PREVALENCE OF PARASITIC INFESTATION IN CHILDREN OF A RURAL COMMUNITY OF PESHAWAR

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ABSTRACT

OBJECTIVE: To find out the actual prevalence of parasitic infestations in a community village Budhni of Peshawar, Pakistan.

METHODS: This cross-sectional study was carried out in village Budhni near Peshawar, Pakistan. A sample of 288 children, aged <5 years were randomly selected. Information was collected on the age, gender, feeding and hygiene habits of the mothers and children. Fresh stool sample were collected in sterile bottles for microscopic examination. Data was analyzed statistically using SPSS version 16.

RESULTS: A total of 288 children were included in the study; out of which 175(61%) were males and 113(39%) females. The mean age was 33.8±16.1 months. An overall prevalence of parasitic infestations was 41% (n=117). The most common parasites observed were *Giardia lamblia* (n=56; 19.4%), *Entamoeba histolytica* (n=36; 12.5%) and *Hymenolepis nana* (n=18; 6.3%). Multiple infestations were seen in 19% children. Worm infestation was found more common up to the age of 36 months. Female children were more infected (n=43; 38%) as compared to male children (n=55; 31.4%). Worm infestation increased with the family size, low parental education, non-breast fed, use of drinking water from well and lack of toilet facility. Hand washing practice before feeding/weaning and use of soother by the child have also showed some increased frequency of worm infestation.

CONCLUSION: Prevalence of parasitic infestation is quite high in children, aged <5 years in rural areas of Peshawar. Single as well multiple infestations were found. Lack of education, improper sanitation and drinking water facility play the major role in causing infection.

KEY WORDS: Intestinal Diseases, Parasitic (MeSH); Worm infestation (Non-MeSH); Multiple infestations (Non-MeSH); Giardia lamblia (MeSH); Entamoeba histolytica (MeSH); Hymenolepis nana (MeSH); Ascaris lumbricoides (MeSH); Hymenolepiasis (MeSH); Parasites (MeSH); Rural Population (MeSH).

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INTRODUCTION

Intestinal parasitic worms' infestation, which is a serious health problem affects millions of people worldwide majority of them being children.[1] It is one of the major causes of childhood malnutrition, anaemia, stunted physical and mental growth, psycho-social problems and this along with repeated gastrointestinal and upper respiratory tract infection contributes to high morbidity in children and remains a major cause of high infant and child mortality in our country.[2,3]

Intestinal parasite infestations are more frequent in children of school age, and they have a tendency to occur more in this age group. Impure water, low socio-economic state, poor sanitation coupled with low literacy rates of parents particularly the mothers are the main causes of this prevalent malady.[1] Its rate varies from country to country and even different among same country.[4] The estimated worldwide affected people are about 3.5 billion, and about 450 million are ill due to these infections, the bulk being children.[2,5,6]

In other estimation about one quarter of the world's population is infected and about 80% of all deaths annually are due to infectious and parasitic diseases in developing countries.[7] The reason behind the high prevalence of these infestations is closely correlated to poverty, poor environmental hygiene and impoverished health services.[3]

The effect of Human Intestinal Pathogenic Parasites (HIPP) are significant on the health of the community.[7] Few studies are carried out on the prevalence of HIPP in Pakistan and that also are based mostly on hospitalized children or on the school going children.[1,8-11]

Due to absence of specific denominator and results it did not reveal the true prevalence of burden of disease due to parasitic infections in the community and health resources, in cooperation by direct analyzing through health services utilization and the disability-adjusted life years (DALYS) lost. These studies also indicated that majority of intestinal parasitic infections were asymptomatic[12,13] and they did not consult laboratory that is why the true prevalence could not be reported. The large numbers of subject are the carriers and are serious threat for epidemics but the true prevalence cannot be reported[13-17]

TABLE I: DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS OF STUDY POPULATION (n=288)

Characteristics		Mean ± SD	
Age (months)		33.88 ± 16.13	
Height (cm)		83.12 ± 18.37	
Weight (kg)		12.39 ± 8.98	
Family Size		4.63 ± 2.22	
	Characteristics	**Frequency (n=288)**	**Percentage**
Gender	Male	175	60.8
	Female	113	39.2
Parents Education	Illiterate	112	38.9
	Literate	176	61.1
Monthly Income (PKR)	<7000	52	18.0
	7000-10000	129	44.8
	>10000	107	37.2
Hand Washing (Mother)	Yes	206	71.5
	No	82	28.5
Hand Washing (Child)	Yes	130	45.1
	No	158	54.9
Use of Soother	Yes	70	24.3
	No	218	75.7
Feeding Practices	Breast feeding	91	31.6
	Bottle feeding	36	12.5
	Mix feeding	24	8.4
	Self/weaned	137	47.5
Source of Drinking Water	Community Tape	37	12.8
	Hand pump	211	73.3
	Bore well	35	12.2
	Well with cover	05	1.7
Latrine Facility	Open field squatting	26	9.0
	Pit or borehole privy	14	4.9
	Pour flush latrine linked with street drain	184	63.9
	Septic tank	37	12.8
	Surface privy	27	9.4

As limited community-based studies are conducted in Peshawar area regarding prevalence of parasitic infestations in pediatric population, this study was planned to find out the actual prevalence of parasitic infestations in children of less than five years of age in village Budhni of Peshawar, Pakistan.

METHODS

This cross-sectional study was conducted on children less than five years in village Budhni, the model village by Pakistan Medical Research Council (PMRC) for its research studies. It is about 30 KM away from Peshawar and has population of 10,147 and total houses 1549. For research purpose the whole village is divided into 9 geographical blocks and each house is marked with a specific number. Family folder of each family is maintained and updated regularly. The population of children under five is approximately 871 in this village. The study was approved from the ethical committee of Post-graduate Medical Institute (PGMI), Peshawar. About 288 children of aged <5 years of either sex were selected randomly in the study by using the formula $N = 4Z\alpha^2 P (1-P) \div W^2$ for sample with prevalence rate at 25% level. The nature and procedure of the study was explained to the parents and informed consent taken. The mother/proxy of child were interviewed by a trained health care worker according to pre-designed questionnaire. The demographic variables age, gender, education/socioeconomic status of the parents, source of drinking water and sanitary condition of the household were recorded. Feeding practices of child whether breast feeding or bottle feeding and use of soother were also recorded. Weight and height of child were measured according to standard methods. Our study inclusion criteria were children under 5 years of age of both genders either having symptoms of parasitic infestation or asymptomatic with no present history of antidiarrheal drugs and dysentery treatment. Children having any type of infection or active disease were excluded from our study.

A plastic vial with a spoon and sterile tight-fitting lid was given to the mother of child for collection of stool specimen during house to house visit. The mother was instructed to avoid stool contamination with urine. Each container was marked with waterproof ink with an identification number. Fresh stool samples were delivered to lab immediately for microscopy and other examinations.

To achieve reliable results a mini lab was established in the Community Research Centre in village Budhni equipped with basic requirements. All stool specimens were examined fresh with microscopy being done for intestinal parasites. Different risk factors associated with intestinal parasites were also calculated at a significance level of $P<0.05$. Data was analyzed statistically using SPSS version 16.

RESULTS

Socio-demographic and socioeconomic characteristics of study population are shown in Table I. A total of 288 children

TABLE II: TYPE OF PARASITES PRESENT IN THE STUDY POPULATION ON MICROSCOPIC EXAMINATION

Type of Parasite	Frequency (n=288)	Percentage
Giardia lamblia	56	19.4
Entamoeba histolytica	36	12.5
Hymenolepis nana	18	6.3
Ascaris lumbricoides	06	2.1
Trichuris trichiura	01	0.3

TABLE III: DIFFERENT TYPES OF PARASITES FOUND IN COMBINATION ON MICROSCOPIC EXAMINATION OF STOOL SPECIMEN

Type	Frequency (n=19)	Percentage
Giardia lamblia & Hymenolepis nana	9	47.3
Giardia lamblia & Entamoeba histolytica	6	31.6
Entamoeba histolytica & Hymenolepis nana	2	10.5
Giardia lamblia & Ascaris lumbricoides	1	5.3
Ascaris lumbricoides & Hymenolepis nana	1	5.3
Total	**19**	**100**

were included in the study; out of which 175 (61%) were males and 113 (39%) females. The mean age was 33.8±16.1 months.

Mean family income of 44.8% families ranged between Rs. 7,000-10,000. About 112 (39%) parents were illiterate. Hand washing before feeding/ weaning was practiced by 206 (71.5%) mothers and 130 (45%) children. Soother was used by 70 (24%) children. Only 91 (31.6%) children were breast fed. Main source of drinking water was hand pump in 211 (73%) and flush latrine was present in 184 (64%) houses.

Different types of intestinal parasites identified on stool microscopy are shown in Table II. An overall prevalence of parasitic infestation was 98/288 (34%). The most common parasite was *Giardia lamblia* found in 56 (19.4%) stool specimens followed by Entamoeba histolytica in 36 (12.5%) cases. More than one parasite was seen in 19% children (Table III).

Distribution of parasites on microscopy according to age and gender is shown in Table IV. Infestation increased with age of the child up to 36 months. Most infected cases were between the age group of 25-36 months.

Factors related to worm infestation are shown in Table V. Female children were somehow more infected (n=43; 38%) as compared to male children (n=55; 31.4%). Worm infestation increased with the family size and maximum 11 (42.3%) infected children belonged to families having >7 family members. It was observed that higher parental education was associated with lower frequency of worm infestation and worm infestation was highest in children whose parents were illiterate. No much difference in frequency of worm infestation was seen in mother/child hand washing practice before feeding/weaning or use of soother by the child. Hand pumps were the major source of drinking water in this community; almost 77 (36.5%) children were infected with the parasites using water from this source. Worm infestation was more (60%) in children using water from a well as compared to those using it from the community tap (24.3%). A significant (P<0.02) number of non-breast fed children 76 (38.6%) were infected with parasites as compared to those who were breast fed 22 (24.2%). Toilet facility showed a direct relation to parasitic infection and 12 (46.2%) children were found infected when latrine facility was not available in the house hold and they used open fields for squatting. Although these risk factors were affecting the frequency of intestinal parasites to certain extent but none except breast feeding could attain the level of significance.

DISCUSSION

In the present study, parasites were present in 40.6% samples; this is similar to many studies where the prevalence ranges from 30% to 80%. Poor living conditions could be the cause of high prevalence along with using of unsafe water, poor sanitary conditions and improper disposal of waste. These factors were reported by other authors as well along with a climatic difference and temperature and humidity.[18,19]

The parasitic infestation was more common in females while this difference was non-significant in other studies. Controversies exist in studies regarding gender and parasitic infestation.[1]

Parasitic infestation was mostly seen between 25-36 months (53.9%). A study from Abbottabad showed 2-5 years as the most common age group as in this age the child starts walking and playing with soil.[20] WHO has recommended that every child between 2 to 5 years should be given single dose of anthelminthic drug (prophylactic dose) every 6 monthly (Integrated Management of Childhood Illness).[18]

In this study the most common parasite was *Giardia Lamblia* (19.4%), followed by *Entamoeba Histolytica*, a protozoan and *Hymenolepis nana*, a helminthes. Similar results were reported from Karachi.[21] Hook worm was not observed in our study and in other studies.[20] Similarly pin worm (*Enterobius Vermicularis*) which is common in this part of the world was not found in this study. Different combinations of helminthes and protozoa are reported in other studies.[22]

Ratio of protozoal (78.6%) to helminthic (21.4%) infection in present study was 3.7:1, which is similar to 3.5:1 reported from Karachi.[21]

A study conducted at Quetta [22] showed an overall lower prevalence of paristosis (31%) as well multiple infestation (18%) same as in our study. The frequency of parasites found were in

TABLE IV: DISTRIBUTION OF PARASITES POSITIVE CHILDREN ON MICROSCOPIC EXAMINATION OF STOOL SPECIMENS ACCORDING TO AGE AND GENDER

Age (months)	Parasite positive					
	Male (n=55)		Female (n=43)		Total (n=98)	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
0-12	05	9	01	2.3	6	6.0
13-24	12	22	09	20.9	21	21.4
25-36	16	29	18	41.9	34	34.8
37-48	11	20	05	11.6	16	16.4
49-60	11	20	10	23.3	21	21.4

Table V: DIFFERENT CAUSATIVE FACTORS ASSOCIATED WITH THE PRESENCE OF PARASITES IN THE STOOL OF CHILDREN

Factors		Total (n=288)	Parasite Positive		p-value
			Frequency	Percentage	
Gender	Male	175	55	31.4	-
	Female	113	43	38.0	0.3
Family Size	< 4	140	41	29.3	-
	5-7	122	46	37.7	0.18
	> 7	26	11	42.3	0.27
Parents Education	Illiterate	112	44	39.3	-
	Secondary	107	35	32.7	0.38
	Higher Secondary	17	5	29.4	-
	Graduation & higher	52	14	26.9	0.17
Family Income (PKR)	< 7000	116	37	31.9	-
	7000-10000	43	12	27.9	0.77
	>10000	129	49	37.9	0.39
Washing Hands for Feeding (Mother)	Yes	206	68	33	0.7
	No	82	30	36.6	-
Washing Hands Before Meal (Child)	Yes	130	48	36.9	-
	No	158	43	27.2	-
Use of Soother	Yes	70	22	31.4	0.70
	No	218	76	34.9	-
Source of Drinking Water	Community tape	37	9	24.3	-
	Hand pump	211	77	36.5	0.21
	Tube well	35	9	25.7	0.83
	Well (house)	5	3	60	0.25
Mode of Feeding	Bottle feeding	36	10	27.8	-
	Breast feeding	91	22	24.2	0.84
	Mix feeding	24	6	25	0.95
	Self/weaned	137	60	43.8	0.85
Breast feeding	Yes	91	22	24.2	0.02
	No	197	76	38.6	
Latrine Facility	Open field squatting	26	12	46.2	-
	Pit or borehole privy	14	2	12.3	0.09
	Pour flush latrine	184	63	34.2	0.33
	Septic tank	37	14	17.8	0.68
	Surface privy	27	7	25.9	-
Open field		26	12	46.2	0.24
Home toilet		262	86	32.8	

order of *Hymenolepis nana* (34%), *Giardia lamblia* (32%), *Entamoeba histolytica* (29%), *Ascaris lumbricoides* (4%) *Ankylostoma duedenale* (1%), while in our study the order of frequency was *Giardia lamblia* 56 (19.4%), *Hymenolepis nana* 18 (6.3%) and *Ascaris lumbricoides* 6 (2.1%).[22]

A study conducted in Karachi [9] on children of 1-5 years showed an increased prevalence of paristosis (52.8%).The most frequent parasite found was *Giardia lamblia* similar to our study. However, the study reported a lower frequency of multiple parasitic infections (10%). Poor living conditions, use of unsafe water supply, improper disposal of waste and poor sanitary conditions along with a climatic difference and temperature and humidity are said to be the risk factors.[9]

CONCLUSION

Prevalence of parasitic infestation is quite high in children, aged <5 years in rural areas of Peshawar. Single as well multiple infestations were found. Lack of education, improper sanitation and drinking water facility play the major role in causing infection.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

JH, RN: Concept & study design, analysis & interpretation of data, drafting the manuscript, final approval of the version to be published

NSM & SF: Acquisition of data, drafting the manuscript, final approval of the version to be published

TA: Critical review, drafting the manuscript, final approval of the version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest

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