DETECTION OF MICROBIAL CONTAMINATION IN COLLECTED RAINWATER IN GROUND RESERVOIRS BESIDE MAIN ROADS (ASBAYYA- GHARIAN- MAZDAH)

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Abstract:

This study is conducted to investigate the extent to which water was contaminated with colon bacteria in ground tanks that extend along the Asbayya-Gharian and Gharyan- Mazdah roads. 20 samples were collected from the collected water pools in the ground reservoirs along the road and also 20 samples of water collected in ground reservoirs along the (Greian-Mazdah) between March and August. The samples were taken by sterilized glass bottles. The sterilized bottle was sealed in water, then, opened inside the tank to enter the water directly and prevent the possibility of external contamination. The samples were placed in the refrigerated case to prevent undergoing bacterial growth. The samples were taken to the laboratory for further investigation and defined for positive/negative samples containing colon bacteria. Statistical analysis of the study found that 20% of the water samples taken from the tanks along the Asbayya- Gharian road were not suitable for drinking, and 37% of the water samples from the Western Mountain Road area were not suitable for drinking. Because it contains a high percentage of colon bacteria.

Keywords: drink water – microbes - colon bacteria- pollution

Introduction

Fresh water is essential for life on earth where most communities have access to drinking water from surface water such as river and lake water. These resources are always exposed to pollution from residues, farms and factories. Libya's geographical location and its desert and semi-desert nature, and along destination between cities, have made it difficult to obtain sufficient quantities of water for use by travelers. Therefore, ground tanks were established on the side of the roads that connecting the Libyan cities from the north to the south and from the east to the west. The tanks became main sources of drinking water for the travelers and the residents. Drinking and cooking of this water is normally consumed without cleaning it. Water contaminated with microbes may cause health problems, the most important of which are diarrhea diseases. The case of pollution issue is aggravated by an increase

in the population and their wastes owing to Libya's geographical location and desert nature. Water collected in tankers was, until few years ago, considered to be one of the main sources of drinking water in the country (Elhassadi, 2007). However, many citizens still live in rural areas (Asbayya-Gharian-Mazdah) still use water collected in tanks as a source of drinking water. Water is often used for cooking, bathing and drinking without being cleaned, therefore, health problems especially diarrheal diseases are likely to accrue. Consequently, purification of drinking water is a necessary process to protect consumers from infection by pathogenic suspended microbes (Elhassadi, 2007). The aim of this study is to determine the water quality that is being collected in the tanks and used for drinking in the Asbayya-Gharian and Gharyan areas and the detection of the type of pathogenic bacteria especially colon bacteria. Fresh water can be polluted from several sources including: acid_rain as consequence of atmospheric pollution with plant gases. Sulfur oxides and nitrogen oxides in plant fumes react with water vapor in the atmosphere or clouds, so sulfuric acid and nitric rain might become acid as well (Schindler,1988). Sewages are also the main source of contamination of drinking water by pathogenic and gastrointestinal microbes. Residues of industrial activity of man, these wastes carry many heavy metals, such as copper, chromium, cadmium, zinc, mercury and others. Industrial waste may also carry radioactive materials (Clarke 2001). Residues of agricultural and pesticides (Agricultural waste), could reach irrigation and drainage water, where fresh water resources might be subject to contamination (Aitken, 2003). In general, hot water is encouraging for the growth of pathogenic microorganisms rather than cold water. The problem of pollution is increasing in developing countries, and people are still unaware of the importance of water conservation from pollution. Infectious microorganisms transmitted by drinking water. The most important infectious microorganisms transmitted by drinking water are diarrhoeagenic *Escherichia coli* is a bacterium that is a Gram-negative bacterium, a sugar-lactose fermented, an anaerobic, motile and a facultative anaerobe. *E.coli* belong to Enterobacteriaceae family. These bacteria are part of the normal flora in human and animal intestinal tract and are mostly non-pathogenic bacteria. However, some strains are pathogenic and are usually transmitted by fecal waste, contaminated water and various types of food, leading to diarrhea (Abdel 1996) Enterotoxigenic *E.coli* [ETEC], this strain causes inflammation of the intestine due to severe watery diarrhea, leading to droughts in infants and young children. These bacteria also cause what is known as travelers' diarrhea. These symptoms are due to the secretion of enterotoxins by bacteria, which are heat-stable enterotoxins (ST) and heat-labile enterotoxin (LT) (Avery 2004). Enteroinvasive *E.coli* [EIEC], this type of strain is a major cause of disease and death in young children in developing countries. This strain sweeps the mucosa, the end of the small intestine, and colon, causing a disease similar to bacillary dysentery-like illness accompanied by blood, pythia, or mucous membranes (Diet, 1992). Enter aggregative *E.coli* [EAGGEC], are defined by their "stacked-brick" pattern of adhesion to the human epithelial cell that

causes acute or persistent diarrhea as well as travel diarrhea (Goss 2008). Studies have also indicated that these strains produce an intestinal toxin similar to the heat-resistant toxin called the intestinal heat-resistant enterotoxin (EAST1) (Enter aggregative heat stable enter toxin) (Abdel Hafez, 1996).

Materials and Methods

This study was conducted in the Department of Biotechnology, where samples collected from the tanks that were constructed beside the main roads to be used by travelers. The samples were collected by sterile glass bottles after moving the upper surface of the water. A sterile bottle was submerged into the water and was opened to enter the water in and closed in water. The samples were then placed in the refrigerated container so as not to be exposed to the growth of microbes. The samples were transferred directly to the Biotechnology Research Center to conduct tests directly. (Mac.B) was the proper media used in this test. The tubes were placed in the autoclave for 45 minutes. After preparation of the media (mac.B), respectively, 10ml, 1ml and 0.1ml of the sample to be tested were transferred to Mac Conkey Prot tubes with each tube 3 dilution, taking into consideration that the lid of the tube is not closed tightly and placed in Incubation at 37 °C for 24-48 hours. Positive samples (ie, containing gas in AED tubes) are then taken from the negative samples and are recorded and placed as in table (1). The statistical RCBD system was used to compare the incidence of pathogenic bacteria from the water samples taken from Asbya-Gharian and those were taken from Greian- Mizda).

Results and discussion

Laboratory analysis were carried out on the samples of water collected from different regions. The aim was to determine the viability of this water. Test the most probable number (MPN) of E-coli for the road area (Asbyya-Ghryan) and (Gharian-Mizda). In the test of detection of E. coli and at 44.5 ° C as in graph, positive samples were taken only (ie, on the coli form). The number of samples (Asbia-Gharian) was 16 samples out of 20 samples. 18 samples from 20 samples were tested and E. coli bacteria were detected using Durham tubes containing a nutrient broth Brilliant Green Bile Broth 2% (B.G.B). Other tubes containing Tryptone Water (TW) in case of presenting gas after incubation of the first tubes (BGB) at 44.5 ° C for 24 hours. Konak detector was added to tube (TW) and red ring was examined to approval of presenting of strain of E.coli feces. Absence of the red ring was clear suggestion of absence of E.cloi. In this study, 25% of the water samples from the Asbayeh - Gharian area were found to be unfit for drinking and 75% were considered valid for drinking. It was found that 37% of the water samples from the road area and 63% are considered drinkable Between 25% and 37% confirm that there are bacterial pathogens found in the studied samples. In terms of statistics, there was a difference in the percentage of bacterial contamination between tank water (Asbia- Gharian)

and tank water (Gharian). Pollution is the result of several sources that vary from a place to another. If the area near the tank is very polluted, such as the presence of garbage or close to grazing areas or various organic wastes, the water in that tank is more likely to pollute and vice versa. They themselves cause pollution and this agreed with several studies and research on water tanks whose water source is rain (Mitchell,ed. 1978) and (Clarke,2001). This test was conducted in MPN method for the most likely number of internationally approved methods. The possible number of coli form bacteria (Hopkins, 1967).

Table (1) the arithmetic mean and the standard Error of road Asbia-Garian & Greian-Mizda.

Samples	(mean $\pm$ SE)	Diluted
Asbia-Gharian road.	(0.35 $\pm$ 0.01)	10 ml
	(0.6 $\pm$ 0.03)	1 ml
	(0.7 $\pm$ 0.032)	0.1 ml
Gharian- Mizda road	(1.95 $\pm$ 0.05)	10 ml
	(1.25 $\pm$ 0.04)	1 ml
	(0.4 $\pm$ 0.012)	0.1 ml

Figure(1) shows the arithmetic mean and the standard Error of road Asbya-Garian & Greian- Mizda.

Conclusion

The presence of pathogenic bacteria in drinking water in tanks may have a negative impact on the health of citizens using this water, especially those individuals with low immunity, such as children and the elderly and people with AIDS and other diseases. Therefore, the owners of these tanks should try to reduce the contamination of drinking water to be free of pathogenic microorganisms by cleaning the area around each special reservoir of animal residues and waste as well as human because it is the main cause of pollution. Also, putting various filters that can be cleaned in the corridors water to reduce the passage of organic materials that help to multiply the pathogenic bacteria. More importantly is the addition of sterile materials for water and harmless human and animal life, such as chlorine can get rid of these bacteria by boiling water before consumption. In addition, conducting reservoir analysis from time to time in case of high rate of pollution to be eliminated from water in this reservoir. Finally, assuring that travelers are not exposed to common intestinal and severe diarrhea which may sometimes result in children death.

References

- AbdelHafez, A. W., 1996. Applied Microbiology Faculty of Academic Cairo - Egypt First Edition, pp. 33-62.
- Aitken, M. N. 2003. Impact of agricultural practices and river catchment characteristics on river and bathing water quality. *Water Science & Technology* 48:217-224.
- Avery, S. M., A. Moore, and M. L. Hutchison. 2004. Fate of *Escherichia coli* originating from livestock faeces deposited directly onto pasture. *Letters in Applied Microbiology* 38:355-359.
- Clarke, sc. 2001 diarrhoeagenic *escherichia coli* an emerging problem? *Diagn Microbiol Infect Dis*. Nov;41(3):93-8.
- Diet, A. 1992. Translation of laboratory exercises in microbiology Omar Al-Mukhtar University First edition. PP 139-142.
- Elhassadi, A. 2007. Pollution of water resources from industrial effluents a case study-Benghazi. Libya. *Desalination*222(1-3): 287.
- Goss, M., and C. Richards. 2008. Development of a risk-based index for source water protection planning, which supports the reduction of pathogens form agricultural activity entering water resources. *Journal of Environmental Management* 87:623-632.
- Hopkins, e.s. and e.l.beaun 1967. water purification control 4th ed. williams and wilkins Co., baltimore, md, usa.

- Mitchell, R.(1972 & 1978). water pollution microbiology,vol.1&2. London; Wiley interscience.
- Schindler, D. W.1988.Effects ofAcid-Rain on Freshwater Ecosystems, Science Vol. 239, No. 4836, 1988, pp. 149- 157.