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Outbreak of Parasitic Protozoa and Pathogenic Micro-organisms as an Endemic and Epidemic

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Abstract

The research paper sought to throw light on the aetiology by focusing on impure and infected water and creating an epidemiological reasoning in the Pakistan's community which is growing need of concern. As WHO argued, world's leading killers are the water-borne diseases. Globally, the outburst of human diseases transmitted through epidemic microbes, including bacteria, virus and protozoa, into water is a scorching issue that results into water-borne contagions. The causes behind one quarter of all deaths around the world are susceptible to pathogenic microbes present in the impure water and it is still counted in high number. A main objective of this article is accentuated from the fact that most of the communicable diseases are transmitted through poor sanitation system and lack of awareness and resources in Pakistan. For a developing country like Pakistan, hygienic awareness is necessary for the optimal development of human health, along with the installation of water filtration mechanisms in every hamlet of the society.

This will help in eradicating the epidemic diseases in ever nock and crony of the country. This research article is a bases on secondary data from different sources like past research articles, hospital records, internet and reports to World Health Organization (WHO). These sources helped in shaping this research articles to further monitor those in the burning issue. This will in policy framework from government side.

Keywords: Epidemic; Water-borne diseases; Contamination; Communicable diseases; Vector-borne diseases; Sanitation

Introduction

The core significant issues within the global public health domain are water contamination. Chemicals used in soaps, pharmaceuticals, detergents, gasoline, and others are extracted from the ground and surface water, which are associated in urban activities and households. This means that water contaminants include biological, man-made chemicals, along with the naturally occurring contaminants. For the health of population, safe drinking and bathing water plays a key role, with respect to the health of children. The pathogenic viruses, bacteria and chemical substances are some of the agents that contaminate water, resulting into water-borne diseases. Drinking water, recreation, and other domestic means, have a direct link to the people. When at least two people suffer from the same sort of illness and water is viewed as its possible source as per the epidemiological evidence, it is when the outbreak of water-borne disease occurs. Besides, not only the developing countries but also the affluent ones are becoming a prey to those outbreaks [1].

The quality and contamination of water is ever-varying and evolving, therefore, its study is link to a dynamic science. As recognized by United Nations General Assembly (UNGA) in 2010, sanitation and access to safe water is also a human right. Water sanitation also has a great stance like other sustainable development goals like gender inequality, ample sustenance, and poverty eradication. The chemical, biological and radiologic agents contaminate water reserves ultimately affect millions of people around the globe. Besides, The United States enjoyed the best water suppliers for public domain. Furthermore, the three categories of drinking water supply have been identified by WHO/UNICEF joint monitoring programme for water-supply and sanitation also monitors the Millennium Development Goal (MDG). The first category includes supply of water into the residence or yard. Other two amounts to the improved (hand pumps, public taps, harvesting rain water) and unimproved sources (unprotected water open to contamination). Still, 663 million people don't have access to the improved drinking water. Around one fifth of the people live in Southern Asia, while half of the population is settled in sub-saharan Africa. This research article would help in understanding the core issues and would provide or suggest some important measures to be tackle these issues in managing pure sanitation system and clean drinking water in the country [2].

The objectives of conducting this research was to evaluate the facts and reasons of most communicable and epidemic diseases that how these transmit through poor sanitation system and lack of awareness and resources in Pakistan. Secondly, to monitor how certain diseases have an impact on rural community of Pakistan. Thus previous reports helped in understanding the core issues. With respect to literature review this research would monitor the water quality issues in respect of water borne diseases. Furthermore, policy recommendation is more required to overcome water quality in the country [3].

Literature Review

Epidemiological scrutiny of the global village

Around the globe, the cholera epidemic is taking a terrible toll; it is preventable through the provision of clean drinking water and proper sewage treatment. During the Zimbabwean outbreak, around 4,000 deaths and 100,000 cases were reported in 2008. That was the severe outburst of last decade. In comparison, a cholera epidemic emerged in Haiti (centers for disease control and prevention) for the first time in 2010. It lasted for more than a century and took the lives many people. Moreover, the non-virus outbreak occurred for the second time in New Mexico. By using the contaminated spring-fed water system, 119 attendees of a youth camp became victim to GI illness. It was reported again after the first outbreak in the particular territory that reflected reluctance in addressing the deficiencies. During 2000 to 2007, there were 354 outbreaks reported in the European countries including Belgium, the Czech Republic, Croatia, Finland, Greece, Hungary, Italy, Lithuania, Norway, Slovakia, Spain, Sweden, England and Wales. Such number of outbreaks also results as an indicator for the quality of water available in the regions [4].

There is a relationship between three different diseases which are cholera, malaria and dengue fever. And they have a strong relationship with water. Cholera is a bacterial illness caused by drinking contaminated water. The caretakers get sick quite easily through that bacterium, when pure water is not available for drinking and washing hands. More often, that epidemic spreads during the times of disaster. It is measured that people living in poorest regions of the world prone to these diseases. In the tropical areas, malaria is the strongest epidemic diseases have killed many people. It also measured that there is a relationship between water-borne infectious diseases and climate. At the time of drought, poor sanitation is an outcome of water scarcity and majority of the population is likely to be exposed by contaminated water. For instance, the epidemic of cholera emerged out of a severe drought in Northern Kenya.

Besides, 147 countries of this global world use clean sources of drinking water, came out from the Sustainable Development Goals that aims to provide safe drinking water to the masses. On the contrary, the regional groupings including Oceania and sub-Saharan Africa, Northern Africa, Caucasus and Central Asia don't have access to clean drinking water facilities. According to the JMP data, eight out of ten people in rural regions don't have access to sources as compared to the people living in urban settings. It is estimated that around 137 million people are affected by drinking arsenic-poisoned water. In developing countries, the young children get suppressed by prevalent diseases. Among children under the age of five, 17% of deaths are attributed to diarrhea. It is also reported that a high correlation exists between infant mortality and the population's proportion.

To give access to adequate Water, Sanitation and Hygiene (WASH) in educational institutions, a need was felt in the pan-European region to prioritize health, education and well-being of students. In 2010, the central concern of parma declaration on environment and health was to attain healthy school environments in the region. So, to meet that target, all of the present governments of that time had committed to renew the hygiene practices and to provide safe drinking water and sanitation by 2020. Besides Water, Sanitation and Hygiene (WASH) is closely associated with nutrition, health and education, and is also complementary for each other. Furthermore, the Agenda for sustainable development also seeks to attain equitable and universal access to safe Water, Sanitation and Hygiene WASH services, along with creating safe learning environments [5].

Water infrastructure of Pakistan

In 2010, Pakistan's water resources expanded up to 92%, which was 85% in 1990. This does not prove that by expanding water resources would result in improvement in the quality of drinking water. Safe and clean water is a separate issue which can be explained through the logic that sometimes, water supply system changes the characteristic of water and alters it into impure water. For that reason, improvements in water sanitation system through some programs like joint monitoring program for water supply and sanitation determines meticulous cleanliness at grass-route level. The project in Karachi and sanitation in rural areas are two examples of innovation under these programs sanitation improved from 27% to 48% during the period of 1990 to 2010. We cannot claim that this segment controls the deficiencies of water supply and formulates pure water because of the limited source of waste water treatment in urban areas, water-borne diseases have been reported in Faisalabad, Karachi, Lahore, and Peshawar. According to a survey conducted in 2006, approximately more than three million people found to be victim. This alarming situation in urban areas marks a question on the cities' sanitation systems and programs. Besides, the national sanitation policy and national drinking water policy was launched in 2006 and 2009, respectively. Under these policies, the service provider relied on government and foreign funding but the estimated investment is not sufficient in accordance with the demand and requirement of the community. Significantly, the quality of water is not improving according to the manifestos of these programs [6].

Despicable information regarding waste-water treatment was given by the ministry of water and power in which a few percent of the industrial and domestic wastewater received treatment. The situational analysis on water depicted that three treatment plants are situated in Islamabad, among which only one is functional while others are of no use. Karachi has two wretched wastewater treatment plants and those are also working without giving some reasonable results. A treatment plant has been working in Faisalabad that just treats 7% of the waste water. Besides, some screening and grit removal systems are working in Lahore. On the contrary, Multan, Rawalpindi, Gujarat, Bahawalpur and Gujranwala have no waste-water treatment plants at all. In addition, no treatment plant exists in rural areas and the purity of surface water is in danger as well. Consequences of polluted water amount to the emergence of pathogenic diseases, which then diffuse into the ground water. Through water treatment, ample number of communicable and non-communicable diseases can be avoided in bulk range. 80 percent of epidemic diseases around the world are the outcome of contaminated water. In this regard, Pakistan's public health has a serious threat of epidemic water-borne diseases, as almost 1.2 million people die out of those diseases every year and billions of rupees are spent while treating the victims [7].

Pakistan's social and living standard survey, 2010-2011

Supply of drinking water is an essential process with regard to fulfilling community's basic requirement on daily basis. Drinking water basically amounts to 32% of tap water, 28% of hand pump, 27% of motor pump, 4% of well, and others. Mostly, it is seen that the other sources of water supply are not secure for health and sanitation that may increase the possibility of germs' amalgamation, which will

prove harmful for the community and society. According to the hygiene survey that was conducted in 2010, the water sources are improved up to 91% and the study emphasized that 66% of the areas have a flush toilet, 15% have a non-flush toilet, and 18% don't have any toilet at all. This showed that the sanitation system is premature and less improved as opposed to water sources.

Quality water for drinking

There is a famous saying that where there is water, there is life. But in this industrial era, this saying has taken another shape, i.e., where there is pure water, there will be a healthy life. In 2012, Pakistan research council of water resources highlighted that 88% of functional water supply schemes are polluted with microbiological infectivity. Large amounts of arsenic, nitrate and fluoride impurities are detected in drinking water in different localities of Pakistan. Some official government credentials described that low pressure of water and leakage in pipelines are two main causes of contamination of water. Besides, parameter of drinking water is not internationally standardized; it is regulated according to the regional condition. Just like in developed countries, safe water is standardized through European drinking water directive and in USA, United States environmental protection agency established the standard of pure drinking water. Moreover, purity of water is standardized in accordance with the context of the country because water differs with regard to the impurities present in it. At some places, water comes from rivers, dams and is filtered through layers of soil and rocks in the earth. Here, some substances get absorbed in the water; most of them are risk-free up to certain level but some can prove infectious to the human health [8].

Scourge of water-borne diseases in Pakistan

Pakistan's health system is framed to deal with deal with the communicable and non-communicable diseases, simultaneously, 40% of the communicable diseases spread infection, together with tuberculosis, measles, pneumonia, acute respiratory infection, diarrhoea, malaria, gastrointestinal infection, viral hepatitis and Acquired Immune Deficiency Syndrome (HIV-AIDS). There are basically two different categories of water-borne disease with regard to the 'water contact diseases', these get produced through fresh water, swimming pool, lakes, streams, rivers, and polluted surface water. People get ill by using water during bath-taking, drinking and washing, in the preparation, or consumption of food. Among the various forms of diseases, diarrheal disease is most prominent in developing countries, especially, in children. An endemic estimated report showed that around 250,000 children lost their lives under the age of five due to the common cause of diarrhoea. The figure become more jeopardized when we realize that 630 children are dying daily with the causes of diarrhoea in Pakistan. According to the World Health Organization (WHO) report, the global burden of those diseases reported 4.1% per day which means 1.8 million human deaths per annum. Another report published in Pakistan estimated that 85% of water-borne diseases belong to drinking unhygienic water which leads to 25 million deaths per year. Toxic chemical don't have any taste or flavour that enters into the drinking water in a huge manner which is likely to cause defects within the new-born at the time of childbirth and creates other health complications. Water-borne diseases are caused by microbes; these are present in water and environment which are harmful for human life and play a key role in mortality. Even in this post-modern era, deficiencies exist within the mechanisms of water filtration and sanitation (Table 1) [9].

Cases reported for viral pathogens in Pakistan	
Type of virus	**Reported area**
Hepatitis E	Rawalpindi and Islamabad
Hepatitis C	Hafiz Abad
Hepatitis C	Faisalabad
Hepatitis A and E	-

Table 1: Cases reported for viral pathogens in Pakistan.

Another category is vector-borne diseases. Here, the microbes are not transmitted directly into the human body they are injected through those insects which lay their eggs into the impure water. The arthropod species like black flies, sand flies, bugs, ticks and mosquitoes transmit infection through their septic bites. In Sub-Saharan Africa, 90% of the cases of vector-borne disease are linked with malaria. Majority of the estimated annual deaths among 1.5-2.5 million people are the outcome of that very disease. Another mosquito-borne viral disease, i.e., dengue fever, has led to death among 5% of the cases associated with the urban settings. Similar to dengue fever, the viral disease of chikungunya is prevalent within the urban settings. In addition, Japanese Encephalitis and yellow fever are predominant in the rural areas of Asia which have the fatality rate of 30%. Both types of water-borne diseases are akin to pathogenic microorganisms which are transmitted through dirty water [10].

The research site was selected rural communities of Punjab from Kasur district is one of the districts in the province of Punjab, Pakistan. It came into existence on 1st July 1976. Earlier it was part of Lahore District. The district capital is Kasur city, the birth city of the Sufi poet Bulleh shah, well known in that region as well as in the whole of Pakistan. The method used to conduct this particular research is secondary data's by focusing on the past research and organizational reports including hospitals more importantly from Pakistan Bureau of Statistic that is elaborated the text very little is known about the epidemiology of potentially pathogenic intestinal protozoan parasitic infections in Pakistan. The formalin fixed stool samples were obtained from 1041 participants of different occupational groups in a randomized controlled trial in Pakistan. The study was aimed to determine the comparative prevalence of potentially pathogenic intestinal protozoan parasitic infections, pattern of infection that whether the protozoan parasite is showing mixed with other protozoan or helminthic parasites. Current findings confirm that intestinal protozoans are a public health threat in different occupational groups. Amongst the infected individuals almost half of the individuals were infected with at least one of the two potentially pathogenic intestinal protozoa" Therefore, this research article is based on secondary data's from different sources like past research articles, hospital records, internet and reports from World Health Organization (WHO). These sources helped in shaping this research articles to further monitor the burning issue. This will help in policy framework from government side [11].

Discussion

Transmission of water-borne pathogens is still a challenge for the

high-income countries; even hygienic sanitation, high quality logistic and cleanliness infrastructure is still under threat of the outbreak of pathogenic micro-organisms. A recent report of the United States suggested that 19.5 million cases of water-borne diseases are reported every year. In United Kingdom, 60,000 cases are reported of cryptosporidiosis disease every year, in which tap water is one of the main cause. Another dilemma within the developed countries lies in the single-user water supplies which are used by 150 million populations; among which many are living in rural areas that increases the risk of pathogenic water-borne diseases through deficient monitoring and rigid standards. A comprehensive review of universal scrutiny on infected water along with parasitic protozoa outburst is divulged from January 2004 to December 2010. Here, 46.7% of the documented outbreaks occurred in Australian continent, 30.6% in North America and 16.5% in Europe. Among them, 60.3% eruption of outbreaks is noted in Europe and America.

Besides, half of the world's hospital beds are occupied by the victims of water-borne diseases, particularly in developing countries. Additionally, 80% of the diseases are linked with impure water and worst sanitation systems. Worldwide, one out of five deaths is caused by water-borne infections. Another appraisal has been conducted by the commission of United Nations which showed that 4,000 children are dying as a consequence to impure water usage. The report emphasized that four out of ten people die around the world due to water-generated diseases, particularly in Africa and Asia. A major portion of the world's population is living in Africa and Asia which refers to the fact that half of the population is suffering from those diseases due to poor hygienic system and contaminated water. In developing countries, four billion people are suffering from diarrhoea and around two million people are dying wretchedly [12].

After critically evaluating the literature review of different sources the facts and reasons of most communicable and epidemic diseases are found in a drastic ratio in rural areas of Pakistan. We also measured that how water borne diseases transmit through poor sanitation system and lack of awareness and resources in Pakistan. Which is negatively affected the large segment of rural areas of the county. "According to figures from the health ministry and UNICEF, more than 50,000 children below the age of 10 die every year from waterborne diseases like cholera, diarrhoea, dysentery, hepatitis, and typhoid." Pakistan is also facing certain issues which need to be given due attention. Unluckily, the problems caused by waterborne diseases are getting worse day by day. And the number of death ratio is increasing day by day. It was noted from the literature that every year, over 100,000 people half of them children die from waterborne diseases in Pakistan. According to water commission of Pakistan currently, Pakistan is spending half of its total health budget for the cure of waterborne diseases. This can easily be saved if we provide safe drinking water to the people. In order to meet the growing demand of clean water the government should initiative some new ways to filter the available quantity of water so to save the masses from epidemic diseases [13].

Conclusion

According to literature studied from the past reports and published articles including with the particular reports of World Health Organization 100 million children less than five years of age suffer from diarrhoea in developing countries every year. The sole reason behind such huge number of ill people is none other than polluted and unsafe drinking water. Besides, Pakistan's council of scientific and industrial research laboratories complex announced that 80% of illnesses and 40% of deaths are caused by water-borne diseases. Moreover, water-borne diseases like cholera, typhoid, hepatitis A and E and diarrhoea are predominant in the country. Not only rural areas are facing this peril, urban areas have also become a prey to that very alarming situation. In addition to the foregoing, it is to recommend that the private sector and NGOs must play a key role in disseminating awareness among schools, colleges, and universities that the advanced sanitation and hygienic environment can control the maximum number of communicable diseases in Pakistan. Especially, the youth can play a significant role in this sector. The famous slogan of health for all is not just the responsibility of public health and government; every individual must contribute on their part with regard to water sanitation and epidemic illnesses.

According to the Pakistan Council for Research in Water Resources (PCRWR), Aasubsidiary of the ministry of science and technology, more than 100 brands out of 111 are selling unsafe drinking water through substandard plants to consumers.

According to the fact found from the past research there are mostly two categories of water borne diseases especially water contact diseases associated with fresh water, swimming pool, lakes, streams, rivers, and polluted surface water. Water borne diseases are associated with taking bath, drinking and washing and more importantly while consumption of food. Pakistan as a developing country is also facing this burning issue in improving sanitation and drinking water system. In Pakistan children are the most affected ones from such diseases and mortality resulting from them. According to the reports from the literature it is estimated that in Pakistan, lack of water and sanitation is one of the most recurrent glitches and nearly 16 million individuals do not have access to safe water. In 2016 dawn published that about 84% to 89% water sources do not fulfill the water quality standards for human consumption.

It is one of the most burning issues in Pakistan that remains one of the important concerns for policy makers along with international organization. There is urgent need of policy measure to overcome or recognized the issue.

According to the experts Pakistan desperately needs new reservoirs to conserve water as the country's existing water storage capacity is fast depleting due to silting of dams and canals, ghulam murtaza, a senior research officer at Pakistan water council, a research institute that operates under the science and technology.

References

1. Beaudeau P, Valk H, Vaillant V, Mannschott C, Tillier C, et al. (2008) Lessons learned from ten investigations of waterborne gastroenteritis outbreaks, France, 1998–2006. J Water Health 6: 491-503.
2. Berman J (2009) Waterborne disease is world's leading Killer. Voi America News.
3. Bridges G (2007) Asian water development outlook country paper Pakistan. Asian Development Bank.
4. Haiti (2010) Centers for disease control and prevention CDC. Update: Cholera outbreak. Morb Mortal Wkly Rep 59: 1473-1479.
5. Clasen T, Schmidt WP, Rabie T, Roberts I, Cairncross S (2007) Interventions to improve water quality for preventing diarrhoea: Systematic review and meta-analysis. Brit Med J 12: 782.
6. Shuman EK (2010) Global climate change and infectious diseases. N Engl J Med 362: 1061-1063.
7. Falco M, Smith M (2010) Poor sanitation could worsen Haiti cholera outbreak, CDC says.

8. Faucher B, Piarroux R (2011) The Haitian cholera epidemic: Is searching for its origin only a matter of scientific curiosity? Clin Microbiol Infect 17: 479-480.
9. Griffith DC, Kelly Hope LA, Miller MA (2006) Review of reported cholera outbreaks worldwide, 1995-2005. Am J Trop Med Hyg 1: 973-977.
10. Harris JB, Larocque RC, Charles RC, Mazumder RN, Khan AI, et al. (2010) Cholera's western front. Lancet 11: 376.
11. Welle K (2008) Mapping as a basis for sanitation implementation in Pakistan: The case of the Orangi pilot project. Construction.
12. van Maanen P, Shinee E, Grossi V, Vargha M, Gabriadze N, et al. (2016) Prioritizing pupils education, health and well-being: Water, sanitation and hygiene in schools in the pan-European region.
13. Roome T, Khan S (2014) Communicable infections in Pakistan: A battle to Confront. J Dow Univ Health Sci 8: 41-42.