OnLine Journal of Biological Sciences 1 (4): 287-288, 2001

Microbia Study of Drinking Water from Rawalakot and its Surroundings

Imtiaz Hussain, Siddique Awan, Tassadique Hussain and Zeb Sarwar
University College of Agriculture, Rawalakot, A.J.K, Pakistan

Abstract: The people of Azad Kashmir in general and mountain dwellers in particular drink water from fresh springs. The objective of the present study was to assess the suitability of spring water for drinking purposes for which the samples were collected from different springs and analyzed for the bacterial presence by multiple tube and colony count method. The study reveals that springs are also contaminated with microorganisms. The presence of *Coliforms, E. Coli, Streptococus, Lactobacillus* and *Shigella* in the most of the samples did not confirm the suitability of water for drinking purposes.

Key words: Microbial, drinking water, quality, Rawalakot, surroundings, spring, coliform, medium, culture, multiple tube method

Introduction

Severe water born epidemics have been prevalent through the history of humanity causing tremendous losses to human life (Carpenter, 1983). Most important water born disease are typhoid, paratyphoid, dysentery and cholera.

Commonly, the coliforms are studied for bacterial analysis of water. Firstly, they are present in greater number in feces and secondly, they survive longer as compared to other pathogenic bacteria present in water. Therefore, the presence of coliforms in water provides an index of fecal contamination of such waters and they are termed as indicator organisms.

Zemla (1988) concluded that the quality of drinking water could have some influence on the frequency of stomach cancer incidence, especially among those who have been using such water for a long time. However, there are also various other factor which can influence the incidence of stomach cancer.

(Shukla *et al.*, 1989) studied the influence of physico-chemical and biological characteristic of river Ganges and found it to be highly polluted at middle part of the city Mirzapur (India) due to assimilation from a number of sewage and industrial drains. Hayes (1989) discussed in the context of microbiological standards for drinking water. Schulze (1990) concluded that drinking water should be free from pathogenic organisms, pathogenic viruses and bacteria.

Materials and Methods

It is not possible to analyze all the water from the source only a small amount of water is taken as sample and analyzed. First of all sampling area was surveyed and then sampling was done from 6th to 7th October, 1998. Only eleven sources of drinking water were selected randomly from Rawalakot and its surroundings, Khaigala, Rawalakot (City), Housing Scheme, Trar, Kharick, Rawalakot (PIA), Shamsabad, Baloch, Qillan, Khaigala (B) and Tata Pani (Hot Spring).

The water samples were collected in pre-sterilized Samuel viols and the viols were sealed after the sample collection. The work was based on the "Quality standard of drinking water" therefore only the sources of drinking water were selected randomly from Rawalakot and its surroundings. For isolation of bacteria L.B. medium was used. This medium introduced in 1955. This is a general type of medium and used for all types of bacteria. Medium was filled in pre-strilized test tube and added 1 ml water sample and plugged. These test tubes were placed in incubator for two days at 37°C. At observation colour of media changed. The morphological characteristics of bacteria were determined by the help of Gram staining and shape of the bacteria was examined by using high power microscope. For the plate counts (Anonymous, 1970) three tenfold dilutions were made out of the samples bottle, which were previously well shaken. Volumes of 1 ml from each dilution were measured in to each of the two petry dishes. The dilutions were prepared by carrying over a suitable quantity of the water nine times its volume of diluent mixing thoroughly carrying over a similar volume of diluted water to further nine volumes of diluent. A separate pipette was used for making each dilution. Two plates from each sample were incubated at 37°C for 24 hours and two at 22°C for three days.

The plates were placed in the refrigerator until the colonies were counted. As the number of colonies were not very large the counting was accomplished with the help of hand lens. Difference in the number of organisms in the plate incubated at 37 and 22°C was recorded. The colony count results were estimated by the multiplication of number of colonies by the reciprocal of the dilution and the arithmetic mean determined.

Results and Discussion

Drinking water samples from various spring sources from Rawalakot and its surroundings were processed to determine the presence of bacteria. The criteria for microbiological examination were recommend by British Ministry of Health (1970 and revised in 1983). This method is very simple precise and easily practicable as compared to previous method recommended by American Health Department (1955). The coliforms were suggested as fecal pollution indicator in the above-cited methods. The indicators were coliforms, *Escheriehia coli, streptococcus* etc. *Escherichia coli* is a member of the family Entrobacteriacae and is characterized by possession of the enzyme Beta-galactosidase and Beta-glucuronidase. In present study all water samples have *E.coli.* except the water sample from hot spring (Table 1).

E. coli. is abundant in human and animal feaces where it may attain concentrations in fresh feaces upto 10^9 per gram. It is found in sewage treated effluents and all natural waters. (Guide lines for drinking water quality by WHO). The present study highlights that the *E.coli.* was present in 10 water samples. This was due to application of farmyard manure around water sources. According to WHO coliform organism have been recognized as a suitable microbial indicator of the drinking water quality. (WHO Guide lines of drinking water quality). Present study shows that 5 water samples contain coliform organism (Table 1). This was due to mixing of sewage effluent into drinking water sources. The samples

Table 1: Result of microbial analysis of drinking water samples

Samples name	*E. Coli*	*Pseudomonas*	*Streptococcus*	*Salmonella*	*Lactobasasilli*	*Coliform*	*Shigella*	pH	Plate counting	
									220°C	37°C
Khaigala	P	P	A	A	A	P	P	7.002	100	200
Rawalakot (city)	P	P	A	A	P	A	P	6.982	200	300
Housing Scheme	P	P	P	P	A	P	P	7.033	300	200
Tarar	P	P	P	P	A	A	A	7.048	400	350
Kharick	P	A	A	P	A	P	A	7.064	200	100
Rawalkot (PIA)	P	A	A	A	A	A	A	7.171	300	200
Shamasabad	P	A	A	A	A	P	P	7.067	400	300
Baloch	P	A	A	A	A	A	A	7.090	100	200
Qillan	P	A	A	A	A	A	A	7.129	300	200
Khaigala (B)	P	A	A	A	P	P	P	7.083	400	300
Tata pani (Hot spring)	A	A	A	A	P	A	A	9.218	300	200

Abrivations: A= Micro organisms were absents, P= Micro organisms were presents, Plate counting= Number of colonies on stresk plates

Table 2: Morphological characteristics of bacteria

Name of Organisms	Gram staining	Morphological characters
E.Coli	-iv	Rods, Facultative, Anerobic, Motitle. Small colonies of LB agar.
Pseudomonos	-ve	Rods, Facultative, Anerobic, Motile
Salmonella	-ve	Rods, Non sporeforming. Anerobic catalase negative, Varing rod and slander
Lactobacillus	+iv	Rodshaped, Oxidase negative, Non sporeforming
Coliform	-ve	Cocci, Non- sporeform, Catalase, Pair or chain arrangement
Shigella	-v	Rods, Facultative, Anorbic, Non motile
Streptococcus	+v	Cocci, Non sporeformer , Catalase, Pair or chain arrangement

analyzed, showed varying n umber of pollution indicator. In the present study out of eleven water samples three were positive for *streptococcus* (Table 1). This study shows the lo w concentration of *streptococcus* in these water samples. This study concludes that three water samples were not suitable for drinking purposes. Opportunistic pathogens are naturally present in the environment and are not formally regarded as pathogens. They are able to cause disease in human beings with impaired local or general defense mechanisms, such as the elderly o r the very young patients with burns or extensive wound s, those under going immunosuppressive therapy or those with Acquired Immunity Deficiency Syndrome (AIDS). Water used by such patient for drinking or bathing, if contains large numbers of these organisms can produce various infections of the skin and the mucous membrane of the eye, ear, nose and throat. Examples of such agents ar e *Pseudomonas aereginosa* (Guideline for drinking-water quality 2n d ed. by WHO). The present study shows that four water samples have *Pseudomonas* (Table 1) which are not fit for drinking purposes.

The *Salmonella* are gram-negative non sporforming rods that ferment glucose usually with gas, but usually do not ferment lactose or sucrose like other bacteria they can grow over wider range of temperature and pH. Human beings and animals are directly or indirectly source of the contamination. *Salmonella typhi* is responsible for human typhoid. (Frazier and William, 1988). According to Frazier and William, (1988). The principal symptoms of *salmonella* are gastrointestinal diarrhoea, infections, nausea, vomiting, abdominal pain and diarrhea along with muscular weakness and faintness. The present study showed that three wat er samples are *Salmonella* (Table 1) positive and others are negative. This contamination occurs due to animal, human beings and birds feacal mater because these springs were present near rural community.

Food-borne out breaks of *shigellosis* have been reported in the United States (early eighties) but most incidents of *shigellosis* involve contaminated water. (Frazier and William, 1988). The present studies highlights that four water samples have *Shigella* contamination. *Lactobacillus* produced Carbon dioxide (Frazier and William, 1988). The present study highlights three water samples have *lactobacillus* contamination (Table 1).

The Morphological Characteristics of Bacteria are given in Table 2.

References

Anonymous, 1955. The recommended criteria for microbiological examination of water.

Anonymous, 1970 and 1983. The criteria for microbiological examination.

Carpenter, 1983. Biology of pollution (2nd ed.) Photo Books Bristal Ltd. 1- 61.

Frazier and William, 1988. Food microbiology International ed. Printed in Singapore.

Hyes, 1989. Microbiological Quality control in the Provision of Safe Drinking water. *Water Science and Technology*, 21 233.

Schalze, 1990. The Virological Control of Drinking Water Quality – a revises Zentrobulatt for microbiology. 145:2, 135-143.

Shukla, S.C., B.O. Tripathi, R. Kant, D.kumari-v and V.S. Panday, 1989 Physicochemical and biological characteristics of river Ganges from Mirzapur Inida. Indian J. Environ Health, 31: 218-227.

Zemla, 1988. Malignat Neoplasms of the Stomach and the Quality of Drinking Water. Nutrition and Cancer, 11: 1-9.

World Health Organization Geneva, 1993. Guide lines for Drinking Water Quality 2nd ed.