Journal of Advances and Scholarly Researches in Allied Education
Vol. 16, Issue No. 6, May-2019, ISSN 2230-7540

Study of Waterborne Diseases of Gandak River during Rainy Season at Sonepur

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Abstract – Change in climate and water cycle will challenge water availability yet it will likewise expand the exposure to hazardous water. Floods, droughts, heavy storms, changes in downpour pattern, increment of temperature and ocean level, they all show an expanding pattern worldwide and will influence biological, physical and chemical components of water through various ways along these lines improving the danger of waterborne diseases. This paper is proposed, through reviewing the accessible literature, to feature environmental changes and critical circumstances brought about by floods, dry spell and hotter temperature that will prompt an expansion of exposure to water related pathogens, chemical risks and cyanotoxins. The last point is give knowledge-based components to more engaged adaptation measures.

Keywords: Climate Change, Waterborne Diseases, Microbial Pathogens, Chemical Contaminants, Toxic Cyanobacteria

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INTRODUCTION

Waterborne Infectious Diseases

Waterborne diseases are conditions brought about by pathogenic miniature organisms that are transmitted in water. These diseases can be spread while washing, washing, drinking water, or by eating food presented to polluted water. While looseness of the bowels and heaving are the most ordinarily detailed symptoms of waterborne disease, different symptoms can incorporate skin, ear, respiratory, or eye problems

The major risk factor for outbreaks related with flooding is the contamination of drinking-water offices, and in any event, when this occurs, as in Iowa and Missouri in 1993, the risk of outbreaks can be limited if the risk is very much perceived and debacle reaction tends to the provision of clean water as a need.

There is an expanded risk of contamination of water-borne diseases contracted through direct contact with dirtied waters, for example, wound infections, dermatitis, conjunctivitis, and ear, nose and throat infections. Be that as it may, these diseases are not epidemic-prone.

The main epidemic-prone contamination which can be transmitted legitimately from tainted water is leptospirosis, a zoonotic bacterial malady. Transmission happens through contact of the skin and mucous layers with water, sodden soil or vegetation, (for example, sugarcane) or mud debased with rat urine. The event of flooding after heavy precipitation facilitates the spread of the organism because of the proliferation of rodents which shed a lot of leptospires in their urine.

Created nations are not insusceptible to the problem of irresistible waterborne diseases. Waterborne diseases happen when parasites or other sickness causing microorganisms are transmitted by means of sullied water, especially water tainted by pathogens originating from excreta. These incorporate typhoid, intestinal parasites, and a large portion of the enteric and diarrheal diseases brought about by microbes, parasites, and infections. Among the most genuine parasitic diseases are amoebiasis, giardiasis, ascariasis, and hookworm. Transmission of malady agents, for example, microbes and growths by means of debased however inadequately treated city water is more normal than it ought to be.

SOURCES

Factory waste

Industries produce huge measure of waste which contains toxic chemicals and toxins which can

cause air pollution and harm to us and our condition. They contain contaminations, for example, lead, mercury, sulfur, asbestos, nitrates and numerous other unsafe chemicals.

Household Sewage

The sewage and waste water that is delivered by every family is chemically treated and delivered in to the ocean with new water. The sewage water conveys hurtful bacteria and chemicals that can cause serious medical conditions. Pathogens are known as a typical water toxin; the sewers of urban areas house a few pathogens and subsequently diseases

Mining activities

Mining is the process of squashing the stone and removing coal and different minerals from underground. These elements when extracted in the raw form contain harmful chemicals and can increase the amount of toxic elements when mixed up with water which may result in health problems.

Chemical fertilizers and Pesticides

Chemical fertilizers and pesticides are utilized by ranchers to shield crops from creepy crawlies and bacteria's. They are valuable for the plants development. Notwithstanding, when these chemicals are mixed up with water produce harmful for plants and creatures.

TYPES OF POLLUTANTS

Point-Source

Pollution Thinking of water pollution, you presumably can think about a solitary source, for example, a manufacturing plant, a wastewater treatment plant, or a leaking oil big hauler. These are altogether instances of pollution discharged from a solitary source. Point-source pollution can regularly be recognized and followed to a source. In any case, in any event, when the source of pollution is known, enforcing cleanup is here and there troublesome.

Following are some extra instances of point-source pollution.

- Leaking septic-tank systems
- Leaking stockpiling lagoons for dirtied squander
- Leaking underground stockpiling tanks that contain chemicals or fills, for example, gasoline Polluted water from abandoned and active mines

Nonpoint-Source Pollution

These originate from various sources that are frequently hard to distinguish. For instance, a river can be dirtied by runoff from any of the land in its watershed. In the event that a ranch, a street, or some other land surface in a watershed is dirtied, runoff from a rainstorm can convey the pollution into a close by river, stream, or lake.

DISEASES OCCURRED BY POLLUTED WATER

Water-borne diseases like cholera, gastroenteritis and the runs emit each year during summer and blustery seasons in India because of low quality drinking water and sanitation. Here is a rundown of the five most dangerous water-related diseases that happen in India, which are depicted as follows:

Cholera

Cholera is a water-related infection, and is diarrhoeal in nature. It can kill in hours whenever left unattended.

Diarrhoea

Diarrhoeal disease is spread through food and drinking water that has been sullied.

Malaria

Malarial fever is spread by the Plasmodium parasite mosquito that breeds in water bodies like lakes, paddy fish and stagnant water.

Typhoid

Fluctuating high fever, exhaustion, sleepiness, loose bowels and so forth are indications of typhoid. The disease spreads through tainted food and water or through close contact with a contaminated individual.

Filariasis

Filariasis is a parasitic sickness and influences people who live close to unsanitary water bodies or sewages.Filariasis is spread by mosquitoes that breeds in new and stagnant water bodies and is the host of the filarial nematode worm. This worm influences humans and leads to elephantitis.

WATER QUALITY PARAMETERS

The biological, physical and chemical characterization of water is characterized as water quality parameters.

pH SCALE

pH is expressed in a scale with ranges from 1 to 14. A solution with a pH less than 7 has more H+ activity than OH-, and is considered acidic. A solution with a pH value greater than 7 has more OH- activity than H+, and is considered basic.

Alkalinity

The Alkalinity or the buffering capacity of a stream alludes to how well it can neutralize acidic pollution and resist changes in pH. Alkalinity quantifies the amount of soluble mixes in the water, for example, carbonates, bicarbonates and hydroxides.

BOD

The Biological Oxygen Demand, or BOD, is the amount of oxygen devoured by bacteria in the decomposition of organic material. It likewise incorporates the oxygen required for the oxidation of different chemical in the water, for example, sulfides, ferrous iron and alkali.

COD

The chemical oxygen request, or COD, is utilized as a measure of the oxygen equivalent of the organic matter content of an example that is vulnerable to oxidation by a solid chemical oxidant.

Metals

A few metals are essential; others may adversely influence water consumers, wastewater treatment systems, and receiving waters. A few metals might be either beneficial or toxic, contingent upon fixation

WATER QUALITY INDEX

Water quality can be considered as a measure of its appropriateness for a characterized utilize dependent on chose physical, chemical, and biological attributes. To decide water quality, a few attributes of the water, for example, temperature, dissolved mineral content, and number of bacteria and so on are measured and investigated. Chosen qualities are then contrasted with numeric standards and rules to choose if the water is appropriate for a specific use. Water quality of common water (surface and ground) relies on its season of measurement and area. It shifts here and there, over the seasons, with climate, and with the types of soils and shakes through which water moves.

REVIEW OF LITERATURE

(McKenzie and Ray, 2013). Defiled drinking water has extensive impact on human wellbeing all through the world (WHO, 2003). Safe water is viewed as an essential need in twenty first century, particularly in creating nations like India. In more than 50 years of political autonomy and financial turn of events, India has not had the option to guarantee the most basic of human needs of protected and dependable drinking water flexibly for every one of its residents

(Rao et al., 2012). India is driving towards a new water emergency primarily because of wrong management of resources of water and environmental degradation, which has prompted absence of access of safe water to a large number of people

(Eswari et al., 2015). Direct water testing is in this way important to survey correctly the drinking water sources security. As water is a basic human right and without water of sufficient amount just as quality sustainable advancement is beyond the realm of imagination. Consequently, ebb and flow worry regarding environmental quality is on water in light of its significance in keeping up strength of the ecosystem and the human wellbeing

(Ramesh et al., 2012). Water supply network is a system of designed hydraulic and hydro logic components which provide supply of water

(Hickey, 2018). Giving faucet water to huge populations of urban and suburban areas requires a complex and accurately designed system of collection of water, storage, water treatment just as distribution and is generally the obligation of a government office. Each city water system ought to have a supply source that is both sufficient and reliable for the city to be served

(Lindhe, 2010) Freshwater sources, for example, groundwater, surface water and combination of both are utilized as raw water sources

(Dufour, 2013). Deep ground water from bound or semi-limited aquifers is viewed as generally suitable for drinking water creation as these have covering soil layers and thusly better shielded from microorganism contamination. Groundwater affected by surface water or shallower ground water is generally prone to fecal contamination

Gibson et al. (2013) and Saleem et al. (2012). Contamination was found be more in surface water sources in contrast with groundwater sources (Shaban and Malkawi, 2007; Gibson et al., 2011). In the event of limited availability of normal groundwater resources, counterfeit revive is utilized to deliver water like regular groundwater. Ocean water after desalination can likewise be utilized for production of drinking water

(Van der Bruggen, 2015; Rygaard et al., 2017). Areas where water resources are scarce, treated wastewater is recovered by groundwater energize or utilized legitimately to deliver drinking water. Raw water are transferred utilizing secured tunnels,

ground level aqueducts, underground water pipes or secured tunnels to water cleaning offices.

OBJECTIVES OF THE STUDY

1. To study on pollutants by which Water borne diseases occur of Gandak River during rainy season

2. To suggest remedial measures to avoid ground and surface water contamination.

RESEARCH METHODOLOGY

Study Design

A cross-sectional survey design was utilized in this investigation. A modest amount of the households in the investigation territory were tested. Thus, a survey was controlled on 100 respondents drawn 10 layers. The separation depended on drinking water sources for the households in the investigation zone in which 10 households in every stratum was picked utilizing random sampling strategy.

Water sample collection and processing

Ten repeat water tests were gathered from the point of utilization (at the family level) and 4 reproduce tests from water sources during the wet and dry seasons utilizing disinfected 250-mL glass sampling bottles. The bottles were first washed in weaken hydrochloric corrosive and afterward altogether flushed with distilled water lastly auto claved. Sampling was performed during the wet and dry seasons. At the water sampling site, each container was washed multiple times with examined water before it was at last filled, capped, named, and set in a cool box

In the Laboratory, E coli and TC concentrations were resolved utilizing the most likely number strategy that utilizes the Chromocult stock media. This media is a specific chromogenic vehicle for concurrent determination of E coli and TC, 27 g of the media was dissolved in 1000 mL distilled water and afterward tenderly warmed to break down the media totally. The media was disinfected via auto claving at 121°C for 15 minutes, cooled to 40°C to 50°C in a water shower, at that point mixed delicately, and 1 mL was poured in the Petri dishes. Sequential dilutions were performed up to 10−3, by picking 1 mL of the example into 9 mL of distilled water. 1 mL of the aliquot from every one of the dilutions was immunized into 5 mL of media. The Petri dishes were altered and afterward brooded at 35°C for 24 hours. After the set time, the Petri dishes were taken out from the incubator and inspected for bacteria province growth. A 10 to 15× magnifier microscope was utilized to count the colonies. The colonies which demonstrated a red shading was counted as positive colonies for TC and dim blue colonies were identified as positive colonies for E coli, and both were accounted for as state shaping units (CFU) per 100 mL.

$$\text{Prevalence rate} = \frac{\text{All persons with a specific condition at one point in time}}{\text{Total population}} \times 100$$

DATA ANALYSIS

The data were overseen utilizing SPSS adaptation 22. Information were broke down utilizing both spellbinding and inferential measurements at alpha = 0.05. Inferential insights, that is (1-path analysis of change [ANOVA]) was utilized to analyze the mean convergence of microorganisms among the water sources and points of utilization. Moreover, a 2-way ANOVA was performed to inspect whether there existed any noteworthy collaborations among water sources, the point of utilization and season on microbial thickness. Prevalence rates were utilized to compute the most common water-related diseases in the investigation region.

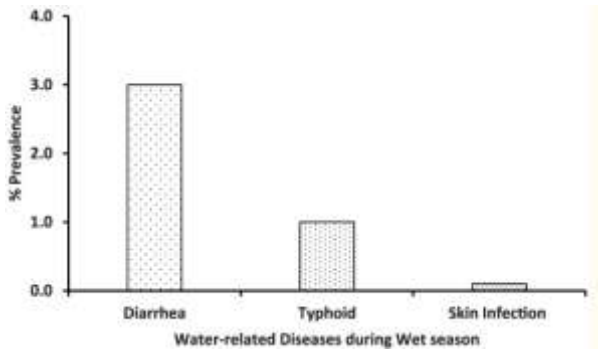
The physical and chemical parameters results on mean qualities at the source and point of utilization during the dry and wet seasons as contrasted and standards acceptable by WHO are appeared in Table 1. Temperature and pH were inside the range recommended by WHO during the dry and wet seasons.

Table 1: Physical parameters at the source and point of use

Point of use	Temperature	pH	Source	Temperature	pH	WHO (pH)
Borehole	25.75 ± 0.94	6.42 ± 0.49	Borehole	27.7 ± 1.4	6.95 ± 0.4	6.5-8.5
River	28.37 ± 0.37	7.25 ± 0.17	River	27.6 ± 0.6	7.47 ± 0.3	
Well	30.9 ± 0.1	7.38 ± 0.05	Well	24.6 ± 3.6	7.29 ± 0.1	

Water-related disease prevalence

There were 194 instances of the runs cases recorded in the examination zone, along these lines the most common during the rainy season



Prevalence of water-related diseases

Water-related diseases account for 4.1% assessed instances of worldwide sickness weight and cause

about 1.8 million passings every year with 88% credited to unsafe water supply, sanitation, and poor personal hygiene.

CONCLUSION

Based on the findings of this study, it is inferred that all drinking water at abstraction and point out at waterborne diseases of Gandak River are miniature biologically defiled and subsequently present serious wellbeing risks to consumers of such water. The levels of chosen microorganisms (E coli and TCs) surpass the WHO-recommended rules for drinking water. The levels of chosen organisms (E coli and TCs) surpass the WHO-recommended rules for drinking water. In this way, there is requirement for intensive general wellbeing awareness crusades on family water management to curb incidences of water-related diseases. General wellbeing practitioners at country and national levels need to guarantee that households have satisfactory admittance to potable water and improved sanitation. There is requirement for households to rehearse conventional family water treatment methods before utilization to diminish incidences of water-related diseases.

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