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# MICROBIOLOGICAL AND PHYSICOCHEMICAL STUDY OF UNDERGROUND WATER

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## ABSTRACT

Drinking water quality assessment in North Karnataka has always been crucial with reference to public health importance. A study was conducted to evaluate the quality of underground water. A total of 12 water samples were randomly collected from tube wells. The samples were analyzed for microbial and physico-chemical parameters. The study revealed that 98% of tube wells found to cross the WHO guideline value for drinking water. The water samples collected from different regions of Bijapur district were found to have significant impurities, considerable deterioration and remarkable variation. The physico-chemical and microbiological characters of different water samples showed that maximum samples were not suitable for drinking purposes.

**KEYWORDS**: Drinking water, impurities, samples.

## INTRODUCTION

Water resources are great significance for various activities such as drinking, irrigation, and aquaculture and power generation. The importance of sustained hydrological studies on Indian waters is now recognized in water resource management due to exploitation of fresh water resources. Report of the scientists at All India Institute of Medical Sciences (AIIMS), New Delhi, finds an alarming prevalence of various diseases causing microbes in drinking water and recreational water. The use of this water may lead to several life threatening diseases. Different authors also reported that Indian River system is polluted mainly because of the human impact [1, 2,3]. Significance of water as a potent ecological factor can be appreciated only by studying its physico-chemical and microbial characteristics. Water is essential to sustain life and a satisfactory supply must be made available to consumers [4].

The right to drinkable water is nowadays part of human rights [5]. In industrialized countries drinking water is ranked as food and high standards are set for quality and safety. According to the World Health Organization (WHO), a third of the world's population suffers from waterborne diseases. In developing countries 13 million people die and 1.1 billion people lack access to an improved water source and 2.4 billion people lack access to adequate sanitation. As a result of infectious diseases related to unsafe water and inadequate sanitation, an estimated 3 million people in developing regions of the world die each year, primarily children aged below <5 years.

Drinking water is indispensable for human existence. The Bijapur district suffers a severe drinking water supply crisis particularly in the summer seasons every year. The drinking water supplies in the cities and villages are intermittent. Nearly all of the surface sources and ground water sources have been exploited. The growing imbalance between supply and demand has led to chronic shortages and competition that have resulted in pollution and environmental degradation. Apart from quantitative shortages, the quality of drinking water in the Bijapur district is becoming a serious public health issue for the past few years. The quality of water for drinking has deteriorated because of the inadequacy of treatment plants, direct discharge of untreated sewage into rivers and inefficient management of the piped water distribution system [7]. All living organisms require a wide variety of inorganic compounds for growth, repair, maintenance and reproduction [8]. In addition water has been traced to be one of the ways by which human could be infected with various kinds of diseases. Some water born diseases include typhoid, fever, cholera and bacillary dysentery. In water born infections pathogens are usually spread by water contamination with untreated or poorly treated sewage [9].Therefore it has become necessary to monitor water quality to observe the demand and pollution level of ground water. Several water analyses have been regularly conducted by different scientific groups across the country. The present work is a primary attempt to examine the water quality of various potable water resources in and around Bijapur district, Karnataka India.

## MATERIALS AND METHODS

Sampling points which are representative of the different sources from which water is supplied to the public are selected. Drinking water samples from different sources in Bijapur district were collected and transported by standard methods as mentioned in APHA,1998

[10]. Random sampling was adopted for the study. Microbiological analysis of water samples was carried out using Rakiro Biotech test kits after incubation at 34$^{o}$C for 24 hours.

## RESULTS AND DISCUSSIONS

The results of biological and physicochemical analysis of water samples were presented in Table.1. The pH of water sample 6.2 to 7.2 indicating that most of the water samples are acidic except one sample No 12.The obtained results indicate ,water sample at Inchageri is slightly alkaline where as all other samples are acidic in nature. As per BIS standard [11] the desirable range of pH for drinking water is 6.5 to 8.5 and therefore Kannur, Kalabilagi water samples are not within the safer limit. Water with pH outside the normal range may cause a nutritional imbalance or may contain a toxic ion which can adversely affect the growth and development of aquatic life [12]. As pH affects the unit processes in water treatment that contribute to the removal of harmful organisms it could be argued that pH has an indirect effect on health [13]. EC of water samples varied in the range of 57 to 316 micro semens/cm. Kalabilagi water sample showed higher EC than permissible limit of 300micro semens/cm by UNEP [14].The desirable and maximum excessive level of TDS in drinking water prescribed by BIS is 500mg/l and 200mg/l respectively. The TDS values ranged from 316 to 1620 mg/l. Out of 12 samples 6 samples have TDS values much higher than the maximum excessive limit. This increased level of TDS might be impacted by the dissolution of higher concentrations of chlorides, calcium, magnesium, sulphates, organic and other inorganic particles which resulted from the discharge of sewage, industrial and solid waste into the water. The excessive TDS in water can cause changes in taste, excessive scaling in water pipes, water heaters, boilers and household appliances [15]. Concentration of E.Coli in water samples ranged from 10 to $10^{7}$/100ml. Diarrheal diseases are the major cause of death in children under 5 years of age in poor countries resulting in approximately 2.5 million deaths each year worldwide [16]. Among the bacterial pathogens diarrheagenic E.Coli (DEC) are most frequently implicated in cases of epidemic and endemic diarrhea worldwide [17]. The presence of fecal contamination is an indicator that a potential health risk exists for indiduals exposed to this water. Some bacteria are ubiquitous in soil, water and on surfaces in contact with soil or water such as pseudomonas aeruginosa which is as opportunistic pathogen. It produces tissue damaging toxins and causes urinary tract infections, respiratory system infections, central nervous system, endocarditic(p.aeruginosa infects heart valves establishes itself on the endocardium), dermatitis, soft tissue infections, bacteremia, bone and joint infections, gastrointestinal infections and a variety of systemic infections, particularly in

patients with severe burns and in cancer and AIDS patients who are immune suppressed [18]. Spread occurs from patient to patient on the hands of hospital personnel, by direct patient contact with contaminated reservoirs and by the ingestion of contaminated foods and water. In the present study pseudomonas varies from 10 to $10^6$/100ml. Sulphate reducing bacteria were not detected in any water samples. In the present study, yeast and fungi load vary between 10 and $10^4$/100ml. The occurrence of fungi in drinking water systems may have significant impact due to health effects of mycotoxins( such as afloxins), mutagenic, tetragonic, estrogenic, carcinogenic and allergic, although no reports of disease attributed to mycotoxins produced in the water distribution systems have been reported [19]. Fungi are ubiquitous in distribution and are a serious threat to public health in indoor environment [20].

**Table.1.Microbiological and Physicochemical Study of underground water**

| S.N. | SOURSE | pH | EC in µS/cm | TDS | E.Coli | Pseudomonas | Sulphur Reducing bacteria | Total Bacteria Count Yeast &Fungi |
|---|---|---|---|---|---|---|---|---|
| 1 | Kannur | 6.2 | 57 | 306 | $10^7$ | $10^6$ | Nil | $10^4$ |
| 2 | Golasar | 6.8 | 167 | 338 | $10^5$ | Nil | Nil | Nil |
| 3 | Ittangihal | 6.9 | 86 | 418 | 10 | $10^7$ | Nil | $10^4$ |
| 4 | Kalabilagi | 6.2 | 316 | 1620 | 10 | $10^4$ | Nil | 10 |
| 5 | Al.Ameen | 6.7 | 137 | 665 | Nil | $10^3$ | Nil | Nil |
| 6 | Halasangi | 6.8 | 83 | 395 | 10 | $10^3$ | Nil | 10 |
| 7 | Shirawal | 6.5 | 109 | 531 | $10^4$ | $10^6$ | Nil | $10^4$ |
| 8 | Nagathan | 6.7 | 79 | 402 | $10^5$ | $10^4$ | Nil | $10^4$ |
| 9 | Indi | 6.9 | 102 | 514 | $10^5$ | $10^5$ | Nil | $10^5$ |
| 10 | Sheshagiri | 6.6 | 281 | 1520 | $10^6$ | $10^2$ | Nil | $10^3$ |
| 11 | Kalakeri | 6.4 | 85 | 445 | 10 | 10 | Nil | $10^2$ |
| 12 | Inchageri | 7.2 | 90 | 568 | $10^3$ | Nil | Nil | 10 |

## CONCLUSION

This study concluded that water quality at Bijapur district need more effort in limiting the number of microbial organisms released into water systems. The use of contaminated water for drinking purpose can expose human body to various water borne diseases, hence water treatment and improving quality of water before drinking is required. It is recommended that effective management and maintenance are required in order to minimize accurate problem of water related diseases which are endemic to the health of man. This research also demonstrated the importance of education for the consumers who use indidual supplies for their drinking water. Much needs to be done to increase awareness of the hazard of drinking contaminated water and ways to prevent contamination.

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