

Prevalence of Worm Infestation and Malnutrition in School going Children and risk factors responsible for Worm Infestation

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ABSTRACT

Objectives: Prevalence of malnutrition in AJK is very high in children between the age of 5-14 years and research based information about these health problems are generally lacking in school going children. The purpose of the present study was to find out the relationship between malnutrition and worm infestation in school going children.

Methodology: The study was carried out in Abbas Institute of Medical Sciences (AIMS) Muzaffarabad. Total 1902 students from nine Government schools of Muzaffarabad of age 5-14 were examined. Among these, 200 children were found with 3rd degree malnourished excluding children who were suffering from chronic diseases. Weight and height of the students was recorded. Stool samples of the students were collected and examined within one hour of collection under direct light microscope.

Results: Among these 200 students, 130 (65%) were found to have ova of one or more types of worms. Among the total population 190(10%) were having worm infestation. The male and female ratio for positive stool test was almost equal. Ova of the seven different types of worms were found in stool of infested students. By far the most common was Tenea (21%) and H-Nana (20%) species. Other species found were Hook worm (20%), Ascaris lumbricoides (12%), Trichuris Tricura (11%), Enterobius Vermicularis (10%) and Giardia Lamblia (6%). The relationship between worm infestation and malnutrition was found highly significant ($p<.001$). Among malnourished students, 65% were having worm infestation whereas only 6% of well-nourished children have worm infestation. The results pertaining to socio-economic status and malnutrition pointed out that the student having low socio economic status were more malnourished (96%) as compare to upper class (4%) $p<.001$. The relationship between malnutrition and safe water supply highlighted that the student having safe water supply were less malnourished ($p<.001$). Among the infested students, 84% falls under the category that depends on open field excreta disposal.

Conclusions: Prevalence of worm infestation was quite high in severely malnourished school going children and the most common worm infestation in our study was Tenea Saginata and H-Nana.

Keywords: Gomeze classification, worm infestation.

Introduction

Malnutrition (primary and secondary) occurs worldwide with very high incidence and predominantly in developing countries. It is reported that 50% of the children in south Asia are malnourished, and half of the world's malnourished children reside in Pakistan¹⁻².

In developing countries, common causes of secondary malnutrition are infections and worm infestation. Women and young children are more vulnerable to this problem and constitute the major proportion. Children mortality rate in Pakistan is comparatively very high (116 out of 1000) as compare to Sri Lanka (19 out of 1000) in South Asia³. "To reduce the child mortality by 2/3 up to 2015 was one of the UN millennium goals which also call for the severity of this worldwide problem⁴. Malnutrition is more common in children between the age of 3 months and 3 years but it can also occur earlier or later. Intestinal

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Helmenthics is one of the common cause of chronic intestinal infection in developing countries⁵⁻⁶ Children can be expected to have intestinal parasitic infection soon after weaning and high risk of re infection in the rest of his/her life⁷. The unsafe drinking water, low socio economic status, poor sanitation and low literacy rate of parents particularly the mother are the main causes of worm infestation⁸.Worm infestation is one of the major cause of childhood malnutrition, anemia, and stunted physical & mental growth. It also causes recurrent Gastrointestinal and upper respiratory tract infection contributing to high morbidity and mortality in children. Helmenthic infections are more prevalent among school children aged 5-14 years, ⁹⁻¹⁰they constitute 12% of total disease burden in children.

Both primary and secondary malnutrition is the main cause of children mortality and morbidity. Primary malnutrition in children is mainly due to lack of basic food whereas infectious diseases and worm infestation are mainly responsible for secondary malnutrition in developing countries. Micronutrient deficiencies (MND) including iron, zinc, iodine, folic acid and vitamin A also contribute significantly in malnutrition, Iron deficiency is the most common MND in the developing world, affecting more than 30% of the world population. Among these, preschool children contribute 47.4% with highest burden in Africa and south Asia¹¹. The hookworm infestation is a leading cause of iron deficiency anemia. Whipworm infestation in children causes growth retardation and anemia while heavy infestation with both roundworm and whipworm causes protein energy malnutrition¹²⁻¹³. It is of particular concern that these infestation have insidious constraint on cognition and learning abilities of the children.¹⁴⁻¹⁵ The reason for being a global public health problem is that helmenthic infection have largely been over looked by clinicians, because although worm can cause severe clinical problems, patients rarely report at health center due to slow progress of the sign and symptoms⁷. The common worm infestation in our community is Ascaris Lumbricoids (round worm), Ankylostoma Duodenale (Hook Worm) Enterobious Vermicularis (Pin Worm) and threads worms and tap worm. In most of these cases, malnourished children continue their poor growth in early school going age which affect their physical and cognitive growth. Because of the high prevalence and serious adverse effect of intestinal parasitic infestation in children, many studies have been conducted in various cities of Pakistan like, in Karachi¹⁶⁻¹⁷, Rawalpindi/Islamabad¹⁶⁻¹⁸, Lahore¹⁹, Sargodha²⁰, Northern Areas²¹, Abbottabad²² Bagh

(Azad Kashmir)²³ and Skardu (Gilgit)²⁴. All these studies show variable prevalence ranging from 12% to 81% which shows the diversity of the implicating factors in causing worm infestation.

Prevalence of malnutrition in Azad Jammu and Kashmir(AJK) also is very high due to mountainous topographical and socio- cultural conditions particularly in low socio economic class. In AJK research based information about health are generally lacking especially in the field of malnutrition. There was a need to study the causes of malnutrition in AJK to develop suggestions for its prevention. We conducted this study to find out the prevalence of worm infestation in school going malnourished children and risk factors involved in worm infestation.

The specific objectives of the study were:

1. To find out the prevalence of worm infestation and third degree malnutrition in school going children of Muzaffarabad between age group 5-14 year of age.
2. To find out relationship between worm infestation and severe malnutrition in school going children.
3. To find out relationship of worm infestation with socio-economic conditions, sewage disposal facilities and safe drinking water.

Methodology

The study was carried out at Abbas Institute of Medical Sciences Muzaffarabad from nine Government schools (6 male and 3 females) of Muzaffarabad. Majority of these schools were from main city or nearby areas. The weight of children was recorded. Total 1902 students with age 5-14 were examined. Gomez classification was used for detection of the malnutrition in the study group²⁵. According to Gomez classification weight was compared with age using standard percentile charts. If the weight of a child was less than 60% of the expected (50th Centile), the child was classified as having severe malnutrition (3rd degree malnutrition). If the weight of the child was 60 - 75% of the expected weight (50th Centile), the child was classified as having 2nd degree malnutrition & if the If the weight of the child was 75 - 90% of the expected weight (50th Centile), the child was classified as having 1st degree malnutrition. In our study according to Gomez classification 200 children with 3rd degree malnutrition were found. Children of families with monthly income of ten thousand or less were designated as low socio economics class and families

with monthly income from 10000 to 30000 were designated as middle class. Families with more than 30000 income per month were designated as high class. Families who do not have any tap water supply either in the house or in premises in spite of having any canal, spring or river nearby, were labeled as having no safe water supply. Fifteen days span was fixed for the collection of stool, its examination and reporting. Stool sample of the all students including 200 students with 3rd degree malnutrition were collected and examined for ova of different worms. Fifty of these students were called daily for stool testing. Fresh stool specimens were examined under direct light microscope.

Children who were suffering from chronic diseases like tuberculosis, inflammatory bowel disease, asthma, recurrent urinary tract infections, chronic liver disease and congenital anomalies of any system were excluded from the study.

Results

The data was analyzed by using chi-Square test and p value was used to find out the significance of different variables. Out of the total 1902 children 200 were diagnosed as having third degree malnutrition. Among the 200 malnourished students, 130(65%) were found to have ova of any one or different types of worms. Among the total population 190(10%) were having worm infestation. The male and female ratio for positive stool test was almost equal. Ova of the seven different types of worms were found in stools. By far the most common was *Tenea* (21%), and *H-Nana* (20%) species. Other species found were *Ankylostoma duodenale* (20%), *Ascaris Lumbricoides* (12%), *Trichuris Tricura* (11%), *Entrobious Vermicularis* (10%) and *Giardia Lamblia* (6%). The relationship between worm infestation and malnutrition was found highly significant ($p < .001$).

1.	<i>Tenea</i>	21%
2.	<i>H-nana</i>	20%
3.	<i>Ankylostoma duodenale</i>	20%
4.	<i>Ascaris Lumbricoides</i>	12%
5.	<i>Trichuris Tricura</i>	11%
6.	<i>Entrobious Vermicularis</i>	10%
7.	<i>Giardia Lamblia</i>	6%

Relationship between Worm Infestation and Malnutrition

Groups	Well Nourished N=1702	Malnourished N=200	Total N=1902
Worm Infestation	40 (6%)	130 (65%)	170
Normal	1662 (94%)	70 (35%)	1732

Chi-Square Value=1187.462 p<.001

Among malnourished student 65% were having worm infestation whereas only 6% of well-nourished have worm infestation. The results pertaining to socio economic status and malnourished children shows that the student having low socio economic status are more malnourished (96%) as compare to upper class (4%) $p < .001$.

Relationship between Malnutrition and safe water supply shows that the student having safe water supply are less malnourished ($p < .001$).

Relationship between Malnutrition and Water Supply

Groups	Available N=1800	Not available N=102	Total N=1902
Normal	1690 (93.8%)	12 (11.7%)	1702
Malnourished	110 (7.2%)	90 (88.3%)	200

Chi-Square Value = 917.208 p>.001

Further, the analysis of the data showed that there was significant relationship between worm infestation and method of disposal of excreta.

Relationship between Worm Infestation and Disposal of Excreta in malnourished children

Groups	Indoor N=86	Outdoor (N=114)	Total (N=200)
Infestation	21 (24.6%)	109 (95.6%)	130
Normal	65 (74.4%)	05 (4.4%)	70

Chi-Square Value = 109.218 p<.001

Among the worm infested students, 95.6% were not having indoor latrine facility rather they depend on open field excreta disposal. The relationship between worm infestation and gender showed that among the worm infested students 64% were male and 36% were female ($p > 0.464$).

Discussion

This study has shown alarming results. Sixty five percent of school going malnourished children were suffering from worm infestation which drastically point out toward an early preventable problem. It is unfortunate that school age children have never received the much needed attention from the health care planners. However in our study, prevalence of worm infestation was 10% which is quite comparable with the studies done in central Punjab(12.4%)²¹, Islamabad (23%)¹⁸, Bagh AJK (21.7%)²³ and in Quetta (31%). Results of our study were different from the studies done in Abbotabad (81%)²² Peshawar (60%)²⁶ and northern areas of Pakistan. This large variation among the results shows implication of different factors in different parts of country. This may also be due to the different topographical, socio-cultural, socio-economic status, and different pattern of life in different areas.

Surprisingly in our study the most common worm infestation found were tenia (21%), and H-Nana (20%) species which is quite different from most of the other studies. This may be due to the fact that it is much more prevalent in intermediate host (the animals used for meat) in our region. This also reflect how beef or meat is cooked before it is offered to children because partially cooked meat is one of the major factor for the spread of tenia infection. Other species found are *Ankylostoma duodenale* (hook worm) (20%), *Ascaris Lumbricoides*(12%), *Trichuris Tricura* (11%), *Entrobious Vermicularis* (10%) and *Giardia Lamblia* (6%).

The prevalence of *ascaris lumbricoids* in our study was 12% which was different from study done by Akbar et al(48%) and Umer et al (33.5%), in Northern Areas of KPK (91%)²⁷. This difference may be due to the fact that, in our study the sample population was mainly taken from the urban area while in other studies children from rural areas were also addressed. In our study we have focused on the prevalence of worm infestation in severely malnourished children while rest of the studies shows the prevalence of worm infestation in general population from 4-12 years This study is one example which has shown 65%

prevalence of worm infestation in severely malnourished school going children which is quite alarming. These results shows that worm infestation could be one of the major cause of malnutrition in school going children which is usually not expected in out community.

The nutritional status of a community depends on various socio-economic factors like daily income, education, living conditions, family size and knowledge regarding their requirements of food. With adverse socio-economic conditions, the brunt of malnutrition falls more on the mothers and the young children. This study also shows that the student having low socio economic status were more malnourished (96%) as compare to upper class ($p < .001$), which was supported by Akram and Arif, (1996) who conducted a study in civil hospital Karachi found that illiteracy and poverty were present in almost all cases of Protein Energy Malnutrition (PEM). Similar results were found in this study, in which most (54.7%) of the mothers were illiterate. Many (26.7%) of the fathers were unemployed. Forty percent had their monthly income between Rs. 10000-30000².

Among environmental factors, polluted water and poor sanitary conditions are the strongest causes of malnutrition among children^{28, 29}. In many localities of Pakistan lack of access to clean water and proper sanitation facilities is a persistent issue that adversely affects the nutritional status of young children in many ways. The use of polluted water for washing, bathing, drinking, and food preparation increases the prevalence of infectious diseases, worm infestation and water borne diseases like diarrhea, cholera etc; whereas, improper sanitation and open sewage systems spreads unhygienic practices, worm infestation, malaria, etc. Literature shows that lack of toilets and hand washing facilities provoke repeated intestinal infections among children, cause intestinal villous atrophy, and ends up in these children with malnutrition, by affecting the absorption of nutrients.²³ One of the Pakistani studies reports, 'Families using open sewage systems had a higher proportion (53%) of malnourished children as compared to 45.1% in families with access to the flush system'⁷. This study shows that among the malnourished student (55%) don't have safe drinking water and 84% students who have no latrine facility have worm infestation which is cause of malnourishment. Both these results are in agreement with study conducted by Hoek and Humphery JH that polluted water and poor sanitation are cause of malnourishment in children^{28,29}.

In Pakistan where a relatively small budget is allocated to health, the majority of the population lacks access to quality health services. As children are the most vulnerable group, who need adequate measures for their health promotion and disease preventions, therefore, lack of access to quality health care services affects the nutritional status of young children by depriving them of primary health care interventions like immunization, supplementation, etc. Also, lack of health services hinders prompt management of many childhood infections and diseases, thus severely affecting the nutritional status of young children¹.

Conclusion

This study indicated that 10.5% of school going children were malnourished and among these, 65% had worm infestations. Furthermore, it is obvious from this study that majority of malnourished worm infested children were lacking safe drinking water, latrine facilities and belonged to low socio-economic status.

Recommendations

On the basis of results of this study, following recommendations are suggested for Government and department of Health Azad Jammu and Kashmir:

- 1) Detailed studies are required in three divisions of AJK about the causes of malnutrition in school going children.
- 2) Inclusion of health education in curriculum of school education.
- 3) Short courses/trainings for parents especially for mothers in the field of health and hygiene education, and importance of compliance.
- 4) More investment in health facilities, safe drinking water and sewage especially in villages.

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