

Prevalence of intestinal parasitic Infestations in relation to wasting among children under 5 years of age in Skardu, Pakistan: A Cross-sectional Observational study

Muhammad Faisal Afridi¹, Kulsoom Farhat², Shabana Ali³, Mehwish Nawaz Qaisrani⁴, Zaheer Ahmed⁵

ABSTRACT

This community based Cross-sectional Observational study was carried out in Skardu city and its adjoining areas, in order to determine the frequency of intestinal parasitic infections and its relation with the nutritional status of pre-school children. A sample of 300 pre-school children was selected through convenience sampling. Stool samples were tested for presence of ova/cysts of intestinal parasites. Anthropometric data was obtained using standard tools. *Ascaris Lumbricoides*, *Cryptosporidium*, *Hymenolepis Nana* and *Giardia* had frequency of 22.33%, 14%, 9.3% and 8.0% respectively. 47 (15.7%) Preschool children were found to be wasted. Out of wasted children, majority (35 children) were infested with some kind of intestinal parasites (p-value 0.001845). Significant relation was found between intestinal parasitic infestation and wasting.

Keywords: Intestinal parasites, Prevalence, Pre-school children, Nutritional status, Stool examination, Wasting

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INTRODUCTION

Intestinal parasites especially remain a challenging public health problem wherever sanitation and health measures are limited¹. Over 267 million preschool-age children and over 568 million school-age children live in areas where these parasites are intensively transmitted². An estimated 52 million children are wasted (16 million severely wasted)³. Such infestations may be manifested in the form of iron deficiency anemia, malnutrition, learning problems and Gastrointestinal (GIT) disturbances. 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 they have had frequent or prolonged illnesses³. In children, wasting is associated with a higher risk of death if not properly treated. Growth of children gets affected by the living conditions and the presence of diseases. Most of the under developed countries present a high prevalence of these infections⁴ with impaired growth patterns. 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 areas⁵. 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 one billion people worldwide⁶ followed by *Hymenolepis nana* and *Giardia lamblia*^{7,8}. 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 hands that are dirty, more often consume contaminated food and above all the bathroom practices that are unhygienic. 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 with

1. Instructor of Community Medicine, CMH Institute of Medical Sciences (CIMS), Multan
2. Associate Professor of Pharmacology, Army Medical College Rawalpindi
3. Assistant Professor of Pharmacology, Army Medical College Rawalpindi
4. Assistant Professor of Pharmacology, Foundation University Medical College Rawalpindi
5. Associate Professor of Home and Health Sciences, AIOU Islamabad

Correspondence:

Kulsoom Farhat
Associate Professor of Pharmacology,
Army Medical College Rawalpindi
Email: kulsoompasha@yahoo.com

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an aim to find the prevalence of parasitic infections and to determine its association with wasting in the pre-school children in remotest areas of Northern Area of Pakistan i.e. Skardu.

METHODOLOGY

This community based, cross sectional observational study was conducted from August 01, 2016 to January 31, 2017 in Skardu city and its adjoining areas. We selected 300 children of less than 5 years of age, for our study. The sample size was calculated using the online ‘Rosoft calculator’; at 95% confidence level and 5% margin of error. Non-probability convenience sampling technique was used to collect required sample. 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 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 was collected using 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 status of wasting. The cut off limits for wasting was set at < -2SD of weight-for-age z score.

SPSS version 20 was used to analyze the data. z-scores of 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 belong to Low or Low Middle SE group i.e. 165(55%) and 90 (30%) respectively. This difference is statistically significant (p value <0.0001)

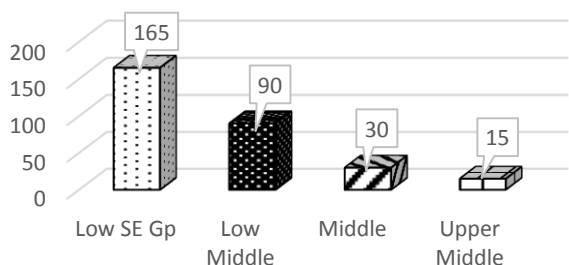


Figure-1: Socioeconomic distribution (N=300)

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 is statistically not significant (p value > 0.5).

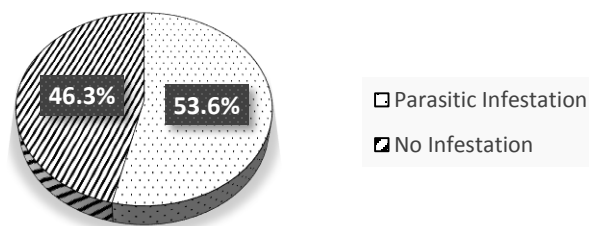


Figure-2: Prevalence of Parasitic infestation (N=300)

We observed that the children in the age groups of 24-35 months and 36-60 months, formed the major bulk of sample and they had the highest percentage values for parasitic infestations. Among the male preschool children, the percentage of parasite infestation of any kind, was found to be 31%; while among all the female preschool children 22.7% had parasitic infestation of some kind. Similarly, out of 161 children who had parasitic infestation 93 were male and 68 were female. However gender difference among those with parasitic infestation is also not significant statistically (p value 0.590).

The result for analysis of parasite types is based on percentages of overall sample of the study. Result reflects percentage of children infested with *Ascaris Lumbricoides* is 22.33%; while 14.0% of children with *Cryptosporidium*; 9.3% and 8.0% with *Hymenolepis Nana* and *Giardia* respectively.

Table-I: Distribution of wasting in children in relation to different parasite types (N= 300)

Name of Parasite	Not Wasted N (%)	Wasted N (%)	Chi sq (X ²)	p-value
<i>Ascaris lumbricoides</i>	60 (20%)	7 (2%)	2.86	0.09
<i>Hymenolepis nana</i> *	17 (6%)	11 (4%)	13.03	0.0003*
<i>Cryptosporidium</i>	33 (11%)	9 (3%)	1.227	0.26
<i>Giardia</i> *	16 (5%)	8 (3%)	6.16	0.01*
No. of children with Parasitic infestation	126 (42%)	35 (12%)		
No. of children without Parasitic Infestation	127 (42%)	12 (4%)		

* Statistically significant (p-value < 0.05)

Distribution of wasting in children in relation to different parasite types. Total of 253 (84%) of children in the whole sample were 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. Infestation with *Hymenolepis Nana* and *Giardia* is significantly associated with wasting in children.

DISCUSSION

We have attempted to describe the magnitude 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 being a remote area of Pakistan that is considered to be deprived of the standard necessities of living. It's 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 become very reluctant to put hands into cold waters. 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 prevalence 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 were the male children in an age group of 3 years to 5 years. This was the age group of children that was more up and about. Since they were the ones who would eat by themselves and would play out doors, got infected the most. Somehow, the younger age groups got a natural protection in the form of being breast fed and more contained within the premises of houses. These results were in line with the results of Tine and colleagues⁹.

These parasitic infections had impacted the health of the children included in our study. We observed that 15.7% of our total sample were wasted. Out of this, the children infected with *Hymenolepis Nana*, *Cryptosporidium*, *Giardia*, were mostly stunted (3.7%, 3.0% and 2.7% respectively) followed by ascariasis (2.3%). A study done in 2018 had shown in their data that 17.1% of the children of school going age were wasted⁸. Suraweera and colleagues also came up with a similar figure of 19.3% wasting¹⁰. 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 9.7% prevalence¹¹. In a study conducted in a village Budhni of Peshawar, the prevalence of *H. Nana* and *giardia* was found 6% and 19% respectively¹².

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 of 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. Here the socio-economic factors, the poor sanitary conditions and dietary habits of the people of this area be the major reasons for the overall findings of this study¹³.

Wasting gets predicted well by low weight for height index. It usually predicts the children at risk and evaluates the acute nutritional changes. Somehow it does not stand correct while predicting long term changes¹⁴. 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. Wasting is the compound effect of multiple things including poor nutrition, less education and large family sizes¹⁵.

CONCLUSION

There is significant relation of intestinal parasitic infestation with wasting that had affected the nutritional status of pre-school children.

Recommendations: This is not only a significant public health issue, but also an indicator of the overall socio-economic conditions and living standards of the area. This may provide a base line for further studies. It is suggested that study may be planned at broader level to explore this public health issue in detail.

AUTHOR'S CONTRIBUTION

Afridi MF: Conceived study, Designed research methodology.

Farhat K: Data collection, Literature review, Manuscript writing.

Ali S: Data collection, Literature review, Manuscript writing.

Qaisrani MN: Data collection, Literature review, Manuscript writing.

Ahmed Z: Data analysis, Critical revision of manuscript.

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