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Evaluation of the effectiveness of sterilization materials added to drinking water in the elimination of the Larval stages of parasites in Al-Najaf Al-Ashraf Governorate

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ABSTRACT

The study was conducted to investigate the cysts and eggs of intestinal parasites in drinking water in four models of drinking water for water purification projects in Al-Najaf Al-Ashraf Governorate for the period from 1/10/2017 to 1/10/2018. The results of the examination of river water in four districts in Al-Najaf Al-Ashraf governorate showed the presence of five species of parasites are cysts of *Entamoeba histolytica* by 39%, and the eggs of the *Ascaris* worm by 12%, worm *Ancylostoma duodenale* by 4%, *Giardia lamblia* cysts 40%, and the eggs of *Enterobius vermicularis* by 18%. The results of the tap water examination showed that there were five types of intestinal parasites, but at a lower rate than in river water, *Entamoeba histolytica* cysts by 16%, eggs of *Ascaris* by 7%, *Ancylostoma duodenale* eggs by 2%, *Giardia lamblia* cysts by 29%, and *Enterobius vermicularis* by 5% overall.

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INTRODUCTION

Drinking water is of particular importance, necessitated by the human need for its daily consumption. It is an essential element of life. It is estimated that it needs about 2 liters per day for a person weighing 60 kg and one liter per day for a child weighing 10 kg (Amanial, 2015). Drinking water is required to be clean, fresh, suitable for human consumption and free from chemical contaminants as well as bacterial contamination as it may be the source of many epidemic diseases such as cholera and viral hepatitis, Caused by microbes or the presence of chemicals Because of the problems of surface water pollution, it has become necessary to pay attention to toxic chemical substances, (Curriero *et al.*, 1948) as well as pesticides of all three types, insecticides, herbs and molds, Studies have proved to be a major cause of diseases, especially cancerous diseases and that such pollutants reach drinking water through poor treatment of water within the Filter stations (Elliott *et al.*, 2015) that Iraq currently lacks the necessary technical capabilities to detect such contaminants. It is imperative to remain in the traditional circle to assess the efficiency of the water purification units. The World Health Organization (WHO) has stipulated that there should be a complete calibration of drinking water. The need to review the stations that are being treated (Punsawad *et al.*, 2017) Due to the low filtration and purification efficiency of many of the liquidation projects, the increasing salinity of the Iraqi rivers for the decline of water and the increase of health awareness of the citizen, in recent years, methods have been developed for the production of water filled with plastic containers and the use of ion exchange equipment and the use of ozone or ultraviolet radiation in the process of sterilization.

There have been many studies dealing with biocontamination in river water and water purification stations for various years. Scientists have been conducting studies and research to reduce these risks and purification of water, as well as proposing ways to prevent the deterioration of the physical, chemical, and biological situation (Oboh *et al.*, 2019). Estimated (Yami *et al.*, 2018) some microbiological and physiochemical properties of raw water and drinking water for three water purification projects in Karbala governorate where there was an increase in the total number of bacterium and faecal coliforms in warm months compared to cold months and observed a significant positive correlation between calcium and magnesium concentration And hydrodynamics with microbial content in water versus high negative correlation Concentration of chlorides and soluble solids (Nxasana *et al.*, 2013).

MATERIALS AND METHODS

The study included four samples of drinking water for water purification projects in Al-Najaf Al-Ashraf Governorate

1. Water purification project in the center of Al-Najaf Al-Ashraf governorate .
2. Water purification project in Kufa district
3. Water Desalination Project in Al Mashkhab district .
4. Water Desalination Project in Al - Haidariyah Area.

Samples from river water and faucet water were collected in sterile plastic containers as reported in. The samples were analyzed simultaneously at the laboratories of the Al-Najaf Environment Directorate and Al-Sadr City Medical Laboratories. The water samples were placed in test tubes and centrifuged at 2500 rpm for 10 minutes. The droplet was poured, and a drop of the residue was taken with a drop of Lugols Iodine solution. It was placed on a glass slide and covered with the slide cover and then examined thoroughly under the microscope to diagnose the cysts of primers and eggs Worms.

Statistical analysis

Percentage calculated using SPSS14 (Windows version)

RESULTS AND DISCUSSION

Percentage of intestinal parasites infection in river water

The results of the examination of river water in four districts in Al-Najaf Al-Ashraf governorate showed the presence of five types of parasites, *Entamoeba histolytica* cysts by 39%, and eggs of the intestinal roundworm *Ascaris lumbricoides* by 12%, the *Ancylostoma duodenale* by 4%, *Giardia lamblia* cysts by 40%, *Enterobius vermicularis* eggs by 18%, as in Table 1 and Figure 1.

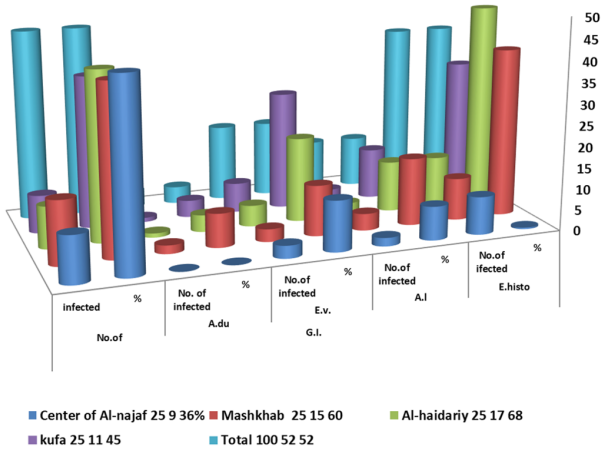

Figure 1: Percentage of intestinal parasites infection in river water

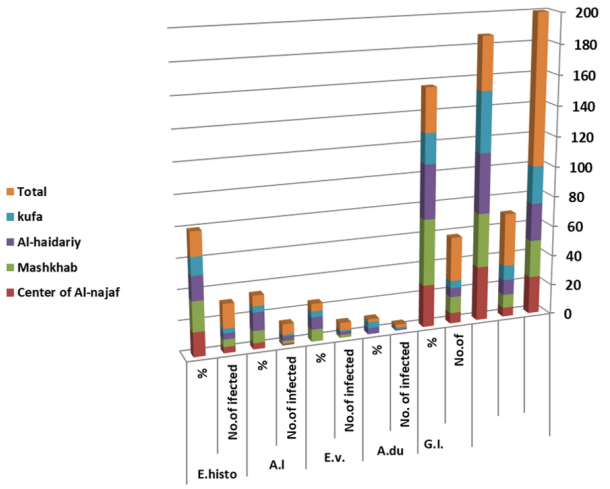

Figure 2: Percentage of intestinal parasites in tap water

Percentage of infection of intestinal parasites in tap water

The results of the present study showed that there are five types of intestinal parasites, but less than in the river water, which is *Entamoeba histolytica* cysts by (16%), Eggs of *Ascaris lumbricoides* worm by (7%), *Ancylostoma duodenale* eggs by (2%), *Giardia lamblia* cysts by (29%) And *Enterobius vermicularis* eggs by (5%), As in Table 2 and Figure 2. The results of the present study showed a high rate of pollution of river water with eggs and cysts of intestinal parasites and less pollution in the tap water provided by

Table 1: Percentage of intestinal parasites infection in river water

Area	No.of samples tested	No. of infected sample	%	Type of parasite									
				G.I. No.of infected	%	A.du No. of infected	%	E.v. No.of infected	%	A.l No.of infected	%	E.histo No.of infected	%
Center of Al-Najaf	25	9	36	11	44	-	-	3	12	2	8	9	36
Mash khab	25	15	60	15	40	2	8	3	12	4	16	10	40
Al-haidariy	25	17	68	10	40	1	4	5	20	3	12	12	48
kufa	25	11	45	9	36	1	4	7	28	3	12	8	32
Total	100	52	52	45	45	4	4	18	18	12	12	39	39

Table 2: Percentage of intestinal parasites in tap water

Area	No.of samples tested	No. of infected sample	**%**	Type of parasite									
				G.I. No.of infected	%	A.du No. of infected	%	E.v. No.of infected	%	A.l No.of infected	%	E.histo No.of infected	%
Center of Al-Najaf	25	6	36	7	28	-	-	-	-	1	4	4	16
Mash khab	25	9	36	11	44	-	-	2	8	2	8	5	20
Al-haidariy	25	10	40	6	36	1	4	2	8	3	12	4	16
Kufa	25	10	40	5	20	1	4	1	4	1	4	3	12
Total	100	35	35	29	29	2	2	5	5	7	7	16	16

the filter stations in four areas in Al-Najaf, including the conservative center, Kufa, Al-Mashkhab, Al - Haidariyah area. The proportion of suspended materials removed in the installation tanks of the filter stations was 12%. Therefore, we can consider that its efficiency is not good, This is due to the lack of water purification station for the system of determining the dose of alum, which leads to not to put the amount of alum suitable to get rid of the turbidity of water, and the entry of water to the filters with high turbidity caused by the inefficiency of reservoirs, Since the specifications, determine the turbidity of 10 units and preferably 5 units of water for the filters (Beilenhoff *et al.*, 2007). Since the value of the filters is higher, the efficiency of the filters has been reduced to 45.5%. This is a very small percentage. It is also declining efficiency of filters not to change the layers of filters whenever needed (Lifson *et al.*, 2016). Increasing the concentration of suspended substances from the limit allows the growth of bacteria, viruses, and parasites in the water, causing pollution. The results of the study showed the presence of total numbers of intestinal parasites in the water that the station pumped to the citizens, Increased turbidity makes cysts and parasitic eggs inevitable because the chlorine efficiency is inversely proportional to the hydrogen number. The higher pH values of water than 7.2 adversely affect the chlorine action. This is a powerful reason to reduce the chlorine action towards the germs and,

conversely, With temperature (Al-Shujairi, 2013). The reason for the presence of *Enterobius vermicularis*, *Ascaris lumbricoides*, and *Ancylostoma duodenale* eggs with high rates in river water is to pollute river water with human excretions in addition to defecation near the river. This is in line with the findings of (Jaggy and Koch, 1997). In the water of the faucet found the same aquatic eggs and cysts parasites found in river water, but at a lower rate may be due to damage to the pipes, which lead to the leakage of heavy water inside these pipes, which are contaminated with parasites. In addition to the weakness of the networks of sewage, where it was observed through the study that the color of the water is yellowish-green and It smells ugly and tastes unacceptable for (Michel *et al.*, 2012). The presence of these parasites in river water and tap water in the center of the Governorate, is lower than in rural areas. This may be due to lack of potable water, poor water discharge, and the spread of insects and domestic rodents, which is the main host of many intestinal parasites. The use of stored water for prolonged periods, increasing the chances of Infection of pathological stages (Nxasana *et al.*, 2013). The result of the current study showed that drinking water reaching citizens is outside the standard specifications of Iraq, Saudi Arabia, and the United States, indicating the amount of water pollution or inefficient sterilization carried out in these projects, and this corresponds to the results (Okyay *et al.*, 2004; Tsuyuoka *et al.*, 1999).

CONCLUSION

It was concluded to determine the rate of contamination of river water and tap water with eggs and cysts from intestinal parasites as well as assess the effectiveness of filters and disinfectants used in drinking water purification plants in the elimination of eggs and abscesses intestinal parasites.

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