Birzeit University
Community Health Unit

An Investigation of Intestinal Parasitic Infection and Haemoglobin Levels of Children in a Bir Zeit School

Occasional Papers

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1. Introduction

The aim of this study was to investigate the extent and type of intestinal parasitic infection and blood haemoglobin levels of elementary school children in a school in Bir Zeit. The research was part of a pilot study which was designed to assess field and laboratory methodology to be used in further parasitological research.

The survey was carried out in the co-educational Latin Convent School in Bir Zeit. This school was selected due to its accessability to the researchers and as it comprised the full range of elementary school classes from grade 1 (age approx. six years) to grade 6 (age approx. 12 years) for both sexes. Links were established between the researchers and the school staff with the assistance of the Head Nurse/Administrator of Birzeit Women's Charitable Society. The survey was carried out in November/December 1984.

. Methodology

he field work was carried out in the following stages:

.. A list of names, ages and places of residence was compiled for all children registered in grades 1-6 inclusively.

2. The researchers visited each class on the allocated day and discussed the aim of the survey and issues of general health and hygiene with the children. Booklets on the topic of parasitosis, which had been produced in the Community Health Unit and were specifically designed for children, were discussed in the class. Posters were left with each class.

3. Letters to the parents were given to each child, requesting the parents' assistance in taking stool samples the following morning. Each child was given a named stool collection container and asked to bring a sample to school the next day.

4. A blood sample was taken from each child by finger prick and sent directly to the laboratory for haemoglobin estimation.

5. The following morning stool samples were collected from the school and taken to the laboratory for analysis.

6. All stool samples were concentrated using the Formol-Ether concentration method as described by Ritchie (1). Fluid stool samples were also examined by direct smear in order to identify the possible presence of trophozoite forms of parasites. No preservative was used during the testing. As there was no assurance that all the samples were fresh, the results indicate minimum infection levels.

7. The results of the blood and stool tests were sent to the Birzeit Women's Charitable Society's clinic in Bir Zeit for follow up.

Results

1 Stool Tests

f the 206 children registered in the six elementary school lasses, a total of 193 children (94%) brought stool samples for xamination. As shown in Table 1, 45 children (23%) were found o be infected with one or more intestinal parasites. Of the 93 children participating in the survey, 159 lived in the town f Bir Zeit, and of these, 31 (20%) were found to be parasitised. he remaining 34 children lived in one of nine villages in the ir Zeit area. Of these children, a total of 14 children (41%) ere found to be parasitised.

Table 1. Number of Children with Positive Stool Samples by Grade and Sex

Grade	avg. age (yrs)	Total tested			Males tested			Females tested		
		no.	no. +ve	% +ve	no.	no. +ve	% +ve	no.	no. +ve	% +ve
1	6	36	7	19.5%	21	3	14%	15	4	22%
2	7	34	14	41%	20	8	40%	14	6	43%
3	8	28	7	25%	16	5	31%	12	2	12%
4	9	29	3	10%	12	1	8%	17	2	12%
5	10	30	6	20%	16	2	13%	14	4	29%
6	11	36	8	22%	18	5	28%	18	3	17%
		193	45	23%	103	24	23%	90	21	23%

103 out of a total of 109 boys registered in the school brought stool samples, 24 of which (23%) were parasitised. Of the 97 girls registered in the school, a total of 90 delivered stool samples, 21 of which (23%) were found to be parasitised. Thus there was no difference in levels of parasitic infection between the sexes overall.

Neither was there a consistent trend in infection levels between children of different sexes in the same class. In grades 3 and 6

he infection level was found to be higher in boys than in girls, hereas in the other four classes girls were found to be more ommonly parasitised than boys. A total of five species of ntestinal parasites were identified in the stool of the 45 arasitised children.

he level of infection varied in each grade, with the highest evels found in grade 2 children (41%) and the lowest in grade 4 hildren (10%). No consistent trend emerged between grade (age) nd parasitosis levels, although the infection rate was higher in hildren of the three lower classes (29% of those examined in rades 1-3 were positive) than in children of the higher three lasses (19% of those examined in grades 4-6 were positive).

Table 2. Parasite Prevalence by Grade (%)

Grade	Entamoeba coli	Giardia lamblia	Trichomonas hominis	Trichuris trichiura	Hymenolepis nana
1	6	14	0	0	0
2	15	29	0	0	0
3	0	18	0	4	4
4	7	3	0	0	0
5	10	10	0	0	0
6	6	11	3	0	3
Total for all grades	8%	15%	0.5%	0.5%	1%

(Prevalence = number of positive cases/total number of stools)

Of the parasitised children, 43 were infected with one, and two children were infected with two parasite species. The most commonly found parasite species was Giardia lamblia, which was present in 28 children (15% of those examined). 15 children (8%) were infected with Entamoeba coli, two children with Hymenolepis nana, one child with Trichomonas hominis and one child with Trichuris trichiura. Both boys and girls were infected with G. lamblia and E. coli, while the other three parasite species were found only in male children.

Although not considered to be a pathogenic parasite, E. coli is included in this study as an indicator of faecal-oral contamination.

3.2 Blood Tests

Of the 206 children registered in the school, 194 children (94%) were tested for blood haemoglobin levels. Table 3 shows the results of the blood tests. The haemoglobin levels of parasitised children (Table 4) reveal no substantial variation from the means for all children.

Table 3. Haemoglobin Values of Boys and Girls in Each Class

Grade	gm Hb/100ml Blood			
	Male		Female	
	Mean	Range	Mean	Range
1	15.0	13.2-16.4	14.6	12.8-16.4
2	13.6	11.4-16.0	14.6	12.2-16.2
3	14.2	12.8-16.0	13.7	11.6-15.2
4	13.2	10.2-16.0	13.1	11.4-15.0
5	13.8	11.4-15.4	13.7	12.0-15.2
6	13.8	12.2-16.2	14.2	13.0-15.4

Table 4. Haemoglobin Values of Parasitised Children

	+ve Stool Tests		
Grade	No. of +ve Stool Tests	Mean gm Hb/100ml	
		Male	Female
1	7	15.0	14.6
2	14	14.4	14.7
3	7	14.0	13.0
4	3	16.0	12.7
5	6	12.8	14.0
6	8	13.6	14.3
Total	45	14.3	13.8

4. Conclusions

The survey established that giardiasis was prevalent in all age groups. No significant association was detected between parasitosis and gender, age and blood haemoglobin.

20% of the children examined who live in Bir Zeit were found to be parasitised. Of the children living in surrounding villages, 41% were infected with one or more parasites. In view of these differences, it should be noted that Bir Zeit has a potable water network and enjoys relatively better socio-economic conditions than many West Bank villages.

However, further research is required to establish the social and environmental factors affecting levels of parasitic infection in the study population.

Appendix

Laboratory Methodology

Formalin-Ether Concentration Method

1. Add 13 ml of saline: mix
2. Strain 10 ml of the mixture with wet gauze
3. Centrifuge at 1500 rpm for 2 min., decant
4. Repeat step 3 one to three times with saline, decant
5. Add 10 ml of 10% Formalin, allow to stand for 5 min.
6. Add 3 ml of Ether and shake
7. Centrifuge at 2500 rpm for 2 min.
8. Free the plug of faecal debris from sides of the tube with applicator, and decant
9. Mix sediment and examine.

Reference

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