The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 3, 2025

WORM INFESTATIONS AND ANEMIA AMONG PEDIATRIC POPULATION IN TERTIARY CARE HOSPITAL

Dr. Maimuna Munir[*1], Dr. Syed Ahmer Hamid[2], Sajid Atif Aleem[3]

[*1]*Indus Hospital and Health Network Resident Pediatric Medicine MBBS, FCPS Trained*
[2]*Indus Hospital and Health Network Consultant Pediatric Oncologist MBBS, DCH, FCPS*
[3]*Jinnah Sindh Medical University (JSMU), Karachi Lecturer Biostatistics MSc, MPhil*

[*1]maimunamunir@hotmail.com, [2]ahmer.hamid@tih.org.pk, [3]sajid.aleem@jsmu.edu.pk

DOI: https://doi.org/10.5281/zenodo.17097586

Keywords
Worm infestations; Anemia; Ascaris lumbricoides; Deworming; Gastrointestinal symptoms

Article History
Received: 07 February 2025
Accepted: 15 March 2025
Published: 28 March 2025

Corresponding Author: *
Dr. Maimuna Munir

Abstract

OBJECTIVE: *To determine the frequency of worm infestations and anemia in the Pediatric Population of The Indus Hospital and Health Network.*

STUDY DESIGN: *This investigation followed the design of cross-sectional framework*

PLACE AND DURATION OF THE STUDY:*This research was executed at the Pediatric and Emergency departments of The Indus Hospital Karachi from August 2023 to June 2024*

METHODOLOGY: *A cross-sectional study was conducted at The Indus Hospital in Karachi, occurring between August 2023 and June 2024, involving a cohort of 100 pediatric participants recruited via a non-probability consecutive sampling approach. The assessment of hemoglobin concentrations and the analysis of stool specimens were performed to evaluate the prevalence of anemia and parasitic infestation. The data were systematically analyzed with SPSS version 26, employing Chi-square tests to determine statistical associations.*

RESULTS: *Among 100 children (58% male, 42% female; mean age 8.87 ± 2.20 years), 16% had worm infestation and 23% were anemic. Ascaris lumbricoides was the most common parasite (43.8%). No statistically significant association was found between worm infestation and anemia ($p = 0.329$), or gender with either condition. However, a significant association was observed between age and anemia ($p = 0.012$).*

CONCLUSION: *This study found a notable prevalence of worm infestations and anemia among children, with* Ascaris lumbricoides *being the most common helminth. Although no significant association was observed between worm infestation and anemia, a significant relationship was identified between age and anemia. These findings underscore the need for age-targeted nutritional assessment, routine deworming, and comprehensive public health strategies to reduce the burden of anemia and parasitic infections in pediatric populations, especially within urban healthcare settings.*

INTRODUCTION

Anemia constitutes major health problem among developing countries and affects half of the school-aged children and adolescents. Iron deficiency anemia affects major pediatric population and is amongst the most common cause of significant morbidity. The manifestations in pediatric

population include growth failure, delayed motor development, poor mental functions and impaired immune responses [1]. Similarly, parasitic diseases represent a significant public health concern on a global scale, with intestinal parasites being predominantly prevalent in developing nations. In one of the study children were more infected (60%) with helminths and protozoa than adults (30%) who had only protozoal infection [2].

Worm infestations are of primary concern in pediatric population but are rarely the direct cause of death therefore missed out. Parasitic worms affect over one third of the global populace, exhibiting the highest prevalence of infection among children and economically disadvantaged individuals. The prevalence of anemia among the entire study population and in those infected with worms was 56.6% and 56.9% respectively in a study conducted in Nigeria [3] High prevalence of worm infestation in children is reported from northern areas of Pakistan where clean drinking water is not available and there are high sanitation issues. In one study conducted in Skardu 2007, 37.01% had anemia out of 978 students out of which 78.18% were positive for intestinal parasites. 59.94% students with anemia were from 5 to 10 years of age, 40.06% were 11-15 years. [4]

The commonest age group affected was of 11-15 years in study conducted in Skardu in 2012 [2]. In a study conducted in Abbottabad in 2003, the frequency of helminthic infestation was found to be above 81%. The mean Hemoglobin (Hb) level was found to be 9.82 g/dl in males. and 9.0 g/dl in females [5] Contrary to these results study conducted in rural area of Punjab in 2013, out of 97 children, 12.4% stool microscopy results were found positive for worms while 87.6% children results were negative. Among positive candidates, 41.3% children were 9–12 years old [6]. In urban areas of Pakistan where low socioeconomic status contributes to sanitary compromise. The history of Pica (eating sand) is one of the major risk factors for developing worm infestations. Thus, the allied factors of worm infestations include illiteracy, poor hygiene, low socioeconomic status, disbeliefs, uncooked food, infected food and water, malnutrition and variable other causes. Major worm infections of public health importance include Ascariasis, Trichuriasis, Hookworm, and Enterobiasis [7]. In the poorest countries, children are likely to be infected from the time they stop breast-feeding, and to be continually infected and re-infected for the rest of their lives [8].

The continuous presence of worm infestations in pediatric population causes severe anemia hence nutritional deficiencies, significant growth issues and morbidity. Significant improvement was observed in hemoglobin level among children after deworming in one of the studies [9].

METHODOLOGY

This cross-sectional investigation was carried out within the Pediatric Outpatient, Inpatient, and Emergency departments of The Indus Hospital and Health Network, located in Karachi. The investigation was to determine the frequency of worm infestations and anemia among pediatric patients aged 5 to 12 years presenting with gastrointestinal complaints, specifically loose stools and abdominal pain lasting at least one week. A total of 100 children who fulfilled the inclusion criteria were selected using non-probability consecutive sampling. Children were included regardless of gender, provided they met the age and symptom requirements and had caregivers who consented to participation.

Children known to have protein-calorie malnutrition or any other hematological disorders were excluded, as were those whose caregivers declined to participate. Worm infestation was operationally defined as the presence of ova or parasites in the stool, detected through microscopy. Anemia was defined based on hemoglobin thresholds: less than 100 g/L for children aged 5 to 10 years and less than 110 g/L for children aged 11 to 12 years. After obtaining written informed consent from caregivers, each participant underwent a standardized diagnostic process. A 3 mL venous blood sample was collected using aseptic technique for complete blood count (CBC), unless a valid CBC result from the previous week was already available. Hemoglobin levels were recorded accordingly. Following blood sampling, a sterile container was provided to the caregivers for stool collection, and samples were processed to detect worm infestation. Anthropometric measurements, including height (measured in centimeters using a standing scale) and weight (in

kilograms using a calibrated scale), were also obtained. All relevant information, including demographic data, clinical findings, and laboratory results, were documented on a structured proforma developed for the study. Data were subjected to analysis utilizing SPSS version 26. Frequencies and percentages were computed for categorical variables, contingent upon their distribution. Associations were evaluated employing the Chi-square test, with a significance threshold established at $p \leq 0.05$.

RESULTS

The investigation encompassed a cohort of 100 individuals with an average age of 8.87 ± 2.20 years, accompanied by a 95% confidence interval (CI) extending from 8.43 to 9.31 years. The average weight of the participants was recorded at 28.20 ± 4.79 kg (95% CI: 27.24–29.15 kg). The average hemoglobin (Hb) level was 11.58 ± 1.53 g/dl with a 95% CI of 11.27 to 11.88 g/dl. Mean corpuscular volume (MCV) was 79.99 ± 4.41 fL (95% CI: 79.12–80.87 fL), and the mean corpuscular hemoglobin concentration (MCHC) was 32.06 ± 1.92 g/dl (95% CI: 31.68–32.45 g/dl). Among the participants, 58% were male and 42% were female. The majority (60%) resided in urban areas, while 40% were from rural regions. Regarding the type of worm infestation identified, Ascaris was the most common (43.8%), followed by Hookworm (31.3%) and Trichuris (25.0%) (TABLE I).

Out of the total 100 participants, 16 (16%) were found to have worm infestation. The mean age of those with worm infestation was 8.38 ± 2.36 years compared to 8.96 ± 2.17 years in those without infestation, but this difference was not statistically significant (95% CI: -1.781 to 0.602, p = 0.329). Among males, 56.3% had worm infestation compared to 58.3% without infestation, and among females, 43.8% had infestation versus 41.7% without. There was no significant association between gender and worm infestation (95% CI: 0.312 to 2.701, p = 0.877). Regarding anemia, 23 participants (23%) were anemic. The mean age of anemic children was significantly higher at 9.87 ± 2.09 years compared to 8.57 ± 2.15 years in non-anemic children (95% CI: 0.288 to 2.308, p = 0.012). Among males, 65.2% were anemic versus 55.8% who were not, and among females, 34.8% were anemic compared to 44.2% who were not. However, the association between gender and anemia was not statistically significant (95% CI: 0.563 to 3.906, p = 0.424) (TABLE II).

Table I: Demographic and Clinical Characteristics of Study Participants (n=100)

Mean ± Standard Deviation		**95% Confidence Interval**
Age in years = **8.87 ± 2.20**		8.43–9.31
Weight in kg = **28.20 ± 4.79**		27.24–29.15
Hb in g/dl = **11.58 ± 1.53**		11.27–11.88
MCV in fL = **79.99 ± 4.41**		79.12–80.87
MCHC in g/dl = **32.06 ± 1.92**		31.68–32.45
n (%)		
Gender	Male	58 (58.0)
	Female	42 (42.0)
Residential Status	Urban	60 (60.0)
	Rural	40 (40.0)
Type of Worm	Ascaris	7 (43.8)
	Hookworm	5 (31.3)
	Trichuris	4 (25.0)

Table II: Association of Worm Infestation and Anemia with Characteristics (n=100)					
Characteristics		**Worm Infestation**		**95% C. I**	**P-Value**
		Yes (n=16)	**No (n=84)**		
Age in years, Mean ± SD		8.38 ± 2.36	8.96 ± 2.17	-1.781-----0.602	0.329
Gender, n (%)	Male	9 (56.3)	49 (58.3)	0.312----2.701	0.877
	Female	7 (43.8)	35 (41.7)		
Characteristics		**Anemia**		**95% C. I**	**P-Value**
		Yes (n=23)	**No (n=77)**		
Age in years, Mean ± SD		9.87 ± 2.09	8.57 ± 2.15	0.288-----2.308	0.012*
Gender, n (%)	Male	15 (65.2)	43 (55.8)	0.563-----3.906	0.424
	Female	8 (34.8)	34 (44.2)		

DISCUSSION

The current investigation elucidated a prevalence of helminth infestation at 16% and a prevalence of anemia at 23% among pediatric subjects aged 5–12 years who exhibited gastrointestinal manifestations at a tertiary care facility in Karachi. The dominance of Ascaris lumbricoides (43.8%) aligns with prior research conducted within Pakistan, including studies in Skardu and Abbottabad, which similarly identified Ascaris as the predominant helminth species amongst the school-aged demographic [2,5]. While the observed prevalence within this urban demographic is notably lower in comparison to previous rural investigations that documented infestation rates ranging from 37% to 81% [4,5], the enduring incidence of helminthiasis signifies the ongoing environmental and sanitation-related difficulties that persist even within urban environments. The lack of a statistically meaningful relationship between helminthic infections and anemia in our study stands in contrast to the observations made in Madhya Pradesh and Nigeria, where the rates of co-occurrence surpass 50% [1,3]. This difference could be due to severity of infection, host nutritional status or geographical differences. Nonetheless, the documented anemia prevalence of 23% within this cohort retains clinical significance and aligns with previous studies that highlighted the association between persistent helminth infections and iron-deficiency anemia, particularly among children hailing from socioeconomically marginalized backgrounds [6,9]. A salient finding in our results is the markedly elevated average age of anemic children, which implies a progressive accumulation of nutritional deficits as age increases, mirroring patterns documented in pediatric populations from Ethiopia and Nepal [10,11].

The gender-based analysis conducted in our investigation did not reveal any statistically significant disparities in the prevalence of anemia or helminthic infestations, which is consistent with findings from local research [5,6]; however, various international studies have indicated an elevated risk of anemia among adolescent females attributed to the increased iron requirements during periods of growth and menstruation [12].

An additional important finding is that the majority of the affected children were residing in urban areas (60%), thereby challenging the common perception that helminthic infections are mainly a rural health problem. This supports recent research conducted in South Asian urban slums and African communities,

which emphasized poor sanitation, overcrowding, and limited deworming access as contributing factors to ongoing transmission cycles in urban environments [13,14]. While the study's strengths include its focused age group, clear diagnostic definitions, and structured data collection, the limitations—namely its small sample size, single-center design, and lack of worm load quantification—limit its generalizability and depth of analysis.

Future studies should consider a multicenter approach, include micronutrient profiling, and assess parasite burden to elucidate the strength of the anemia-infestation relationship. In conclusion, despite lower prevalence than historical data, helminthic infections and anemia persist as significant pediatric health concerns. Sustained school-based deworming programs, community hygiene initiatives, and nutritional support interventions remain vital to reducing this dual burden [9,15].

CONCLUSION

This study found a notable prevalence of worm infestations and anemia among children, with *Ascaris lumbricoides* being the most common helminth. Although no significant association was observed between worm infestation and anemia, a significant relationship was identified between age and anemia. These findings underscore the need for age-targeted nutritional assessment, routine deworming, and comprehensive public health strategies to reduce the burden of anemia and parasitic infections in pediatric populations, especially within urban healthcare settings.

REFERENCES

Chakma T, Rao PV, Tiwary RS. Prevalence of anaemia and worm infestation in tribal areas of Madhya Pradesh. J Indian Med Assoc. 2000;98(9):567–70.

Yousafzai US, Niazi SUK. Worm infestation in children of Skardu. Pak Armed Forces Med J. 2012;62(3):422–6./

Anah M, Ikpeme O, Etuk I, Yong K, Ibanga I, Asuquo B. Worm infestation and anaemia among pre-school children of peasant farmers in Calabar, Nigeria. Niger J Clin Pract. 2008;11(3):220–4.

Maqbool A, Abdul Latif K, Mohammad T. Anemia and intestinal parasitic infestations in school children in Skardu. J Pak Med Assoc. 2002;52(9):456–60.

Ahmed AK, Malik B, Shaheen B, Yasmeen G, Dar JB, Mona AK, et al. Frequency of intestinal parasitic infestation in children of 5–12 years of age in Abbottabad. J Ayub Med Coll Abbottabad. 2003;15(2):28–30.

Dar UF, Iqbal MS, Latif MZ, Javaid M, Nayyar U, Nizami RJP. Worm infestation among children of rural area of central Punjab. Prof Med J. 2013;7(3):713–5.

Bharti B, Bharti S, Khurana S. Worm infestation: Diagnosis, treatment and prevention. Indian J Pediatr. 2018;85(11):1017–24.

Kumar C, Anand Kumar H, Sunita V, Kapur IJ. Prevalence of anemia and worm infestation in school-going girls at Gulbarga, Karnataka. Indian J Pediatr. 2003;40(1):70–2.

Girum T, Wasie A. The effect of deworming school children on anemia prevalence: A systematic review and meta-analysis. Open Nurs J. 2018; 12:155–61.

Mesfin F, Berhane Y, Worku A. Anemia among primary school children in Eastern Ethiopia. PLoS One. 2015;10(4):e0123615.

Chalise B, Aryal KK, Mehta RK, Dhimal M, Sapkota F, Mehata S, et al. Prevalence and correlates of anemia among adolescents in Nepal: Findings from a nationally representative cross-sectional survey. PLoS One. 2018;13(12): e0208878.

Kejo D, Petrucka P, Martin H, Kimanya ME, Mosha TC. Prevalence and predictors of anemia among children under 5 years of age in Arusha District, Tanzania. Pediatric Health Med Ther. 2018; 9:65–72.

Mehraj V, Hatcher J, Akhtar S, Rafique G, Beg MA. Prevalence and factors associated with intestinal parasitic infection among children in an urban slum of Karachi. PLoS One. 2008;3(11):e3680.

Gunawardena K, Kumarendran B, Ebenezer R, Gunasingha MS, Pathmeswaran A, De Silva N. Soil-transmitted helminth infections among plantation sector schoolchildren in Sri Lanka: Prevalence after ten years of preventive chemotherapy. PLoS Negl Trop Dis. 2011;5(9):e1341.

Osazuwa F, Ayo OM, Imade P. A significant association between intestinal helminth infection and anaemia burden in children in rural communities of Edo state, Nigeria. N Am J Med Sci. 2011;3(1):30–4.