Original Research Article

Detection of Intestinal Parasites in Food Handlers in Karari Locality, Sudan

Abstract:

Aims: Food handlers play a major role in ensuring food safety. Mishandling and disregard for hygiene measures on their part may result in food contamination and its attendant consequences. This study was aimed to determine the frequency of intestinal parasites among food handler in Karari locality.

Study design: This is a descriptive cross-sectional hospital-based study

Place and Duration of Study: This study was conducted in department of Laboratory medicine ~~during~~ from the period ~~from~~ of January to July 2013.

Methodology: A total of 1250 food handles were enrolled in this study. Stool sample was collected from each food handler in clean universal screw cap bottle at morning. ~~, t~~The feces ~~was~~were examined by the naked eye for its characteristics such as its consistency, color, texture and also for the presence of larvae or adult of nematodes and\or segments of cestodes. Wet mount was done to identify motile trophozoites, larvae, eggs and cysts. Modified Ziehl Neelsen staining technique was used to identify Cryptosporidium oocysts.

Results: Our results demonstrate that males were 74.8% of total population, while females were only 25.2%. The prevalence was found to be 6.1% among the food handlers that participated. Predominated parasitic infestations were ~~reported in~~; Giardia in 5%, *Entamoeba histolytica* 0.8% and 0.3% cryptosporidium respectively. Among total identified parasites, Giardia was found the

most dominated parasite 81.6%, followed by *Entamoeba histolytica* 13.3% and Cryptosporidium 5.3% respectively.

Conclusion: There was low prevalence of intestinal parasitic infections in Karri locality food handlers. The rate of infestations reported in male as approximately twice likely as females. *Giardia lamblia* was the most common protozoa infection.

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Key words: Intestine, Parasites, Food Handlers.

Introduction

Health is an indispensable asset of every individual. In the modern medical practice health is regarded as universal property of every human mankind.~~,~~ H~~h~~ence the public health is the fundamental responsibility of every health professionals. In this regard the prevention and control of food born diseases which play an important role in public health and the responsibility of food handlers is of great concern. Food handlers play a major role in ensuring food safety. Mishandling and disregard for hygiene measures on their part may result in food contamination and its attendant consequences. However, food contamination may occur at any point during its journey through production, processing, distribution, and preparation (1). A major risk of food contamination lies with the food handlers dangerous organisms present in or on, the food handler's body can multiply to an infective dose, given the right conditions, and come into contact with food, or surfaces used to prepare food (2).

The distribution of intestinal parasitic infection of human may be related to several human factors such as, age, gender, and infection by therapeutic measures, education in a personal

prophylaxis to prevent dissemination of infection and to reduce opportunities for exposure, sanitary control of water, food living and working conditions, and waste disposal, destruction or control of reservoir hosts and vectors, erection of biological barriers to the transitions of parasites (3). Intestinal parasitices infections are measured using the DALY (disability- adjusted life year) and one DALY represents the loss of one year of equivalent full health (4). The resulting diseases have socio-economic impact in terms of high treatment costs per DALY and hospitalization costs (5). Globally, millions of people suffer from parasitic infections such as *Ascaris lumbricoides* (1.2 billion), *Trichuris trichiura* (795 million), hookworms (*Ancylostoma duodenale* and *Necator americanus*) (740 million) (6), *Entamoeba histolytica* (50 million) (7) and *Giardia lamblia* (2.8 million) (8). No available data concerning the prevalence of intestinal parasites in Sudan, despite some studies have been obtained dissimilar prevalence according to the difference in climates, topography and others related factors. Conversely, many gastrointestinal parasites are reported as potentially harmful emerging as zoonoses, while others manifested only human populations. However, the most predominated intestinal protozoa are recorded *Giardia lamblia* and *Entamoeba histolytica*, whilst helminthes are prevailing nationwide*; Schistosoma* spp, *Hymenolepis nana*, *Taenia* spp *and Strongyloides*.

To best of knowledge only few studies have been conducted about this subject in Sudan. Therefore, this study was aimed to determine the frequency of intestinal parasites among food handler, in addition to determine proportion of intestinal parasites among different nationalities of food handlers and to identify distribution of intestinal parasites among different administrative units in Karrai locality.

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Material and methods

Study Design and setting

This is a descriptive cross-sectional hospital-based study which was conducted during the period ~~from~~ of ~~January~~January to ~~-~~July 2013. The study was carried out in Alnw Hospital which is situated at Alhara - Althora of Karri- Omdurman. The hospital provides health services for Althora and neighboring areas. This study ~~was~~ included food handlers who perform a routine medical checkup at the laboratory of Alnw hospital during study duration, any food handlers who having invalid medical certificates and providing informed consent for the study was included in this study while those who didn't willing to participate in this study and/or having valid certificates were excluded from this study. A total of 1250 food handles were enrolled in this study. Stool sample was collected from each food handler in clean universal screw cap bottle at morning.

Examination of Stool Samples

Macroscopic examination

Before microscopic examination of stool samples, the feces were examined by the naked eye for its characteristics such as its consistency, color, texture and also for the presence of larvae or adult of ~~nematodes and\or segments of cestodes~~helminths parasites.

Microscopic examination

Wet-mount Technique

The stool samples were emulsified with 3-4 ml normal saline, then a drop of emulsified sample was placed on a glass slide, a few drops of iodine were added, and all covered with a cover slip. The preparation was first examined under a x10~~x~~ objective lens, then x40~~x~~ for detailed identification of parasites under low light intensity. Prior microscopic examination, the

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microscope was checked for calibration (9). This process helped to identify motile trophozoites, larvae, eggs and cysts.

Quality Control

Prior microscopic examination, the microscope has been checked for calibration (9).

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Modified Ziehl Neelsen Staining Technique

Fresh stool sample was mixed with a normal saline, and then a smear from this emulsified stool was made. Afterwards each smear was air-dried and fixed in methanol for 2-3 minutes. The slides were then stained with cold carbolfuchsin for 5-10 minutes. The slides were then differentiated in 1% hydrochloric acid-ethanol solution and rinsed in distilled water. The slides were then counterstained with 0.3% methylene blue for 30 seconds and rinsed in tap water followed by air-dry -and examined microscopically under a x100~~*~~ objective oil-immersion lens.

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Ethics considerations

The study received approval from the ethics commission of GharbElneel College (Number 07/2013) and Alnw Hospital, and was conducted in accordance with the Declaration of Helsinki. Informed consent was taken from each participant.

Data Management and Analysis

Statistical Analysis

The data were analyzed by Statistical Package for Social Science (SPSS) software, version 15 was used throughout. The chi-square ($\chi 2$) test was used to compare data and to determine the significance of differences between prevalence. Nationality and gender were used as (independent) explanatory variables, while intestinal parasitic infestations were displayed as dependent variables.

Results

Our results showed that the ratio of male to female was found approximately to be in 3:1 respectively. Males were reported in 74.8% while female in 25.2% (Table 1). Among different nationalities of food handlers whom involved in this study, Sudanese were 77.9%, followed by Ethiopian 21.8% and Egyptian 0.2% respectively (Figure 2). Our results demonstrate that Karri region was represented the peak of administrative units of food handlers 44.5%, followed by Althora 25.8%. Sabreen administrative unit and Al-Senaat were recorded similar administrative units (Figure 2). Our result found that Giardia was found the most dominated parasite 81.6%, followed by *Entamoeba histolytica* 13.3% and Cryptosporidium 5.3% respectively (Table 2). The prevalence was found to be 6.1% among food handlers participated. Predominated parasitic infestations were reported in; Giardia in 5%, *Entamoeba histolytica* 0.8% and 0.3% *Ceryptosporidium* respectively (Table 3). Regarding the food handlers' occupations, 33.8% worked in groceries, 17.4% tea sellers, 16.8% in cafeterias and restaurants, 15.5% were food industry employers and 12.1% were bakery and 1.8% refresher sellers. Vegetable/fruit-sellers and ~~where~~ milk sellers were found likewise 0.6%. In addition, there was no statistical association between intestinal parasites infestations and gender (p- value < 0.29). Males 50/76 were more prone as more twice likely than females 26/76 for intestinal infestations (Table 5). Our results illustrate the the was no significant association between different nationalities and intestinal

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parasitic infestations (p <0.28). Sudanese food handlers seem to be infested by intestinal parasites more than Ethiopian (Table 6). Our results showed that there was no statistical association between administrative units' distribution and intestinal parasitic infestations (p<0.53). Giardia cysts and Giardia trophozoites were found predominated in Karri administrative unit, followed by Althora (Table 7). There was no a statistical difference noted between types of occupations and intestinal parasitic infestations (p value <0.06). Grocery sellers were recorded the highest occupation acquired intestinal parasitic infestations. Tea sellers were seen in 18/76 followed by cafeteria/restaurant employed 10/76, while bakery alike juice and labors at food preparation factories altogether (Table 8).

Table 1: Gender distribution among ~~F~~food handlers

Gender	Frequency	Percent
Male	**935**	**74.8**
Female	**315**	**25.2**
Total	**1250**	**100.0**

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Table 2: Frequency of intestinal parasites among food handlers

Disease	Frequency	Percent

Giardia cysts	**50**	**65.8**
Giardia trophozoites	**12**	**15.8**
Entamoeba histolytica	**10**	**13.3**
***Cryptosporidium* spp**	**4**	**5.3**
Total	**76**	**100**

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Table 3: The overall prevalence of intestinal parasitic infestations among food handlers

	Disease		Frequency	Percent
Intestinal parasitic infestations	**Positive**	**Giardia**	**62**	**5**
		Entamoeba histolytica	**10**	**0.8**
		Cryptosporidium	**4**	**0.3**
Total			**76**	**6.1**

Table 4: Different occupations among food handlers

Occupation	Frequency	Percent
Grocery seller	422	33.8
Tea seller	217	17.4
Cafeteria/ Restaurant workers	210	16.8
Food industry employers	194	15.5
Bakery	151	12.1
Refresher sellers	22	1.8
Butchers	20	1.6
Milk seller	7	0.6
Vegetable and fruits seller	7	0.6
Total	1250	100.0

Table 5: Cross tabulation between gender and intestinal parasitic infestations

		Intestinal parasitic infestations				Total
		G C	GT	E h	Crypto	
Gender	Male	33	8	8	1	50
	Female	17	4	2	3	26
Total		50	12	10	4	76

Table 6: Relationship between nationalities and intestinal parasitic infestations

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		Intestinal parasitic infestations				Total
		G C	GT	E h	Crypto	
Nationality	Sudanese	34	8	8	1	51
	Ethiopian	16	4	2	3	25
Total		50	12	10	4	76

Table 7: The relationship between administrative units and intestinal parasitic infestations

		Intestinal parasitic infestations				Total
		G C	GT	E h	Crypto	
Administrative units	Karri	32	10	6	2	50
	Al-Sanaat	1	0	0	0	1
	Sabreen	5	2	1	1	9
	Althora	12	0	3	1	16
Total		50	12	10	4	76

Table 8: Different occupation versus intestinal parasitic infestations

Occupations	Intestinal parasitic infestations				Total
	G S	GT	E h	Crypto	
Grocery seller	29	8	6	0	43
Tea seller	11	2	2	3	18
Cafeteria/restaurant employed	8	0	2	0	10
Bakery	0	2	0	0	2
laborers at food preparation factories	1	0	0	1	2
Juice seller	1	0	0	0	1
Total	50	12	10	4	76

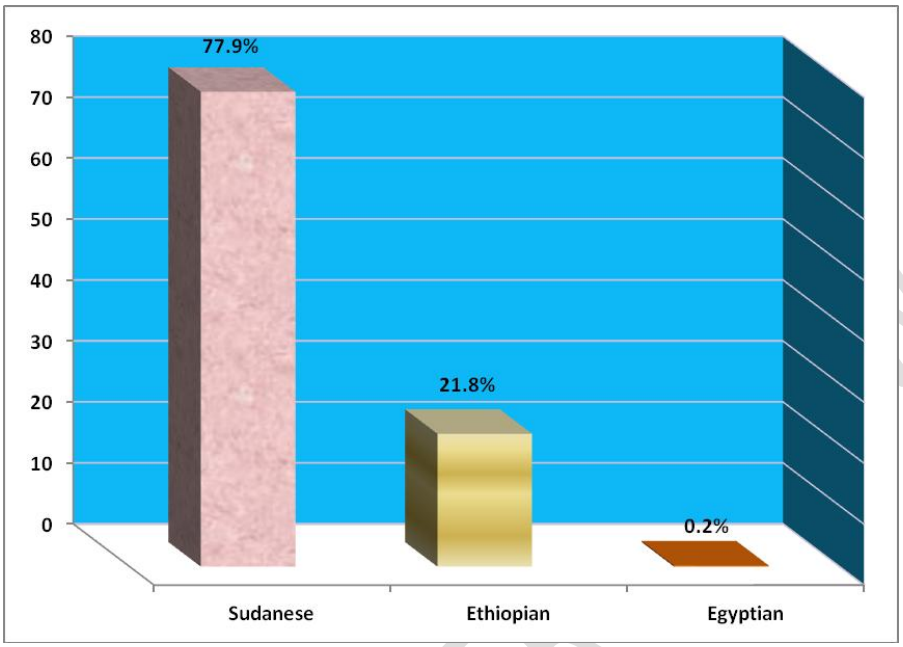

Figure 1 displayed different nationalities of food handlers

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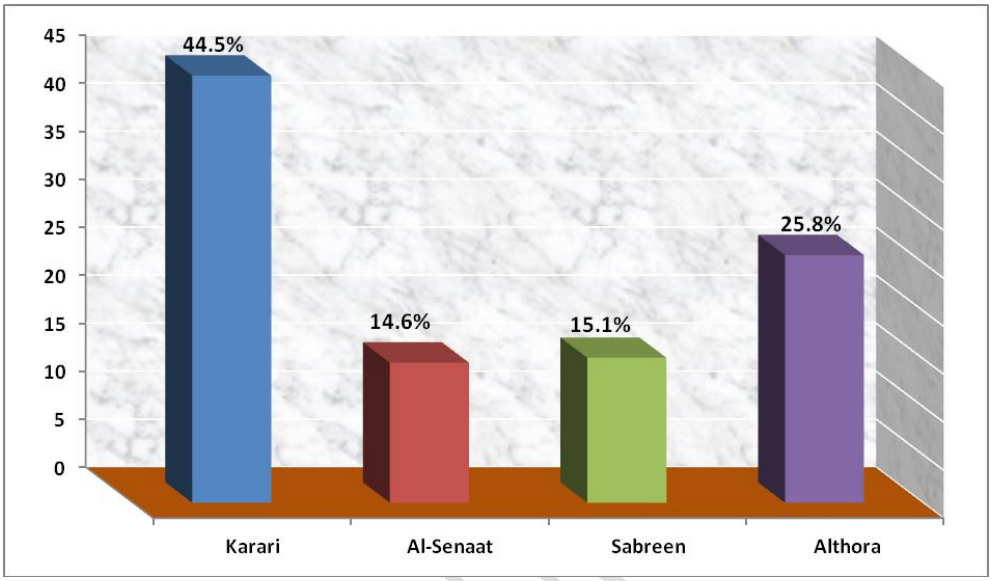

Figure 2: Administrative units' distribution among participants

Discussion

This study has shown that, the prevalence intestinal parasitic infestation among food handlers is found relatively a quite low 6.1%. This finding is of particular significance since infected food handlers may be at risk of developing illness themselves, and may pose a threat to the health of consumers. All intestinal parasitic infestations reported in this study are transmitted via the fecal-oral route. The predominant~~tee~~ parasitic ~~intestinal~~ agents seen were *Giardia lamblia* (5%), *Entamoeba histolytica* (0.8%) and *Cryptosporidium* (0.3%) correspondingly. This result is found similar to previous stud~~ies~~y (10). The overall, prevalence obtained in the current study is found to be (6.1%). This finding in accordance with other authors' results elsewhere which had obtained alike results (11). Nevertheless, other studies have been conducted elsewhere found the prevalence of intestinal parasites are remarkably higher than the current study finding (12). This discrepancy might be probably attributed to the difference in environmental sanitation and hygiene of food handlers regarding intestinal parasitic infestations.

In the present study, most of infe~~s~~cted food handlers were food workers in grocery, tea sellers' cafeterias/restaurant and food industry employe~~d~~ed; similar finding has been observed in another study (13).

Despite, observationally, participants who attended routine checkup at the hospital are apparently health and maintaining a satisfactory personal hygiene. Thus, the findings highlight the importance of regular and periodical examinations for food handlers. It has been confirmed by many studies findings (11) which elucidated ~~that food-borne disease outbreaks~~those food-borne disease outbreaks are due to contamination by the food handlers.

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In our study, parasitic infestations are more prevailed among Sudanese rather than their counterparts from other nationalities. This finding may be explained by involving a high number of Sudanese food handlers. In contrast to, other studies have been conducted in United Arab Emirates (14) and Saudi Arabia (15). This variation could be verified by examining only expatriates rather than their own nationalities.

Concerning the commonest type of parasites isolated in this study, our finding showed that 76 among the infected food handlers;– *Giardia lamblia* was the most common protozoa infection (5%), followed by *E. histolytica* (0.8%). This result is consolidated by tremendous studies being carried out had recorded that, Giardia was the most common parasite (10, 16-18). On contrary to, many authors' findings didn't in coherence with our study result (19-21). This inconsistency may be attributed to geographical variations in distributing intestinal parasites.

Cryptosporidium was reported in our study in (0.3%) which has been in line with global pattern distribution (11).

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According to the results of this study, there were no significant differences in the prevalence of intestinal parasites among different occupations, gender and nationality, the ratio of infection with parasites in males was found as twice likely as females. The high rate of infection in males may be due to their activities and might be exposed to parasite, used to eat outsides and the working pressure for almost the whole of day. Although there is a study in is not in agreement with our study finding (22). This variance could be elucidated to the difference in culture, activities and simultaneously with workplaces.

Variations in these factors from different administrative units to another within the study setting may be explained by differing in socioeconomic factors, poverty and malnutrition. However, in two different studies have been conducted in Saudi Arabia (17,15), which concurs with our study

results, showed differences in the prevalence and types of parasites among infected food handlers in various areas within the same country.

Conclusion The overall prevalence of intestinal parasitic infections among food handlers in Karri locality- Omdurman is found in 6.1%. The rate of infestations reported in male as approximately twice likely as females. There is an obvious variation within the selected locality concerning prevalence of intestinal parasites. *Giardia lamblia* was the most common protozoa infection, followed by *E. histolytica* and *Ceryptosporidium*. Sudanese food handlers recorded with a higher prevalence compared to other nationalities. No statistical difference observed between parasitic infestations; regarding gender, occupation and nationality.

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Availability of data and materials

The data sets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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