Forms of some colon bacteria in drinking water stations in AlQasim city

Hajer Aba Al- ameer[1], Rusul Jabbar Al-Jubouri[2], Dhiaa Hameed[3]

[1,2,3] college of pharmacy /Ahl al-Bayt university, Iraq

Abstract

The current study examined an environmental study of drinking water stations in the city of Al-Qasim, Quofan2, from December 2018 to the month of November 2019, samples were collected monthly from the two stations within the city of Al-Qasim. The study included measuring (total count of bacteria, total coliform bacteria, coliform E. coli bacteria), the study of bacteriological characteristics, the total number of bacteria in the Quofan station ranged between (1- 270) cell / ml))

Key Words: fecal contamination, coliform bacteria, Escherichia coli bacteria, Fecal coliform bacteria

Introduction

Human waste and food residues are mixture containing millions of pathogenic and unsatisfactory microorganisms represented by germs, filtrates, primaries, and fungi. All human beings' wastewater is represented many types of bacteria such as Colstidium perfringens, fecal streptococci, as well as pathogens that may exist such as Salmonella spp, Shigella spp and Vibrio cholera (Wiewel, 2001). Wastes of animals such as cattles, sheeps or other animals, such as dogs and birds with a high proportion of germs, can directly reach and contaminate surface water, or use animal manure on farms and during watering, or when raining on natural water sources such as rivers, streams, and lakes. Some studies have shown that animals are the largest reservoir of diseases and are an important cause of many bacterial diseases transmitted to humans through water (Eshcol and Keshapagu, 2009), Total Bacterial Count (TBC) :- This assay was used to evaluate the bacterial content in the water, but this test does not show the presence of all bacteria in water except those capable of growing, and the production of clear colonies in the media used under the conditions of examination such as time and medium temperature (WHO, 2004). The numbers of colonies after the incubation period are usually calculated at 22 C and 37 °C to determine the numbers of naturally occurring water bacteria that are not related to fecal contamination, human-derived bacteria and warm-blooded animals. The calculation of the numbers of bacteria at 22 ° C is of less rate health but useful in evaluating the effectiveness of water treatment, while that growth at 37 ° C is an early sign of contamination (WHO, 2011) as a reason of an external source (Waar, K, 2004)

Fecal contamination indicators :- These bacteria have long been known as an appropriate microbiological indicator to identify the quality of drinking water because of its ease of detection and calculation in water (WHO, 2011). The term coliform bacteria (the total number of colon bacteria) refers to the group of gram-negative, non-constituent of blackboards, and fermented sugar lactose at a degree (35 - 37) C and a component of acid and gas within (24-48) hours, and negative for the examination of oxidase test. It shows the effectiveness of the enzyme beta-galactosidase (actgalactosidase), as well as its ability to grow in the presence of bile salts (Ali Alaa kareem,2016), Previously, this group of bacteria included four genera, Escherichia, *Citrobacter, Klebsiella,* and *Enterobacter* (Harbor, 2002)The Iraqi Standards No. 417 of 2011 ,specified the number of coliform bacteria in drinking water by no more than 10 cells per 100 ml in the case of using the most probable count method (MPN), and that 90% of the water samples examined during the year do not contain these. If the Membrane Filter Technique (MFT) method is used, then the average of the number of organisms is reduced to 1 per 100 ml, and should not exceed 4 per 100 ml in two or more consecutive 10% of the tested models. However, WHO (2004) ***Echerichia coli*** **:-** These bacteria are found in abundant numbers in human and animal feces, as their numbers may reach (910) cells per gram in the new stool. These bacteria are found in wastewater, treated wastewater, and in all-natural water and soils contaminated with modern faces originating from human, fertilizer or wild animals and birds.

These bacteria are able to grow warmly (44-45) C in complex lactose fermented media producing acid gas, as well as its ability to produce tryptophan at 44 ° C (Prager et.al., 2009). It is essential that drinking water models be free of these bacteria for the purpose of several suitable for drinking according to the Iraqi standard No. (417) of the year 2011 and the specification specified by (WHO, 2011).

Materials and Methods Study Area and Sampling

This study started from December 2018 to November 2019 for the drinking water filtration plants which are located in Babylon province, Al-Qasim city Quofan(2). In these drinking water filtration plant used chloride gas in disinfection and sometimes used powder chlorine or powder alum, It is located in the south-central part of the province of Babylon exactly in the end of Al-Shomly in Al-fidhiae city ,the power of the plant is 200 m3 \hour, the amount of discharge is 0.748 m3/m , It is consumed for irrigation, drinking, and human uses and operating is 24 hours. It distribute water to area Hey alaskary ,Hey Aljazera ,Hey Alwahda , Alfidhia ,Alshanagel ,Hey Alandlas ,Hey Alwahda2 and Hey Allosh. Samples are collected for bacteriological testes the samples have been taken through month and according to standard method 1- 250 m l of sample have been collected in glass bottle and transport to the ice box to transport to the laboratory for bacteriological test It prepares by added 8.5 g from sodium chloride in 1000 ml distilled water it use to diluted the sample of water to easy the count of numbers of bacteria in those samples Nutrient agar :- Prepare according to the company that packaging this media. Is used for account and isolation the total bacteria MacConkey broth :- It Prepare according to the company that packaging this media , is used to account and isolate bacteria gram negative bacteria especially enterobacteriacea,,Detection agent agar **:-** It Prepare according to the company that packaging this media, It used to account and isolate (*Escherichia Coli, Klebsiella pneumonia, proteus aeruginosa. Staphylococcus aureus ,Enterococcus Faecalis , Staphylococcus Saprophyticus , Entero.cloacae ,S.marcescens . P.mirabilis.* and others bacteria that listed with the media from the company, Eosin Methelene blue EBT:- Is Prepare according to the company that packaging this media ,it is used to detecte of *E.coli* bacteria , Counting of bacteria **:-** The total bacterial numbers have been determined after using the series of dilution (10X) by adding 1 ml of the original sample to 9 ml of the physiological salt solution, Then transfer 0.1 ml of each dilution to a clean and sterile petri-dish then pouring the sterilize medium on it and move the dish circular motion for the purpose of mixing the sample with the medium, after that, the plates left to harden then incubate upside down at 37 ° C for 24-48 hours. The standard dish counting method (SPC) was used to calculate the number of living bacteria by calculating the number of growing colonies on the culture medium in each dish, also the CFU have been. According to the following equation as described in APHA (2003) : Cfu= the number of bacteria colonies X $\frac{1}{upsite \ \ diluting}$ xfactor diluting.

Figure shows the studied sites (Quofan 2)

Result and Discussion

The total count of bacteria in Quofan station (1x10-270x10) CFU, the highest value is in the Q1 in December, the lowest value in Q3 in January as The results showed significant differences between month and location, see (Appendix 1). Also, the results showed the number of bacteria was above standard in almost sites of residential area and river While the number of *E.coli* rangein Quofan station was ($4x10^{-2}$ -210 $x10^{-2}$) CFU, the highest value in Q1 during March, but the lowest value in the Q3 during January . The results showed significant differences between month and location and showed the number of these bacteria were above the limitations of Iraqi standard the number of coliform bacteria was in Quofan station was (0-140) CFU the highest number in Q3 during April, and the lower number in Q4 during January, And the kind of bacteria that found in Quofan station and belong to coliform bacteria were *K.phenomonia, E.colacea, S.aureaus, S.marcense, Pseudomonas*) the results showed the number of these bacteria were above the limitation Iraqi standard. Where the results showed a correlation between the growth of bacteria and water temperature and also with TDS and EC see (Appendix 2) Some biological evidence is also used to determine the quality of drinking water, including bacterial evidence in the form of a clear indication of faecal contamination, *Escherichia coli* in the presence of colon bacteria and the presence of some bacteria such as *Streptococcus facials and Clostridium perfringens.* Evidence of faecal pollution as well as to determine the efficiency of drinking water treatment plants Governorate drinking water models give the most evidence that this water is unsafe for drinking, and this may be due to a lack of interest in sterilization drinking water in the filtering projects. In addition to the old distribution network, which serves as another source of drinking water contamination, total coliforms and Fecal coliform are present. And that indicated of the probability of total coliforms being pathogenic bacteria where the results showed that there was a correlation between total bacteria and *E.coli* and with Fecal coliform as showed in (Appendix, 2), Its presence in the water gives the impression of wastewater reaching the stations. In both cases, it must be sterilized before it is sent to the consumer. Where the results also showed there was a correlation between total hardness and chlorine in water because it has serious health implications. The presence of total coliform bacteria in large numbers as a result of water contamination with animal waste, because the group of coliform bacteria and faecal coliform are naturally present in the intestines of animals and humans. Also, the results showed the total bacteria, and *E. coli* and another faecal coliform bacteria correlate with TDS, TSS, EC, Temperature, NO3, PO4, SO4. And another physical, chemical properties which means that the presence of those bacteria depended on many several factors that can increase or decrease the presence of bacteria in water**.**

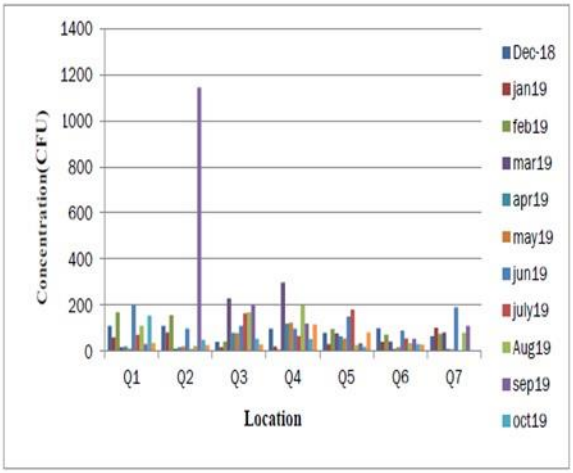

Figure.1 show the average variation of total bacteria among months in Quofan station .

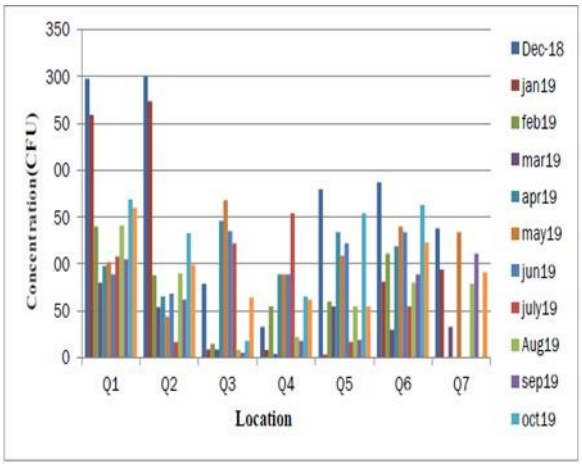

Figure.2 show the average variation of *E.coli* among months in Quofan

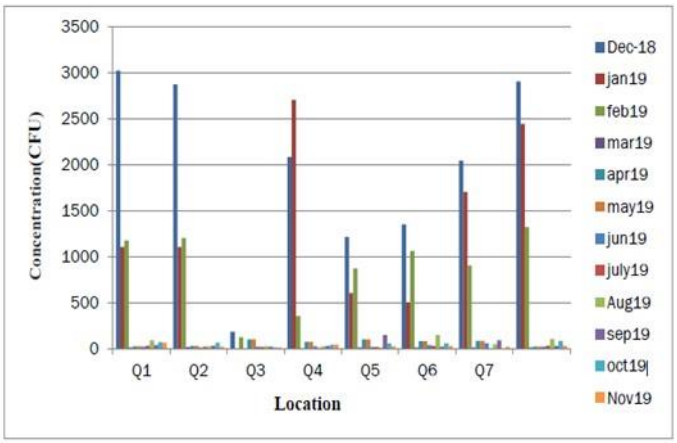

Figure 3. show the average variation of *coliform bacteria* among months in Quofan station

References

1. **Wiewel,E.(2001**).Cholera epide miology and molecular pathogenesis of Vibrio cholera Bio 444.Emergin Infectious Dis
2. **Eshcol Jayasheel, Keshapagu Sarita(2009).** Is fecal contamination of drinking water after collection associated with household water handling and hygiene practices? A study of urban slum households in Hyderabad, India
3. **WHO (2011). "**Guidelines for Drinking Water Quality " [Electronic Resource]: Fourth Edition, World Healt h Organization, Geneva, p. 541.
4. **WHO (2004).** World Health Organization, & World Health Organisation Staff. (2004). Guidelines for drinking-water quality (Vol. 1). World health organization.
5. **MOHAMMED, Alaa Kareem; ALI, Safaa Abdalrasool; ALI, Ibtisam Fareed.(2016)** Using locally isolated Chlorella vulgaris in wastewater treatment. Eng. &Tech. Journal, 2016, 34.4: 762-768.
6. **Rahaman, S. O., Harbor, P. C., Chernova, O., Barnett, G. H., Vogelbaum, M. A., & Haque, S. J. (2002).** Inhibition of constitutively active Stat3 suppresses proliferation and induces apoptosis in glioblastoma multiforme cells. *Oncogene*, *21*(55), 8404-8413.

7. **Prager, R., Fruth, A., Siewert, U., Strutz U. & Tschäpe, H. 2009**. Escherichia coli encoding Shiga toxin 2f as an emerging human pathogen. International Journal of Medical Microbiology, 299(5): 343–353. Doi: 10.1016/j.ijmm.2008.10.008
8. **APHA American public Health Association(2003).** Standard methods for examination of water and wastewater, 20th, Ed. Washington .DC, USA