

Original Article

PREVALENCE OF INTESTINAL PARASITIC INFESTATIONS IN RELATION TO WASTING; AMONG PRE-SCHOOL CHILDREN IN SKARDU, PAKISTAN

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ABSTRACT

Background: Parasitic infestations are one of the prominent public health problems. Children are affected the most and result in Malnutrition (Undernutrition), Iron deficiency anemia, learning problems and Gastro-intestinal disturbances. Malnutrition (undernutrition) may manifest in four broad forms: undernutrition, wasting, stunting, and micronutrient deficiencies. WHO defines 'wasting' as low weight-for-height. It often indicates recent and severe weight loss, although it can also persist for a long time. Wasting in children is associated with a higher risk of death if not treated properly. This community based, cross sectional study was aimed at determining the prevalence of intestinal parasitic infestations and their impact on the nutritional status, among pre-school children in Skardu, Pakistan.

Material and Methods: A sample of 300 pre-school children was selected through convenience sampling. The demographic data was collected from the parents of children. The intestinal parasites were identified in the stool samples. The pediatric weight scale was used to measure the recumbent weight and the adult weight machine was used to measure the standing weight. The cut off limit for wasting was set at < -2SD of weight-for-age z score.

Results: The prevalence of *A.Lumbricoides*, *Cryptosporidium*, *H.Nana* and *Giardia* was noted to be 22.33%, 14%, 9.3% and 8.0% respectively. Out of 300 preschool children, 47(15.7%) were found to be wasted. Out of wasted children, majority (35 children) were infested with some kind of intestinal parasite. This difference was statistically significant (p-value 0.001845).

Conclusion: In this study, we found significant prevalence of intestinal parasitic infestation in pre-school children of Skardu vis vis and its impact on the nutritional status. It is suggested that health promotion strategies should be developed, not only to control the intestinal parasitic infestations but also to improve the nutritional status of pre-school children.

Key Words: Hymenolepis Nana, Ascaris lumbricoides, Cryptosporidium, Giardia

INTRODUCTION

A large population of the world gets infected with parasitic infections.^{1,2} These include the

Ascaris lumbricoides, Giardiasis, Hymenolepis nana and Cryptosporidiosis. The children are targeted the most where it becomes manifest as iron deficiency anemia, malnutrition, learning problems and Gastrointestinal (GIT) disturbances.³ Growth is an important gauge that predicts the well-being of a child. WHO defines 'wasting' as below normal 'weight-for-height. It often refers to recent and severe weight loss, although it can also persist for a long time. It usually occurs when a person has not had food of adequate quality and quantity; and/or

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they have had frequent or prolonged illnesses. In children, wasting is associated with a higher risk of death if not properly treated. Growth gets affected drastically by the living conditions and the presence of diseases.⁴ Most of the under developed countries present a high prevalence of these infections with impaired growth patterns.⁵⁻⁷ Intestinal parasitic infections are amongst the most ignored diseases of the tropical region and constitute a major problem in respect to public health in such areas.⁸ These infections are most common among the children of such areas where there are poor environmental conditions and defective disposal of human feces. The commonest intestinal parasite is *Ascaris lumbricoides* that infects about 1 billion people worldwide followed by *Hymenolepis nana* and *Giardia lamblia*.⁹⁻¹¹ It has been observed that the most commonly affected age group are the children, because of their unhealthy habits; including their frequent handling and playing with infested soils. Moreover, they are less careful while they ingest food with dirty hands, more often consume contaminated food and above all the unhygienic bathroom practices. The same factors may have resulted in the malnourishment of the children. Northern areas of Pakistan being in the remotest and tough mountainous terrain remained isolated from mainstream studies. Not much work has been done to identify and quantify the health related issues of children of these areas. Whatever work was done, it was carried out focusing only the prevalence of parasitic infections in the specific localities, however less work has been conducted to find its association with the nutritional status. Therefore, this study was conducted to find the prevalence of parasitic infections and to determine its association with wasting in the pre-school children in remotest northern area of Pakistan i.e. Skardu.

MATERIAL AND METHODS

This cross-sectional study was conducted from 15 August 2016 to 30 January 2017 in a secondary care hospital, as well as in the community of district Skardu, located at an

altitude of 2500 meters. We selected 300 children less than 5 years of age, for our study. The sample size was calculated using the online 'Rosoft calculator'; at a 95% confidence level and 5% margin of error. The non-probability convenience sampling technique was used to collect required sample. All those were included with less than upper cut off point of age of 5 years. Those children whose parents gave history of comorbidities like congenital malformations, genetic disorders or chronic illness were excluded from the study. Similarly, all those were not included whose parents/caretakers did not give consent. Informed consent was taken from parents/guardians and approval of ethical committee was obtained before start of the study.

For collection of stool samples, mothers were provided with labeled and sterilized containers. Stool samples were processed in the laboratory within 8 hours of sample collection. The ova and cyst were examined with direct fecal examination and protozoa were detected with iodine staining. Social and demographic data were collected using a structured questionnaire which was filled by parents of the children. The anthropometric measurements were performed by trained staff. The pediatric weight scale was used to measure the recumbent weight and the adult weight machine was used to measure the standing weight. Lower cutoff limits of z-scores were observed which helped to determine the status of wasting. The cut off limits for wasting were set at $< -2SD$ of weight-for-age z score.

SPSS version 20 was used to analyze the data. Z scores for the weight for age indices were calculated using WHO Anthro-plus version 1.0.4 software.

RESULTS:

The gender distribution of 300 children was 56% males and 44% females. The socioeconomic (SE) distribution of the sample is shown in Figure 1. The majority (85%) of sample belongs to the low or low middle socioeconomic group i.e. 165(55%) and 90 (30%) respectively (p-value < 0.0001).

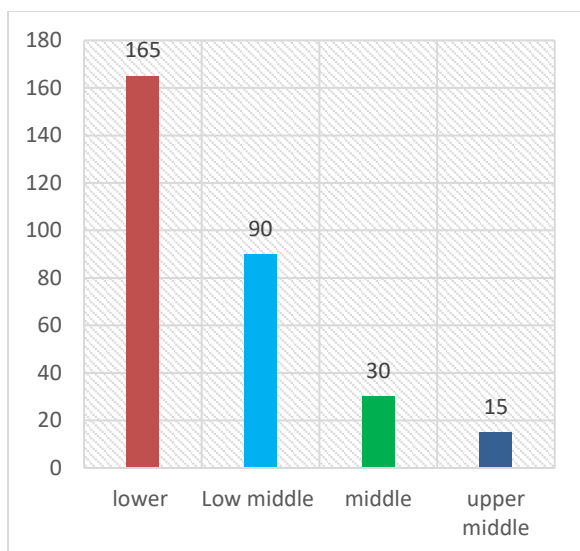


Figure-1: Socioeconomic distribution

Among the sample of 300 preschool children, 161 (53.67%) had parasitic infestation and 139 (46.33%) had no parasites in their stools. However, this difference was statistically nonsignificant (p-value > 0.5). (Figure-2)

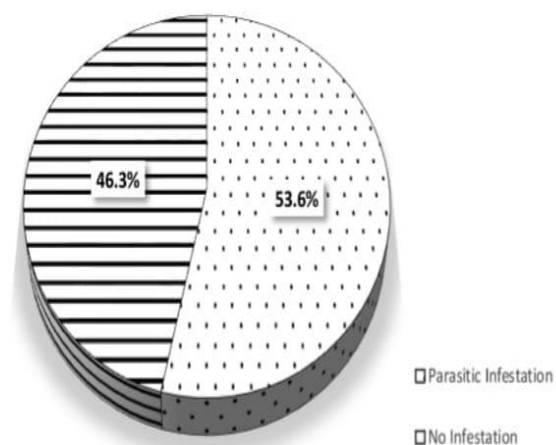


Figure-2: Prevalence of Parasitic infestation

Among the male preschool children, the percentage of parasitic infestation of any kind, was found to be 31%; while among all the female preschool children 22.7% had parasitic infestation. Similarly, out of 161 children who had parasitic infestation 93 were male and 68 were female. (Table-1). However, gender difference among those with parasitic infestation was statistically non-significant (p-value = 0.590).

Table-1: Gender-wise Parasites Infestation in the study sample (n=300)

Presence of Parasite	Male		Female	
	N	%	N	%
Yes	93	31.0%	68	22.7%
No	76	25.3%	63	21.0%
Total	169	56.3%	131	43.7%

p-value = 0.590

Looking at different types of intestinal parasites, it was found that 22.33% of children were infested with *Ascaris Lumbricoides*, while 14.0% of children with *Cryptosporidium*; 9.3% and 8.0% with *Hymenolepis Nana* and *Giardia* respectively (p-value < 0.00001).

Table-2 shows the distribution of wasting in children about different parasite types. Total of 253 (84.3%) was well-nourished; out of these 126 were infested with intestinal parasites while 127 were parasite-free. Similarly, 47 (15.7%) children were found to be wasted; out of these 35 children were infested with some kind of intestinal parasites. This difference is significant statistically, with Chi square statistic of 9.6981 and p value of 0.001845 (i.e. p < 0.05)

Table -2: Wasting in Pre-school children with Different Parasites (n=300)

Parasitic Infestation	No Wasting		Wasting		G Total
	N	%	N	%	
No	127	42.3%	12	04.0%	139
Yes	126	42.0%	35	11.7%	161
Total	253	84.3%	47	15.7%	

p-value = 0.001845

DISCUSSION

In this study we have attempted to highlight the issue of parasitic infections and the nutritional status of pre-school children in the district Skardu of Pakistan. We had selected

this region for our study as it is one of the remotest areas of Pakistan, considered to be deprived of the standard necessities of living. Its location at an altitude of nearly 2,500 meters, makes its residents exposed to extreme weather conditions. In such weather conditions, it becomes difficult to maintain hygiene especially the younger children who become very reluctant to put their hands into cold water. We, therefore, selected the children of this region as our subjects keeping in view the failure of these people in maintaining hygiene due to lack of standard conditions of sanitation, largely due to the low socioeconomic conditions.

The overall frequency of parasitic infections in our study sample was 53% which pointed towards the living standards of this locale. Out of this 53%, the major bulk was the male children in an age group of 3 years to 5 years. This is the age group of children that is up and about. Since they were the ones who would eat by themselves and would play outdoors, got infected the most. Somehow, the younger age groups got natural protection in the form of being breastfed and more contained within the premises of houses. These results were in line with the results of Tine and colleagues.¹²

These parasitic infections had impacted the health of the children included in our study. We observed that 15.7% of the studied children were malnourished (wasted). Out of these, the children infected with H.Nana, Cryptosporidium and Giardia were mostly stunted (3.7%, 3.0% and 2.7% respectively) followed by ascariasis (2.3%). A study done in 2018 shows that 17.1% of the children of school going age were wasted.¹² Similarly Amare and colleagues found out that 8.9 % of children were wasted because of parasitic infections.² An African study came up with a figure of 19.6 % wasting observed in school children in Ethiopia.¹ Suraweera and colleagues also reported similar figure of 19.3% of children being wasted.¹³ The main reason for this high prevalence of under nutrition is explained by the poor socio-economic status of the people of these areas. Unlike the results for H. Nana by Abdel et al

with a prevalence of 32.6%, our sample had a 9.7% prevalence.¹⁴ In yet another study conducted in a village Budhni of Peshawar, the prevalence of H.Nana and giardia was found 6% and 19% respectively.¹⁵

We observed that the intensity of infections increased with the advancing age of the child. Moreover, there was an increase in the severity of wasting with this increase in age. It shows that less the nutrition was available for the infected children as more worms were competing for the child's food. So this all points towards the conclusion that with an increase in the worm load, there are more chances that the nutritional status of the child be drastically affected. This has affected those children who were more independent, running around in open. Some important factors like socio-economic conditions, poor sanitary facilities and dietary habits of the people may be the major reasons for the findings in this study.

Wasting indicates the children at high risk and points towards the acute nutritional changes. Somehow it does not stand corrected while predicting long term changes.¹⁶ The main reason for it remains the decreased intake of food along with the presence of recurrent infections. It ultimately affects the cognitive development of the children.¹⁷ Wasting may be an indicator of multiple issues including poor nutrition, less education and large family sizes.^{18,19} These studies had been conducted on parasitic infections and nutritional statuses, however most of the studies could not bring out any significant association between the two.²⁰

CONCLUSION

There is significant relation of intestinal parasitic infestation with wasting that had affected the nutritional status of pre-school children of Skardu. This pinpoints the hazards of bad sanitation and poor hygienic conditions. These findings will help in designing the strategies to combat this situation, improving the overall productivity of an area.

AUTHOR'S CONTRIBUTION:

MFA: Conceived and designed the study
 KF: Collection of Data, Writing
 SA: Final drafting of the manuscript
 MQ: Data Analysis, Editing
 ZA: Data analysis
 HA: Critically reviewed the manuscript

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