

Study Of The Prevalence Of Some Intestinal Parasites And Its Effect On Some Blood Parameters Aspect Among Children Patients Of Al Muthanna Province / Iraq

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Abstract: The present study was carried out in Al Muthanna province through the period from June, 2017 to May, 2018. A (551) and (566) of stool samples were collect from urban and rural respectively from children under 12 years. The percentages of prevalence in urban and rural monthly changes (highest and lowest) were: *Entamoeba histolytica* (urban: 21.41%, rural: 23.49%, and total: 22.47%, urban: 28.12% in July, 5.0% in January, rural: 31.74% in June, and 5.0% in January). *Giardia lamblia* (urban: 21.41%, rural: 27.20 and total: 24.35, urban: 31.03% in June, 5.0% in January, rural: 36.50 in June, 0.0% January) and *Enterobius vermicularis* (urban: 12.15%, rural 21.55%, and total: 216.92%, urban: 15.51% in June, 5.0% January, rural 29.03 in July, 0.0% in January) respectively. The incidence according to the age and sex of children was: *E. histolytica* (10-24% in male), (18-24% in female), *G. lamblia* (13-12% in male and female), the highest infection at age groups (3-6), (6-9) in both sexes of the two parasites, and *E. vermicularis* (13-12% males and females), the most affected at age group (3-6). There is a significant effect of age and sex of incidence at (0.01). The mean \pm standard deviation (SD) of hemoglobin (Hb), packed cell volume (PCV) and white blood cell (WBCs) for (20) patients and (20) control were as following: *E. histolytica* (Hb 9.88 ± 0.455 , PCV 31.61 ± 1.359 , WBCs 9.55 ± 2.81), *G. lamblia* (Hb 9.71 ± 0.519 , PCV 31.12 ± 1.549 and WBCs 7.94 ± 1.117) and *E. vermicularis* (Hb 9.62 ± 0.423 , PCV 30.84 ± 1.265 and WBCs 8.22 ± 0.767) and control group (Hb 11.01 ± 2.597 , PCV 36.73 ± 0.475 and WBCs 7.41 ± 1.179). Statistical analysis showed a significant effect of the three parasites on the level of Hb at (0.05), PCV and WBCs at (0.01).

Keywords. *Entamoeba histolytic*, *Giardia lamblia*, *Enterobius vermicularis*, Seasonal changes, Urban, Rural.

INTRODUCTION

Human is a broad host of most parasites, especially intestinal, whether primary or intestinal worms and the incidence of these parasites are increasing in poor countries in tropical and subtropical regions. Intestinal parasites such as *Entamoeba histolytica*, *Giardia lamblia* and *Enterobius vermicularis* are the most common parasites in the third world because their spread is related to climatic conditions, high temperatures, excessive humidity and poor

social and economic conditions such as poverty, lack of clean water supply and low level of health services.

The importance of intestinal parasites comes through their infected the children in most developing and poor countries for the ease of infection in most of their species through contaminated food and water [1, 2]. All ages are susceptible to infected by intestinal parasites, but children are more likely to be infected because of their age and lack of awareness [3]. These parasites are either unsatisfactory or satisfactory that attack the tissue and its damage, depending on the parasite type and its number and infection duration, food, environmental factors, age and gender [4]. The intestine, especially the large intestine, is more sensitive because of its slow movement giving the parasite an opportunity to attack its mucus layers causing inflammation [1, 2]. Intestinal parasites cause diarrhea, which is one of the most important signs of the disease in children under five years and is also one of the causes of child mortality in the world [5]. Intestinal parasites infect most organs of the body and lead to complications sometimes ending with death [6]. And have the potential to reproduction in large numbers, which leads to not completely eliminated [7]. Intestinal protozoa are easily transmitted through contaminated water and food with infectious cysts, which are different in their resistance to infectious and intestinal juices [8]. Therefore, the infection of intestinal parasites causes malnutrition and anemia and slow in physical and mental development [9]. Due to the importance of the parasites came this study as a scientific reference of the health and education departments in Al Muthanna Governorate in order to maintain the health of children in Iraq.

MATERIALS AND METHODS

Samples were collected from different areas in Muthanna Governorate (Samawah, Warka, Rumaiytha, Al-Majid, and Al-Hilal) from June 2017 until May 2018. Five hundred Fifty-one samples were collected from the urban areas and five hundred sixty-six from the ruler areas were collected from children under one year to 12 years old who attend the health centres and hospitals in the above-mentioned areas.

Laboratory analysis

Each stool sample is examined in terms of texture, color and smell. Liquid stool is more contain active trophozoite phases and should to be examined quickly before 30 minutes passed [10], the cyst phase present incomplete stool. Amebic dysentery caused by *E. histolytica* is smelly with blood and mucous substance. In the case of *Giardia*, the stool is yellowish, greasy and mucous [11].

Stool Microscopic Examination

A stool sample is taken with a wooden stick and divided into two sections on each end of the slide and then a drop of normal saline is added to one side of slide in order to detect the trophozoite and cysts phase of the protozoa as well as the red and white blood cells. A drop of Iodine is added on the second side of slide and mix well until the starch is become dark brown, the nuclei of cysts phase in red color and cytoplasm in light yellowish brown, then the cover is put on slide and examined by microscope to find the trophozoite of protozoa [12].

Vaseline - Paraffin Technique

The skin surrounding the anus and its folds are wiped with a swab and then placed in the glass tube. One-third of the tube is filled with Xylene, which is sufficient to immerse the

swab and leave it's for (2-5) minutes. And the tube is centrifuged for one minute. The residue is examined microscopically to diagnose the *E. vermicularis* eggs

Blood samples

Blood samples were taken from patient children (who infected with intestinal parasites) and control group (who did not infect). The white blood cells (WBCs), packed cell volume (PCV), and hemoglobin (Hb) were measured by Hematocytometer analyzer.

Statistical analysis

The square was used to determine the statistically significant differences in incidence rates between rural and urban areas, monthly changes, rates of infection between males and females and different age groups, and to know the effect of parasites on the level of some blood parameters.

RESULTS AND DISCUSSION

The result of present study show that the total infection with *E. histolytica* was 22.4 % table 1 that is agreement with Kadhum [13] in Baghdad, Iraq. Al Nakhas et al. [14] in Kuwait and Al Gharawi [15] in Karbala, Iraq, table 4, results were higher than other authors such as Morsy 1991: Agi [16], Saygi et al. [17], Al Dujaili [18] Perez et al. [19] Youssef et al.[20], Nazali et al. [21], Hussein [22] and lowest than Al Yassaree [23], Sheinin [24], table 4.

Table 1. The monthly changes of the prevalence percentage of (*E. histolytica*, *G. lamblia* and *E. vermicularis*) in the urban and rural areas.

Months 2017- 2018	No. of examined samples		<i>E. histolytica</i>				<i>G. lamblia</i>				<i>E. vermicularis</i>			
			Urban		Ruler		Urban		Ruler		Urban		Ruler	
	Urban	Ruler	No. of infected samples	Prevalence %										
June	58	63	16	27.58	20	31.74	18	31.03	23	36.50	9	15.51	17	26.98
July	64	62	18	28.12	19	30.64	17	25.56	21	33.87	9	14.06	18	29.03
August	70	72	16	22.85	19	26.38	17	24.28	23	31.94	8	11.42	17	23.61
September	51	54	12	23.52	15	27.77	13	25.49	18	33.33	6	11.76	13	24.07
October	48	49	10	20.83	12	24.48	9	18.75	14	28.57	5	10.41%	11	22.44
November	40	39	8	20	9	23.07	7	17.50	12	30.76	4	10.00	10	25.64
December	30	32	4	13.33	5	15.62	4	13.33	5	15.62	3	10.00	5	15.62
January	20	21	1	5	1	4.76	1	5.00	0	0.00	1	5.00	0	0.00

February	25	27	2	8.0	1	3.70	2	8.00	1	3.70	2	8.00	4	14.81
March	40	44	6	15.00	5	11.36	3	7.50	4	9.09	5	12.50	6	13.63
April	51	48	13	25.49	12	25.00	12	23.52	15	31.25	7	13.72	12	25.00
May	54	55	12	22.22 %	15	27.27 %	15	27.77 %	18	32.72 %	8	14.81 %	9	16.36
Total	551	586	118	21.41 %	133	23.49 %	118	21.41 %	154	27.20 %	67	12.15 %	122	21.55
Total infection	1117		251, 22.47 %				272, 24.35 %				189, 16.92 %			

The result of total infection of the children with *G. lamblia* are 24.35 % that is similar with Dib *et al.*, [25] who was recorded 23% in Khathmanclu, Knut-Arne [26] 25% in Ethiopia, Al Mekhelfi *et al.*, (2005) (15-20%) in Saudi Arabia and results were higher than the results of other authors such as Youssef *et al.* [20], Hussein [22],.....etc. table 4. The total infection of children with *E. vermicularis* was (19.91%) which that is less than results recorded by Perez *et al.* [19], (20.4 %) in Spain and Al Nakhas *et al.* [14], (74.6%) in Kuwait, but more than the result reported by; Agi [16], Sayg *et al.* [17], Al Yasseeri [23], Al Gharawi [15], table 4.

The result of study showed that the infection of intestinal parasites (*E. histolytica*, *Giardia lamblia*, *E. vermicularis*) in urban and rural areas were: (21.41 %, 23.49 %), (21.41 %, 27.20 %), and (12.15 %, 21.55 %) respectively, these results are less than Azazy and Al Tiar [27] in *E. histolytica*, *Giardia lamblia* in Yemen and Shnawa [28] in Iraq , table 4. [29, 30, 31] found high infection in rural areas compared with urban areas. The result of present study showed that the number of the sick children that infection with amoebic dysentery (the infection with *E. histolytica*) in the urban areas during months of the year were different, as it was high in the spring and summer months, the highest of which in July (28.12 %), as well as the autumn months where it reached in September (23.52 %) and then gradually decreased until the winter, with the lowest rate in January (5.0%). The infection of children with amoebic dysentery in the rural areas were higher than urban areas during months of the year as they were high in the spring and summer months, and the highest value (31.74%) in June (table 1). The results were in the line with studies of [31] in Al Najaf and [15]. The results of the children infection with *G. lamblia* in the urban areas showed a marked variation during the year months, which was high during the spring, summer and autumn months, the highest in the June (31.03%) and decreased during the winter months, which reached in the January (5.0%), either in the rural areas, the result showed a remarkable increase than in the urban areas and varied during the months of the year where the peak was in June (36.5%), with the spring, summer, and autumn months showed an increase in infection, while the winter months declined and the lowest was in January (0.0%), table 1. The monthly changes in the incidence of *G. lamblia* were indicated by Mallah [32] and Al Turki, [29] in Al Muthanna, also [31] in Al Najaf and [15] in Karbala. The result of study showed that the infection of children with *E. vermicularis* in the urban areas were varied during the months of the year, but it was high during the spring and summer seasons and decreased the winter months and the highest value in June (15.51%) and the lowest value in January (5.0%), table (1), in rural areas, children infection during the months of the year were varied as they were high during the spring, summer, and autumn and were lower during the winter months and reached the highest value in July (29.03%) and the lowest in January (0.0%), [15] recorded the monthly

changes of infection of G lamblia and it was higher in spring, summer, and autumn months but it was lower in the winter months. Salman [33] and Sheinin [24] recorded the highest infection of children infected with intestinal parasites through spring, summer, and autumn months but the lowest in the winter months. The variation in the prevalence rates depending on study months and the sample size [34]. Knut- Arne [26] recorded (25.8%) among children prevalence in the dry season and (39.8%) in the wet season in Ethiopia.

This is due the effect of temperature, it seems that the low temperature and cold weather have a significant impact on infection of parasites and even in the high and mild temperature, with presence the moisture, and the parasites vectors such as insect contributed together to the activation of the infections [35]. As for the relationship of sex with parasitic infection, there was similar in results of parasitic infection in males and females, where percentage of E histolytic was (22%) for the both sexes, at G lamblia (25%) for males and (24%) for females and in the E. vermicularis (17%) for males and (16%) for females, there is a significant effect of sex in the incidence of the intestinal parasites, table (2).

Table 2. The percentage of infection of (*E. histolytica*, *G. lamblia* and *E. vermicularis*) in the human according to age and sex.

Age category / year	Sex	<i>E. histolytica</i>		<i>G. lamblia</i>		<i>E. vermicularis</i>	
		No. of infected samples	Percentage of infection	No. of infected samples	Percentage of infection	No. of infected samples	Percentage of infection
<3 year	Male 51 %	24	19 %	26	21 %	17	13 %
	Female 52 %	22	18 %	25	21 %	15	13 %
<6 year	Male 73 %	34	24 %	37	26 %	30	21 %
	Female 70 %	29	23 %	32	25 %	27	21 %
<9 year	Male 68 %	38	24 %	41	26 %	27	17 %
	Female 66 %	35	23 %	37	24 %	25	16 %
<12 year	Male 54 %	35	21 %	38	23 %	26	15 %
	Female 60 %	34	22 %	36	23 %	22	14 %
Total	Male 64 %	131	22 %	142	25 %	100	17 %
	Female 62 %	120	22 %	130	24 %	89	16 %

The result of the current study were agreement with [15, 31, 33, 36, 37, 38], all these authors have found the infection with intestinal parasites among males more than females children, this due to the male children movement and paly outside of the home [36, 37].

The result of the current study were disagree with [24, 29, 39] who they found the infection in females children more than males and they said that may be no effect for sex factor on the prevalence and attributed to same opportunities and conditions that available for both sexes and [40] found that the prevalence of the *E. vermicularis* is not associated with gender. *E.*

histolytica recorded an infection range (10-24%) in males and (18-23%) in females. The highest incidences was in the age groups (3-6) and (6-9) in both sexes. The infection rate of *G. lamblia* in male children (21-26%) and in female (21-25%), also the highest range of infection was in the two groups (3-6) and (6-9) in both sexes, table (2). While the infection of *E. vermicularis* was (13-21%) in males and females. The most affected age group is (3-6). The statistical analysis showed a significant effect of sex and age in the percentage of infection of the intestinal parasites in this study at (0.01). The result of the current study were agreement with [15, 41] who found the high infection in males at age group (3-6) and in females at age group < 3. For *E. histolytica* and *G. lamblia*, but in *E. vermicularis* at age group (9-12). [24] reordered the highest prevalence at age 7 years for *E. histolytica* and at 9 years for *G. lamblia*. [42, 43] found the highest infection at age (5-9) [8, 23] reported an infection in the under 15 age group. Studies in Iraq indicated that there are differences in the incidence rates according to the different age groups [44, 45].

The percentage of hemoglobin of infection patients with *E. histolytica* was (9.88±0.46), *G. lamblia* (9.71±0.52), and *E. vermicularis* (9.62±0.42) and control group (11.01± 2.6), while the packed cell volume (PCV) were (31.61±1.36), (31.12 ±1.12), (30.84 ±1.27) for parasites respectively and in control group (36.73±0.48), and white blood cell (WBCs) were (9.55± 2.81), (7.94 ±1.12) (8.22 ±0.77) for parasites and in the control (7.41 ±1.18), statistical analysis showed a significant effect of the three parasites on the level of Hb at 0.05. PCV and WBCs at 0.01 as presented table 3.

Table 3. The mean and standard deviation of some blood parameters of the control group and patients with parasites (*E. histolytica*, *G. lamblia* and *E. vermicularis*) in a human.

Blood parameters	Mean ± Standard deviation (SD)			
	<i>E. histolytica</i>	<i>G. lamblia</i>	<i>E. vermicularis</i>	Control
Hemoglobin (Hb)	9.88 ± 0.46	9.71 ± 0.51	9.62 ± 0.42	11.01 ± 2.52
Packed cell volume (PCV)	31.61 ± 1.36	31.12 ± 1.55	30.84 ± 1.27	36.73 ± 0.48
White blood cell (WBCs)	9.55 ± 2.81	7.94 ± 1.12	8.22 ± 0.77	7.41 ± 1.18

The results of the present study indicate that the Intestinal parasites affect the level of blood parameters in infected children where the mean of hemoglobin and the packed cell volume is less than the normal range and as shown in table 3 is compared with control group, these results are consistent with the results of the study of [24, 46], where they found that there was a decrease in hemoglobin in affected children with *E. histolytica* and *G. lamblia*.

Also, there is an increase in the number of white blood cells in infected children in compared to healthy children (control group), it is known that the infection of intestinal parasites leads to inflammations and also cause scratching or attacking of the body tissues and this may lead to bacterial infections lead in turn to increase white blood cells. Where *E. histolytica* caused necrosis of the intestinal mucosa this causing the breakdown and atrophy of the absorption sites of an intestine, this process is accompanied by bleeding hemorrhage [47]. Anemia occurs in late cases of liver damage, abscesses and heart damage and is responsible for deaths due to low hemoglobin level [48], and it causes colitis [49] appendicitis [50, 51], the liver abscess [51, 52, 53, 54, 55], venereal amobiasis, penile and vaginal amobiasis [56, 57] and

blood with mucus in the feces [58, 59]. While *G. lamblia* covered the absorption sites of vitamins and essential nutrients, acting as a barrier of the transfer of these substances from the intestinal cavity into the bloodstream [60], as a result of the thick cover made up from the flagella associated with intestine membrane and lead to it overlapping with the absorption of these materials [61]. *E. vermicularis* causes for children anorexia, weight loss, irritability, emotional instability and enuresis [62], in women, the parasite move into vulva, vagina, to external orifice of uterus, and onwards to uterine cavity, fallopian tubes, ovaries and peritoneal cavity [40], this can causes vulvovaginitis, vaginal discharge and pruritus [62].

Table 4. Comparison of the current study with previous studies.

Country	<i>E. histolytica</i> Prevalence %	<i>G. lamblia</i> Prevalence %	<i>E. vermicularis</i> Prevalence %	Sample size	Source
Iraq, Baghdad	21.1 %	15.9 %	2.3 %	---	Kadhun, 1989
Egypt	7.8 %	9.0 %	0.9 %	---	Morsy, 1991
Iraq, Karbala	3.5 %	9.9 %	1.1 %	1858	Al- Dujaili, 1993
Spain	0.3 %	5.1 %	20.4 %	1917	Perez et al., 1997
Yemen	3 % (Urban), 3.5 % (Ruler)	9 % (Urban), 11 % (Ruler)	--	958	Azazy and Al-Tiar, 1999
Iraq, Basra	13.6 % (Urban), 8.4 % (Ruler)	13.6 % (Urban), 4.2 % (Ruler)	20.04 (Urban), 3.15 (Ruler)	---	Shnawa, 2000
Turkey	13.3 %	11.7 %	---	---	Nazliqul et al., 2001
Kuwait	21.2 %	11.4 %	74.6 %	---	Al- Nakkas et al., 2004
Iraq, Babylon	29.5 %	---	13.7 %	---	Al-Yassaree, 2004
Iraq, Nassyria	41.5 %	19.5 %	---	439	Sheinin, 2005
Iraq, Baghdad	16.9 %	3.78 %	---	3195	Hussein, 2009
Iraq, Karbala	20.31 %	15.96 %	5.99 %	2036	Al- Gharawi, 2015
Iraq, Muthanna	22 %	24 %	16 %	1117	Present study

CONCLUSION

1. The prevalence percentage of intestinal parasites between children at age groups (3-9) and (6-9) were higher than others groups.
2. The infection rates of intestinal parasites were high through the spring, summer and autumn months.
3. The distribution of intestinal parasites infection was in rural areas more than urban areas.
4. The sex and age have a significant effect on infection of children with intestinal parasites.

5. The infection of children with *E. histolytic*, *G. lamblia* and *E. vermicularuis* effected a significant on the some blood parameters (Hemoglobin, Packed cell volume, White blood cells).

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