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BACTERIOLOGICAL INVESTIGATION; WATER SUPPLY OF MAYO HOSPITAL & KEMC, LAHORE

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ABSTRACT... Adequate supply of fresh and clean drinking water is a basic need for all human beings on the earth. Although we as humans recognize this fact, we disregard it by polluting our water source. In order to combat water pollution, we must understand the problems and become part of solution. Thousands of persons come to Mayo hospital & KEMC daily and they consume the water from a single source, this study was therefore designed to note any contamination of water in different departments. Samples were taken from 15 different departments including the source. Analysis was done both physically and bacteriologically by E. coli count, adapting the procedure by Monica Cheeshbrough. It was revealed in our study that source of water supply was alright, but the contamination in some of the departments category B (acceptable) 5, 33.33% & category C (unacceptable) 8, 53.33% is most probably due to old rusted water pipes which are running along the drainage pipes.

INTRODUCTION

Comprising over 70% of the Earth's surface, water is undoubtedly the most precious natural resource that exists on our planet. Without the seemingly invaluable compound comprised of hydrogen and oxygen, life on Earth would be non-existent: it is essential for everything on our planet to grow and prosper¹. Although we as humans recognize this fact, we disregard it by polluting our rivers, lakes, and oceans. Subsequently, we are slowly but surely harming our planet to the point where organisms are dying at a very alarming rate. In addition to innocent organisms dying off, our drinking water has become greatly affected as is our ability to use water for recreational purposes. In order to combat water pollution, we must understand the problems and become part of the solution².

Adequate supply of fresh and clean drinking water is a basic need for all human beings on the earth, yet it has been observed that millions of people worldwide are deprived of this³.

Bacteria in water cannot be seen, tested, or smelled and many health-related symptoms are not immediate therefore a water test is the only way to evaluate whether bacteria is present in a water supply⁴. Testing for all individual pathogens is impractical and expensive. Instead, the EPA (The Environmental Protection Agency) has designated total coliform bacteria as a standard to determine bacterial safety of water⁵. Coliform bacteria are relatively simple to identify and are present in much larger numbers than more dangerous pathogens. By monitoring coliform bacteria, the increase or

decrease of many pathogenic bacteria can be estimated⁶.

Coliform bacteria originate as organisms in soil or vegetation and in the intestinal tract of warm-blooded, animals (fecal coli). This group of bacteria has long been an indicator of the contamination of water and possible presence of intestinal parasites and pathogens. However, coliform bacteria do not necessarily make you sick⁷. Coliform bacteria are gram negative, non-sporing rods capable of growing aerobically on an agar medium containing bile salts and able to ferment lactose within 48 hours at 37°C, with the production of acid and gas⁸.

KEMC & Mayo hospital buildings are more than a century old although water source has been changed but the underground water supply pipes and sewerage run side by side. Thousands of patients both inpatient and outpatient, their relatives and workers in both Hospital and Medical college consume the water from single supply therefore the study was designed to estimate the contamination of water supply to different departments This study was in continuation of the same study conducted in 1998.

MATERIALS & METHODS

Samples were collected from various departments of KEMC & Mayo Hospital (Table I) and analyzed in Pathology Department KEMC, Lahore.

Collection of samples

Fifteen samples were taken from the source and different departments including KEMC and Mayo hospital both Inpatient and outpatient. (Table I) Water samples were collected in screw capped presterilised bottles of 200 ml capacity. Any external fittings e.g antispash nozzle or rubber tube were removed from the tap. Outside of the tap were cleaned for any dirt or grease. Tap were sterilized by igniting a piece of cotton soaked in methylated spirit until the whole tap was unbearably hot to touch.

Taps were allowed to cool by running the water for

a few seconds and then the sample bottles were filled Sample bottles were corked immediately. The samples were marked sample code number with water proof marker⁸.

Incubation of samples

For counting fecal coliform bacteria , samples were added to Me Conkey broth containing lactose as an indicator. A 100 ml water sample was distributed in (a) five, 5ml of water in 5ml of broth (single strength), (b) five, 5ml of water in 10 ml of broth (double strength) and (c) one, 50 ml of water in 50 ml of broth (double strength). Incubated the broth water mixture at 44°C for 24 hours with loose caps⁹.

RESULTS

Table-I. Physical examination was performed for color, smell and taste & appearance				
Department	Color	Taste	Smell	Appearance
Tube well	N	N	N	Clear
Anatomy	N	N	N	Clear
Pathology	N	N	N	Clear
Pharmacology	N	N	N	Turbid
Patiala block	N	N	N	Clear
Cafeteria	N	N	N	Clear
ENT ward	N	N	N	Turbid
Eye ward	N	N	N	Clear
Operation theatre	N	N	N	Clear
Emergency	N	N	N	Clear
OPD	N	N	N	Clear
TB Chest	N	N	N	Clear
Paeds Deptt	N	N	N	Clear
Residences	N	N	N	Turbid
Musafir Khana	N	N	N	Clear

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After 24 hours results were interpreted by Multiple tube/MPN technique (Suggested bacteriological criteria for drinking water from untreated source : Table II). Examined and counted each bottle which produced both acid and gas, used the probability table for estimation of coliform bacteria (Table III & IV). (Table III & IV). There was no change of colour and production of gas in 02 bottles MPN

count 0 : category A (Table III & IV). There was change of colour and production of gas in 05 bottles but the MPN count less than 10 : category B

There was change of colour and production of gas in 08 bottles the MPN count in between 10-50 : category C (Table III & IV). There was no sample with MPN count > 50.

Table-II. Suggested Bacteriological criteria for Drinking Water for unchlorinated rural Hand pumps and other sources

E.Coli count 44oC, 100ml	Category	Comments
0	A	Excellent
1-10	B	Acceptable: But make regular sanitary checks on equipment
10-50	C	Unacceptable: Look for and correct structural faults and poor maintenance of pump and plinth. Then disinfect equipment and source
More than 50	D	Grossly polluted: Look for alternative source, or carry out necessary repairs, and disinfect well

Table-III.

Department	50ml	10ml	1ml	MPN Coliform	Category
Tube well	0	0	0	0	A
Anatomy	0	0	0	0	A
Pathology	1	3	2	14	C
Pharmacology	1	4	0	13	C
Patiala block	1	5	2	50	C
Cafeteria	1	0	3	6	A
ENT ward	1	5	1	35	C
Eye ward	0	1	2	3	B
Operation theatre	1	4	0	13	C
Emergency	1	2	2	10	B
OPD	1	4	2	20	C
TB Chest	1	5	1	35	C
Paeds Deptt	1	2	2	7	B
Residences	1	4	3	30	C
Musafir Khana	0	4	0	5	A

Table-IV.

Category	Mean count coliform	Comments	No of sources	%age
A	0	Excellent	2	13.33
B	1-10	Acceptable	5	33.33
C	10-50	Unacceptable	8	53.33
D	>50	Grossly polluted	0	-

DISCUSSION

Bacterial contamination of drinking water can be a problem. Estimates suggest that nearly 1.5 billion people lack safe drinking water and that at least 5 million deaths per year can be attributed to waterborne diseases. Water-borne diseases are infectious diseases spread primarily through contaminated water. Though these diseases are spread either directly or through flies or filth, water is the chief medium for spread of these diseases and hence they are termed as water-borne diseases.

In our study it was revealed that the source of water supply falls in category A.

Although there was contamination in water supply of some of the departments but acceptable (Category B): Cafeteria, eye department, Paeds department & Musaffir Khana.

Whereas in other 8 sites the water contamination was there and fell in Category C : Pathology, Pharmacology. Patiala block, ENT department, Operation theaters, OPD, TB chest departments & residences

The water source although safe and free from contamination but, the contamination is most

probably

due to rusted & old water pipes which are running along the drainage pipes, more pollution was found in departments lodged in old building. Our study is in contrast to the study conducted in 19987. This study is also in contrast to the study by Pak-EPA, where the source of water supply was from river Indus⁹.

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