Research Article

Microbiological Assessment of the Water of Lake Livoqi during Autumn Season 2005

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ABSTRACT

Microbiological water analysis is mainly based on the concept of fecal indicator bacteria. Water-borne diseases are caused by pathogenic microorganisms which are directly transmitted when contaminated water is consumed. According to the World Health Organization, diarrhoeal disease accounts for an estimated 4.1% of the total daily global burden and is responsible for the deaths of 1.8 million people every year. The objective of this study is to assess the quality of water, of the lake Livoqi, during autumn season, 2005 year, through the microbiological analysis.

Keywords: Microbiology, analysis, lake, livoqi.

INTRODUCTION

Water resources are great significance for various activities such as drinking, irrigation and aquaculture and power generation.

Water is essential to life, but many people do not have access to clean and safe drinking water and many die of waterborne bacterial infections. In this review a general characterization of the most important bacterial diseases transmitted through water— cholera, typhoid fever and bacillary dysentery—is presented, focusing on the biology and ecology of the causal agents and on the diseases' characteristics and their life cycles in the environment. Monitoring is usually done indirectly by identifying and quantifying indicators of faecal pollution such as the coliform group. Water temperatures fluctuate naturally both daily and seasonally[13].

Another factor influencing microbial populations is the organic content of the water; if this is high, the growth of decomposers will be encouraged, which will in turn deplete the oxygen[12].

The presence of pathogens in water for drinking and swimming purposes is of public health significance considering the possibility of the presence of other bacteria, protozoa and enteric viruses that are implicated in gastro-intestinal water borne diseases and the low infectious dose for these water borne pathogens.

MATERIALS AND METHODS

Collection of water samples

Samples were collected from 3 different sites on Lake Livoqi, during autumn season 2005.

Water samples from the water of lake were brought to the laboratory in 500 ml sterile glass bottles. In order to inactivate chlorine, sterile sodium thiosulphate solution was added (13.2 mg/l). The samples were immediately stored under ice-cold conditions and microbiological analyses were performed within 2h of collection.

Isolation and identification of the strains

Violet Red Bile Agar (VRBA) use for coliform bacteria counts, SS agar for salmonella and shigella bacteria, Nutrient Agar for total aerobic mesophilic bacteria counts (heterotrophic bacteria), Bile aesculin agar for streptococcus bacteria and Potato Dextrose Agar for fungi,

In this technique, 100ml of water sample filtered through a membrane filter. After incubation, the number of coliform colonies is counted.

The physico chemical parameters analysed are temperature, TDS (Total Dissolved Salts), Conductivity, Salts and pH.

Study area Lake Livoqi is located in eastern part of Kosovo. Lake Livoqi is an artificial lake nearby Gjilani, Kosovo. Sea level is about 530 m. The dam of Livoqi, is located at 5th kilometer on the road Gjilan – Prishtina.

RESULTS AND DISCUSSION

From analyzed microbs dominate heterotrophic bacteria, compared with other groups of microorganism. As it show at table 1, the higher number of heterotrophic bacteria are detect at third locality with 16.900, while the lower number are detect at first locality (8.900). At third locality the number of heterotrophic bacteria it is about twofold more, compared with first locality. The second has lower number of heterotrophic bacteria, compared with third locality. At second locality registered 11.700 /100 ml water. Third locality has more bacteria because nearby this locality is located a village, who dicsrad the dirty waters in lake.

The higher number of coliform bacteria, it was higher at third locality with 6.900, while the other locality has lower number of Coliform bacteria such as first with 3.600cfu / 100 ml water. At second locality registered 5.600 /100 ml water.

The presence of coliforms group in this water samples generally suggests that a certain selection of water may have been contaminated with faeces either of human or animal origin.

The higher number of Streptococcus faecalis detected at third locality with 7.500, while the lower number are detect at first locality with 2.600 cfu/ 100 ml water, followed by second locality (5.200).

Also and number of Salmonella and shigella, was higher at locality three with 4.400, while the lower number are detect at first locality with 2.100. From these can see that the third locality dominate twofold compared with first locality.

The present investigations have rendered the values (850 – 2.300) of fungi per 100 ml of water, which have exceeded the prescribed limit.

Total number of microorganism at third locality (38000) it was twofold higher compared with first locality (18.050), while at second locality it was 27200

Regarding to the total number and average number of each group of microorganism we can conclude that heterotrophic bacteria, at all locality, dominate compared with other groups of bacteria.

Table 1: Results of microbiological analysis of water of lake Livoqi during autumn season 2005.

Group of microorganism	Amount of analysed water	Locality 1 cfu /100 ml	Locality 2 cfu /100 ml	Locality 3 cfu /100 ml
Heterotrophic bacteria	100 ml	8.900	11.700	16.900
Total coliform	100 ml	3.600	5.600	6.900
Streptococcus faecalis	100 ml	2.600	5.200	7.500
Salmonella and shigella	100 ml	2.100	3.600	4.400
Fungi	100 ml	850	1.100	2.300
Total number of microorganism per locality		**18.050**	**27.200**	**38.000**

The total coliform bacteria counts for all the water samples were generally high exceeding the limit of 1.0X102 cfu/ml which is the standard limit of heterotrophic count for drinking water [5]. (EPA, 2002). The high total heterotrophic count is indicative of the presence of high organic and dissolved salts in the water.

Regarding to the total number of microorganism per locality, show that the third locality it was higher polluted, exceeding the limit of standard according to[5]. The total number of microorganism dominate at third locality (6.300 cfu / 100 ml water), while the first locality (3.000 cf/100 ml) is less polluted compared with third locality

Coliform bacteria are the major microbial indicator of monitoring water quality. Total coliform (TC) and faecal coliform (FC) counts are the most widely used bacteriological procedures for assessment of the quality of drinking and surface waters [8].

Physico-chemical parameters

The lake water was neutral (*p*H range 6.32–7.69) and was unaffected by seasonal variation.

The *p*H was within the range of 6.5–8.5 stipulated for drinking and domestic purposes [11]. The EU also sets protection limits of *p*H from 6 to 9 for fisheries and aquatic life[4]. The *p*H obtained in the river waters was within these ranges. Based on these guidelines, the *p*H of the river water would not adversely affect its use for domestic and recreational purposes, and the aquatic ecosystem.

The well buffered nature of the river water can be attributed to the fact that, normally, running waters are influenced by the nature of deposits over which they flow[5].

Water temperatures ranged from 11.8 to 13.7°C. These values are within the temperature ranges experienced in the lake.

Values of conductivity (electrical conductivity) varied between 286 – 445µS/cm. We recorded the highest conductivity of 445 µS/cm at locality three.

The conductivity of water is lower at first locality, while at third locality is about twofold higher. Therefore, the parameter does not give cause for concern and it makes the water suitable for direct domestic use. TDS are common indicators of polluted waters. TDS values ranged from 351 to 524 mgl. These values were not high compared with WHO guideline value of 1000 mgl (1993) .

Table 2: Results of physicochemical analysis of water of lake Livoqi during autumn season 2005.

Physicochemical parameters	Locality 1	Locality 2	Locality 3
Temperature ^{o}C	11.8	12.5	13.7
TDS mgl	351	433	524
Conductivity µS/cm	286	387	445
pH	6.32	6.65	7.69

CONCLUSIONS

The waters of Livoqi Lake are highly polluted by bacteria at all localities. Higher numbers of all microorganisms were found at all localities. On the base of coliform bacteria according to Tumpling system the water of Livoqi lake belongs to the third class of pollution.

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