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EPIDEMIOLOGICAL STUDY OF INTESTINAL PARASITES AMONG PRIMARY SCHOOLS STUDENT

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ABSTRACT : This study aims at assessing prevalence and associated risk factors of intestinal parasites among primary school students in Basrah city south of Iraq. 153 fecal sample from primary schools students were collected from (6-12) years groups, fecal samples were examined using simple direct smear. Investigate the proportion of the various kinds of parasites. 32.5 % were found positive showed that the infections were more in females than in males. The spectrum of intestinal pathogens were including *Entamoeba histolytica* (46.6%), *Ascaris lumbricoids* (33.3%) and*Giardia lambelia* (13.3%).

Key words : Intestinal parasitic infection, *Entamoeba histolytica*, *Giardia lambelia*, *Ascaris lumbricoids*.

INTRODUCTION

Intestinal parasitic infections are global in distribution and particularly endemic in developing countries due to lack of sanitation (Rossana *et al*, 2015) lack of access to safe water and improper hygiene; therefore, they occur wherever there is poverty. Students of all ages are affected by this cycle of prevalent parasitic infections (Al-Hindi *et al*, 2016).

Giardia lamblia, causing giardiasis, is the most prevalent protozoan parasite which affects about 200 million people being currently infected (Adam, 2000) These infections are considered as a serious public health problem, as they cause growth retardation in children and other physical and mental health problems (Fink, 2017). There is association between malnutrition and intestinal parasitism and the correlation between nutritional status and both prevalence and intensity of infections (Pestechian *et al*, 2014). Malnutrition may affect student's development, affecting even cognitive function and school performance of the students (Abera *et al*, 2017). Also, acute complications such as intestinal obstruction, severe anaemia. *E. histolytica* is the third leading cause of death from parasitic infection worldwide, with its greatest impact on the people of developing countries (Alemayehu *at al*, 2015). According to World Health Organization (WHO) showed that approximately 50 million people worldwide suffer from invasive amoebic infection each year, resulting in 40-100 thousand deaths annually (John *et al*, 2010).

Ascariasis is a helminthic infection in humans caused by the nematode *Ascaris lumbricoides* (Alemayehu *at al*, 2015). The infection is acquired by the ingestion of the embryo nated eggs and the larvae pass through a pulmonary migration phase for maturation CDC (2016). It has been estimated that over 1.4 billion people throughout the world are infected with *A. lumbricoides* (Alemayehu *at al*, 2015). The aim of our study is to detect the prevalence of intestinal parasitic infection among primary school students.

MATERIALS AND METHODS

Sampling and laboratory techniques

A cross-sectional survey was carried out from September to December 2019 in Basrah, Iraq, to identify the intestinal parasites and their prevalence among primary and secondary school students.

153 stool specimens were collected, in sterile containers of 30 ml capacity which contain 10% formalin. Examination of protozoan and helminths Stool specimens were transported very rapidly to the laboratory and examined to avoid disintegration, Examination of faecal samples was done by Direct method for adult worms and body parts, an appropriate amount of the sample was taken and put on glass slide and drops of salt solution 0.9% were put to diagnose eggs, as the initial cyst were diagnosed with the addition of drops from Lugois iodine to dye these and Covers slips were put and microscope was used with 40x, 10x magnification force (Wolfe, 1992)

Hematological Parameter measurements

Hemoglobin Concentration (g/100 ml) was calculated by Sahli method (Coles, 1980).

PCV (%) using Microhaematocrite method was calculated (Sood, 1987).

Total number of white blood cells (WBCs) was calculated (Coles, 1980).

Biochemical testes

Serum phosphor concentration (mmol/L) was measured by using the Linear chemical test kit and the Spectrophotometer (Deadre, 1977).

Zinc Test was done depending on colorimetric test (Deadre, 1977).

Serum ferritin concentrations were analyzed using VIDAS Ferritin kit (bio Merieux SA).

Serum Iron concentration was determined by a TPTZ-colorimetric assay using IRON-TPTZm Test (Itano, 1978) .

Statistical analysis

Statistical analysis of the results of the experiment was done using the Statistical Package for the Social Science, Version 20 (SPSS) (2008), the averages at the probability level ($p < 0.05$) according to the Dunkin test (Duncan, 1955).

RESULTS AND DISCUSSION

Out of 153 stool samples, 25 (32.5%) samples had one or more intestinal parasites. Males had lower positive rate (15.7%) than females (16.8%) (P>0.05) (Table 1). *Entamoeba histolytica* (46.6%) was the commonest parasite followed by Ascaris lumbricoides (33.3%). The other parasites detected were *Giardia lamblia* (13.3%) (Table 2).

The highest positive rate was found among student of age group 6-8 years (18.1%) and the least among those 9-12 years (10.2%) (P>0.05) (Table 3).

Table 1 : The distribution of infection in different genders.

Schools	Total	Positive(%)	P-value
Female	83	14(16.8)	P>0.05
Male	70	11(15.7)	
Total	153	25(32.5)	

Table 2 : Frequency of intestinal parasites detected.

Parasites types	Frequency %
Entamoeba histolytica	7(46.6)
Giardia lamblia	2(13.3)
Ascaris lumbricoides	5(33.3)
Total protozoa and worms	15(93.2)

Table 3 : Distribute the infections in different age groups.

Age group	Total	Positive(%)	P value
6-8 years	77	14(18.1)	P>0.05
9-12 years	76	8(10.2)	
Total	153	22(28.3)	

Infection with intestinal parasites on some haematological parameters shown in Table 4, Figs. 1, 2, 3, 4, 5, 6, 7.

The results showed the average of haemoglobin of the students infected within testinal parasites was 9.5g/dl while the non-infected rate was 13.0g/dl the statistical test showed that there is a significant differences at level $p \leq 0.05$.

In the current study, the average PCV rate for student within testinal parasites was 34% while the non-infection group of students had 41%, the statistical test showed asignificant differences at the level of $p \leq 0.05$.

The number of white blood cells for student infected within testinal parasites is 6500 cells/mm^3, where as the non-infected student sample number was 9000 cells/mm^3, Statistical analysis showed highly significant differences at $p \leq 0.05$ level.

The result of Blood serum Phosphorus, zinc, iron and ferritin concentration of a group of students infected with intestinal parasites and control group of the current study showed that the average concentration of phosphorus in the blood serum of the infected student was 2µg/dl, while the control group had phosphorous element concentration with 2.77 µg/dl, Statistical analysis showed that there were no significant differences at $p \leq 0.05$.

Zinc results showed that the average concentration in the serum of infected student was 73.27 µg/dl, while the average concentration in non-infected student was 83.4 µg / dl, the Statistical analysis showed a significant differences at $p \leq 0.05$.

Iron results showed that the average concentration in the serum of the infected student was 46.05 µg / dl while the average iron concentration of non-infected student was 105 µg/dl, the Statistical analysis showed a significant differences at $p \leq 0.05$. Ferritin results showed that the average concentration in the serum of infected student was 26.20 µg/dl while the average ferritin concentration of non-infected student was 133.97 µg/dl, the Statistical analysis showed a significant differences at $p \leq 0.05$.

The results of the study showed the significant differences in hematological tests between infected and non-infected students, and the reason is due to the effect

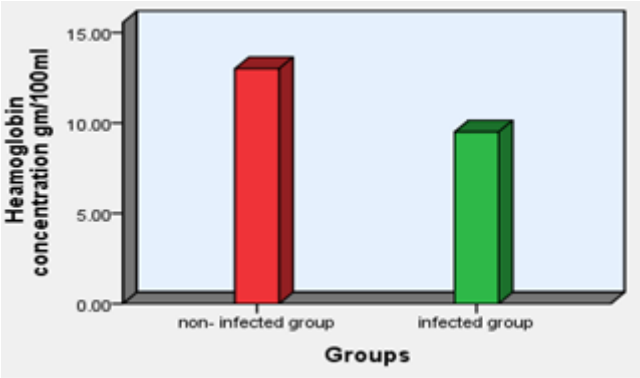

Fig. 1 : Hb concentration of Non-infected and infected group with parasites.

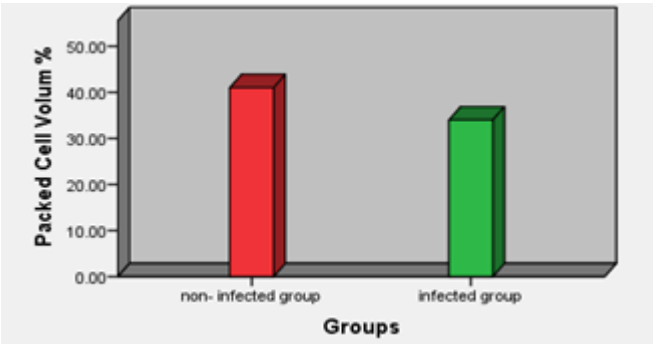

Fig. 2 : PCV% of Non-infected and infected group with parasites.

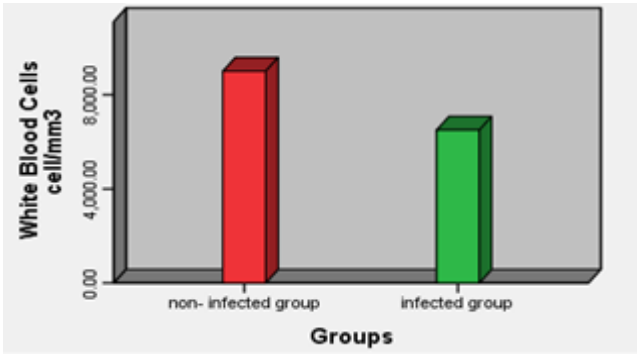

Fig. 3 : White Blood Cells count of non-infected and infected group

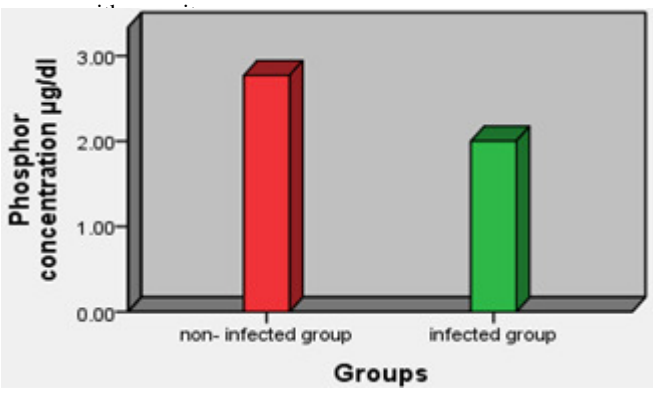

Fig. 4 : Serum Phophor concentration of Non-infected and infected group with parasites.

of parasites on blood cells and upon intestinal mucosal vessels (Benjamin, 1919).

Abnormal haemoglobin level can resulted in Anemia

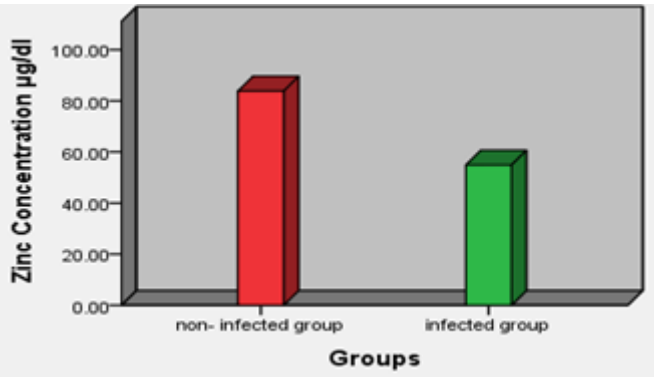

Fig. 5 : Serum Zinc concentration of non-infected and infected group with parasites.

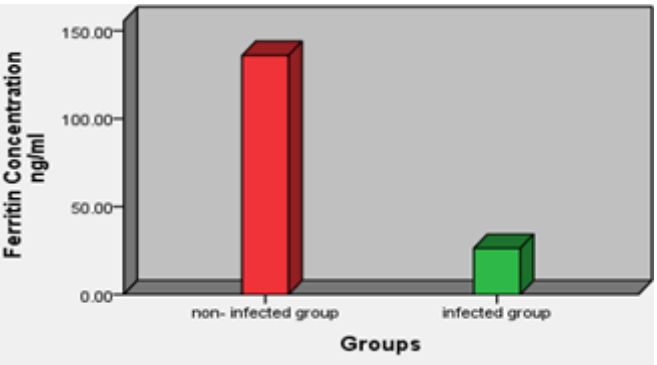

Fig. 6 : Ferritin concentration of non-infected and infected group with parasites.

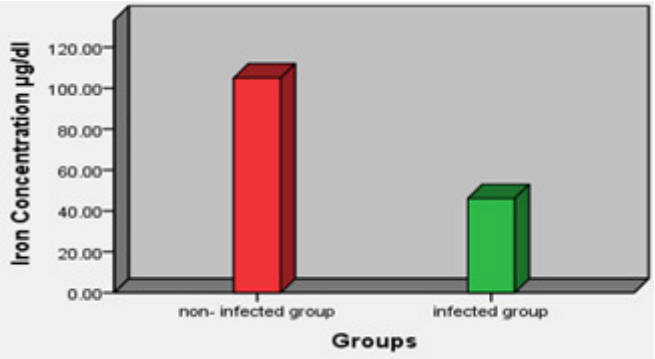

Fig. 7 : Serum Iron concentration of Non-infected and infected group with parasites.

as a cause of iron deficiency It is mainly expected that about 40% of school students in developing countries of the cases of anemia are due to low intake of iron due to poor absorption of nutrients. Which is an important public health problem that caused by protozoan parasites (Rossana *et al*, 2015; Banu e*t al*, 2014).

Entamoeba histolytica is the most protozoa that infect children and interacts to the mucous layer of the small intestine, resulting in villous atrophy in different levels, besides triggering infiltration of inflammatory cells and crypt hypertrophy. These processes disrupt the enterocytes and change the metabolism of bile acid that affects the absorption of most nutrients, which are essential for body, such as vitamins, iron, zinc and folic

Table 4 : Hemoglobin count (Hb), Packed Cell Volume (PCV), White Blood Cell Counts (WBCs %) and Serum Concentration of phosphor, Zinc, Ferritin and iron in the intestinal parasite group compared with the control group.

Groups		Sample number	The average + SD
Hb (mg/100ml)	Infections	50	9.5±0.17
	Non infections	50	13.0±0.13
PCV%	Infections	50	34 ±1.70*
	Non infections	50	41±0.81
WBCs (Cell/mm^3)	Infections	50	6500±0.001*
	Non infections	50	9000±0.0001
Serum Phosphor concentration (g/dlμ)	Infections	50	2.0±0.4653
	Non infections	50	2.77±0.1732
Serum zinc concentration (g/dlμ)	Infections	50	54.85±3.23*
	Non infections	50	83.80±3.20
Ferritin concentration (ng/ml)	Infections	50	26.20 ±22.16*
	Non infections	50	135.97 ± 54.03
Serum iron concentration (g/dlμ)	Infections	50	46.05±2.10*
	Non infections	50	105.0±2.160

*The statistical analysis showed a significant differences using the Chi square (χ^2), $p \leq 0.05$ between the percentage of infection in parasites and the age groups of primary schools.

acid and causing anemia (Da Silva *et al*, 2016).

As for *Giardia lamblia* acute or chronic diarrhea may occur leading to food deficiency due to the spoiling of the mucosal barrier surface. This destruction result in malabsorption of iron as it infects the duodenum, which is the main site of iron absorption (Wolfe, 1992).

The high load of parasites in the intestine may also spoil the absorption mechanism (Pestechian *et al*, 2014).

Ascaris lumbricoides can cause anemia due to several reasons : Iron enters the composition of its egg in a considerable quantity (Schimmelpfennig *et al*, 1902; Liao *et al*, 2016).

Death of the warm in the intestine causes a rapid disintegration of its tissue and libration of toxic substances before it passes out of the host, also it contains oxyhemoglobin in its bodyfluid and sucks blood by the structure of the mouth parts causing lesions in the mucosa of the intestine and lacerating the smaller blood vessels (Liao *et al*, 2016).

The proportion of infections in primary schools can generally depend on the degree of personal immunity and because that primary school category is the least knowledgeable of hygiene conditions such as not washing hands, fruits, vegetables and the possibility to transmit the infection during playing and exchanging food between students (Liao *et al*, 2016).

As for the distribution of intestinal parasite infection among primary school students, *E histolytica* was one of the most prevalent followed by *G. lambilia*. for the worms, *Ascaris lumbricoids* was the predominant. The reason of the high percentage of *E. histolytica* was : direct method of transmission through contaminated food and water, insufficient interest in personal hygiene, fecal pollution of water and food with domestic flies by transferring the cysts mechanically (Egbuobi *et al*, 2014). The infection of *G. Lambilia*, is due to the airborne transmission of this parasite from one region to another (Korkes *at al*, 2009). Its prevalence may be attributed to the consumption of contaminated drinks and foodstuffs, as their cysts remain alive and distressing in a person for two months in water and resist chlorine (Lass *et al*, 2017). Lack of attention to health conditions and low social level are also reasons for the prevalence of this type of parasite at a high rate (Haftu *et al*, 2014). The study region drinking water system was also contaminated with *G. lamblia* that result in a high rate of infection (Abossie *et al*, 2014).

As for infection with intestinal worms, the high proportion for the *Ascaris lumbricoids* parasite was due to the contamination of the eggs of this parasite, insufficient attention to hygiene, lack of use of sanitation and the use of human feces as fertilizer for vegetables (Tefera *et al*, 2017). On the other hand, the strong resistance of *Ascaris lumbricoids* eggs to health conditions and chemicals and the laying of worms to a high number of eggs all of these factors help. The spread

of this parasite widely in various parts of the world (Ali, 2016).

CONCLUSION

Intestinal infection of parasites is one of the most important public health problems among primary school students that cause's growth retardation. Food safety and health education should be increased to raise awareness of the society. Also the health office must give attention to the early detection of this serious problem especially in the very poor regions.

Conflicts of interest

The authors declare no conflicts of interest.

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