiarrheaincompanionanimalscausedby *Salmonellasp.*,*Escherichiacoli*,*Shigella sp.* and *Campylobactersp.* can also betransmittedtopeoplethroughfaeco-oralroute. Campylobacter, like many other enteropathogens, can cause gastroenteritis (diarrhea, vomiting), headaches, and depression, sometimes even leading to death. It is obvious that raw food diets for pets dramatically increase the risk of human exposure to such zoonotic bacterial enteropathogens, which cause gastrointestinal diseases.Althoughpetbirds e.g., canaries, finches, sparrowsandpsittaciformese.g.,parrots,parakeets,budgerigars, lovebirds areasmallfractionofadoptedpets,theyareincreasing popularity in Indiaandarepotentialcarriersofzoonoticdiseases. Someofthemcouldhavean important impactonhuman health, suchaschlamydophilosis (Vanroonpayet al. 2001), Campylobacteriosis (Bandekar et al. 2005), and salmonellosis (Carlson et al. 2011).Inhalation of dust, dander, and nasal secretions of infected birds is the main way of transmission to humans. Mild to severe flu-like illnesses may develop and infected people might be misdiagnosed with influenza.

Farm Animal-Borne Zoonoses

The zoonotic diseases may be transmitted to livestock farmers through contamination during production, processing, and handling of food products of animal origin. About 68% of Indian population is in close contact with domestic animals (Pavani2014) and their activities, such as working with animals and in their sheds, improper disposal of waste from animal sheds, skinning of infected animals, slaughtering of diseased animals, disposal of infective material from the diseased animals, and poor personal hygiene practices, have been reported to be important risk factors.

Annually, a large amount of drugs are being used worldwide in animal husbandry. Antibiotics are routinely fed to livestock as growth promoters to increase profits and to ward off potential bacterial infections in the stressed and crowded livestock environment (Anthonyet al. 2001).Furthermore, the recent emergence of ESBL-producing and carbapenemase positive Enterobacteriaceae bacteria in animal production (Horton et al. 2011), the emergence of farm associated MRSA ST398 (the main pig associated clone) (Kluytmans2010), and of plasmid-mediated quinolone resistance in animal isolates and food products are great threat for public health. Unfortunately, these antimicrobial resistant "superbugs" are not only confined to hospital environments where antimicrobial use is high and many pathogens were prevalent. The causative agent of bovine tuberculosis, *Mycobacterium bovis* (*M. bovis*) has been identified worldwide. There are still hundreds of new cases of human tuberculosis reported in the India.Among many others, brucellosis, which is not an emerging disease, has a significant impact on the developing countries with sporadic outbreaks. Plague, caused by *Yersinia pestis*, is the most important re-emergent bacterial wild rodent borne disease. The current case reports of plague are primarily limited to Africa. However, it is a great potential public health hazard due to increased traveler mobility or a potential bioterrorist attack (WHO 1994).

Occupational Zoonoses

In 1975, a joint WHO/FAO meeting of VPH experts(WHO 1975) recognized zoonoses and traumas caused by differentspecies of animals as occupational risks andstressed the need for specific knowledge for securingtheir prevention and control.There exist several occupational diseases possibly involvingpersonnel working in animal husbandry and relatedactivities (Mantovaniet al. 1978). Farmers, personnel working in abattoirsand processing products of animal origin are at the higher risk and the same applies to some workers not directly workingin the above sectors but sharing frequent contacts withliving animals or their carcases or with faecesor urine present in the environment.The probability to come into contact with zoonoticagents during work depends upon multiple factors likeanimals' health status, the worker's type of activity, the periodicityof contacts with living animals, their carcases andorgans, individual and environmental preventive measurestaken, the level of professional training/information onrisks.Also, the major zoonotic diseases that are transmitted from wild animals to humans include rabies, anthrax, leptospirosis, Q-fever, psittacosis, hendra virus, nipah virus, herpes B encephalitis, toxoplasmosis, etcthat are reported in India (Kumaret al. 2013)and these diseases represent the occupational diseases for the veterinarians and the zoo workers.

In addition, the fight againstoccupational zoonoses coincides with the application ofrational farming techniques and that human and animalhealth and zoo-economics are three fundamental pillarsof modern farming (Batteli et al 2006). Such animal borne diseases can be controlled only when diseases are controlled at basic farming level.

Prevention and Control

The very first step to recognize the zoonotic disease and investigation involving the collaborative field work of multidisciplinary teams with the support of expert scientists and advanced laboratories. Education involving training, technology transfer, information and communication plays major role in curbing down the zoonoses. Lack of awareness about the occurrence of zoonotic diseases and their impact on public health have acted as a major hurdle in commencing adequate and effective control measures (Asokanet al. 2011). In one of the study conducted in Punjab, livestock farmers were well aware of rabies, but the knowledge toward other zoonotic diseases was low to medium. Livestock holders were mostly not aware of the risk of contracting zoonotic pathogens from consuming contaminated raw milk, meat, and eggs. In addition, proper disposal of infected animal products, aborted materials, and use of hygienic procedures during animal product storage are extremely important steps in successful control of zoonotic pathogens (Al-Majaliet al. 2006). These zoonotic diseases have a direct effect on human and animal health and production, but this may influence the economy of the country by being barriers to trade, increased cost of marketing the product to ensure it is safe for human consumption and the loss of market because of decreased consumer confidence. Even though the government is practicing most disease control schemes including vaccination, organization of animal health camps but preponderance over the issue of improving awareness among the farmers, veterinarians and general population could become a milepost in prevention and control of zoonotic diseases.

The basic prevention of occupational zoonoses must beimplemented by Veterinary Services throughout the wholeproduction chain through appropriate tools of control, diagnosis,epidemiological surveillance and evaluation ofhealth interventions. Also, identification and control of such zoonotic diseases require a "One Health" approach,

which demands combined efforts of physicians, veterinarians, epidemiologists, public health workers, and urban planners.

References

1. Al-MajaliAM, Talafha AQ, Ababneh MM. and Ababneh MM. Seroprevalence and risk factors for bovine brucellosis in Jordan. *J Vet Sci. 2009*;10:61-65.
2. Anthony F, Acar J , Franklin A, Gupta R, Nicholls T, Tamura Y, et al. Antimicrobial resistance:responsible and prudent use of antimicrobial agents in veterinary medicine. *RevSciTech. 2001;*20:829–39.
3. Asokan GV, Vanitha A. and Prathap T. One Health National Programme across species on zoonoses: A call to the developing world. *InfectEcolEpidemiol*.2011;1:8293.
4. Bandekar J, RautAD and Kapadnis BP. Occurrence of Campylobacter in Local Poultry Meat in Pune and Mumbai. Founder's Day Special Issue.2005;120-123.
5. BattelliG, Baldelli R, Ghinzelli M and Mantovani A. Occupational zoonoses in animal husbandry and related activities. *Ann Ist Super Sanita. 2006*;42(4):391-396.
6. Bhatia R, Narain JP andPlianbangchang S. Emerging infectious diseases in East and South-East Asia. In: Detels R, Sullivan SG, Tan CC, editors. Public health in East and South-east Asia. Berkeley, USA: University of California Press; 2012. 43–78.
7. Carlson JC, Engeman RM, Hyatt DR, Gillil RL, DeLiberto TJ, Clark L, et al. Efficacy of European starling control to reduce *Salmonella enterica*contamination in a concentrated animal feeding operation in the Texas pan handle. *BMC VetRes. 2011;7*:9
8. Goldstein EJC, Richwald CA. Human and animal bite wounds.*Am FamPhysician1987;*36:101–9.
9. HortonRA,RandallLP,SnaryEL,CockremH,LotzS,WearingH,etal.Fecal carriageandsheddingdensityofCTX-Mextended-spectrumß-lactamase-producing *Escherichiacoli* in cattle,chickens,andpigs: implicationsfor environmentalcontaminationandfoodproduction.*ApplEnvironMicrobiol. 2011;77*:3715–9.
10. KluytmansJAJW. Methicillin-resistant *Staphylococcusaureus*in food products:causeforconcernorcaseforcomplacency? *ClinMicro boil Infect*2010;16:11–5.
11. Kumar CHB, Lokesha KM, Madhavaprasad CB, Shilpa VT,Karabasanavar NSand Kumar A. Occupational zoonoses in zoo and wildlife veterinarians in India: A review. *Veterinary world. 2013;6*(9): 605-613.
12. Mantovani A, Battelli G andZanetti R. Occupational diseases associatedwith animal industry with special reference to the influenceof the techniques of animal maintenance.*Ann Ist SuperSanità. 1978;*14:259-64.
13. Morgan M. Hospital management of animal and human bites. *J Hosp Infect 2005;* 61:1–10.
14. Pavani G. Zoonotic diseases with special reference to India. *Int J Basic Appl Med Sci*.2014;4:73-87.
15. Singh BB, Dhand NK and Gill JPS. Economic losses occurring due to brucellosis in Indian livestock populations. *Prev Vet Med*. 2015;119(3-4):211-5
16. Singh BB, Sharma R, Gill JPS, Aulakh RS and Banga HS. Climate change, zoonoses and India. *Rev Sci Tech OffIntEpiz 2011;*30:779-788.
17. Stechenberg BW. Bartonella. 19thed. In:Kliegman RM, Behrman RE, JensonHB, Stanton BF, editors. *Nelson Textbook of Pediatrics*. Philadelphia, PA: Saunders Elsevier. 2015.
18. Taylor LH, Latham SM andWoolhouse MEJ. Risk factors for human disease emergence. *Philos Trans R SocLond B BiolSci* 2001;356(1411):983–9.

19. Vanrompay D, Harkinezhad T, VanDeWalle M, Beeckman D, VanDroogen- broeck C, Verminnen K, et al. Chlamydophilapsittaci transmission from pet birds to humans. *Emerg Infect Dis 2007;*13:1108–10.
20. Wastling JM, Akanmori BD and Williams DJL. Zoonoses in West Africa: Impact and control. *Parasitol Today 1999*;15: 309-11.
21. WHO. Plague in India: World Health Organization Team Executive Report [internet]. Geneva: World Health Organization. 2002 [Updated on 20 February 2002, cited on July 2017]. Available on: http://www.who.int/csr/don/2002_02_20/en/
22. World Health Organisation. 2006. The Control of Neglected Zoonotic Diseases: A Route to Poverty Alleviation. Geneva Report of a Joint WHO/DFID-AHP Meeting with the participation of FAO and OIE, Geneva, 20-21,2005.
23. World Health Organization. ContributodellaMedicinaveterinariaallasanitàpubblica, 1975. (translation by Benazzi P, Zanetti R from the original *The Veterinary contribution to public health practice*. Geneva: WHO; Technical Report Series No. 573). *N Ann IgMicrobiol;*27:314-403.

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ORIGINAL ARTICLE

The text of original articles amounting to up to 3500 words (excluding Abstract, references and Tables) should be divided into sections with the headings Abstract, Key-words, IMRAD format (Introduction, Material and Methods, Results, Discussion), References, Tables and Figure legends.

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