

Prevalence of intestinal parasites in three localities in Gaza Governorates – Palestine

by

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Abstract

This study was carried out among urban, rural and refugee camp populations in three localities (Rimal, Jabalia Village, Jabalia Refugee Camp), in Gaza Governorates – Palestine. School children between 6 and 11 years old were examined. The prevalence of intestinal parasites among 309 school children was higher in the rural area (53.3%) and the Refugee Camp (48.0%) than in urban areas (33.0%).

Many cases of polyparasitism were detected, especially in the rural area. The main intestinal parasites were E.histolytica, G.intestinalis and A.lumbricoides, with a high prevalence level. Prevalence levels of T.trichiura and H.nana were low in all investigated localities.

Keywords

Intestinal parasites, Ascaris lumbricoides, Entamoeba histolytica, Giardia intestinalis.

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Introduction

The Gaza Governorates are a narrow elongated zone of land with a surface area of 365 square kilometers. They extend longitudinally 45 kilometers along the Mediterranean Sea coast and their width ranges between 5 kilometers (in the northern part) and 12 kilometers (in the southern part). Gaza Governorates are bordered on the south by Egyptian Sinai desert, on the east by Negev Desert and on the north by Israel. The Gaza Governorates consist of five provinces: North, Gaza, Mid-zone, Khan Younis, and Rafah. They comprise four towns, eight refugee camps and fourteen villages (1).

The Gaza Governorates figure among the most densely populated areas in the world. The overall population density is estimated to be 3,000/km² but it is much higher in the refugee camps (21,087/km²). It is also estimated that 50.3% of the total population of the Gaza Governorates are children below the age of 14.

Multiple factors such as socio-economic (economic resources, employment, poverty), demographic and environmental conditions influence health status. The lowest standard of living is to be found on the outskirts of Gaza City. It is lower in villages than in cities – a large part of the total population of villages is part of the group with lowest standard of living. A high percentage of Gaza Refugee Camps' population can be classified as medium standard of living.

Social phenomena such as rural to urban migration and job opportunities, urban infrastructure and economic factors are among the determinants shaping the epidemiological pattern of parasitic diseases (2).

The state of health in Gaza Governorates is related to social, economic and environmental variables such as social status, income, family size, quality of water, drainage, proper housing and health awareness. It is also affected by nature, type and distribution of health services (3).

Gaza Governorates are considered an endemic area for parasitic infection since population size, density, socio-economic and environmental factors contribute to the development and transmission of many intestinal parasites.

Harm to health can result from exposure to a harmful agent through skin contact with contaminated soil; ingestion of soil or contaminated material which is most likely in young children; drinking contaminated

water; inhalation of dust containing harmful materials; or ingestion of fruit or vegetables grown on contaminated land. These factors affect health, especially children's, and can cause many diseases such as diarrhoea and intestinal parasitism (4).

Materials and Methods

This work was conducted using a random sample of children belonging to six primary schools in Gaza Governorates. A total of 309 stool samples were collected from children aged between 6 and 11 years. The study was conducted in three localities including Gaza City, Jabalia Village and Jabalia Refugee Camp.

Gaza City (South Rimal area) with 70,000 persons constituting 23% of the total Gaza City's population.

Jabalia Refugee Camp lies in the north of Gaza Governorates with the highest population density (65,000 persons live in an area of about four square kilometers, population density being 16,250 /km²).

Jabalia Village is the largest village in the north of Gaza Governorates, with a population of 40,802 (National Palestine Authority, 1995).

Permission for study was obtained from the Director of Health Administration (Ministry of Health) and the Director of Health of the United Nations Relief and Work Agency (UNRWA).

For stool collection six primary schools were selected. The nature of the study was explained to the children, and they were given a plastic vial with a spoon and tight-fitting lid to avoid contamination with urine. None of children had any gastro-intestinal symptoms during the period of sample collection. Each container was marked with waterproof ink with an identification number.

Parasitological methods: direct smear method (5); concentration techniques (formol – ether sedimentation method (6), zinc sulphate centrifugal flotation (7).

An Arabic questionnaire, which was later translated into English, was designed, distributed and analyzed. The questionnaire comprised three principal parts: personal information (name, sex and age); socio-economic factors, environmental and health data.

Results

Table I outlines the laboratory investigation results of 309 children in three localities: Rimal area, Jabalia Camp and Jabalia Village. An overall prevalence of 44.6% was found among various children groups.

The prevalence of intestinal parasites among children of Rimal area, Jabalia Camp and Jabalia Village was 33%, 48% and 53%, respectively.

The differences in prevalence rates between the three localities were statistically significant ($X^2 = 83.09$, P value = <0.05).

TABLE 1
Prevalence of intestinal parasites in three localities in Gaza Governorates

Parasites	Rimal area		Jabalia camp		Jabalia village	
	No	%	No	%	No	%
Single infection	34	32	48	48	43	41.7
<i>E. histolytica</i>	17	16	17	17	9	8.7
<i>A. lumbricoides</i>	9	8.5	11	11	28	27
<i>G. intestinalis</i>	8	7.5	16	16	6	5.8
<i>H. nana</i>			4	4		
Mixed infection	1	0.9			12	11.6
Total infected	35	33	48	48	55	53.3
Non infected	71	67	52	52	48	46.6
Total	106	100	100	100	103	100

($X^2 = 83.09$, P-value = <0.05)

With respect to the three areas, Jabalia Village had the highest prevalence in helminthic infections, followed by Jabalia Refugee Camp and Gaza City, which had the lowest prevalence. Higher prevalence of infection with *A. lumbricoides* (27%) was registered in Jabalia Village (rural area), in comparison to Jabalia Refugee Camp (11%) and Rimal area (8.5%). Infection with *H. nana* was only registered in Jabalia Camp, *T. trichiura* was found in polyparasitism with a low prevalence usually associated with *A. lumbricoides*. The results may be attributed to improvement in health services since the fifties.

In contrast to helminthic infection, prevalence of protozoa was higher in Jabalia Camp, a noticeable drop occurred in Gaza City and the low-

est prevalence was found in Jabalia Village. The high prevalence in the Refugee Camp could be related to poor hygiene, inadequate sanitation and health care and to the fact that the high population density (65,000 persons live within an area of about 4 square kilometers) made the municipal services become insufficient in both quality and quantity.

E. histolytica showed the highest prevalence rates of all intestinal parasites in Jabalia Camp "refugee" children (17%) and in Rimal area (16%). In Jabalia Village "rural" children, the prevalence was only 8.7%. It was also observed that all the *E. histolytica*-positive children were asymptomatic.

The frequency of infection with two or more species of parasites was more prevalent only in Jabalia Village, while the two other localities had single infections. In Jabalia Camp there were no polyparasitism cases. The prevalence of multiple infections in school children put them at the highest risk of morbidity.

Of particular interest is the complete absence from the 309 cases examined of *Enterobius vermicularis*, but this is not surprising given the absence of appropriate methods for *E. vermicularis* diagnosis.

Male children in Rimal area and Jabalia Camp had a higher prevalence of intestinal parasites than female children, while only a slight difference was observed in Jabalia Village (Table II).

TABLE 2
Prevalence of intestinal parasitic infection by locality and by sex

	Location					
	Rimal area		Jabalia camp		Jabalia village	
	Femal	Male	Female	Male	Female	Male
Infected cases	25.5	41.4	46	5	54.3	52.6
<i>E. histolytica</i>	10.9	21.6	18	16	8.7	8.8
<i>G. intestinalis</i>	1.8	13.7	12	20	10.9	1.8
<i>A. lumbricoides</i>	10.9	5.9	8	14	28.3	26.3
<i>H. nana</i>	—	—	8	—	—	—
Double infection	1.8	—	—	—	6.6	10.6
Triple infection	—	—	—	—	—	5.3

Rimal area ($\chi^2 = 2.957$, P-value = 0.049).

Jabalia camp ($\chi^2 = 0.160$, P-value = 0.689).

Jabalia village ($\chi^2 = 0.030$, P-value = 0.862).

Comparing the results of three age groups in the three localities, a higher prevalence among children in the 1st and 3rd age group was found in Jabalia Village while the 2nd age group in Jabalia Camp showed higher prevalence rates (Table III).

TABLE 3
Prevalence of intestinal parasites in children according to age in 3 localities in Gaza Governorates

Locality	Status	Age range (years)		
		6-7 years	8-9 years	10-11 years
Rimal P-value <0.05	Number examined	48	29	29
	Number. infected	12	9	14
	% infected	25	31	48.3
Jabalia camp P-value <0.05	Number examined	30	36	33
	Number infected	14	18	15
	% infected	46.7	50	45.5
Jabalia Village P-value >0.05	Number examined	48	36	34
	Number infected	33	16	21
	% infected	68.8	44.4	61.8

Discussion

Intestinal parasitic diseases are endemic in many countries particularly in the developing world. Gaza Governorates are endemic areas for many intestinal parasitic diseases. The warm climate, the moisture and relative humidity, the sandy and clay nature of the soil and the salty nature of the water play an important role in the prevalence of infection in Gaza Governorates.

Yassin, et al. (8) stated that the lack of sufficient sanitation, environmental or personal hygiene in Gaza overcrowded areas and children's habits of playing in groups on contaminated areas such as soiled yards are additional factors which account for the increased prevalence of intestinal parasites.

Our results were higher than previous records of Yassin et al. (8) who reported 27.6% prevalence of intestinal parasitic infection among the children in Gaza City.

There was a remarkable difference in prevalence rates among the three localities, which shows that socio-economic and environmental factors (status of the parents and guardians of the school children,

urbanization, availability of drink water, population density, inadequate waste disposal systems, street contamination, personal hygiene habits, housing conditions and food preparation) were different.

Our results of the role of unfavourable school environment in the transmission of intestinal parasites either by direct contamination of food and water or by autoinfection. School children in Rimal area have lower prevalence than Jabalia Village and Camps which is an indication of the high standards of living, good environmental sanitation as well as other socio-economic factors; like family size, food availability, dietary practices, standards of child care and other cultural community characteristics.

High prevalence of helminths may be due to eggs reintroduced into the residential population through contaminated soil water and food, with the end result being that susceptible individuals contract the infection through either contact or inadvertent ingestion of polluted materials (9).

In 1979, Abed (10) reported higher prevalence (62.3%) of *A. lumbricoides* in preschool children in Jabalia Village in Gaza Governorates. That is an indication that the environmental and hygienic factors in this village have become better than before. Other studies revealed higher prevalence of *A. lumbricoides*. Al-Zain and Sharma (11) reported a prevalence of 12.8% of *A. lumbricoides* in Gaza school children. As regards the intestinal protozoa, *E. histolytica* is the most prevalent parasitic infection among school children. This finding could be attributed to the widespread prevalence of amoebic infection in tropical and subtropical regions (12). Gaza Governorates are considered a subtropical region.

Al-Wahaidi (13) reported a high prevalence of *G. intestinalis* (64%) and *E. histolytica* (29%) among children infected with intestinal parasites.

Al-Eissa, et al. (14) reported only 9% of *G. intestinalis* and 5% prevalence of *E. histolytica* in Saudi Arabia.

Although all age groups sampled showed infection, the highest prevalence occurred in children between 6-7 and 10-11 years old in rural and refugee camp areas. Our result was consistent with the results of Bundy (15, 16), who declared that generally the prevalence of intestinal parasites tends to vary according to age, being the highest throughout the vulnerable years of childhood.

Infection could result from letting children play on polluted soil. Intestinal parasites are mainly transmitted by dirty habits, lack of personal hygiene and ineffective methods of faecal disposal.

As regards correlation with sex, the prevalence rate was slightly higher in males than in females. Most probably this difference is due to the frequent exposure of male children to infection in the poor dirty environment and lack of hygienic knowledge and habits.

There was a significant difference in the sex distribution of intestinal parasites in Rimal locality ($P = <0.05$), but it did not reach a significant level in Jabalia Camp and Jabalia Village. A possible explanation is that both male and female primary school children were exposed to the same environmental conditions that equally facilitate their being infected by intestinal parasites.

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