BACTERIOLOGICAL QUALITY OF DRINKING WATER SUPPLIES IN KHULNA CITY, BANGLADESH

TAHERA SULTANA[1], M. HASIBUR RAHMAN [2], NARGIS ARA[3], SHAMIM AL MAMUN [4], M. NAZMUL HASAN[1]

[1] Biotechnology and Genetic Engineering Discipline, University of Development Alternative, Dhanmondi, Dhaka –1205, Bangladesh, [2]Biotechnology and Genetic Engineering Discipline, Khulna University, Khulna 9208, Bangladesh, [3]Pharmacy Department, University of Development Alternative, Dhanmondi, Dhaka -1205, Bangladesh, [4] Electronics and Telecommunication Engineering Department, University of Development Alternative, Dhanmondi, Dhaka – 1205, Bangladesh.

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ABSTRACT

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The whole concepts adopted for microbiological quality is that no water intended for human consumption shall contain *E. coli* in 100 ml sample. Our study was aimed to investigate the extent of bacterial contamination among protected and unprotected water sources and potable quality of drinking water was assessed from seven (07) selected areas in Khulna city, Bangladesh. The experiment was conducted during May-June 2007. Water from the mains (pump water) and corresponding residences (households) were tested paralally for the presence of coliform organism. Analysis of bacteriological quality of pump water and household's water showed that 36.36% pump water and 42.86% of household water were contaminated with faecal-coliform and coliform of non-fecal origin. Our study concludes that 71.43% drinking water sources of Khulna city are unsafe & not potable. We suggest that regular quality control measures to be adopted to ensure safe drinking water.

Keywords: ***Coliform Bacteria, Fecal Coliform, Drinking Water***

INTRODUCTION

The overall high mortality rates and high incidence of childhood diarrhea, helminthiasis, and trachoma are associated with poor environmental sanitation (Teka, GE., 1977; Daunders Rj; 1976). In 1995, more than three million worldwide deaths, of which about 80 % were among children under five years of age, has been reported to be caused by contaminated food and water (Anonymous, 1996). It is estimated that up to 80% of worldwide sicknesses and diseases was caused by inadequate sanitation, polluted water or unavailability of water (Anonymous, 1997). Approximately three out of five persons in developing countries do not have access to safe drinking facilities. Over 60% of the communicable diseases are due to poor environmental health conditions arising from unsafe and inadequated water supply and poor hygienic and sanitation practices (Abebe Ls; 1986). Regular monitoring of water quality for the presence of organisms, chemicals, and other physical contents provides information of the safety level. Frequent examination of fecal indicator organisms remain the most sensitive way of assessing the hygienic conditions of water. Indicator organisms of fecal pollution include the coliform group as a whole and particularly *Escherichia coli, Streptococcus faecalis* and some thermo tolerant organisms such as *Clostridium perfringens* (Anonymous, 1983).Major objectives of the study was to investigate the extent of bacterial contamination among protected and unprotected water sources of Khulna city, Bangladesh and to assess the quality of drinking water and investigate the possible causes that influence their potability.

MATERIALS AND METHODS

Selection of Study Area

The study was carried out from different place of Khulna city. The study area included Rupsha, Hadis Park, Khalishpur, and Mujgunni, Nirala and Sonadanga and Khulna University campus. The collection points were the supply pump and a residence ~500 meter away from it. However in case of Khulna University campus, water distribution system of all the academic buildings, administrative buildings and student dormitories were bought under investigation.

Collection of Water Sample

Water samples were collected at the randomly selected areas (Sonadanga, Rupsh, and Hadis Park, Khalishpur, and Mujgunni, Nirala, and Khulna University campus) of Khulna city during May-June 2007. Water samples were collected parallely from each of the seven pump water and corresponding residence water. However, special emphasis was given to assess the water quality of Khulna university campus; hence, five samplings were made as household water from different buildings (Figure 1-Figure 2). The

method of sample collection at each source was according to the WHO Guidelines for drinking water quality assessment (Anonymous, 1983). From each point, five hundred ml of water samples were collected in sterilized glass bottles and kept in icebox during transportation and analyzed in the laboratory.

Analysis of Microbiological Parameter

All samples were analyzed for fecal coliform count and total coliform bacterial count by the most probable number methods (MPN). The result was interpreted using WHO guidelines for drinking water (Anonymous, 1983).

RESULTS

A total of 18 samples were collected from the seven selected areas of Khulna city of which 7 were pump water and 11 were residence water samples. Among 7 pump-water samples tested 3 were found to contain coliform organisms of faecal origin and one was found to be contaminated with coliform organism of soil origin, the rest three was free from any coliform bacteria. Among 11 residence-water samples 4 were found to contain non-fecal coliform and the other 4 carried coliform contamination of faecal origin while the rest 3 were found free from contamination. Total colioform and faecal coliforms were quantitated as number (most probable number) per 100ml of water sample. The total coliform and fecal coliform bacterial count in both types of water samples collected form Nirala were 23 and 09 respectively (Figure A). Total coliform and fecal coliform count of the pump water and corresponding residence water sample of Sonadanga were 23, 93 , 04 and nil respectively (Figure B).While pump water of Rupsha, Mujgunni, Khalishpur were free from coliform contamination. Water samples of the corresponding residences also found to be free form fecal coliform contamination except Rupsha, containing 04 fecal coliform bacteria.

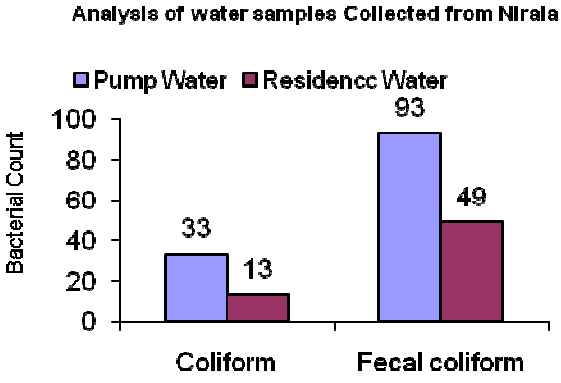
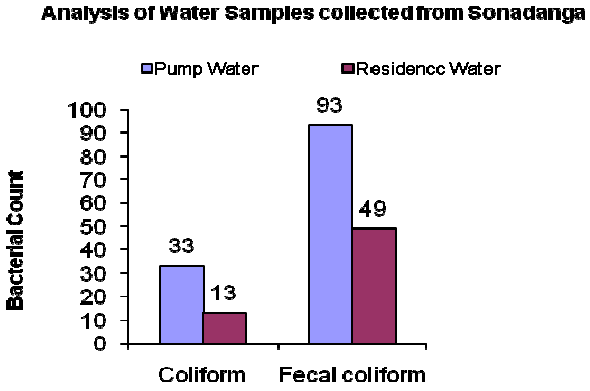


Figure A



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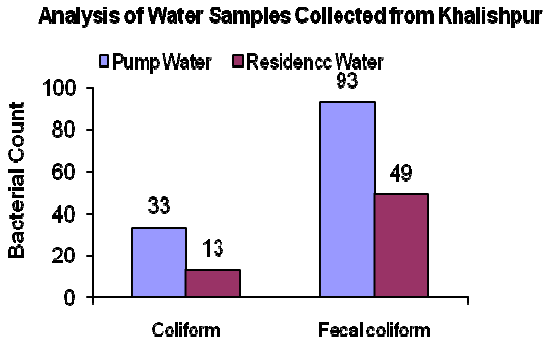

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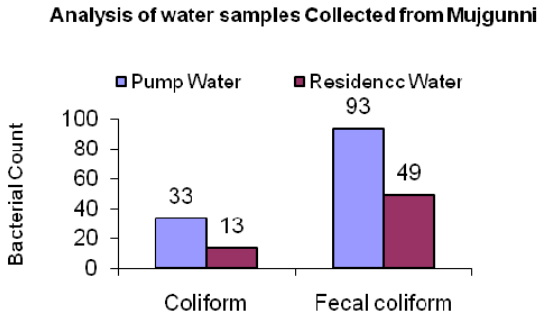

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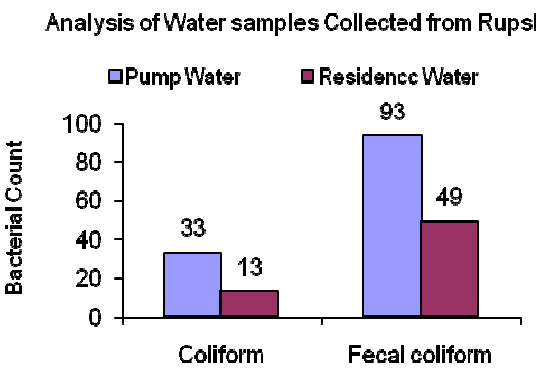

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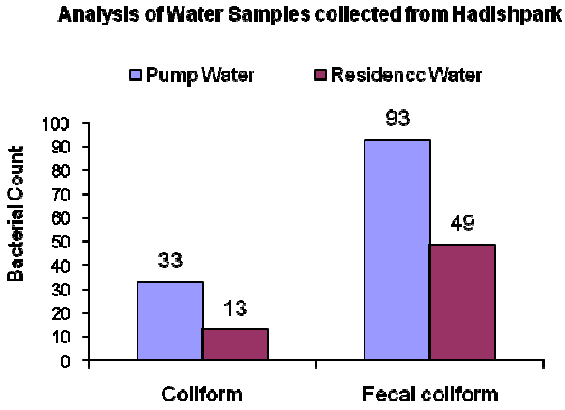

Figure E

Figure 1. Bacteriological quality of drinking waters collected form different points of Khulna city, Bangladesh

The water samples collected form Khulna university were found free of fecal coliform organisms but the counts for total coliform was quite high (43). Water sample collected from Academic building-1, Academic building-2, Ladies hall, and Khan Jahan Ali hall contained total coliform organisms of 09, 09, 21 and 04 repectively. The water of administrative building was found to be free from both coliform and fecal coliform contamination.

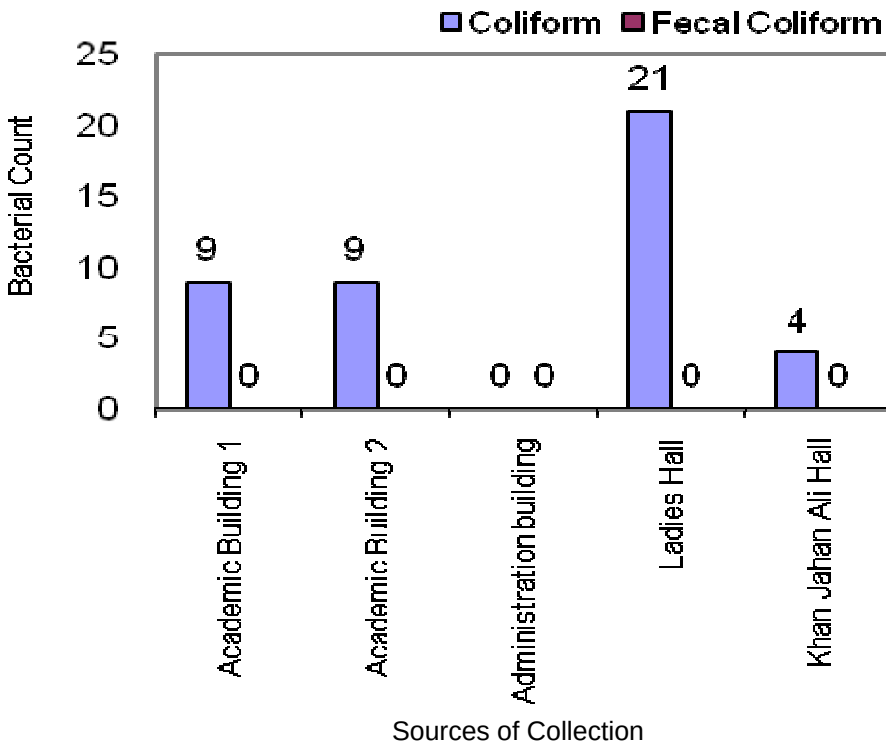

Figure 2. Bacteriological quality of drinking water collected from different sources of Khulna University

Analysis of bacteriological quality of pump water and household's water showed that 36.36% pump water and 42.86% of household water were contaminated with fecal-coliform and coliform of non-fecal origin. A total of 71.43% drinking water sources of Khulna city are unsafe & not potable. Considering high count

and prevalence of total coliform and faecal coliform in most of the water samples, it is contended that distribution systems under investigation are exposed to coliform group of organism. Household water may be contaminated with connecting the supplied pipeline with sewerage system. Our study concludes that majorities of the water sources are grossly polluted. The types of coliform exhibited are of fecal origin. The effect, therefore, is attributed to constructional defects, poor sanitation, poor supervision, maintenance, and irregular disinfection.

CONCLUSION

The data presented here may serve as baseline for comparison with the data generated by the future investigator. Result of this study warns to safeguard ourselves against water born infection and suggests boiling the water before use.

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