Research Article

Estimation of Ereniku's River Water Quality During Autumn Season, Through Physico-Chemical and Microbacterial Analysis

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ABSTRACT

The main objective of this investigation is assessing the quality of water Ereniku river during autumn season 2011, through physico-chemical and microbiological analysis. The Ereniku river is located in west part of Kosovo, who passes through the city Gjakova. Samples for microbiological analyses are collected in three localities along the river. Based on the results obtained we can say that the water of "Ereniku" river is high polluted by bacteria at all localities. There is registered relatively large number of all microorganisms, at all locality. On base of coliform bacteria according to Tumpling system the waters of "Ereniku" river belongs at third class of pollution. Also we have done the physico-chemical analysis such as: temperature of water, TDS, conductivity, pH, salinity.

Keywords: Autumn, microbiological, water, river, Ereniku.

INTRODUCTION

Water borne diseases arise due to the percolation of reservoir and other water into the drinking water. Water from inadequately maintained or polluted sources can carry a number of pathogens that cause diarrhea, hepatitis, typhoid fever or parasitosis[1]. At present, public health concerns remain focused on waterborne diseases, with incidence data in both developed and developing countries making gastroenteritis highly important. A diversity of enteric bacteria and viruses has been associated with outbreaks of waterborne gastroenteritis[2,3]. Drinking water is a major source of microbial pathogens in developing regions, although poor sanitation and food sources are integral to enteric pathogen exposure. The biological contamination in drinking water is a major problem of public health in developing world. WHO estimates that about 1.1 billion people globally drink unsafe water and the vast majority of diarrhea disease in the world (88%) is attributable to unsafe water, sanitation and hygiene[4, 5].

The lack of safe drinking water and adequate sanitation measures lead to a number of diseases such as cholera, dysentery, salmonellosis and typhoid and every year millions of lives are claimed in developing countries [6].

Groundwater is the main source of drinking water in the villages without any treatment. It may be contaminated by disease-producing pathogens, leachate from landfills and septic systems, careless disposal of hazardous household products, agricultural chemicals, and leaking underground storage tanks. Dam water enters into wide area causing the disturbances including drinking water [7].

The most common and widespread health risks associated in drinking water in developing countries are of biological origin. It is well known that the quality and safety of the drinking water continues to be an important public health issue because its contamination has been frequently described as responsible for the transmission of infectious diseases that have caused serious illnesses and associated mortality worldwide [8-13].

Water-related diseases continue to be one of the major health problems globally. An estimated 4 billion cases of diarrhoea annually represented 5.7% of the global disease burden in the year 2000 (WHO 2002)[14].

MATERIALS AND METHODS

The samples analyses were collected with two-litre sterile polyvinyl chloride (PVC) plastic water bottles from four (4) designated sampling points in river Ereniku during autumn season. The water samples were collected for both physicochemical and microbiological analysis.

Samples were collected during the day at 9.00 am, 12.00 pm, from each sampling station. The objective of the sampling was to collect a portion of material small enough in volume to be conveniently transported to lab, while still accurately representing the material being sampled. The preservation method for storage was refrigeration.

Water samples were analyzed for physiochemical and microbiological quality and physico- chemical characteristics (T^{o}, TDS, conductivity, pH, salinity) and were determined by digital aparature HACH.

Bacteriological Analysis

For the bacteria isolation, nutrient agar for heterotrophic bacteria, bile aesculin agar for Streptococcus faecalis, Violet red agar for total coliform bacteria, SS agar for

salmonela and shigella, saborud agar for fungi, were used. All media were prepared and sterilized as instructed by manufacturer.

RESULTS AND DISCUSSION

The microbiological analysis of the water samples are shown in Table 1.

As it can be seen at Table 1, the highest number of heterotrophic bacteria is registered at second locality by 510 cfu /10 ml water while the lowest number of heterotrophic bacteria is registered in first locality (260 cfu / 10 ml water).

The highest number of total coliform bacteria is registered at second locality, 278 cfu/10 ml water and lowest number, of total coliform bacteria, is registered at first locality 180 cfu /10 ml water. Table 1 shows that the highest number of Streptococcus faecalis bacteria is registered at locality (2) two, 370 cfu /10 ml water, whereas the lowest number of Streptococcus faecalis bacteria is registered in first locality (190 cfu /10 ml water), and the largest number of SS bacteria is registered at second locality, 170 cfu /2ml water while the lowest number of SS bacteria is registered in first locality (130 cfu /2ml water).

The highest number of fungi is registered at first locality, 56 cfu /2ml water whilst the lowest number of fungi is registered in first locality (16 cfu /2ml water).

Table 1: Microbiological results of waters of river "Ereniku" during autumn season 2011

Group of bacteria	Loc.1	Loc.2	Loc.3	Loc.4
	10 ml/water	10 ml/water	10 ml/water	10 ml/water
Heterotrophic bacteria	260	480	440	510
Total coliform bacteria	180	278	240	220
Streptococcus faecalis	190	370	357	330
Salmonela Shigella- SS	130	170	140	120
Fungi	16	56	48	38

These results show that the water of the river Ereniku is highly polluted than standards according to FAO (1997) allow. This large number of bacteria is found in very small amount of water (10 ml water). In this study we performed complex microbiological analyses, in order to evaluate the present situation of water quality and the anthropogenic impact in water quality of Ereniku's River that originates from large urban settlements, such as Gjakova city.

The physico-chemical analysis (T^{o}, TDS, conductivity, pH, salinity) of the water of river Ereniku are shown in Table 2.

Table 2: Physico- chemical results of"Ereniku" river waters during autumn season 2011

Physico-chemical parameters	Loc.1	Loc.2	Loc.3	Loc.4
T (^{o}C)	13.8	14.1	14.2	14.8
TDS (mg/l)	254	465	561	587
Conductivity (S/m)	479	485	538	567
pH	7.81	8.15	8.72	8.86
Salinity	0.1 %	0.1 %	0.1 %	0.1 %

The water temperature is ranged from 13.8 to 14.8^{o}C.The lowes value of conductivity was at first locality, while the highest value at fourth locality. This confirms that these waters contain large amount of salts.

The value of pH ranges from 7.81 (first locality) to 8.86(fourth locality), these value indicates that the waters are alkaline. WHO specify pH value for drinking water as 6.5 to 8.5. The pH of third and fourth locality exceeds allowed values determined by WHO.

The value of TDS at second locality is nearby the maximum concentration level set by EPA (it is 500 mg /l), while the third and fourth locality exceeds allowed values.

CONCLUSION

Based on the results obtained we can conclude that the water of Ereniku'sriver is highly contaminated. This is due to the indiscriminate disposal offecal wastes. The presence of Salmonella, Shigella and the other enterics microorganism calls for serious concern. A value of TDS, conductivity and pH at third and fourth locality, exceeds allowed values.

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