Original Article

Parasitosis through the Food-Handlers and Food Samples of Lahore City

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ABSTRACT

Background: Parasitosis" means infection or infestation with parasites. Parasites are responsible for significant morbidity and mortality worldwide. Various epidemiological studies indicate that the prevalence of intestinal parasites is high specially in developing countries.

Objective: To identify possible positive cases of intestinal parasitic infection among food handlers and also to determine the presence of intestinal parasitic cysts and ova in vegetables and meat.

Study Design: A co-relational descriptive study design.

Place and Duration of Study: Study was conducted in two randomly selected markets of Lahore from January 2009 to June 2009.

Materials and Methods: This study was designed to determine the association between various risk factors and the occurrence of intestinal parasites. Random sampling was done. Stool parasitological profile was done by direct smear and foramline-ethyl acetate sedimentation method. Both vegetables and meat samples were examined for the presence of intestinal parasitic cysts and ova by using centrifugal-flotation technique.

Results: 58% vegetables, 71.1% meat and 34.5% stool samples were found to be positive for intestinal parasites. Of the parasites detected, the most common parasites infecting the food handlers were Entamoeba histolytica and Ascaris lumbricoides. Whereas parasites were more in the meat samples that were not properly stored than those that were kept in refrigerator.

Conclusion: This study revealed that risk of intestinal parasites is in direct proportion to the poor sanitary conditions.

Key Words: Parasitosis, Food handlers, Food samples.

INTRODUCTION

Parasites present a persistent and intolerable threat to the health of millions of people mainly in the tropics and subtropics.[1] Parasitic intestinal infection continue to be an important cause of morbidity and mortality in developing world.[2-6] The risk of intestinal parasitic infection is measured using the DALY (disability-adjusted life year) and one DALY represents the loss of one year of equivalent full health.[7] The resulting diseases have socioeconomic impact in terms of high treatment costs per DALY and hospitalization costs.[8] Globally millions of people suffer from parasitic infections such as Ascaris lumbricoides (1.2 billion), Trichuris trichiura (795 million), Hookworms-Ancylostoma duodenale (740 millions)[9], Entamoeba histolytica (50 million), Giardia lamblia (2.8 million)[11] and Taenia saginata (3.2 million).[12] In man, intestinal parasites are significantly associated with diarrhea.[8]

Most of the pathogenic organisms known to cause diarrhea are transmitted by the oro-faecal route[13], environmental conditions like contamination of soil and water sources with human faeces and poor sewage disposal such as use of night soil as fertilizer.[14] When the soil becomes contaminated, the eggs in soil can be transferred onto vegetables then onto the hands and transferred directly into the mouth[15] or ingested by eating raw vegetables.[14] Intestinal parasites have been found to adhere to vegetables, fruits, fingers, utensils, door handles and money.[16] Additionally, they can be transmitted through house-flies[17] and contaminated finger nails.[18]

Studies carried out in Lahore city during seventies reveal that intestinal parasitic infection was a significant health problem. A study was carried out by Ansari and Sapru[19] in conservancy staff of Lahore Municipal Corporation and rate of infestation was found to be 80.6%. Another study by Ansari and Naru[20] revealed that frequency of intestinal parasitic infection in 216 children of Lahore orphanage was 64.75%. In 1995, a study was carried out on school children belonging to urban areas of Lahore. The frequency of infection was observed to be 51.83%.[21] Recent studies carried out at various locations in Lahore city showed that there was high prevalence of many intestinal parasites such as Ascaris lumbricoides, Entamoeba histolytica, Entamoeba coli, Ancylostoma duodenale, Trichuris trichiura and Taenia among the food handlers at different locations in Lahore and also in different food samples.

MATERIALS AND METHODS

This study was carried out from January 2009 to June 2009 in Lahore City. This study was designed to determine the association between various risk factors and the occurrence of intestinal parasites. Two markets were randomly selected. The sample size for food stuffs and food handlers was calculated on a prevalence of 10%, d = 0.05. Sampling was done under three categories; vegetables, meat and food handlers. Vegetables – each of the four varieties of vegetables commonly sold in the study area was selected by random sampling from vendors in the open air markets. Samples of vegetable leaves weighing 250 g for each variety – Saag (Mustard leaves), spinach, cabbage and Fenugreek (Methi) were collected each day from the vendors by random sampling. Meat – similarly thirty butcher shops were chosen randomly. The meat samples (chicken, mutton and beef) each weighing 250 g was collected from butcher shops selected, weekly. Food handlers – at the same time 200 food handlers from the sampled markets and butcheries were randomly selected for routine examination of stool parasitological profile. Each of the food handler selected was given a plastic stool container and asked to bring bean-sized stool sample within 24 hours.

A 250 g sample of each vegetable or meat sample was examined for intestinal parasitic profile.[16] The sample was washed in distilled water and the suspension was strained through a sterile sieve to remove undesirable materials. The filtrate was centrifuged and supernatant discarded while the deposit was suspended in magnesium sulphate floatation fluid of specific gravity 1.3 and recentrifuged. The floatation fluid was filled to the brim and a cover slip was superimposed. The cover slip was lifted and examined under a light microscope. The cysts and eggs of various parasitic species present were identified.[22] The food handling practices of the butcheries including the meat storage method, the handlers hygiene standards and the presence of house-flies on meat samples were observed using a check list and recorded during each sampling day. A direct saline smear preparation of the stool sample specimens obtained from the food handlers were prepared for examination of trophozoites, ova and cysts of intestinal parasites using Lugol's iodine solution and formaline-ethyl acetate sedimentation method.[23]

RESULTS

A total of 100 vegetable samples comprising of 25 samples for each category were collected – saag, spinach, cabbage and Fenugreek (methi). In all 58 (58%) vegetable samples were infected with intestinal helminthes. Fourteen (56%) of saag, 17 (68%) of spinach, 12 (48%) of cabbage and 15 (60%) of Fenugreek tested positive. An average parasite score density of 2.37 was observed in the vegetables (Table 1).

The relationship between risk factors for meat handling practices and prevalence of parasites was studied by observing independent variables (risk factors) influencing infection with intestinal parasites (dependent variables). Independent variables include meat storage methods, presence or absence of cashier and the presence or absence of house-flies on meat samples collected from 22 butcher shops. Parasites were significantly less likely to be present on meat that was refrigerated (7%) than meat that was displayed at ambient temperature (37.5%) [P=0.002]. There was a significantly high prevalence of intestinal parasites in meat samples where there was no cashier (59.8%) than where the cashier was present (16.1%) [P0.000]. The prevalence of parasites where there were house-flies on the meat samples collected was (71.1%) and that did not have house-flies was 7%. The average parasite score density in the meat samples was ranging from 1.40 to 2.83 (Table 2)

Table No.1: The prevalence and density of intestinal parasites among vegetable food samples

Sample	No.	Frequency of intestinal parasite (%)	Score of parasite density
Saag	25	14 (56%)	2.43
Spinach	25	17 (68%)	1.86
Cabbage	25	12 (48%)	2.57
Fenugreek	25	15 (60%)	2.62
Overall	100	58 (58%)	2.37

Table No.2: The relationship between risk factors for meat handling practices and prevalence of intestinal parasites

Risk factors	No. of samples	Frequency of intestinal parasite (%)	Score of parasite density
Storage methods			
Refrigerator	80	31 (7.0%)	1.40
Open surface	200	165 (37.5%)	1.87
Wire mesh	160	138 (31.4%)	1.63
Cashier			
Absent	300	263 (59.8%)	1.85
Present	140	71 (16.1%)	1.64
House-flies			
Present	360	313 (71.1%)	2.83
Absent	80	31 (7.0%)	1.64

Stool samples were collected from 200 food handlers. 87 (43.5%) were infected with one or more of intestinal parasites of whom 31 (15.5%) were infected with one species of protozoan, 49 (24.5%) were infected with one species of helminth, 7 (3.5%) had mixed infection. Of the most common intestinal parasites were A. lumbricoides 27 (13.5%) and E. histolytica 24 (12%). There was a statistically significant difference between

the number of various intestinal parasitic species among the food handlers (P<0.010). The parasite score density in the faecal specimens observed ranged between 1.67 for Giardia lamblia whilst highest parasitic score density was found among multiple infection with Entamoeba histolytica and Ascaris lumbricoides with 2.63 (Table 3).

Table No. 3: Intestinal parasite distribution in stool samples of food handlers

Parasites (single infection)	No. of infected Cases (n)	Infection rate (%)	% of those examined (N=200)	Score of parasite density
Protozoa				
Entamoeba histolytica	24	77.4	12.0	2.50
Gardia lamblia	7	22.5	3.5	1.67
Subtotal	31	100.0	15.5	
Helminths				
Ascaris lumbricoides	27	55.1	13.5	2.55
Ancylostoma duodenale	16	32.6	8.0	2.38
Trichuris trichiura	6	12.3	3.0	1.50
Subtotal	49	100.0	24.5	
Multiple infection				
E. histolytica + A. umbricoides	4	57.2	2.0	2.63
E. histolytica + G. lamblia	3	42.8	1.5	2.56
Subtotal	7	100.0	3.5	
Overall total	69		34.5	

DISCUSSION

Despite of development in the delivery of health services, parasitic diseases remain as the most important public health problem in most countries, particularly the developing countries of the world.[24] This study showed high intestinal parasitic infestation of both meat and vegetable foodstuffs as 58% and 71.3% respectively. Additionally, the burden of infection with intestinal parasites among food handlers was 34.5% which is much higher than that reported in Sudanese food handlers which was 2.7%[25] and also much higher than reported by Al-Lahlam et al[26] who found that 13.5% of non-Jordanian food handlers working in Jordan were infected with intestinal helminthes. Whereas it was found to be 41% in a study carried out in Kenya[27] which is higher than our study.

All the vegetable samples namely Saag, Spinach, Cabbage and Fenugreek were found to be highly contaminated with infestation by different parasites in percentages of 56%, 68%, 48% and 60% respectively. This is attributed to handling techniques of vegetables.[14] The risk of infection with intestinal parasites to the population is increased because these contaminated vegetables are sometimes eaten raw, undercooked to retain the natural taste and preserve heat labile nutrients or unclean.[28]

The type of meat storage practice influenced the prevalence of intestinal parasites. Only 18.1% of butcher shops used refrigerators, whereas it is appropriate to use refrigerator for meat storage. Poor storage methods expose meat to mechanical vectors like house-flies, cockroaches and rats that transfer eggs and cysts of intestinal parasites to improperly stored meat.[17] The butcher shops where the handlers handled money while serving meat had 59.8% parasite prevalence while those where different personnel handled money and the meat serving had low prevalence 16.1%. This has been a major factor in acquiring intestinal parasites as shown in other studies.[29,30] The most common intestinal parasites affecting the food handlers were A. lumbricoides (13.5%) and E. histolytica (12%) as was observed in Kisii District.[31] This high prevalence is a risk to consumer especially if the food handlers fail to sanitize hands and other materials in their use.

CONCLUSION

Thus this study has revealed that there is a high risk of infection with intestinal parasites in the sampled markets of Lahore. About half of the people surveyed (43.5%) had one or more parasitic infection. Furthermore, meat (71.36%) and vegetables (58%) sold at those markets were found to be contaminated with parasites. So it is required that food handlers and even the consumer should be properly educated about the food safety and improvement of sanitary conditions.

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