Pakistan J. Zool., vol. 36(4), pp. 267-271, 2004.

Epidemiological Factors Affecting Prevalence of Intestinal Parasites in Children of Muzaffarabad District

ZAHID HUSSAIN CHAUDHRY, M. AFZAL AND MUSHTAQ AHMAD MALIK

Department of Zoology, University of Azad Jammu and Kashmir, Muzaffarabad (ZHC, MAM) and Animal Sciences Division, Pakistan Agricultural Research Council, Islamabad, Pakistan (MA)

E-mail: afz-parc@isb.paknet.com.pk

Abstract.-Prevalence of gastro-intestinal parasites in <15 years old children in Muzaffarabad city was 29.26%. Protozoal infection was higher than helminth infestation. Prevalence of *Giardia lamblia* (11.8%) was higher than *Entamoeba histolytica* (5.9%). *Ascaris lumbricoides* (3.8%) was the most prevalent helminth followed by hookworms (2.4%). Prevalence of all other helminths namely *Enterobius vermicularis, Trichuris trichiura, Hymenolepis nana* and *Taenia saginata* ranged from 1.0 to 1.7 percent. Mixed infection was seen only in 3.1% children. Rural children had higher prevalence of parasites than children living in city but the difference was statistically non-significant. After 2 years of age, the prevalence of parasites continued to decrease as the age of children increased. Family size and income did not have statistically significant effect on the prevalence of gastrointestinal parasites in the children. The education of mother was the single and most important factor that influenced the prevalence of parasites in the children. The children of educated mother had 3.5 times less chance of being infected with parasites.

Key words: Epidemiology, intestinal parasites, Muzaffarabad.

INTRODUCTION

Parasitic diseases constitute one of the major public health problems for people living in developing countries, especially children who are most severely affected because parasites directly contribute towards malnutrition. High worm loads and repeated infections with intestinal parasites can cause severe anaemia and chronic diarrhoea, resulting in negative impact on growth, fitness and learning ability of children (UNICEF, 1998; Sakti *et al*., 1999). Furthermore, about 150,000 children die annually due to intestinal obstruction and related abdominal complications caused by large adult worms. High prevalence of infections with intestinal parasites in developing countries is related to poverty, poor living conditions, poor personal and environmental hygiene, inadequate health services, inadequate sanitation and water supply facilities (Cook, 1996; Montresor *et al*., 1998).

Studies on the prevalence of parasites in Pakistan have mainly been restricted to big cities like Karachi, Lahore, Rawalpindi-Islamabad and Peshawar and targeted specific population like school children, low income groups and rural population. Summary of these studies is presented in Table I. The present study was carried out in children of <15 years age in Muzaffarabad city and included all strata of population, thus is expected to yield information on epidemiological factors affecting prevalence of gastro-intestinal parasites in the small city dwellers.

0030-9923/2004/0004-0267 $ 4.00/0

MATERIALS AND METHODS

The study was carried out in 287 children of less than 15 years age in Muzaffarabad. Randomly selected houses in different localities were visited and families were informed about the study and impact of parasites on children health. If the family agreed to provide stool sample of the child, the family was provided with a clean plastic container carrying identification number and a sterile disposable wooden spatula. The mother was briefed on the method of collection of faecal sample in the container. At the time of collection of sample, a questionnaire for each child was also filled-in.

All samples were transported to the Pathology Laboratory of Combined Military Hospital, Muzaffarabad where all faecal samples were examined immediately by direct smear technique as

Table I.- Prevalence of gastrointestinal parasites in various cities of Pakistan.

Authors	Study area	Study population	Size	Prevalence (%) of parasites									
				EH	GL	OP	AL	HW	TT	EV	HN	TA	SS
Farooqi (1964)	Peshawar	Mixed population	572	3.5	9.8	0	1.5	5.5	0.2	0.2	2.8	0.2	0
Haleem *et al*. (1965)	Karachi	Mixed population	6197	13.0	5.4	12.2	11.0	1.6	0.6	0.4	1.6	0.5	0.5
Ansari and Naru (1968)	Lahore	Mixed population	1771	0.8	1.8	14.4	-	-	-	-	-	-	-
Pal and Malik (1979)	Islamabad	Primary school children	3478	11.9	41.9	0	11.1	2.3	2.1	9.1	21.6	0	0
Siddiqui and Bano (1979)	Peshawar	Primary school children	400	0	22.8	13.7	13.5	0	0	3.5	13.3	0	0
Bilqees *et al*. (1982)	Karachi	Patients with gastric complaints	3249	58.4	26.9	0	11.9	2.3	2.3	6.0	2.3	0.2	0.2
Pal and Rana (1983a)	Rawalpindi	Mixed population	5360	5.3	32.9	3.4	15.5	9.8	2.8	4.7	8.8	1.2	0
Pal and Rana (1983b)	Islamabad	Mixed population	3490	5.6	31.7	4.6	5.8	1.2	1.7	4.6	16.4	0.4	0
Nawaz and Nawaz (1983)	Peshawar	Food handlers in hostels	166	12.7	22.9	47.0	4.2	0.6	0	3.0	0	0	0
Baqai *et al*. (1985)	Karachi	0-3 years healthy children	160	0.6	5.0	0	1.3	0	0.6	0	0	0	0
Baqai and Zuberi (1986)	Karachi	Diarrhoeal patients	455	36.5	43.7	4.6	8.0	0.8	1.0	1.5	3.3	0.3	0.3
Shah *et al*. (1986)	Hazara Div.	Hospital samples	6874	-	-	-	7.3	3.2	0.3	0.4	1.5	0.7	0
Khan *et al*. (1988)	Faisalabad	University students	240	2.5	0.4	7.9	1.3	2.9	0.4	0.8	2.5	0	0
Pal and Subhani (1989)	Dir, NWFP	Primary school students	2027	-	-	-	14.9	6.1	4.9	3.3	6.6	3.5	0
Ali (1993)	Kurram agency	Mixed population	1269	-	-	-	31.0	0.6	7.8	2.3	7.0	1.7	0
Akhtar *et al*. (1993)	Lahore	Hospital patients	2651	3.2	9.0	25.8	24.4	1.9	2.4	1.7	17.2	7.1	3.2
Qureshi (1995)	Islamabad	Hospital patients	387	-	-	-	10.6	0	1.6	2.3	4.9	0.8	0
Jamil (1999)	Islamabad	Urban and suburban populations	1350	-	-	-	15.1	1.4	4.1	13.8	7.2	2.6	0

EH, *Entamoeba histolytica*; GL, *Giardia lamblia*; OP, Other protozoa; AL, *Ascaris lumbricoides*; HW, Hookworms; TT, *Trichiuris trichiura*; EV, *Enterobius vermicularis*; HN, *Hymenolepis nana*; TA, *Taenia* spp.; Ss, *Strongyloides stereoralis*.

described elsewhere (Cheesbrough, 1992). Each positive sample was rated as having low (1-3 eggs per preparation), moderate (4-10 eggs per preparation) and heavy (>10 eggs per preparation) infection. Data were analyzed statistically.

RESULTS

Overall prevalence of gastrointestinal parasites in the study population *i.e.* children in Muzaffarabad city was 29.26%. Protozoal infection was higher

than helminth infection (Table II). Two protozoan parasites were detected, the prevalence of *Giardia lamblia* being higher than *Entamoeba histolytica. Ascaris lumbricoides* was the most prevalent helminth followed by hookworms. Prevalence of all other helminths namely *Enterobius vermicularis, Trichuris trichiura, Hymenolepis nana* and *Taenia saginata* was almost similar and ranged from 1.0 to 1.7 percent. Mixed infection was seen only in 9 children with 6 having two parasites, 2 children with 3 parasites and only one child had infection with 4 parasites.

Table II.- Prevalence of different gastrointestinal parasites in children (n=287) of Muzaffarabad.

Parasite	Infected children	
	Number	Percentage
Protozoa (all)	51	17.7
Giardia lamblia	34	11.8
Entamoeba histolytica	17	5.9
Helminths (all)	33	11.4
Ascaris lumbricoides	11	3.8
Hookworm	7	2.4
Enterobius vermicularis	4	1.3
Trichuris trichiura	3	1.0
Hymenolepis nana	5	1.7
Taenia saginata	3	1.0
Parasites (all)	84	29.26

Urban vs rural analysis showed that rural children had higher (32.7%) prevalence of parasites than children living in city (24.8%). However, this difference was statistically non-significant. There was also no statistically significantly difference in prevalence of parasites between male and female children (Table III). Types of parasites were also similar in both sexes.

Prevalence of parasites in children of different age groups is shown in Table III. The prevalence was higher in children of <8 years age than older children. After 2 years age, the prevalence of parasites continued to decrease as the age of children increased. Nematode infection was minimum in children of >12 years age and only one child had *Trichuris* infection in this age group. The prevalence of cestodes and protozoa were however, similar in all age groups.

Table III.- Prevalence of gastrointestinal parasites in children (n=287) in Muzaffarabad as related to sex, age, family size, family income and mother's education.

Parameter	Number of cases		
	Total tested	Infected (No.)	Infected (%)
Sex			
Male	155	49	31.6
Female	132	35	26.5
Age			
< 2 years	32	12	37.5
> 2 and < 5 years	51	20	39.2
> 5 and < 8 years	68	25	36.7
> 8 and < 11 years	59	15	25.4
> 11 and upto 15 years	77	12	15.5
Family size (No. of members)			
3	59	14	23.7
4 – 6	112	34	30.3
7 – 9	79	22	27.8
> 9	37	14	37.8
Family income (Rs. / month)			
< 3000	121	42	34.7
3001 – 8000	114	25	21.9
8001 – 15000	31	10	32.2
15001 – 20000	15	5	33.3
> 20000	6	2	33.3
Mother's education			
< matriculation	82	49	59.8
> high school education	205	35	17.1

Family size did not have statistically significant effect on the prevalence of gastrointestinal parasites (Table III). However, higher prevalence of parasites was seen in children of very large (>10 members) families. Different parasites were almost uniformly distributed among various groups of family sizes. Family income also did not seem to influence the overall prevalence of parasites in their children. However, *Ascaris* infection was higher in children from low-income (< Rs. 3000 per month) group. Infection with nematodes and cestodes was lower in children of higher income families.

The education of mother was the single and most important factor that influenced the prevalence of parasites in the children. The children brought up by mothers with at least high school education had lower (17.1%) prevalence of parasites than

uneducated or under-matric mothers (59.8%). In fact children of educated mothers had 3.5 times less chance of being infected with parasites.

DISCUSSION

Prevalence of intestinal parasites in a population is generally related to the level of poverty, type of living conditions, personal and environmental hygiene, adequacy of health services, sanitation and availability of clean water supply. Prevalence of gastrointestinal parasites seen in this study was lower than those reported in recent studies in Pakistan (Khan *et al*., 1988; Pal and Subhani, 1989; Ali, 1993; Akhtar *et al*., 1993; Qureshi, 1995; Jamil, 1999). This is due to the fact that those studies dealt with targeted groups *i.e.* children living in slums, rural children or those with gastrointestinal problems that are expected to have higher prevalence of the parasites. The parasite species found in this study are similar to those reported earlier and no parasite specific to the region was recorded.

Association of parasitic infection with different factors like rural vs urban, sex and age of the children, number of family members, family income and mother's education were also studied. While sex and locality had no effect on the prevalence of parasites, children of <8 years of age had higher prevalence than older children. This may be due to the awareness of importance of improved hygiene in older children as nematode infection was minimum in this age group. Among the family parameters, the mother's education was the most important factor that influenced the prevalence of parasites. Educated mothers being aware of the importance of the sanitation and cleanliness, were able to inculcate better sense of hygiene in their children resulting in the lower prevalence of endoparasites.

ACKNOWLEDGEMENTS

The authors are highly thankful to Dr. Muhammad Altaf, Head Pathology Laboratory and Dr. Muhammad Jahangir Khan, Commanding Officer, Combined Military Hospital, Muzaffarabad for permission to use the facilities. The technical assistance of laboratory technicians Raja M. Zubair, Abdul Qayyum, Gulzar Ahmad, Iftikhar Ahmad and Safeer Kiyani are also highly acknowledged.

REFERENCES

AKHTAR, T., TEHSIN, N. AND USMAN, S., 1993. Intestinal parasitic burden in two local hospitals of Lahore. *Biologia*, **38**: 41-48.

ALI, N., 1993. *A survey of intestinal helminths of man in Kurram agency*. M.Phil, thesis, Department of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan.

ANSARI, M.A.R. AND NARU, N.A., 1968. Some incoming parasites of Lahore. *Pakistan J. med. Res*., **7**: 138-139.

BAQAI, R., ZUBERI, S.J. AND KHAN, M.A., 1985. Pathogens in faecal samples from apparently healthy children. *J. Pakistan med. Assoc*., **35**: 307-308.

BAQAI, R. AND ZUBERI, S.J., 1986. Prevalence of intestinal parasites in diarrhoeal patients. *J. Pakistan med. Assoc*., **36**: 7-11.

BILQEES, F.M., KHAN, A. AND AHMAD, A., 1982. A survey of intestinal protozoan and helminth parasites in Karachi. *Pakistan J. med. Res*., **21**: 54-57.

CHEESBROUGH, M., 1992. *Medical laboratory manual for tropical countries*. Vol., 1, 2nd Ed. Cambridge University Press, Cambridge.

COOK, G., 1996. *Manson's tropical diseases*, 20th Ed., W.B. Saunders, London.

FAROOQI, M.A., 1964. An investigation of human intestinal parasitism in some areas of Pakistan. *Pakistan J. med. Res*., **3**: 113-115.

HALEEM, M.A., AKRAM, M. AND AKRAM, S., 1965. Intestinal parasitic infection in Karachi. *J. Pakistan med. Assoc*., **15**: 499-501.

JAMIL, F., 1999. *An analysis for the prevalence of human intestinal helminth parasites in urban and suburban communities of Islamabad*. M.Phil. thesis, Department of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan.

KHAN, M.N., HAYAT, C.S., IQBAL, Z. AND HAYAT, B., 1988. Survey of gastrointestinal parasites in students of University of Agriculture, Faisalabad. *Pakistan Vet. J*., **8**: 194-196.

MONTRESOR, A.D., CROMPTIN, W.T. AND BUNDY, D.A.P., 1998. *Guidelines for the evaluation of soil transmitted helminths and schistosomiasis at community level, A guide for managers of Control Programmes*, World Health Organization, Geneva.

NAWAZ, M. AND NAWAZ, Y., 1983. Observations on incidence of intestinal parasitic infection in the food handlers of hostels of Peshawar University, NWFP. *Bull. Zool*., **1**: 63-66.

PAL, R.A. AND MALIK, Z., 1979. Prevalence of intestinal parasites in primary school children of Islamabad. *Pakistan J. Zool*., **11**: 105-108.

PAL, R.A. AND RANA, S.I., 1983a. Incidence of intestinal helminth parasites of main in the twin cities of Rawalpindi-Islamabad. *J. Pakistan med. Assoc*., **33**: 33-38.

PAL, R.A. AND RANA, S.I., 1983b. Incidence of intestinal

protozoan parasites of man in the twin cities of Rawalpindi-Islamabad. *J. Pakistan med. Assoc*., **33**: 156-161.

PAL, R.A. AND SUBHANI, F., 1989. Prevalence of intestinal helminth parasites in primary school children of Dir District (NWFP). *Pakistan J. Sci. Tech*., **13**: 99-102.

QURESHI, R.Q., 1995. *Intestinal helminth parasites with emphasis on hookworms of man in and around Islamabad*. M.Phil. thesis, Department of Biological Sciences, Quaid-i-Azam University, Islamabad.

SAKTI, H., HERTANTO, W.S., HALL, A., BUNDY, D.A.P. AND SATOTO, F., 1999. Evidence of an association between hookworm infection and cognitive function in Indonesian school children. *Trop. Med. Intern. Hlth*., **4**: 322-334.

SHAH, S.H., KHALIQ, M.A. AND SUBHANI, F., 1986. Helminth infestation in Hazara Division. *J. Pakistan med. Assoc*., **36**: 11-13.

SIDDIQUI, M.N. AND BANO, L., 1979. Observations on parasitic infections in school children of Peshawar. *Pakistan J. Zool*., **11**: 109-113.

UNICEF, 1998. *State of the World's Children,* 1997, UNICEF, New York.

(Received 20 September 2003, revised 20 May 2004)