Prevalence Rate of Parasitic Infections among Displaced People who Arrived at Al–Mil Hospital in Marib During 2022–2023

معدل انتشار الإصابات الطفيلية بين النازحين الذين وصلوا إلى مستشفى الميل بمأرب خلال عامي 2022–2023م

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Abstract:

Background: Parasitic infections (PIs) are considered one of the major health concerns in developing countries, especially among displaced people due to disasters and wars. The most people affected are children and persons who are living in low-income areas, such as displacement camps, which lack safe water, basic health care, and sanitation facilities. Currently, in Marib province, there are camps housing millions of displaced people from different regions of Yemen, and this has formed an environment for spreading many pathogens. Therefore, there is an urgent need to study the prevalence of parasitic infections among displaced people in Marib camps. The aim of the present study is to assess the prevalence of intestinal and urinary parasites among displaced people in Al-Suwayda and some Al-Jufaina camps who arrived at Al-Mil Hospital, Marib governorate, Yemen during 2022-2023.

Methods: A cross-sectional study was conducted on displaced people who arrived at Al-Mil Hospital between September 2022 and May 2023 in Marib, Yemen. The data of the study were collected based on hospital records. Data were analyzed using the Statistical Package of Social Science (SPSS), version 25.0. All differences were considered statistically significant when the probability values (P-value) were < 0.05, at a confidence level of 95%.

Results: A total of 1482 people were included; 786 (53%) were infected with parasites and 696 (47%) were uninfected (P-value = 0.015). Four hundred eighty-eight (62.1%) females and 298(37.9%) males were infected. The prevalence rate of parasitic infection was 62.1% in females, which was higher than that in males (37.9%), and the difference was statistically significant (P<0.05). The results showed a high prevalence rate of Protozoa parasites being more common than helminths (686/87.3% and 40/5.1%, respectively) and mixed (60/7.6%). The most predominant parasite was Entamoeba histolytica 528 (67.2%), which was significantly different (P<0.05).

Conclusion: The current study indicates that displaced people in AL-Suwayda and part of the Al-Jufaina camps in the Yemeni Marib Governorate suffer from a high prevalence of many parasites (53% infected, 1280 parasite), especially among women (62%). Therefore, all interests are required to intensify efforts to improve health sanitation in all camps.

Keywords: Intestinal parasites, urinary parasites, prevalence rate, displaced people, Al-Suwayda camp, Al-Jufaina camp, Marib Governorate, Yemen.

الملخص:

الخلفية التاريخية: تعتبر الالتهابات الطفيلية (PIs) واحدة من المشاكل الصحية الرئيسية في البلدان النامية، وخاصة بين النازحين بسبب الكوارث والحروب. يعتبر الاطفال من أكثر الأشخاص المتضررين بهذه الطفيليات وخاصة الذين يعيشون في المناطق ذات الدخل المنخفض، مثل مخيمات النازحين التي تفتقر إلى المياه الصالحة للشرب والرعاية الصحية الأساسية ومرافق الصرف الصحي. وتوجد حاليا في محافظة مأرب العديد من المخيمات التي تؤوي ملايين النازحين من مختلف مناطق اليمن، وهذه تشكل بيئة خصبة لانتشار العديد من مسببات الأمراض. ولذلك فإن هناك حاجة ملحة لدراسة مدى انتشار العدوى الطفيلية بين النازحين في مخيمات مأرب. **تهدف الدراسة الحالية إلى تقييم مدى انتشار الطفيليات المعوية بين النازحين في مخيمات السويداء وجزء من مخيمات الجفينة الذين وصلوا إلى مستشفى الميل بمحافظة مأرب اليمنية خلال عامي 2022–2023.**

طريقة البحث: أجريت دراسة مقطعية على النازحين الذين وصلوا إلى مستشفى الميل خلال الفترة من سبتمبر 2022 الى مايو 2023م في محافظة مأرب، اليمن. تم جمع بيانات الدراسة من واقع سجلات المستشفى. تم تحليل البيانات باستخدام الحزمة الإحصائية للعلوم الاجتماعية (SPSS)، الإصدار 25.0. تم اعتبار جميع الاختلافات ذات دلالة إحصائية عندما تكون القيمة الاحتمالية ($P.<0.05$) ، و مستوى الثقة 95%

النتائج: تم ادراج 1482 شخصاً حيث كان 786 (53%) مصابين بالطفيليات و696 (47%) غير مصابين قيمة ($P = 0.015$). كان عدد المصابين من الاناث 488 بنسبة (62.1%) والذكور 298 بنسبة (37.9%). فيما بلغ معدل انتشار الإصابة بالطفيليات لدى الإناث 62.1% ، حيث كانت أعلى من الذكور بكثير (37.9%)، وكان الفرق بينهما ذو دلالة إحصائية($P<0.05$). كما أظهرت النتائج أن معدل انتشار الطفيليات الأولية أكثر من الديدان الطفيلية]686 (87.3%) و40 (5.1%) على التوالي[وكانت الاصابات المختلطة 60(7.6%). وكان الطفيل الأكثر انتشاراً بين النازحين هو **Entamoeba histolytica** 528(67.2%)، وكان هذا الفرق ذو دلالة معنوية ($P<0.05$).

الاستنتاج: تشير الدراسة الحالية إلى أن النازحين في مخيم السويداء وجزء من مخيمات الجفينة في محافظة مأرب اليمنية يعانون من ارتفاع معدل انتشار العديد من الطفيليات لدى الفرد الواحد (53% مصابون ب 1280 طفيل)، خاصة بين النساء (62%). ولذلك فإن المطلوب من كافة المعنيين تكثيف الجهود لتحسين الصرف الصحي والخدمات الصحية في المخيمات.

الكلمات المفتاحية: الطفيليات المعوية، الطفيليات البولية، معدل الانتشار، النازحين، مخيم السويداء، مخيم الجفينة، محافظة مأرب، اليمن.

1. Introduction:

Intestinal parasitic infection (IPI) is a collective term that refers to parasites that inhabit the human gastrointestinal tract (GIT), which includes infections caused by both helminths and protozoans. Some parasites can live in other parts of the body, but many prefer the intestine. Infections are the most common worldwide, especially in developing countries. It has been estimated that 3.5 billion individuals worldwide are infected with intestinal parasites, and approximately 450 million individuals develop the disease, with the majority being children [1, 2].

Globally, approximately one-third of the world's population is infected with the intestinal parasite Ascaris lumbricoides, which infects about 819 million people; an estimated 464.6 million people are positive for Trichuris trichiura and 438 million people are infected by hookworms, and most of these infections are sustained through cycles of repeated exposure from the environment [3]. Some disregarded parasites can persist in human hosts for decenniums and are associated with increased morbidity and mortality, which can be avoided through early detection and treatment[4].

Despite improvements in the quality of medical services in terms of the detection and diagnosis of parasitic infections. Most parasitic infections remain a major challenge for healthcare providers in many developing countries, and the population requires treatment and preventive interventions [5]. IPIs are considered one of the top ten major public health problems in developing countries, primarily affecting schoolchildren, especially in displacement camps, and children are more vulnerable to the severe consequences of these infections due to their negative effects on growth and development. Overcrowding, lack of clean water and vegetables, poor personal hygiene, and poor nutritional status in children are the most important known risk factors[6].

There is also variation in the prevalence rate of parasitic infections from area to area due to economic and social factors, such as poverty, malnutrition, personal hygiene, open field defecation, crowding, unsafe drinking water, low level of education, poor sanitary conditions, and unavailability of sufficient

health care, as well as the prevailing adverse climatic and environmental conditions[7]. Amoebiasis is one of the diseases caused by the intestinal parasite Entameba histolytica, which is estimated to infect 40–50 million people and kill up to 100, 000 people annually. Giardia lamblia, the causative agent of giardiasis, is the most prevalent protozoan parasite worldwide, with over 200 million infected individuals. Yemen, India, and East Africa are among the regions most endemic to intestinal parasitic infections [8, 9].

Previous studies have been conducted in different countries dealing with parasitic infections caused by one or more parasites, and most have concentrated on the prevalence of these parasites in infants and children. These studies reported that the prevalence rate of intestinal parasites among children was 23% in Damanhur, Egypt[10], and 27.1% in Duhok, Iraq[7] following parasites were reported in adults as well as Giardia. Lamblia, Entamoeba. Histolytica, Enterobius.vermicularis, Schistosoma. Hematopum, Trichuris. Trichura, Hymenolepis. nana and Taenia. sagnata, 30.0% in Khartoum, Sudan[11] and 57.88% in Ethiopia[5].

In Yemen, especially in rural areas, intestinal parasite infection is predominant, particularly among children in displaced camps. This significant increase in parasitic infections is due to economic and social factors, such as poverty, malnutrition, personal hygiene, geographical environment, swimming in water contaminated with freshwater snails, and playing in soil that may contain eggs of parasites that grow in soil[12].

Many studies have been conducted on intestinal parasites in different regions of Yemen, and most of them have focused on the prevalence of these parasites in children, reaching 90% in Al Mahweet Governorate[9], 51.8%[12], and 54.8% [13]in the capital, Sana'a, and 27.8%[14] and 38.2%[15] in Taiz City. Only one study was conducted among displaced people, where it was noted that the prevalence rate of intestinal parasites was 27.1%.[16]. In this study, we investigated the prevalence of parasitic infections among displaced people in Al-Suwayda and part of Al-Jufaina camps who arrived at Al-Mil Hospital, Marib governorate, Yemen between 2022-2023.

Internally displaced persons refer to individuals or communities that had to

move or were obliged or forced to leave or flee their homes and normal places of habitual residence, especially as a result of or to avoid the effects of war, conflict, violations of human rights, and natural disasters[17]. Migration due to wars, crises, and disasters from regions where urinary and intestinal parasites are endemic to non-endemic areas has increased the potential individual and public health effects of these parasitic infections[18].

When populations emigrate from parts of the world where intestinal parasites are endemic and resettle in other parts where they do not find healthy living, including clean water, sanitation facilities, and good health care, this infection will increase if not treated after immigration. There are two intestinal parasites (Strongyloides and Schistosoma) that may persist for decades as subclinical infections or low-grade diseases with nonspecific clinical manifestations. In the presence of immunosuppression, strongyloidiasis can rapidly evolve into a life-threatening disseminated disease, whereas chronic schistosomiasis can result in complications that lead to future morbidity and death. Subclinical strongyloidiasis and schistosomiasis can persist for decades after infection of the displaced and, if left untreated, can lead to serious morbidity or death through the spread of the disease[18, 19]. Serological and stool testing of these intestinal parasites are recommended.

2. Materials and Methods

2.1. Study Area

This cross-sectional study was conducted from September 2022 to May 2023 at Marib Governorate, Yemen, on displaced people who arrived at Al-Mil Hospital from Al-Suwayda and part of the Al-Jufaina camps. Marib Governorate is located within the central part of the Republic of Yemen, northeast of the capital, Sana'a. It is approximately (173) kilometers away from the capital, and the number of its districts is 14 (Figure 2-1). Al-Suwayda camp is located east of Sirwah District and has a population of approximately 23,000 displaced people from different regions of Yemen, while Al-Jufaina camp is located south of the city of Marib and has a population of approximately one million displaced people from various governorates of Yemen. These two camps represent a small part of the number of camps in Marib (204 camps), according

to the Executive Unit for Camp Management[20]. The camps under study are located within about 12.7 kilometres from the city centre of Marib, and their selection was based on geographical location near health services and the appropriate population size for the study sample.

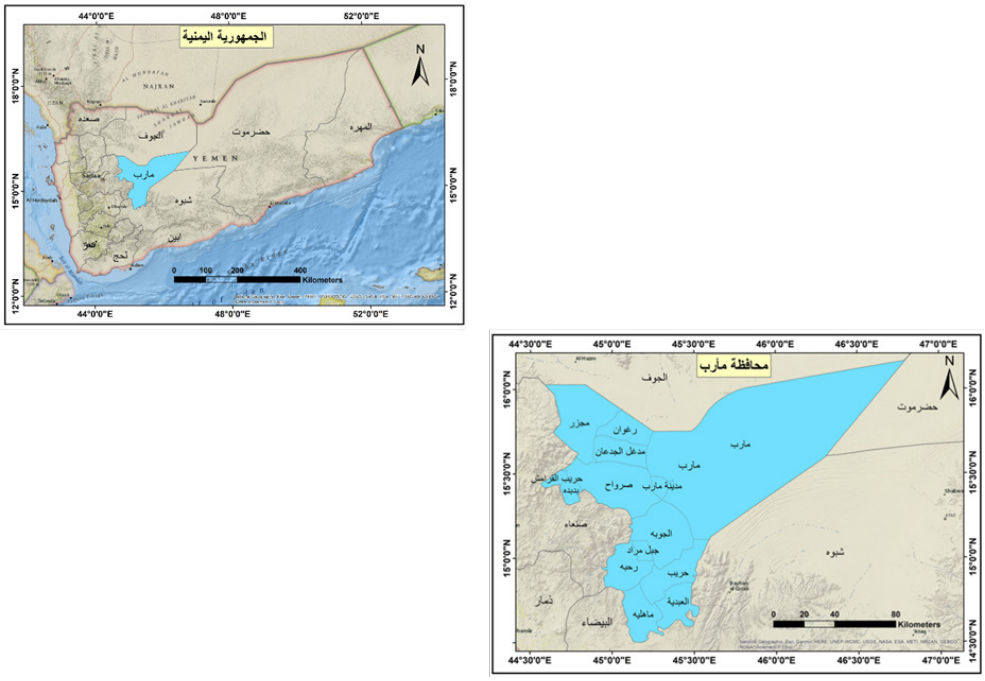

Figure 2–1: Map showing the study area Marib governorate, Yemen

2.2. Study Population

The data of the study participants were collected based on hospital records. Entirely of 1482 people both males and females ranging from ages of 4–50 years were enrolled. The actual number of those who participated during the period of the research was 1496, but 14 people were excluded due to incomplete information (age, gender, or place of residence). The study participants were classified into five different age groups as follows; ≤10, 11–20, 21–30, 31–40 and more than 40 years,

Ethical approval for this study was obtained from the Ethics Committee of the Faculty of Medicine at the University of Saba Region, Marib, Yemen, following an explanation of the goal of the study.

2.3. Statistical Analysis

The data were analyzed using version 21 of the Statistical Package of Social Science (SPSS) (SPSS Inc., Chicago, IL, USA). For the qualitative data (frequency and proportion), the chi-square test was used statistically to compare observed data with expected data. All differences were considered statistically significant when the probability values (P-value) were < 0.05, at a confidence level of 95%.

3. Results:

The results showed that the number of people infected with parasitic infections among displaced persons was 786 (53%) out of one thousand four hundred and eighty-two participants, and 696 (47%) were uninfected. This indicates a high prevalence rate of parasitic infections among displaced people in Marib (53%). There was a statistically significant difference between the uninfected and infected groups (P =0.015) (**Figure 3.1**).

3.1. Demographic Characteristics of the Infected Participants

3.1.1. Distribution of Parasitic Infections among Displaced People According to Gender

Four hundred eighty-eight (62.1%) females and 298(37.9%) males were infected, of which 62.1% prevalence rate of parasitic infection was determined in females, which was higher than that found in males (37.9%); the difference was statistically significant (P<0.05) (**Table 3.1**).

3.1.2. Comparison of Parasitic Infections among Displaced People

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According to Age Groups.

Parasitic infections were studied in various age groups (≤ 10, 11–20, 21–30 years, 31- 40 years, and > 40 years). The prevalence of infections was significantly varied according to age groups (P = 0.000) with 301 (38.3%), the highest prevalence infection rate was in the second group 11 to 20 years and 219 (27.9%) rate was for children aged in the 10 and fewer years. The prevalence rate decreased with increasing age to the third age group (21-30 years) 163 (20.7%) which was greater than the fourth 31 to 40 years 62 (7.9%), and the fifth age group (more than 40 years) recorded the lowest prevalence rate 41 (5.2%) (**Figure3.2**).

In addition, the rates of single, double, triple, and multiple infections were identified in all age groups, where it was found that the highest prevalence infection rates by two or three parasites were in the second group 11 to 20 years 124 (15.8%), 18 (2.3%), respectively, followed by the first group 10 and fewer years, 85 (10.8%). The lowest prevalence infection rates of two or three parasites were observed in the fifth age group (> 40 years) 28(36%%) and 2 (0.3%) respectively (**Figure 3.3**).

3.2. Distribution of Displaced People Infected According to the Type of Parasitic Infection.

The results of the study found that the prevalence rate of Protozoa parasites was higher than that of helminths (686 (87.3%) and 40 (5.1%), respectively) and mixed 60 (7.6%) (**Figure 3.4**).

3.3. Distribution of Parasitic Infections Pattern among Displaced People According to Species

The most predominant parasite was **E. histolytica** 528 (67.2%) compared to all studied parasites, followed by **G. lamblia** 366 (466%%), 283 36%%) for **Entamoeba. coli**, 57 (73%%) for **H. nana**, **S. haematobium** 28 (3.6%). and **Schistosoma. mansoni** had the lowest prevalence of 18 (2.3%). This finding

showed a statistically significant difference (P<0.05) (**Table 3.2**).

Single, double, triple, and multi-infections were identified, finding that of the 786 persons, 378(481%) were infected by a single parasite, 327(416%) were infected by two parasites, 76 (9.7) were infected by three parasites, and the remaining five persons (0.6%) were infected by four types of parasites. Overall, statistically significant differences were observed among the number of displaced people and parasite infection patterns (P<0.05) (Table 3.2).

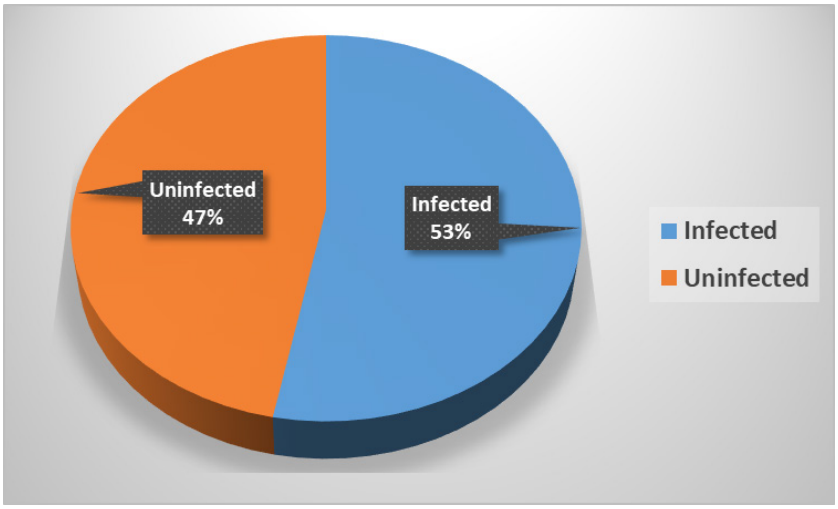

Figure 3.1: Prevalence Rate of parasitic infection among displaced people under study

Table 3.1: Comparison of Parasitic infections among displaced people according to Gender

		Frequency	Percent	Test Statistics	
			Chi-Square	P.Value	
Gender	M	298	37.9%	45.929	0.000
	F	488	62.1%		
	Total	786	100%		

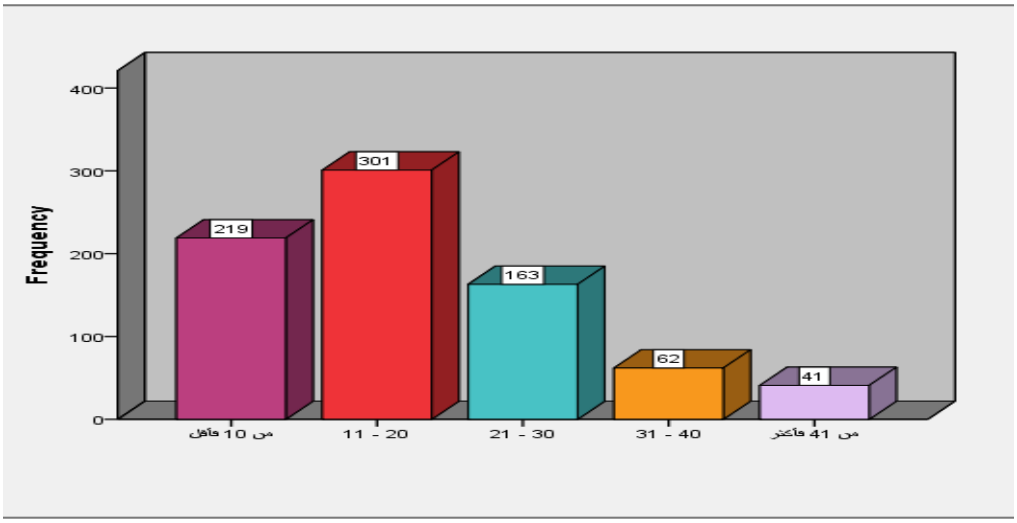

Figure 3.2: Comparison of Parasitic infections among displaced people according to age groups

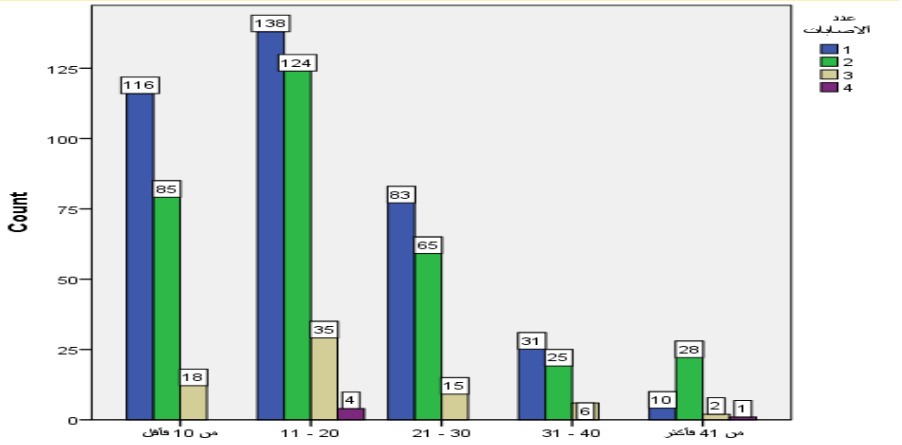

Figure 3.3: Comparison of parasitic infection patterns among displaced people according to age Groups

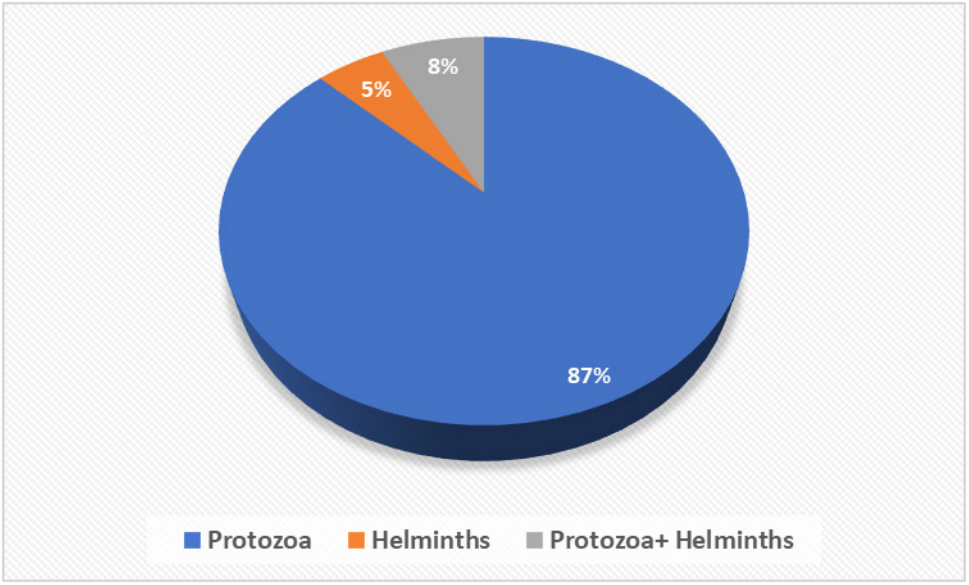

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Figure 3.4: Distribution of displaced people infected according to the type of parasitic infection.

Table 3.2: Distribution of parasitic infections pattern among displaced people according to Species

Cases Processing Summary		(%) No	Cases Infected				Test Statistics	
			Single	Double	Triple	Multiple	Chi-Square df=3	P.value
			1	2	3	4		
Protozoa	E. histolytica	(67.2%) 528	180	275	69	4	127.624	0.000
	E.coli	(36%) 283	73	137	68	5	153.824	0.000
	G. lamblia	(46.6%) 366	87	203	71	5	188.677	0.000
Helminths	S. mansoni	(2.3%) 18	9	5	2	2	32.675	0.023
	S.hematobium	(3.6%) 28	19	6	2	1	9.323	0.025
	H. nana	(7.3%) 57	10	28	16	3	54.965	0.000
Total		1280						

4. Discussion

The study showed that the prevalence rate of intestinal parasites was high (53%) among the IDPs studied, with protozoan predominant (87.3%) compared to helminths (5.1%), indicating that intestinal parasitic infections are endemic in the camp, with a statistically significant difference. This finding was similar to that of Egbuobi et al. [21]: 52% in Nigeria, 54.8% documented by Al-Mekhlafi et al. [13] in Yemen, 51.3% in Ethiopia[22], and 47.7% by Yanola et al.[23] in Thailand.

This finding differs from those of many studies conducted in Yemen, where the reported prevalence was higher than our findings. In Al-Mahweet Governorate[9] and Sana'a capital[24], prevalence rates of 90% and 72.9% were

reported, respectively, whereas a lower rate of 44.6% was found in Lahj [16]. On the regional level, the prevalence rate in this current study is markedly higher than in the United Arab Emirates (7.7%)[25], Qatar (10.2%) [26], and Iraq (364%%)[27]. Other studies among displaced persons demonstrated high infection rates of 89.6%, as observed by Evbuomwan et al.[28] and Gyang et al. [29] 86.2% in Nigeria and 87.8% by Rivero et al. [30] in Argentina. The difference can be attributed to the varied characteristics of the study population, differences in sample size, socioeconomic, hygienic conditions, geographical distribution, and diagnostic techniques employed by the participants. It could also have been that these wide variations could have been connected to the age of the children, time, and period of the study. In addition, the level of education, environmental sanitation, variations in diet, sources of drinking water, and personal hygiene could also have been responsible for these [31, 32].

This study also recorded that protozoans were predominant (87.3%) compared to helminths (5.1%), and the most dominant protozoan parasite was E. histolytica, followed by G. lamblia and E. coli, which were found to be the most reoccurring protozoans as dualism and multiple infections, followed by helminths of H. nana, S. haematobium, and S. mansoni, which were found at a lower prevalence rate among the IDPs. This was similar to the findings of Pukuma et al.[17] and Gyang et al. [29], who reported a high prevalence of protozoans and were also documented with E. Histolytica/dispar had the highest prevalence, followed by Giardia. In addition, in Sudan, El-Mekki et al.[33] in Khartoum State and Bayoumi et al.[34] in Gezira State reported a high prevalence of protozoans, with the difference in arrangement between the types of protozoa, where Giardia is the dominant one in these two studies. Amazigo et al. [35] in Tanzania, and Adabara et al. [36] in Bosso Town, Niger State, also found a high prevalence rate of protozoans. This is because children are exposed to sand and water that have been contaminated by human stool

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containing E. histolytica cysts. The prevalence of protozoans could be a result of poor water supply. Buying water from vendors, fetching water from wells, drinking directly without boiling, poor personal hygiene, and eating contaminated food, fruits, and vegetables are all predisposing factors that are common practices in DPs camps.

However, the results of this study disagreed with those of previous studies in Nigeria [37] and Southern Sudan [38], where the author indicated a high prevalence of helminth parasites compared to protozoa. This variation may be due to differences in sanitation and environmental conditions; Southern Sudan and Nigeria are much more rainy, which provides environmental conditions suitable for the development of helminthic parasites.

This study revealed a higher prevalence of infection in females (62.1%) than in males (37.9%). This result is a statically significant difference; it agrees with the previous studies in Yemen that the infection rate among females (38.5%) was higher than that among males (13.3%)[12], and another conducted by Azazy and Raja'a found that females (31.5%) were greater than males (24.6%) among Children and Adults presenting in Sana'a, Yemen[39]. This is in agreement with a previous report from Ethiopia, which mentioned that the infection rate of intestinal parasites was different between females (54.1%) and males (47.3%) [22]. A study conducted in Nigeria revealed that the prevalence of intestinal parasites among females (97.4%) was higher than that among males (82.8%) [28]. In addition, infection rates were higher among the female group than the male group (59.4% and 29.5%, respectively) in Saudi Arabia. The association between sex and intestinal parasitic infection was statistically significant[40].

This result disagrees with some studies performed in Yemen[14, 16], which reported no significant difference in the prevalence of intestinal parasitic infections and sex. Conversely, in Al-Mahweet, Yemen, the infection rates were

significantly different between males (46.5%) and females (43.5%)[9]. In addition, males were observed to have a higher intestinal parasite prevalence rate (41.1%) than females (29.1%), and the difference was statistically significant in Nigeria[17]. However, Mazigo et al.[35] reported that both males and females have the same chances of being infected by these parasites. The differences in infection rates could be attributed to differences in behavior between the two groups.

The higher incidence of infection in females can be explained by the fact that females are more susceptible to the stages of infection with the parasite due to the nature of the work they do at home and their lifestyle. Females, on average, have more contact with soil when animal husbandry, growing vegetables, and eating raw vegetables with prepared food more frequently than males. Our findings may be explained by females increased risk of exposure to contaminated water because they are usually responsible for obtaining water and household work in Yemen. Pukuma et al.,[41] who was of the view that the males were more susceptible to infection than the females because males mostly engaged in outdoor activities such as recreational activities, animal husbandry, and swimming.

Our findings indicated that over 66% (520/786) of the school-aged children and adolescents tested positive for one or more parasites species, and the prevalence of infections significantly varied according to age groups, which decreased with the increasing age (P = 0.000). This is in agreement with the previous studies were conducted in Yemen by Nazeh et al.[16], Al-Yuosofi et al. [12]. among children, and adults in Sana'a, Al-Mekhlafi et al. [13]. among rural schoolchildren in Sana'a, in Sudan by Bayoumi et al.[34], and in Nigeria by Ayuba et al.[37] among IDPs belonging to the same age groups. A similar result was recorded by Pukuma et al.[17] and Ozumba and Ozumba [42]who

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documented higher prevalence in age group 12–17 in Nigeria. This also agrees with Pradhan et al.[43], who reported that intestinal parasitic infections were the highest among children at the primary level in a rural village in Kathmandu, Nepal. The high prevalence rate within these age groups could be a result of high exposure to transmission because primary and secondary school-age children tend to eat and play outdoors with their friends, especially in environments that lack hygiene. More often than, children and adolescents are reported to have a higher prevalence due to their poor personal hygiene. This could be due to the similar exposure factors among these groups. Generally, the transmission of intestinal parasitic infection can be attributed to a high level of outdoor activities, walking bear footed, and contact with soil contaminated with feces, among other numerous factors.

Unsatisfactorily sanitized living conditions, poor personal hygiene practices, and unhygienic food and water sources could have played a role in the rate of parasitic infection observed in the participants. The main means of transmission of intestinal parasites is through the ingestion of contaminated food, vegetables, and water, and this calls for much concern for elimination and control. The degree of infection and prevalence of intestinal parasites indicate the climatic and living conditions of people. The transmission and prevalence of parasites are largely dependent on parasite fitness to survive, and this could be influenced by the host/parasite genome, host defense mechanisms, parasite virulence, and environmental factors[44]. Furthermore, interactions between the host, parasite, and their environment also influence the prevalence of parasitic infections.

Most previous studies have attributed the high prevalence of infection to a number of common factors, including poor personal hygiene, overcrowding, poor waste management, and human behavior. The high prevalence of infection among IDPs compared to resident persons could be attributed to the

fact that IDPs come from diverse backgrounds with different exposure coupled with the fact that displaced camps lack basic amenities such as adequate toilet facilities, and water supply is usually not sufficient. Unlike the members of the host community, most are in their houses with access to basic infrastructure in terms of housing, water supply, and improved personal hygiene.

5. Conclusion

The results of the present study showed a high prevalence of parasitic infections among displaced people in the Al-Suwayda camp (53%), especially among women (62%). This is due to several factors that play an essential role in increasing the spread of infection, that include severe overcrowding in displacement camps, weak health awareness and education, lack or insufficient sanitation facilities, clean drinking water, primary health care, not hand washing before eating, eating uncooked vegetables and malnutrition were determined as major factors. All of these factors increase the negative effects on the productivity of displaced people.

Accordingly, it was recommended to adopt programs to raise awareness and health education among displaced people in camps and for students in schools and to change some inappropriate habits and behaviors. In addition, from the Health Office and supporting civil organizations, more effort measures are needed to combat or limit the spread of parasitic infections through periodic interventions in distributing worming treatments among children inside the camps. As well as increasing preventive measures such as improving sanitation, safe water, good personal and environmental hygiene, treating malnutrition, and good washing of vegetables and fruits is recommended. Such information is important and beneficial for policymakers in planning strategies to improve health services, especially in areas of displacement.

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