

**STUDY ON THE STATUS OF PREVALENCE OF
STRONGYLOIDES STERCORALIS INFECTION AMONG
CHILDREN IN AGRICULTURAL AREAS
IN BEIT LAHIA, GAZA STRIP**

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ABSTRACT: This study was conducted in Beit Lahia town in order to find the rate of prevalence of *Strongyloides stercoralis* parasite. The study reveals that the prevalence rate of *Strongyloides stercoralis* was extremely high compared to the previous studies conducted in the same region.

Beit Lahia town is located in the north governorate of Gaza Strip. It is bordered in the west by the Mediterranean Sea, in the north by Israeli colonization, Jabalia camp from the south, and Beit Hanoun town from the east. The population of the town is nearly 55.000 people.

In order to conduct the study, random cases were selected from eleven unique agricultural regions in Beit Lahia town. The prevalence of *Strongyloides stercoralis* and other intestinal parasites were assessed by the examination of stool specimen from each of the random selected 1600 individuals aged between 3-18 years, using direct fecal smear and formalin- ether concentration techniques.

The overall infection rate was 74.6 % (1195) and 13.4 % (213) of the cases had multiple infections. The infection rate of *Strongyloides* cases was 5.6% (90) and most of those infected children were passing adult worms. Moreover, 45.8 % (733) of the children living near the sewage water pools were infected by *Ascaris lumbricoids*. Amongst the protozoa infection, *Entamoeba histolytica* was observed most frequently 5.5 % (88) and *Giardia lamblia* was 3.5 % (56), other less commonly found parasites were *T. Trichura* and *H. nana*. The high rate of parasitic and multiple infections reflect the low socioeconomic status of the studied community.

Key word: Strongyloidiasis, Farms, Infection, Prevalence, Children.

Introduction:

Intestinal nematodes infect many of the world's children and constitute a formidable public health problem [1]. Although worm infections are common and often minimized, the infected children may suffer nutritional deficits, serious illness; cognitive impairments and occasionally death [2].

Most data on the prevalence of intestinal parasites infections especially strongyloidiasis in agricultural communities in Gaza strip are biased because they come from studies on selected individuals such as hospitalized and

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others seeking medical attention [3]. True prevalence, which is mostly derived from unselected populations, is generally unknown. Strongyloides infection rates in the general population are thus difficult to obtain particularly as strongyloidiasis infections are miss diagnosed in Palestine as in other parts of the world [4,5]. Because routine laboratory diagnosis is based on direct fecal examination except a few recent studies which were performed in Gaza strip especially in Beit Lahia town [6]. Extensive parasitological studies were undertaken among school children of Gaza strip revealed high prevalence of infection with *A. lumbricoids* (53%), *G. lamblia* (55%) and *E. histolytica* (43%) [7]. These investigations have been based on the examination, using direct method and formalin-ether concentration of a single stool sample from each individual. However, available information indicates that 74.6% of the study populations had intestinal parasites of at least one species and 13.4% had multiple parasites. The most prevalent parasite in this survey was *A. lumbricoids* 45.8% followed by *Strongyloides stercoralis* 5.6%, *T. Trichura* 0.1% and *H. nana* 0.9%. Amongst the protozoan parasites, *E. histolytica* was 5.5% and *G. lamblia* was 3.5%.

Human strongyloidiasis in Beit Lahia town - Gaza strip is a highly severe health problem due to its prevalence and long term morbidity [8]. It is known that several factors determine whether a disease will affect a household's income and activities. These include the type of disease, the intensity of infection, the type of activities on which a household and communities depend for their livelihood, and the occurrence of disease in relation to peak working activity [9]. The Strongyloidiasis prevalence rate depends on the geographical area, environmental safety conditions, quality of housing, socio-economic status, standards of hygiene in the community crowding, physical and chemical characteristics of the soil, temperature, humidity and vegetation...etc [10-12]

The aims of the present study were to investigate the prevalence of infection with Strongyloides and others intestinal parasites in agricultural community in Beit Lahia town and to speculate the certain epidemiological features that could play a role in the parasites dissemination especially Strongyloides in the environment.

Materials and methods:

a-The study community

The study was conducted in eleven agricultural areas of Beit Lahia town North of Gaza strip. The town has a population of about 55.000 people [13], and it has low socio-economic and sanitary standards. Some streets are

unpaved and others have many pot-holes, which are filled with water during the raining season. Over flooded sewage and piles of rubbish are frequently observed. Moreover 95.7 % of the population drink the municipality water, 4.3% uses well water and the rest use water from other sources (mineral waters). 34.4% of the community uses the adequate sewage system and 65.6% use the absorption dowels. 1.4% of the community have house ground, 71.9% has tile and 26.7% have cement ground. The majority of the houses have one or two dormitories for six or more occupants, over crowding and close contact between people and domestic animals is very common.

The population tends to live in large families, but with frequent intermarriages. Only 12.8% of the male parents have a post-high school degree on the other hand, the female parents' percentage 2.2%. Moreover the illiteracy among the males and females parents was 15% & 24.8% respectively.

b- Survey methods:

Each of the housing units included in the study was determined by random sampling and then visited to get the co-operation of the family. One member of each household was interviewed where name, age sex, sanitary facilities and socio-economic status information was obtained. A single stool sample was collected in the morning from each of 1600 children aged 3-18 years and transported to the laboratory and processed within half an hour and was examined by a qualified technician using normal saline and lughole's iodine. A formal-ether sedimentation technique was applied for each specimen and the sediment was examined using light microscope.

c- Statistical analysis:

Data were entered to computer system and analyzed using SPSS programme for frequencies, chi-Square test, P-value <0.05 was considered a significant.

Results:

Stool specimens were obtained from 1600 children, 967 (60.4%) were male children and 633 (39.6%) were female children, aged between 3-18 years. Intestinal parasites were found in 1195 (74.6%). Soil-transmitted helminthes was the most prevalent as follows *A. lumbricoids* 733, (45.8%) followed by *S .stercoralis* 90 (5.6%) whereas *H. nana* and *T. trichuris* were the lowest prevalent 15 (0.9%), 2 (0.1%) respectively. Amongst protozoan infections *E. histolytic* and *G. lamblia* were found to be 88(5.5%) and 56(3.5%) respectively Table (1).

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Table (2) shows the prevalence of intestinal parasites in eleven regions of Beit Lahia town. Infection with *A. lumbricoids* was the commonest form of parasites with a significant difference among the children in the eleven regions. Whereas infections with *S. Stercoralis* were also observed in all eleven regions, except among El-Barrawy region's children. *S. stercoralis* was highly significant in Maarof area 34.5% and was lowest in El-Khazzan and Saknat Fadaos areas 1.1%. Maarof area children showed the highest prevalence rates for most forms of parasites except *T. trichuris* which was common among Saknat Fadous and El-Manshia areas. Infection with *G. lamblia* and *E. histolytica* were also observed. The highest prevalence of Giardiasis was in El-Manshia area 32.2% and was lowest in El-Salateen area 1.8%. The highest record of *E. histolytica* 25.5% was observed in El Manshya area but was lowest in El-Khazzan, El-Salateen and El-Hatabya areas 1.2%. *H .nan* and *T. trichuris* were very rare and were only observed in five areas 15 (.9%) and in two areas 2(1%) children respectively Table2. The number of children with intestinal parasites was higher in males than in females Table 3. The overall infection rate was 61.2% in males and 38.8% in females with a significant difference ($p=0.002$). The commonest parasites, *A. lumbricoids* and *S.stercoralis*, were also more prevalent in males than in females with prevalence rate 54.2% and 45.8% respectively, no significant difference was found ($p>0.05$). Table1. In addition the prevalence of multiple and triple parasitic infection was observed in different regions of Beit Lahia Table1, 2. Generally, the number of children harboring more than one parasite species is low in comparison to infection with one parasite. Thus the overall percentage of children with one species was 61.4%, with two species 12.8% and three species 0.5% table 2.

Children with double and triple parasitic infection showed higher prevalence rates among Saknat Maarof and Aslan areas' children. The commonest combination was between *A. lumbricoids* and *S. stercoralis* followed by *A. lumbricoids* and *E. histolytica* table 2. Triple parasites infections with *S. stercoralis*, *A. lumbricoids* and *G. lumblia* was observed only in three regions with overall prevalence of 0.4%. Similarly only Al-Atatra children showed triple parasitic infection with *S.stercoralis*, *A. lumbricoides* and *E. histolytica* with prevalence rate 0.1% table 2.

Table (3) shows that the highest prevalence of strongyloidiasis infection was found in age group 6-8 years ($P=0.002$) followed by age between 9-12 years ($P=0.002$) whereas age above 16 years showed lowest prevalence rate of parasitic infection.

Discussion

The present work describes the phenomena of prevalence of Strongyloidiasis among the children in Beit Lahia town, which depends on planting fruits and vegetables as a main source of income. In this agriculture town, most farms use untreated organic fertilizers in their farms. The farmers also irrigate their crops from the sewage pools, which are close to the farms.

Moreover, most parents accompany their children -even the infants- to the unhealthy farms without attending or taking perceptual procurer (as most children are also closely linked with the habit of discriminating defecation around the farms and homes as well as neglected and moving bare foot in the farm (without shoes nor gloves) . These factors along with the over-crowding in the town may cause high degree of contamination of the soil around the houses and farms resulting in the observed higher rates of ascariasis and strongyloidiasis among the town children. The town houses are situated close to each other and very near to sewage pools and children spend most of their time outdoors playing in the soil.

Analysis of this result shows that *A. lumbricoids* was the commonest intestinal parasites in all the eleven regions of Beit Lahia followed by *S. Stercoralis* except El-Barrawy region , *E. histolytica* and *G. lamblia*. Other parasites, in order of their prevalence namely *H. nana* and *T. trichuris* were very rare. The overall prevalence of parasitic infection among the study population was very high 74.6% while in other regions in Palestine, e.g. the prevalence was 53% in Jabalia as a rural area putting into account that it has the same socioeconomic and environmental condition as Beit Lahia and 33% in El Remal as urban area which has a high socioeconomic status, and in the West Bank, the overall prevalence of intestinal parasitic infection was 32.3% [14].

In our study the prevalence of *Strongyloidiasis* had a little variation among all age groups expect in the age group between 16-18year which shows the highest prevalence rate was 3.7%in the age between 6-8year compared to the childhood 1.8%. It could be attributed to the fact that male children always work with the householder to help him in the farm and there are more chances of exposure to infection. In addition, the present work shows that Maarof area which has the highest prevalence of parasites has a few common sanitary latrines; small children always defecate in open areas around the farms, and thus contaminating the soil which might be the cause of the observed high rates of ascariasis and strongyloidiasis.

The ubiquitous nature of helminthes infections in this study may be attributed to the high incidence of parasite in certain locations of Beit Lahia,

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especially Maarof and Al-Manshia areas, which are deprived of clean drinking water, soil contamination and personal hygiene which is the major potential source of infection.

Acknowledgement: I would like to acknowledge all persons who helped to perform community examinations, supply of drugs for infected patients especially TAMKEEN project who financed the greatest portion of this study.

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