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Prevalence of intestinal parasitic infections in Jenin Governorate, Palestine: a 10-year retrospective study

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ABSTRACT

Objective: To assess the prevalence of intestinal parasites among Jenin Governorate (Northern Palestine) population. **Methods:** A retrospective laboratory analysis of stool specimens was carried out for intestinal parasite examination in Jenin Governmental Hospital, Jenin Governorate, Northern Palestine. The records were collected from the clinical microbiology laboratory of the Jenin Governmental Hospital between January 2000 and December 2009. **Results:** Our retrospective study showed that the prevalence of intestinal parasite infection during 10 years ranged from 32.0-41.5%. There are at least 7 different parasites *encountered*. The most common pathogenic parasites identified were: *Entamoeba histolytica* (8.2-18.2%), *Enterobius vermicularis* (15.6-28.9%). The other parasites present were *Giardia lamblia, Ascaris lumbricoides, Strongyloides stercoralis*, *Taenia* species and *Ancylostoma duodenale* (Hookworms). **Conclusions:** Intestinal parasitic infection is an important public health problem in Jenin governorate, Palestine. It is necessary to develop effective prevention and control strategies including health education and environmental sanitation improvement.

1. Introduction

Intestinal parasites are frequently transmitted via contaminated food or drinking water, but may also be spread from person to person through fecal-oral contact. Intestinal protozoan and helminth parasites are widely prevalent causing considerable medical and public health problems in developing countries. Intestinal parasitic protozoal and helminthic infections are widely distributed throughout the world, especially in the developing countries. World Health Organization estimates that some 3.5 billion people worldwide are affected, and that 450 million are ill as a result of these infections[1]. The prevalence of these parasitic infections varies in different parts of the world. In developing countries, however, geographic and socioeconomic factors as well as unpredictable factors such as natural disasters contribute to the problem. In addition to that, these countries mainly have tropics or subtropics climates and relatively humid areas that, combined with poverty, malnutrition, personal and community hygiene, high population density, unavailability of potable water and low health status, poor sanitary facilities all provide optimum conditions for the growth, transmission of these parasites and increase the probability of exposure to intestinal parasites[2-4].

The situation of intestinal parasitic infection in Palestine, is still a problem, probably due to defect in health status, poor sanitation, population crowdedness, bad hygienic habits, and poor health education mainly in Palestinian Refugee Camps. In Palestine relatively few studies have been done on the gastrointestinal parasites. Most of these studies focused on Gaza Strip. According to the best of our knowledge no studies have been done on the intestinal parasites in Jenin Governorate. The aim of this study is to get a true idea about the existence of intestinal parasites and their prevalence among Jenin Governorate (Northern Palestine) populations by referring to records in Jenin Governmental Hospital.

2. Materials and methods

A retrospective laboratory analysis of stool specimens was carried out for intestinal parasite examination in Jenin Governmental Hospital, Jenin Governorate, Northern Palestine. The records were collected from the clinical microbiology laboratory of the Jenin Governmental Hospital, between January 2000 and December 2009. Specimens were normally examined by qualified medical technologists within 2 hours of collection, first grossly for the presence

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of adult parasites then by light microscopy. The stool specimens were examined using different microbiological analysis including direct and stool concentration techniques. The age, sex and other demographic information of the patients were recorded inconsistently and thus these parameters were not included in the data analysis. The stool samples were obtained from both inpatients (hospitalized patients) and outpatients (non-hospitalized patients). The cellophane tape technique has been used for recovery *Enterobius vermicularis* eggs from around the anus.

3. Results

Our retrospective study showed that prevalence of intestinal parasite infection ranged from 32.0–41.5%. There are at at least 7 different parasites encountered, and the most common pathogenic parasites identified were: *Entamoeba histolytica* (8.2–18.2%), *Enterobius vermicularis* (15.6–28.9%). The other parasites present were *Giardia lamblia*, *Ascaris lumbricoides*, *Strongyloides stercoralis*, *Taenia* species and *Ancylostoma duodenale* (Hookworms) (Table 1).

Table 1
Over all prevalence of intestinal protozoan and helminth parasites from 2000 to 2009 in Jenin governorate, Northern Palestine [*n*(%)].

Year	No. of samples/year	Infected cases							Infected samples /year
		Protozoa species		Helminth species					
		Entamoeba histolytica	*Giardia lamblia*	*Taenia* spp	Hookworms	*Ascaris lumbricoides*	*Strongyloides stercoralis*	*Enterobius vermicularis*	
2000	9 656	796 (8.24)	64 (0.66)	11 (0.11)	5 (0.05)	97 (1.00)	7 (0.07)	2 494 (25.80)	3 474 (36.00)
2001	14 441	1 531 (10.60)	41 (0.28)	27 (0.19)	1 (0.01)	188 (1.30)	34 (0.24)	4 174 (28.90)	5 996 (41.50)
2002	13 923	1 766 (12.70)	30 (0.22)	11 (0.08)	1 (0.01)	50 (0.36)	13 (0.09)	3 763 (27.00)	5 634 (40.50)
2003	14 096	1 546 (11.00)	25 (0.18)	15 (0.11)	7 (0.05)	9 (0.06)	3 (0.02)	3 699 (26.20)	5 304 (37.60)
2004	14 981	2 187 (14.50)	41 (0.27)	36 (0.24)	4 (0.03)	11 (0.07)	14 (0.09)	3 103 (20.70)	5 396 (36.00)
2005	12 688	1 765 (13.90)	30 (0.24)	17 (0.13)	3 (0.02)	2 (0.02)	10 (0.08)	2 984 (23.20)	4 811 (37.90)
2006	10 839	1 750 (16.20)	44 (0.41)	42 (0.39)	3 (0.03)	2 (0.02)	5 (0.05)	2 432 (22.40)	4 278 (39.50)
2007	11 022	2 004 (18.20)	38 (0.34)	36 (0.33)	1 (0.01)	15 (0.14)	5 (0.05)	1 856 (16.80)	3 955 (35.90)
2008	11 717	1 732 (14.80)	68 (0.58)	31 (0.26)	9 (0.08)	38 (0.32)	7 (0.06)	1 870 (16.80)	3 755 (32.00)
2009	9 927	1 727 (13.40)	50 (0.50)	52(0.52)	12 (0.12)	0 (0.00)	14 (0.14)	1 552 (15.60)	3 407 (34.30)

4. Discussion

This study shows that intestinal parasitic infection is a major public health problem in Palestine during last 10 years (2000–2009). These parasites have different prevalence in other Arabian countries or countries located in Middle East, for instance, reports on intestinal parasites have shown prevalence rates of 28.7% in Yemen[5], 19.3–27.3% in Iran[3,6,7], 12.4% in Lebanon[8], 16.6–74.6% in Gaza strip (Palestine)[9–14], 28.5% in Jordan[15], 42.5% in Syria[16], 31.4–32.2% in Saudi Arabia[17,18], 17.0–90.4% in Sudan[19,20], 33.9% in Qatar[21], 31.8–37.2% in Turkey[22,23], and 27% in Egypt[24]. The difference in prevalence of infections in these countries is due to different factors such as geographic, socioeconomic, climate, poverty, malnutrition, personal and community hygiene, population density, unavailability of potable water and poor sanitary facilities.

Different types of intestinal parasitic diseases were detected during this retrospective study. As regard to the infection, *Entamoeba histolytica*, was the commonest intestinal protozoa, while *Enterobious vermicularis* was the commonest helminth. In other studies, some found that *Giardia lamblia* and *Entamoeba histolytica* were the most common protozoa[4,9,10,20,24,25], others including *Giardia lamblia* and *Entamoeba coli*[7], *Entamoeba coli*, *Giardia lamblia* and *Entamoeba histolytica*[8], *Entamoeba histolytica/dispar*[14], *Giardia lamblia*[15,19,23], *Entamoeba histolytica*[12,26]. According to helminthes it was reported that *Ascaris lumbricoides* seemed to be the most common helminth[9–12,20,24], *Hymenolepis nana* and *Ascaris lumbricoides*[25], *Enterobious vermicularis*[4,15,23].

Amoebiasis, giardiasis, ascariasis, and hookworm infection are among the most common intestinal parasitic infections worldwide and are closely related to socio-economic status, poor sanitation, inadequate medical care and absence of safe drinking water supplies[27–29]. Variability in human behavior, through deeply instilled social practices and traditions can also be a major obstacle in attempts to control directly transmitted parasitic infections over different geographic areas. The high rate of infection with *Entamoeba histolytica* might be attributed to poor hygiene standard in this region. This parasite can be transmitted orally by drinking contaminated water. Both *Entamoeba histolytica* and *Giardia lamblia* are environmental contaminants of the water supply. The water supply is really an important risk factor for the amoebiasis and giardiasis, and several large outbreaks have resulted from the contamination of municipal water supplies with human waste[30]. The high rate of infection in this part of Palestine may be attributed to the habit of eating unwashed vegetables or ingestion of contaminated water, mainly in rural areas and refugee camps due to the lower quality of water and faulty sewage lines or do not have a municipal water network or sewage system. In view of the prevalence of intestinal parasitic infections in this study, preventive measures should be taken to prevent dissemination of infection and to reduce opportunities for exposure, by increasing level of knowledge about personal and community health and hygiene, sanitary control of water and waste disposal and reduction of the source of infection by therapeutic measures.

Ascaris lumbricoides, *Strongyloides stercoralis* and the hookworms are the causal agent of soil-transmitted helminthiasis. The prevalence of these helminthes was low, this may be due to the techniques employed in the

examination of stool specimen searching for helminthes. In addition to that, Jenin is an agricultural area where most residents are working as farmers and some farmers use untreated organic fertilizers in their farms. Enterobiasis occurs worldwide, usually involving school-aged children[31]. In general *Enterobious vermicularis* infection is transmitted by hand to mouth and/or person to person directly. High prevalence of *Enterobious vermicularis* in this area might be due to improper hygiene including not washing hands with soap after defecation, before eating and preparing foods. The higher prevalence of *Enterobious vermicularis* could also be explained by the highly infectious nature of this parasite.

In conclusion, intestinal parasitic infection is an important public health problem in Jenin governorate, Palestine. It is necessary to develop effective prevention and control strategies including health education and improving environmental sanitation.

Conflict of interest statement

We declare that we have no conflict of interest.

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