DOI: https://doi.org/10.53350/pjmhs2023173599

ORIGINAL ARTICLE

Prevalence of Water Borne Diseases in Flood Affected Areas of District Khairpur Mirs, Pakistan

SAJID ALI[1], MARVI METLO[1], ZUHEEB AHMED[1], SABIT ALI[2], SAGHEER AHMED[3], NAZMEEN ZAFAR[4], NABEELA LATIF[5], NISHA JAMAL[6]

[1]*Department of Pharmacy, Shah Abdul Latif University (SALU), Khairpur Mirs, Sindh, Pakistan.*
[2]*Department of Pharmacy Practice, Faculty of Pharmacy, University of Sindh, Jamshoro, Sindh, Pakistan.*
[3]*Principal, Bhittai Institute of Nursing and Allied Health Sciences, Nawabshah, Sindh, Pakistan.*
[4]*Monitoring & Evaluation Coordinator, District Health Office Shaheed Benazirabad, Health Department, Government of Sindh, Pakistan.*
[5]*Department of Pharmaceutics, Faculty of Pharmacy, University of Sindh, Jamshoro, Sindh, Pakistan.*
[6]*Institute of Pharmacy, Shaheed Mohtarma Benazir Bhutto Medical University (SMBBMU), Larkana, Sindh, Pakistan.*
Correspondence to: Sajid Ali, Email: sajid.mojai@salu.edu.pk, Cell: +923053492285

ABSTRACT

Objective: The purpose of this study to observe the impact of flood on the prevalence of water borne disease.

Methodology: A cross sectional observational study was conducted from July 2022 to September 2022 in flood affected areas of district Khairpur Mirs, Pakistan. The study was conducted on 910 patients after taking informed consent.

Results: In this study 61% patients were males, 36% were female whereas only 3% participants were transgender. Majority of the patients belongs to rural areas while few belong to urban areas. Majority of the patients were of 01 to 10 years of age while only 43 patients were of age from 71- 80 years. Disease wise 397 case were of malaria, 156 patients were of diarrhea, 75 patients were of dysentery, 66 cases were of cholera, 89 cases were of typhoid fever, 76 cases were of skin diseases, 51 cases were of hepatitis. By keeping in view policy makers can take serious steps to treat the residents of district as well as took preventive measure to rescue the residents of district Khairpur Mirs.

Conclusion: This study concludes that due to flood water accumulation water borne diseases increased. Among whole diseases malaria was on top with 44%, diarrhea was on second number with 17% while typhoid was on third number with 10% cases

Keywords: Prevalence, Water borne diseases, Flood, Malaria, Diarrhea, Dysentery, Cholera, Typhoid fever, Skin diseases, Hepatitis.

INTRODUCTION

In the government-run relief camps that have been established across the nation, diarrhoea, skin conditions, and eye infections are on the rise. In the previous 24 hours, Sindh, one of the worst-affected provinces, has reported more than 90,000 cases of diarrhoea, according to a data provided by the health officials on Thursday 1st September 2022. A day after the government and the World Health Organization expressed alarm about the spread of waterborne infections among flood victims, the most recent development has occurred. In areas affected by the most recent record-breaking floods, Pakistani health officials have reported an outbreak of waterborne diseases. At the same time, authorities are stepping up their efforts to ensure that the hundreds of thousands of people who lost their homes in the disaster have access to clean drinking water. According to WHO, it is increasing cholera, acute diarrhoea, and other communicable disease surveillance, as well as supplying medical supplies to healthcare facilities.[1] According to doctors, at first they mostly saw patients who had been traumatized by the flooding, but now they are treating thousands of people who have diarrhoea, skin infections, and other waterborne illnesses. Many expectant mothers who resided in flood-affected areas were also at risk. The fact that 27,000 children die from water-borne infections each year is a worrying development.[2-4]

The head of UNICEF stated that unclean water kills more children than firearms in March 2019. In comparison to 30,900 deaths from conflict, he said that 85,700 children under the age of 15 die each year from diarrhoea connected to inadequate infrastructure for water, sanitation, and hygiene.

Drinking water should ideally not include any harmful microorganisms, and it is deemed polluted if it has a colony count of between 10 and 100. While contaminated water may appear clear, tasteless, and odorless from a distance, it actually harbors dangerous microorganisms. Insufficient turbidity, ineffective disinfection procedures, cross connections, or a decrease in water pressure can contribute to contamination in treated water.[5,6] Significant fluctuations in water pressure may cause bacteria to be dislodged from their colonization sites in the slime and sediments lining the pipe wall, leading to an erratic and changing assemblage of organisms. Poor water quality is also a result of flawed chlorination. Water is the primary means of disease transmission, at least in some areas, according to solid data.[7,8] According to how they spread, diseases connected to water are categorized as water-borne, water-washed, water-based, or those connected to a water-related insect vector. A waterborne outbreak is characterized by at least two people contracting the same ailment after drinking water, or by epidemiological data linking the illness to water. Water-borne and water-related diseases overlap and are likely the leading causes of death in underdeveloped nations.[9,10] Water is the primary means of transmission for the majority of infectious organisms that cause diarrhea, including cholera, typhoid, dysentery, hepatitis, and parasitic infestations. Improved hygiene can help decrease water-washed illnesses, which are linked to skin and eye diseases. Guinea worm and schistosomiasis are water-based illnesses in which the pathogen spends a significant portion of its life in water or an aquatic host.[11,12] Malaria and filariasis are two diseases that are spread by insects that are associated with water. Both endemic goitre and dental disease are water-related and water-borne illnesses. Water contains three different kinds of microorganisms: innocuous earth dwelling organisms, natural aquatic bacteria, and digestive tract organisms (diseases producing).[13] The quantity and type of food accessible to these creatures determines how many bacteria are present in the water, and the number of bacteria varies from day to day. Organic matter promotes the growth of microorganisms, but some inorganic metals, such as silver, copper, and aluminium, have an inhibiting effect. While some bacteria are inhibited by iron and manganese, other bacteria are encouraged to proliferate. Coliform bacteria, such as those found in E. coli, Citrobacter, Enterobacter, and Kiebsiella species, are accepted as reliable microbiological indicators of the quality of drinking water.[14-16] They can contaminate water by entering through non-metallic construction materials since they are made from the faeces of warm-blooded animals, plants, and soil. If observed in treated water, coliforms indicate insufficient treatment or post-treatment contamination. Streptococci from faeces suggest faecal contamination in water. These organisms are more resistant to disinfection than coliforms and seldom ever grow in contaminated water. Smaller amounts of Cl. perfringens, an anaerobic spore-forming bacteria than E. coli, are found in faeces. Compared to the coliform group, they can survive in water for a longer period of time and are more resistant

to treatment. Their presence in treated water, therefore, suggests treatment flaws and ongoing water source pollution.[17,18] It has been suggested to use other microorganisms, such as pseudomonas aeruginosa, to evaluate the hygiene of drinking water. The presence of these organisms reveals information about the distribution system's general cleanliness and the calibre of the bottled water. Pseudomonas can grow on the materials used to build distribution and plumbing systems, and it can occasionally be found in drinking water that doesn't have coliform bacteria. Although it is impossible to overlook the existence of this organism in drinkable water, its lone occurrence should not be interpreted as a sign of faecal pollution.[19] Waterborne outbreaks have also been linked to Campylobactor jejuni and a virus resembling the Norwalk virus. In addition to germs, contaminated water can lead to parasite infestation. At several locations, cysts have been found in sewage water entering the treatment plant. Cysts are not inactivated by chlorinating water, but organisms are. Untreated surface and ground water are the main cause of waterborne giardiasis. The amount of water consumed each day and the dose of the infectious agent are both directly correlated with giardiasis.[9,15]

This study conclude that the moon soon 2022 and climate change severely hits the Pakistan including district Khairpur Mirs, Sindh as well as flood came from KPK and Balochistan province affected whole sindh province.

METHODOLOGY

Study Design: A cross sectional observational study was conducted after detailed literature review on water-borne diseases through various sources mainly on PubMed and visited the web pages of major public and global health institutions such World Health Organization, WHO and the United States Center for Diseases Control and Prevention (CDC). After reviewing literature water borne diseases were selected.

Study Duration: The study was conducted from July 2022 to September 2022 in flood affected areas of district Khairpur Mirs, Pakistan.

Sample Population: The study was conducted on 910 patients after taking informed consent. Male, females and transgender were included in the study. All age groups were included in the study. Patients suffering from diarrhea, cholera, dysentery, typhoid, skin diseases and malaria were included in the study.

Data Analysis: The data was statistically evaluated by using descriptive statistics.

RESULTS

Gender wise distribution of study subjects: In Table 01 gender wise details of the patients are given in which majority of the study subjects were male as compared to female and transgender.

Table 1: Gender wise details of study subjects

	Variables	n (%)
Gender	Male	550 (61%)
	Female	330 (36%)
	Transgender	30 (3%)

Locality wise distribution of study subjects: In Table 02 location wise details of the patients are given in which majority of the study subjects were belongs to rural areas as compared to urban areas of district Khairpur Mirs.

Table 2: Locality wise details of study subjects

	Variables	n (%)
Locality	Rural	675 (74%)
	Urban	235 (26%)

Age wise distribution of study subjects: In Table 03, age wise groups of the study subjects were given, in which majority of the study subjects were of age from 01 years to 10 years where as few of the study subjects were of age from 71 years to 80 years.

Table 3: Age wise distribution of study subjects

	Variable	n (%)
Age in Years	1-10	290 (31.86%)
	11-20	115 (12.63%)
	21-30	120 (13.1%)
	31-40	79 (8.68%)
	41-50	85 (9.34%)
	51-60	79 (8.68%)
	61-70	49 (5.38%)
	71-80	43 (4.72%)
	81 to onwards	47 (5.16%)

Water borne disease wise distribution of participants: In Table 04, patients were divided according to water borne disease, majority of the patients were suffering from malaria followed by diarrhea, typhoid fever, skin diseases, dysentery, cholera, while some patients were suffering from hepatitis.

Table 4: Disease wise distribution

S.No	Name of the disease	n (%)
1	Diarrhea	156 (17%)
2	Dysentery	75 (8%)
3	Cholera	66 (7%)
4	Typhoid	89 (10%)
5	Skin diseases	76 (8%)
6	Hepatitis	51 (6%)
7	Malaria	397 (44%)

DISCUSSION

This study made the point that following the flood, water-borne illnesses including typhoid and diarrhoea were more widespread among the locals as a result of them consuming water through broken pipelines. This study is related to one that was conducted in the Thiruvallur district in response to an acute diarrheal illness outbreak brought on by the intake of water from damaged pipelines. Anam Javed and Aisha Kabir conducted a study on water borne disease rise up and their control in Pakistan in which they highlighted water borne diseases which routinely occurs in Pakistan, similar with current study in which more or less same diseases occurred but difference between these studies is that in current study results are different due to climate change and sever flood affected the whole district Khairpur Mirs the disease pattern changed, malarial cases increased a lot than routine weather change. Due to prolong moon soon rains and flood came from KPK and Balochistan province huge water accumulated everywhere in whole district especially in rural areas where there is no any sewerage system that drain out water, due to water diseases like malaria, diarrhea, dysentery, cholera, skin diseases and hepatitis rapidly affected the residents of district.

According to one study, long-term inhabitants of giardia-prone areas had a lower attack rate than transients. Amoebiasis outbreaks are brought on by sewage-contaminated water supplies. Water contamination can potentially cause ascariasis since the eggs can survive for a long time in water and are resistant to most chlorination techniques. Children are most commonly affected by waterborne diseases, which result in high mortality, carrier state, disability, and growth retardation. Waterborne illness transmission can happen mechanically, such as when food handlers and utensils are contaminated. The amount of a pathogen that must be consumed in order to cause diarrhoea depends on a variety of host characteristics. Shigella may be waterborne, but it typically spreads through person-to-person contact among people who do not maintain good hygiene. Salmonellosis typically spreads through contaminated food, but cholera typically spreads through contaminated water. Consideration should be paid to the treatment, manner of delivery to the consumer, and frequency of inspection in addition to the source of drinking water in order to prevent contamination.[20] Avoid intermittent water supply and pay closer attention to joining and bending techniques. Pipes need to be regularly inspected and replaced. The primary strategy for managing harmful bacteria and viral pathogens is disinfection. Although chlorine is the most popular disinfectant used in most

nations, it must be coupled with flocculation and filtration to get rid of cysts, worms, and ova where parasitic infestations are suspected. Turbidity must be as low as possible for successful disinfection, and when chlorinated, p must be less than 8.0. There should be public education about the value of clean water and sanitation. To avoid illness, each home needs to have a piped water supply. A preliminary investigation carried out at the Pakistan Medical Research Council Research Centre in Karachi revealed that 89% of the water samples taken from different parts of Karachi were contaminated with bacteria. Both the taps (87%), as well as the above tanks (91%), were contaminated. Pseudomonas was the first bacteria isolated, followed by E. coli, A. faecalis, and Kiebsiella. Pseudomonas was frequently recovered by itself in water samples, but it only becomes relevant when combined with faecal bacteria. Water drawn from open wells in several parts of the NWFP was discovered to be tainted with coliforms and Strept faecalis. Since faecal contamination was discovered in 57% of samples and non-faecal contamination in 24%, drinking water from springs, streams, and shallow wells is not safe. The most common bacteria found were E. coli (51%) and Klebsiella (14%). Water samples should be examined more often during epidemics, floods, and other disasters when the regular water supply is momentarily disrupted. In conclusion, it can be claimed that better water supply and proper waste disposal significantly lower morbidity and mortality from water-borne illnesses.[21,22]

CONCLUSION

This study conclude that the moon soon 2022 and climate change severely hits the Pakistan including district Khairpur Mirs, Sindh as well as flood came from KPK and Balochistan province affected whole sindh province. Due to flood water accumulation water borne disease increased. Among whole disease malaria was on top with 44%, diarrhea was on second number with 17% while typhoid was on third number with 10% cases. By keeping in view policy makers must take serious steps to treat the residents of district as well as took preventive measure to rescue the residents of district Khairpur Mirs.

REFERENCES

1. Karthiga and Sarika, Outbreak of Water-Borne disease due to improper water management- A Cross-sectional study. I J Social Rehab 2022;7(1):16-20
2. Cissé, G., Menezes, J.A., Confalonieri, U., 2018. Climate-sensitive infectious diseases. In: UNEP (Ed.), The Adaptation Gap Report 2018. United Nations Environment Programme (UNEP), Nairobi, Kenya, pp. 49–59. Confalonieri, U.E., Menezes, J.A., Margonari de Souza, C., 2015. Climate change and adaptation of the health sector: the case of infectious diseases. Virulence 6 (6), 554–557.
3. DeJarnett, N., Robb, K., Castellanos, I., Dettman, L., Patel, S.S., 2017. The american public health association's 2017 year of climate change and health: time for action. Am. J. Public Health e1–e2. Dennis, S., Fisher, D., 2018. Climate change and infectious diseases: the next 50 years. Ann. Acad. Med. Singapore 47 (10), 401–404.
4. Shrestha, A., Sharma, S., Gerold, J., Erismann, S., Sagar, S., Koju, R., Schindler, C., Odermatt, P., Utzinger, J., Cisse, G., 2017. Water quality, sanitation, and hygiene conditions in schools and households in Dolakha and Ramechhap Districts, Nepal: results from A cross-sectional survey. Int. J. Environ. Res. Public Health 14 (1).
5. M. Daud, M. Nafees, S. Ali, M. Rizwan, R.A. Bajwa, M.B. Shakoor et al. (2017). "Drinking water quality status and contamination in Pakistan". BioMed research international. 2017.
6. A. Akbar, U. Sitara, S.A. Khan, N. Muhammad, M.I. Khan, Y.H. Khan et al. (2013). "Drinking water quality and risk of waterborne diseases in the rural mountainous area of Azad Kashmir Pakistan". International Journal of Biosciences. 3(12), p. 245-251.
7. S. Haydar, M. Arshad, and J. Aziz. (2016). "Evaluation of drinking water quality in urban areas of Pakistan: A case study of Southern Lahore". Pakistan Journal of Engineering and Applied Sciences.
8. E.C. Lee, M.R. Kelly Jr, B.M. Ochocki, S.M. Akinwumi, K.E. Hamre, J.H. Tien et al. (2017). "Model distinguishability and inference robustness in mechanisms of cholera transmission and loss of immunity". Journal of theoretical biology. 420, p. 68-81.
9. A.S. Saima, R. Ferhat Abbas, M. Rizwan, M. Yousaf, Y. Hassan, M. Naeem et al. (2018). "27. Isolation & identification of Shigella species from food and water samples of Quetta, Pakistan". Pure and Applied Biology (PAB). 7(1), p. 227-235.
10. M.M. Hasan and N. Gerber. (2016). "The impacts of piped water on water quality, sanitation, hygiene and health in rural households of north-western Bangladesh-a quasi-experimental analysis".
11. Kibret,S.,G.G.Wilson,D.Ryder,etal.2017.Theinfluence of dams on malaria transmission in Sub-Saharan Africa. Ecohealth 14: 408–419.
12. M.Shoaib,M.J.Asad,S.Azizetal.,"Prevalenceofpathogenic microorganisms in drinking water of Rawalpindi and Islamabad, "World Journal of Fish and Marine Sciences, vol.8, pp.14– 20,2016.
13. T. Ahmed, S. Imdad, and N. M. Butt, "Bacteriological assessment of drinking water of Islamabad Capital Territory, Pakistan," Desalination and Water Treatment, vol. 56, no. 9, pp. 2316–2322,2015.
14. N. Shahid, Z. Zia, M. Shahid et al., "Assessing drinking water quality in Punjab, Pakistan," Polish Journal of Environmental Studies,vol.24,no.6,pp.2597–2606,2015.
15. M.Yamin,A.Nasir,M.Sultan,W.WanIsmail,R.Shamshiri,andA.N.Akbar," Impactofsewageandindustrialeffluentsonwater quality in Faisalabad, Pakistan," Advances in Environmental Biology,vol.9,pp.53–58,2015.
16. A.Nasir,M.S.Nasir,I.Shauket,S.Anwar,andI.Ayub,"Impactofsamanduri drainonwaterresourcesofFaisalabad,"Advances inEnvironmentalBiology,vol.10,pp.155–160,2016.
17. H.Zulfiqar,Q.Abbas,A.Raza,andA.Ali,"Determinantsofsafe drinking water in pakistan: a case study of faisalabad," Journal of Global Innovations in Agri cultural and Social Sciences, vol.04, no.01,pp.40–45,2016.
18. S.Khan,R.Rauf,S.Muhammad,M.Qasim,andI.Din,"Arsenic and heavy metals health risk assessment through drinking waterconsumptioninthePeshawarDistrict,Pakistan,"Human andEcologicalRiskAssessment,vol.22,no.3,pp.581–596,2016.
19. A.Alamgir,M.A.Khan,O.E.Hanyetal.,"Publichealthquality of drinking water supply in Orangi town, Karachi, Pakistan," Bulletin of Environment, Pharmacology and Life Sciences, vol.4, pp.88–94,2015.
20. W. M. Daudpota, N. U. N. Memon, and T. F. Miano, "Determinationofgroundwaterqualityforagricultureanddrinking purpose in Sindh, Pakistan," Science International, vol. 28, pp. 701–704,2016.
21. A. Alamgir, M. A. L. Khan, J. Schilling, S. S. Shaukat, and S. Shahab,"Assessmentofgroundwaterqualityinthecoastalarea of Sindh province, Pakistan," Environmental Monitoring and Assessment,vol.188,no.2,p.78,2016.
22. S.A.Hussain,A.Hussain,U.Fatima,W.Ali,A.Hussain,andN. Hussain, "Evaluation of drinking water quality in urban areas ofPakistan,acasestudyofGulshan-e-IqbalKarachi,Pakistan," JournalofBiologicalandEnvironmentalScience,vol.8,pp.64– 76,2016.