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Microbiological Assessment of Ganga River, Bithoor, Kanpur Nagar, UP, India using Enteric Bacteria

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ABSTRACT

One of the most valuable natural resources is water, which is also essential to a nation's socioeconomic growth. Still, the most significant supply of surface water comes from rivers. India has an abundance of large, medium, and minor rivers with a combined catchment area of 252.8 million hectares. The biggest river basin in the Indian subcontinent is the Ganga basin. It originates in the state of Uttarakhand and spans more than one-fourth of the nation's entire land area. About half of her population resides there. Approximately 50% of class 1 and class 2 towns in the nation are located in the Ganga basin, and the majority of these towns dump their municipal garbage into the river system. In and around the Bithoor Area in Kanpur Nagar, U.P., India, microbiological research was conducted on river Ganga pollution, and the level of pollution is being assessed.

Keywords: *Microbiological Assessment, Ganga River, Bithoor, Kanpur Nagar and Enteric Bacteria*

INTRODUCTION

For numerous millennia, the Indo-Gangetc plains in northern India have been the birthplace of civilization, with the Ganges River (known as Ganga in India). Rivers have been used as a source of water for eons. The Ganga was designated as a National River by the Indian government in 2008 due to its significance [1]. However, a variety of causes, including surface runoff from fields, industrial effluent, and household sewage, are polluting the river. Numerous contaminants find their way into the river system, lowering water quality and so harming the aquatic life that lives in the riverine ecosystem. Water resource managers often measure a few physical, chemical, and biological properties to determine the quality of the water and recommend it for different useful purposes. One of the most valuable natural resources is water, which is also essential to a nation's socioeconomic growth. Still, the most significant supply of surface water comes from rivers. India has an abundance of large, medium, and minor rivers with a combined catchment area of 252.8 million hectares. The biggest river basin in the Indian subcontinent is the Ganga basin. It originates in the state of Uttarakhand and spans more than one-fourth of the nation's entire land area. About half of her population resides there. Approximately half of the nation's class 1 and class 2 municipalities are located in the Ganga basin, and most municipal trash is discharged into the river system. According to [2] water pollution is therefore defined as alterations to the physical, chemical, and biological properties of water that may hurt aquatic life as well as humans. Water pollution is a result of both forced and unforced human activity. These days, water pollution is taken into consideration with conservation, aesthetics, and the preservation of natural resources and beauty in addition to public health. Therefore, to guarantee safe water for agricultural purposes, water quality should be assessed. If ingested, the presence of indicator microorganisms raises the possibility of harm to the human population [4]. Among all the natural resources found on Earth, water is among the most vital [5]. Water exists on Earth in three different states: solid, liquid, and gas. It is an essential component of the ecosystem. It makes up the hydrosphere, or roughly three-fourths of the earth's surface when it is liquid. Over 80% of the 768 million people who lack access to a sufficient water supply globally reside in rural regions [6-7]. Only 3% of the water on Earth has a suitable level of salt in it, with the majority of the water being saline at 97%. Routine uses account for just 1% of the water supply [8]. According to WHO research, 1.1 billion people do not have access to clean drinking water [9]. Over the past century, water consumption has increased twice as fast as global population growth [10]. Since the beginning of human civilization, rivers have been an essential component of human rights. A large portion of the world's needs for drinkable water are met by rivers. Referred to as a sizable natural water body that empties into the ocean, lake, or other bodies of water, rivers are usually nourished by tributaries that converge along their path [11]. Only a small percentage of this freshwater meets human needs for freshwater. There is an urgent need to increase water conservation globally owing to the freshwater scarcity caused by water pollution [12].

MATERIALS AND METHODS

Three different sampling stations along the Ganga River provided water samples, which were collected in sterile glass bottles. After that, they were transported on ice to the lab, where they were processed in 6-7 hours. The four samples in the collection were collected from three different places. The study area was divided into four parts. The traditional most probable number (MPN) method assessed the water's quality. Samples were inoculated into MacConkey broth tubes and incubated for 48 hours at 37 ±1ºC to identify coliforms. The positive tubes were sub-cultured in Brilliant Geen Bile Broth (BGBB) and incubated at 44.5±1ºC. Fecal coliform was detected by gas production in BGBB at 44.5±1ºC after a 48-hour incubation period. To detect fecal streptococci, water samples were inoculated into Azide Dextrose broth and incubated at 37.5±1ºC for 24 to 48 hours [13].

RESULT AND DISCUSSION

Three samples in total—Brhma Khuti 1 (BK1), Brhma Khuti 2 (BK2), and Brhma Khuti 3 (BK3)—were collected from Bithoor Ghat in Kanpur Nagar. Total Coliform (TC), *fecal coliform* (FC), and *fecal streptococci* (FS) samples were analyzed. According to experiments, BK1 may include TC 350, FC 50, and FS 40, in that order. The BK2 Second Samples indicated TC 240, FC 70, and FS 40, in that order. The most recent samples of BK 3 showed TC of 240, FC of 90, and FS of 40. The entire experiment supports the finding that sample BK1 had the highest microbial load whereas sample BK2 had the lowest.

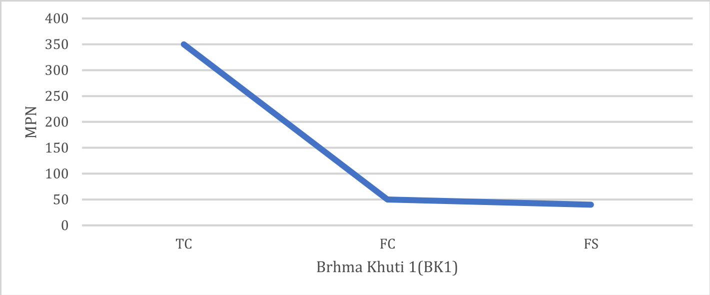

Fig 1. Total Coliform (TC), Feacal Coliform (FC) and Faecal Coliform (FS) of Brhma Khuti 1 (Bk1)

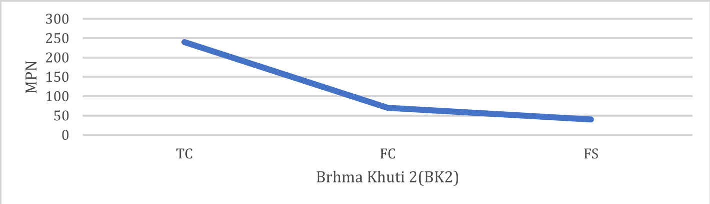

Fig 2. Total Coliform (TC), Feacal Coliform (FC) and Faecal Coliform (FS) of Brhma Khuti 2(BK2)

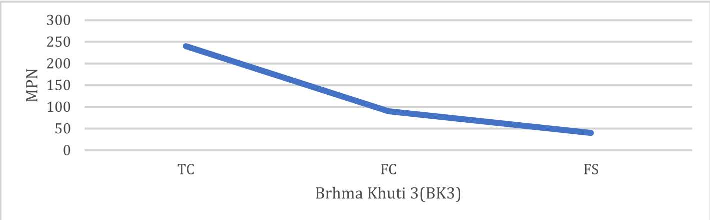

Fig 3. Total Coliform (TC), Feacal Coliform (FC) and Faecal Coliform (FS) of Brhma Khuti 3(BK3)

The planet's water supply, both in terms of quantity and quality, is now questionable. Water quality and quantity should thus be given equal weight. 'Save Water' is the motto of any country whose population and economy are on the rise. The local populace must be most crucially educated and made aware of the need for "safe drinking water" and "water conservation" to fulfill the demand for "fresh water for everyone."

CONCLUSION

In concluding the microbiological assessment of the Ganga River at Bithoor, Kanpur Nagar, Uttar Pradesh, India, focusing on enteric bacteria, it is evident that the river faces significant microbial pollution challenges. The presence of high levels of enteric bacteria, which are often indicators of fecal contamination, raises serious concerns about water quality and public health. This situation underscores the critical need for effective wastewater treatment and stricter pollution control measures in the area. It also highlights the importance of continuous monitoring and research to understand the sources and impact of such contamination. Addressing these issues is vital not only for the health and well-being of the local population who depend on the river for their daily needs but also for the overall ecological health of the Ganga River, which holds immense cultural and environmental significance in India.

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