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Original Article

Parasitic Infections among Restaurant Workers in Mukalla (Hadhramout/Yemen)

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Abstract

Background: To identify intestinal parasites among restaurant workers in Mukalla, Yemen in 2007.
Methods: Stool specimens were collected and examined from a total of 500 restaurant workers at Hadhramout University Health Center .Three types of techniques were used: direct examination, saline sedimentation and formol-ether concentration.
Results: The positivity in majority of them was single infection whereas 6 cases were double infection that constituted 1.3% of the prevalence. The prevalence was 14.8 % for *Entamoeba histolytica/dispor*, and 5.2 % for *Giardia lamblia*, while it was 4.4% for *Hymenolepis nana*. Other intestinal parasites including *Ascaris lumbricoides, Ancylostoma duodinale* were also detected. Additionally, the blood parasite *Schistosoma mansoni* was also detected in 4 cases. The double infection was only with *E. histolytica/dispor* and *Giardia*. The infection with these parasites was also accompanied by abdominal troubles "diarrhea, constipation", nausea and vomiting.
Conclusion: These results lead to understand that sanitary measurements are not effective, and this hazardous situation facilitate parasitic agents' distribution among clients. The effectiveness of current pre-employment screening policy must be annual and systematic surveillance is needed in addition to health education.

Keywords: *Parasitic infections, Restaurant workers, Yemen, Risk, Dissemination*

Introduction

Many surveys had been carried on intestinal parasites that prevail in Yemeni population: northern provinces (1,2) and Hadhramout (3) also the work done by Hazza *et al*. in 1983 (4) on schistosomiasis in Taiz province, aiming to determine the prevalence of these parasites in different regions of this country.

The intestinal parasites that prevail in restaurant workers as food handlers had been investigated in some neighbor regions (5-8) and other regions (9). This prevalence is determined also in expatriates in some Arabic countries like Saudi Arabia (10) and United Arab Emirates (11), while Shojaei, in 2006, studied the efficacy of simple hand washing in reduction of microbial hand contamination of Iranian food handlers (12).

This survey is the preliminary one deals with this group of workers in Yemen, it was conducted for the aim to determine the percentage and prevalence of intestinal parasites among restaurant workers "food handlers" in Mukalla district, Hadhramout Yemen. The group represents a sensitive sector for parasitic agents distribution, by the manner that they are in direct contact with a wide specter of population.

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Materials and Methods

A cross-sectional survey was carried out from January to April 2007, in Mukalla district (Hadhramout/Yemen), to identify the intestinal parasites and their prevalence among restaurant workers "food handlers". A total of 500 restaurant workers were submitted to answer the survey questionnaire (which included information about valid health certificate, symptoms, educational levels etc.). They were visited by a physician to ensure the accuracy of these symptoms. Restaurant workers were asked to bring a fresh stool specimen. Four hundred sixty (92%) of the restaurant workers cooperated.

Three stool smears of each sample represent each restaurant worker were prepared and examined at Hadhramout University Health Center by adoption of three techniques of routine stool examination: saline sedimentation, direct examination and formol-ether concentration (13-14).

Results

Table 1 demonstrates the prevalence of parasitic infection among restaurant workers. The types of intestinal parasites detected, their percentage is also illustrated in the same table. *Entamoeba histolytica/dispor* shows the high percentage (51.5%).

Four workers only were infected by the intestinal *Schistosoma* mansoni, all of them were from other regions of the republic where this parasite is prevail.

The restaurant workers infected with parasites suffer from abdominal disorders are cited in Table 2. Additionally, this table details the complaints versus the parasitic infections, where the majority of sufferings are related to the main parasites in Yemen i.e. *E. histolytica/dispor* and *Giardia*. Nausea and vomiting are shared to all parasitic infection. Table 3, shows the educational level of cases.

Table 1: Percentage and prevalence of intestinal parasites detected in stool examination of restaurant workers.

Type of parasite	Number infected	Parasites %	Prevalence %
Entamoeba histolytica/dispor	68	51.5	14.8
Giardia lamblia	24	18.2	5.2
Hymenolepis nana	20	15.2	4.4
Ascaris lumbricoides	8	6.1	1.7
Ancylostoma duodinale	8	6.1	1.7
Schistosoma mansoni	4	3.0	0.9
Total	132	100	28.7

Table 2: Restaurant workers complaints versus percentage and parasitic infections

Symptom	No.	%	*E. h/d*	*Giardia*	*H.n*	*Ascaris*	*Ancylos.*	*S.m*
Abdominal Pain	52	39.4	28	0	0	0	0	0
Constipation	16	12.1	0	0	10	2	2	2
Diarrhea	84	63.6	60	24	0	0	0	0
Fever	64	48.5	42	12	0	4	4	2
Abdominal distention	34	25.8	12	22	0	0	0	0
Nausea and vomiting	70	53	42	12	6	4	4	2
No symptoms	20	15.1	8	0	4	4	2	2

Table 3: Educational levels of restaurant workers.

Education level	Number	Percentage
Illiterate	52	11.3
Primary school	292	63.5
Secondary school	116	25.2
Total	460	100

Discussion

Parasitic infections must receive increasing attention for their responsibility to cause parasitic diseases. The World Health Organization regards illness due to contaminated food as one of the most widespread health problems in the contemporary world (15). The detection of parasites throughout their agents of distribution (Eggs and cysts) is the confident way to evaluate their percentage and prevalence among populations.

The food handlers in the restaurants are the sensitive group of population that can be a focus for contamination by these parasitic infectious agents as they are in direct contact with clients. Additionally, asymptomatic carriers of intestinal parasites are a particular public health hazard, especially if they work in catering facilities, where they may become a source of infection (5)

Intestinal parasites are frequent among food handlers and expatriates as food handlers in many countries (5, 7-11). The prevalence of intestinal parasites is varied in different regions of Yemen: *E.histolytica/dispor* (1.7–31.69%), *Giardia* (10.2–19.73%), *H. nana*(0.05–5.3%) and *A. lumbricoides* (0.42–15.9%) (1-3). These parasites also have different prevalence in neighbor countries. High prevalence of parasitic infection (28.7%) in this study compared to other surveys as 7.56% in Dammam and Al-Khobar (5), 14.2 % in Al-Medina (6), and 12.8 % in Riyadh (7), shows higher degree, but slightly lower than 33% in Tabriz, Iran (8), 44.95% in Brazil 9), and 31.4 % in expatriates of Al-Khobar (10).

In Hahdramout, the prevalence of intestinal parasites in restaurant workers is low compared to that illustrated previously in Hadhramout population, and many parasites are not detected in restaurant workers in the present survey (3). The two parasites; *E. histolytica/dispor* and *Giardia* were the most frequent parasites in Hadhramout, and most of the symptoms declared were shared with these infections especially abdominal pains and diarrhea. Additionally nausea and vomiting were shared to all parasitic infections (13, 16).

The presence of *A. duodinale* ensures that soil-transmitted helminthes infections are widely distributed in tropical and subtropical areas, especially in poor hygienic populations.

To the authors' knowledge, *S. mansoni* is not previously declared in Hadhramout, so the detection of this parasite raises a question about its origin. The infection with both urinary and intestinal schistosomiasis is prevalent with patchy distribution in Taiz Province, while *S. mansoni* is found in the most parts of the province (4) where the majority of restaurant workers came from.

Global migration patterns will continue to promote transmission of human intestinal parasites in foreseeable future because untreated infected individuals can serve as roving reservoirs of infection for long-life parasites (17), so *S. mansoni* may be, in the future, implemented in the region of Hadhramout.

The majority of infected restaurant workers are symptomatic but they were not proclaiming their sufferings for unknown personal reasons, so they may be considered as infection's carriers. The situation of the infected workers as

food handlers, either asymptomatic or symptomatic was high enough to merit a spotlight on it as a health problem.

Contaminated food plays a major role in the occurrence of diarrhea diseases (15). In this survey, all restaurant workers who suffer from diarrhea were infected with *E. histolytica/dispor* and *Giardia*, the two parasites transmitted by direct contact and highly favored by the habits and costumes of the people, so simple hand-washing was efficacy to reveal a significant decline in microbial hand contamination of the food handlers from 72.7% to 32% (12).

From the statistical point of view, and with the hypothesis that restaurant food handlers infection must not exceed 3% ($H_{o:}$ $P \leq 0.03$ and $H_{1:} > 0.03$), the infection rate was more than 3% at the three significant levels (0.1, 0.05, 0.01), accordingly we refuse the hypothesis zero and accept the hypothesis H_1 and at the same time 95% of the specimens give the same results. For this reason, the goal of this survey was to show the prevalence of parasitic infection among food handlers in spite they have all valid employment certificates. This will help the authorities to review their laws of employment.

In spite of the constant increase of food-borne illness, the global importance of food safety is neither fully appreciated by many of the public health authorities (18), nor by food handlers.

It is to be known that hygienic measurements concerning the restaurant workers as food handlers must be considered in the first category of measurement control, and the periodical supplement of health performance must be obligatory for each worker. The majority of restaurant workers are illiterates or have primary school education (Table 3), and take no care about the health measurements in theses cites, so dissemination of parasitic agents can take place easily and this will raise health hazard. It is the responsibility of the Ministry of Health to motivate all the control rules in restaurants, school canteens and all cites of human propagation, in order to minimize the distribution of intestinal parasitic agents.

In conclusion, food safety education is a critical prerequisite, and health education in general should be increased to raise awareness of the society about intestinal parasites problems (7, 9, 10, 15), so we are in need for constant epidemiological surveillance through periodical surveys parallel with development of healthcare towards the problem of parasitic infections.

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