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CLINICAL RESEARCH

Prevalence of Intestinal Parasites & Associated Risk Factor in Al-Shokria Village Al-Gazira State

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ABSTRACT

OBJECTIVE

Intestinal parasitic infection represents a major health problem in Sub-Saharan as the prevalence count in the region as high as 90% in central Sudan with socioeconomic subsequence's therefore the study aimed to assess the species, prevalence of intestinal parasite and the associated risk factor in a representative sample in El-Shokria village at Al-Gazira state.

METHODS

This is a cross sectional study; Stool sample were collected from 398 villagers. Study subjects were selected using random sampling method. Data were gathered through direct interview using a pretested questionnaire. The collected stool samples were examined microscopically for the presence of egg, cyst, larvae and trophozoites of intestinal parasites using direct saline smear and formal ether concentration methods. Data entry and analysis were done using SPSS program.

RESULT

Out of 398 study subjects, 194 (48.7%) were found to be infected with intestinal parasite. Most of the cases were single infection 160(82.4%) only 24(12.3%) were double infection Giardia lamblia with *Hymenlopis* nana the prevalence of intestinal parasite was to be high in age group (0-12) compared to other age group. The predominant intestinal parasite was *Entamoeba histolytica* (47.4%) followed by *Giardia lamblia* (44.3%), *Hymenlopis nana* (18.5%) and *Enterobius vermicularis* (2.0%).

CONCLUSION

This study suggests Intensive health education on personal hygiene and environmental sanitation is needed. Implementing of the formal ether technique in the diagnostic lab to increase the diagnose sensitivity.

KEYWORDS

Prevalence; Intestinal parasites; Al gazira state

INTRODUCTION

Parasites are more common in the developing world where untreated ground water is consumed by the majority of rural people [1]. This is a public health problem with an estimated 3.5 billion people being infected worldwide and the majorities are children [2,3]. Socio-economic factors such as poor hygiene, lack of safe water and sanitation facilities and low socio-economic status are known to play a pivotal role in susceptibility to infection [4].

The distribution and prevalence of various species of intestinal parasites also differs from region to region because of several environmental, social and geographical factors. Hence, study on the prevalence of various intestinal parasitic infections is a prerequisite not only for formulation of appropriate control strategies but also to predict risk for communities under consideration. Although several studies have been conducted on the distribution and prevalence of intestinal parasites [5], there are still several localities for which epidemiological information is not available. Intestinal parasites as generally classified into two phylum protozoa and helminthes.

Intestinal Protozoan Infections

Protozoan parasites consist of a single "cell-like unit" which is morphologically and functionally complete and can perform all functions of life. The protozoal parasite possesses the property of being transformed from an active (trophozoite) to an inactive stage, losing its power of motility and enclosing itself within a tough wall. The protoplasmic body thus formed is known as a cyst [6].

Intestinal protozoa of importance to man are *Entamoeba histolytica* and *Giardia duodenalis* and others opportunistic protozoa such as *Cryptosporidium* species and *Isospora* species have been identified as the causes of diarrhea in children and immunocompromised patients. Other protozoal intestinal infections have restricted distribution (*Balantidium coli*) or are widely distributed but not pathogenic (*Entamoeba coli*, *Dientamoeba fragilis*, *Trichomonas hominis*). *E. histolytica* affects about 10% of the world's population or 480 million people [7], however this infection can be as high as 25% in certain areas of underdeveloped tropical countries.

Intestinal Helminthic Infections

Helminths are trophoblastic metazoan (multi-cellular organisms). Helminths are classified into two broad groups, the cylindrical worms belonging to the Phylum Nemathelminths (Class Nematoda) commonly called Nematodes (from Nema-thread) and the flat worms belonging to the Phylum Platyhelminthes (from Platys-flat). The flat worms in turn are classified into two categories-the leaf-like Trematodes (Class Trematoda) or flukes and the tape-like Cestodes (Class Cestoda) or tapeworms [8].

Intestinal helminths of importance to man are *Enterobius vermicularis* (pinworm), soil-transmitted helminths (STH) as *Ascaris lumbricoides* (round worm), *Trichuris trichiura* (whip worm), *Necator americanus* and *Ancylostoma duodenale* (hookworm) and *Strongyliodes stercoralis* (thread worm). The other intestinal nematodes (*Anisakis sp.*, *Capillaria philippinensis*), trematodes and cestodes are less widespread in man. Their distribution is limited to certain areas in the world and the infections are usually confined to certain communities [9].

Intestinal parasitic infections are among the major diseases of public health problems in sub-Saharan Africa. Apart from causing mortality and morbidity, infection with intestinal parasites has been associated with stunting of linear growth, physical weakness, and low educational achievement in school children [10,11].

Furthermore, chronic intestinal parasitic infections have become the subject of speculation and investigation in relation to the spreading and severity of other infectious diseases of viral origin, tuberculosis, and malaria [12,13]. Nevertheless, similar study was not conducted in this area considering the area is at high-risk duo to the presence of high-risk factor.

METHODS

Study Design and Ethics Statement

This study is a randomized cross-sectional study, carried out in Al-Shokria village, Al-Gazira state.

This study was approved by the review committee of Al-Neelain University and the local health authority, village chief and local health. Volunteers to inform the details of the research study. All participants who agreed to join the study were enlightened about the research objectives, procedures, possible risks, and benefits of the research project. All participants infected with intestinal parasites (helminths and protists) was informed of the diagnostic results and subjected for treatment under control by the local doctor.

Study Population

Al-Shokria village a rural area located west to El-Gazira state part of 24 Al-Gorashi localities, occupied by more than five thousand citizen the study was targeting citizen who live in AL shokria from different age group and gender.

Sample Size

The sample size (n) was estimated to be (398) by using the Slovin's formula:

$n = N/N+1(d^2)$

Where N is the population number which equal approximately 5000.

d is the margin of error (significance level for e.g., 0.05).

Sample Collection Technique

After proper instruction, the villagers were given labeled collection cups and applicator sticks. From each villager, fresh stool was collected. Each of the specimens was checked for its label, quantity and procedure of collection.

Methodology

A portion each of the stool samples was processed with a direct microscopic technique to detect cysts, trophozoites, eggs and larva of intestinal parasites immediately. A formal-ether concentration technique was run for all stool samples. Both the 10 × and 40 × objectives were used for detection of eggs and larvae of helminths also cysts and trophozoites of protozoan parasites [14,15].

Data Collection Method

Based on the possible risk factors the questionnaire was developed. The questionnaire was tested for validity by interviewing all statistically random selection the interview included information such as age, sex and drinking water source. All the questionnaires were checked for accuracy and completeness.

The Quality Controls

All microscopes were checked. New and clean stool container, slides, and cover glasses were used, and care was taken with container labelling.

Data management and analysis plan

The data were entered and analyzed using the SPSS statistical software version 16. In all cases, P-values less than 0.05 were considered statistically significant. Initially the association between each exposure and the presence of infection was assessed using the Chi-squared test.

RESULTS

Prevalence of the Intestinal Parasites among the Villagers

Out of the 398 stool samples examined for the present of gastrointestinal parasites, 194 villagers were found to harbour parasites in their gastrointestinal tract, this constituted an overall prevalence of 48.7% (Table1).

Table 1: Prevalence of the intestinal parasites among the villagers.

Number Examined	Number Positive	Prevalence %
398	194	48.70%

Prevalence of Intestinal Parasites according to Age Groups

As shown as in table 2, the highest prevalence rate of gastrointestinal parasites (79.3%) was found among the age group (0-12), while the lowest prevalence rate 2.5(%) was reported among the age group (59 & above). These differences were found to be statistically insignificant (P value = 0.11).

Table 2: Prevalence of intestinal parasites according to age groups.

Age Group	Number of Positive	Percentage	p-Value
0 - 12	154	79.30%	0.11
13 - 18	13	6.70%	
19 - 59	22	11.40%	
59 & above	5	2.50%	

The most Dominant Parasitic Infection

Regarding the prevalence of intestinal parasitic infection among the villagers, *Entamoeba histolytica* was designated as the most dominant as it found in 92(47.4%) of total positive cases, followed by *Giardia lamblia* 86(44.3%), then *Hymenolepis nana* 36(18.5%) & *Enterobius vermicularis*. most of the cases were single infection160(82.4%) only few were double infection *Giardia lamblia* with *Hymenlopis nana* 24(12.3%) (Table 3).

Table 3: The most dominant parasitic infection.

Name of Parasite	Number of Positive	Percentage
E. histolytica	92	47.40%
G. lamblia	86	44.30%
H. nana	36	18.50%
E. vermcularis	4	2.00%

Prevalence of Intestinal Parasite according to the Gender

As shown in table 4, the prevalence of intestinal parasite is slightly higher in the male group which is 98(50.5%) while prevalence reported among the female group is 96(49.5%). This difference was found to be statistically insignificant p-value = 0.32.

Table 4: Prevalence of intestinal parasite according to the gender.

Gender	Number of Positive	Percentage	P-value
Male	98	50.50%	0.32
Female	96	49.50%	

The Prevalence of Intestinal Parasite among Symptomatic & Asymptomatic Villagers

Out of 194 positive cases, 38.1%% were found with symptoms of abdominal pain, while 61.9% were found asymptotic of abdominal pain (carriers). This difference was found to be statistically highly significant (p-value = 0.01).

Table 5: The prevalence of intestinal parasite among symptomatic & a symptomatic villager.

		Asymptomatic	Mild	Moderate	Sever	
Parasite Load	Absent	160	37	9	0	206
	Low	(6.7%)13	(2.5%)5	(0.0%)0	(0.0%)0	18
	Moderate	(41.7%)81	(9.7%)19	(4.6%)9	(0.0%)0	109
	High	(10.8%)21	(5.1%)10	(14.9%)29	(2.5%)5	65
Total		275	71	47	5	398

Prevalence of Intestinal Parasite according to Hand Washing after WC

As shown in table 6, 94.3% of the positive cases sometimes wash their hand with soap After entering the WC on the other hands only 5.7% of the positive cases wash their hands frequently after entering the WC. This difference is statistically insignificant (p-value = 0.28).

Table 6: Prevalence of intestinal parasite according to hand washing after water cycle.

		Wash Hands after with Soap after WC		Total
		Sometimes	Yes	
Intestinal	Negative	197	7	204
Parasite	Positive	(94.3%)183	(5.7%)11	194
Total		380	18	398

Prevalence of Intestinal Parasite according to Hands Washing after Eating

As shown in table 7, 66.5 of the positive cases washing hands sometimes with soap & water and 32.9% of the positive cases wash their hand with soap and water & only 0.5% wash their hands with just water before eating. This difference is found to statistically insignificant p-value 0.23.

Table 7: Prevalence of intestinal parasite according to hands washing after eating.

		Wash Hand Before Eating			Total
		Yes	No	Sometimes	
Intestinal Parasite	Negative	52	2	150	204
	Positive	(32.9%)64	(0.5%)1	(66.5%)129	194
Total		116	3	279	398

The Efficiency of the Two Techniques Used

The result demonstrated that the highest detection rate was reported for the formal Ether technique 194(100%) while the wet preparation technique detection rate was reported in 193(99.48%), (Table 8) the difference was found to be very highly significant.

Table 8: The efficiency of the two techniques used.

Technique Used	Number of Positive	Percentage	p-value
Formal Ether	194	100%	0
Wet Preparation	193	99.48%	

DISCUSSION

From the results it is obvious that the overall prevalence rate of gastrointestinal parasite among Al-shokria villager is notably high (48.7%). This rate was found to be higher than the rate reported by Abd Elhafiz [16] in Khartoum 30%, which maybe duo to low personal hygiene and differences in behavior and daily routine between urban and rural area. & lower than the rate reported by Magdi [17] in Al Gazira (64.3%) which might be duo to the difference in geographical area, season, community behavior and sample size.

The highest prevalence rate of intestinal parasite was reported among the age group (0-12) 79.3% this might be because in primary school age children, tend to eat and playing outdoor with their friends especially in this

environment which lack hygiene. This result was found to be lower than the rate reported by Abd-Alaziz [18] in central Sudan (90.4%) and higher than the rate reported by Abd Elhafiz [16] in Khartoum (30%).

The results showed that, the highest prevalence of parasitic species was reported for *Entamoeba histolytica, Giardia lamblia, hymenlopis nana* & *Enterobius vermecularis* with prevalence rate (47.4%), (44.3%), (18.5%) & (2.0%) respectively. The prevalence of *Entamoeba histolytica* (47.4%) was found to be higher than the rate reported by Abd Elhafiz [16] in Khartoum (15.5%) and higher than the rate reported by Abd-Alaziz [18] in central Sudan (32.5) and higher than the rate reported by Khalid [19] in Um-Asher area (7.6%).

The lowest prevalence rate of parasitic species was reported for *Enterobius vermecularis* (2.0%) this result was found to be lower than the rate reported by Abd-Alaziz [18] in central Sudan (19.7%). And higher the rate reported by Magdi [17] in Al Gazira (64.3%).

Although the symptoms of intestinal parasite infections are a lot, many cases remained subclinical while they released parasitic stages in stool.

The finding indicated that the prevalence of positive cases in Asymptomatic (carriers) cases was (61.1%), while the prevalence of positive cases in symptomatic (diseased) cases was (38.9%). Several reports have been published on parasitic infections in Saudi Arabia documented a prevalence rate from (9.4% to 47.4%) in symptomatic and a symptomatic villager [20].

The result showed insignificant difference between male and female group in the prevalence of intestinal parasite (p-value 0.32), indicating that the transmission is independent from gender, this agrees with finding of Magdi [17] in Al Gazira.

Our finding showed a very high significant difference between the two-technique used (p-value 0.000) with the detection 100%, 99.4% for the formal ether & the wet preparation respectively. Our finding was higher than the rate obtained by Eissa [21] who reported 90% detection rate for the formal ether.

However, the detection rate reported in this study was greater than the detection rate reported by Eman [22] (44%). The study revealed that the detection rate for the wet preparation was higher than the detection rate reported by Eman [23] (41.4%) and Rasha [23] (44.9%).

CONCLUSION

Based on this study, we concluded the following:

- The prevalence of infections was higher for protozoa compared to helminths.
- The highest prevalence of intestinal parasitic infection was found among the age group (0 - 12).
- The most dominant parasites among the cases were: *Entamoeba histolytica, Giardia lamblia, Hymenolepis nana, Enterobius vermecularis* species respectively.
- The findings showed that much work remains to be done to improve the health of the villagers.

The Formal Ether Technique is more efficient than wet preparation technique in detection of cysts and ova, yet wet preparation is efficient in detection active form of protozoa.

LIMITATIONS

- The process of obtaining the data from the local was quite difficult in the beginning because they are closed community, but their response increased after engaging volunteer from their local.
- Other risk factor should be assessed in the village for instance; pots, water source and some of their social behavior we couldn't evaluate them all duo to the limited budget and time.

DECLARATION

Ethical Approval and Consent to Participant

Ethical approval was obtained from the local health authority of El-shokria village the village chef. Informed consent of the participant was obtained and signed with commitment to apply all relevant guidelines and regulation.

Author Contribution

AAH provide conceptual framework for the project, guidance for interpretation for data, performed data analysis, AAH, HS, MAM provide guidance for data interpretation and perform reviewing. All author read and approved the final manuscript.

Competing Interest

Not applicable.

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