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FIELD MEDICINE

ANEMIA AND INTESTINAL PARASITIC INFESTATIONS IN SCHOOL CHILDREN IN SKARDU

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ABSTRACT

Objective: Anemia and intestinal parasitic infestations are major medical and public health problems in Pakistan. This study was carried out to determine the frequency of anemia, intestinal parasitic infestations and possible correlation between two in Skardu district of Northern Areas.

Materials and Methods: This study included 978 school children in the villages of Alchori, Kharmang, Hamzigound and Dassu of district Skardu under school health care program 2004. Stool smears were prepared with normal saline and each sample was studied under light microscope using 10x and 40x objectives. Free flowing 20 ul capillary bloods by prick method was taken from each student and hemoglobin estimation was done by Cyanmethemoglobin method.

Results: Out of 978 specimens, 537 (54.91%) revealed the presence of either cysts or ova of the intestinal parasites. Out of 543 parasites isolated, the most common parasite isolated was Ascaris lumbricoides 193 (35.54%) followed by Giardia lamblia 168 (30.94%), Entamoeba histolytica 59 (10.87%), Trichuris trichura 46 (8.47%), Ankylostoma duodenale 32 (5.89%), Hymenolepsis nana 31 (5.71%), Entrobius vermicularis 11 (2.02%) and Taenia species 3 (0.55%). Three hundred and sixty two students (37.01%) had anaemia out of 978 students. Out of the 362 children with anemia, 283 (78.18%) were positive for intestinal parasites. Out of these 978, 623 (63.70%) were males and 355 (36.30%) were females. They were further subdivided on the basis of age into two groups. Six hundred and thirty three (64.72%) students were in 5-10 years age group and 345 (35.28%) in 11-15 years age group.

Conclusion: The present study revealed the high percentage of intestinal parasitic infestation associated with anemia in school children of district Skardu.

Keywords: Anemia, intestinal parasites, children, school health

INTRODUCTION

Anemia is one of the most commonly recognized disorders. It is estimated to affect half the school-age children and adolescents in developing countries. Iron deficiency anemia affects about 1.3 billion people with highest prevalence and morbidity in young children and pregnant women [1]. Anemia in children is associated with growth retardation, delayed motor development, poor cognitive abilities and impaired immune response [2]. Similarly intestinal parasitic infestation represents a considerable medical and public health problem in the developing countries and up to 10% of the population of the developing world is infected with intestinal worms [3]. The continuous presence of intestinal parasites in marginally nourished children can cause severe anemia and subsequently affect the growth and

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development of these children. Since worm infestation is seldom the direct cause of death, they tend to be regarded as relatively unimportant [4].

In Pakistan, anemia and parasitic infestations are widely prevalent. The epidemiological surveys regarding prevalence of anemia and intestinal parasitic infestation have been carried out separately in various parts of Pakistan [5-8]. The present study was carried out to determine the frequency of anemia, intestinal parasitic infestation and possible correlation between the two in Skardu district of Northern Areas.

MATERIALS AND METHODS

This was a descriptive study involving children of Federal Government Schools in the villages of Alchori, Kharmang, Hamzigound and Dassu of district Skardu under school health care program 2004. A total of 1542 children were enrolled in this study but only 1023 students brought stool samples for examination. Out of these 1023 students, 45 students did not give blood samples so only 978 students participated in this project. On the first day of the free medical camp at each village, a lecture about personal hygiene and importance and purpose of the study was explained to the students, teachers and parents by the local nursing assistant under the supervision of one of the authors of the study. Stool containers were distributed on the same day to bring stool samples next day. On second day stool smears were prepared with normal saline and each sample was studied under light microscope using 10x and 40x objectives. The specimens failing to reveal the presence of intestinal parasites were examined after formal-ether concentration technique by laboratory technologists. Pathologist for quality control examined about 10% of the random samples of stool. Blood hemoglobin estimation was done by taking 20 ul free flowing capillary by prick method and it was thoroughly mixed with 4 ml Drabkin's solution reading was taken after 5 minutes on Micro lab 200 at 540 nm. Anemia was defined as hemoglobin of less than 100g/l for children 5-10 years old and 110g/l for male and female children 11-15 years old. On the third day children, teachers and parents were briefed about the results of samples. Medicines were provided to treat the anemia and intestinal parasites in the affected school children. Data has been analyzed using Epi Info 6. Descriptive statistics i.e percentages and mean $\pm$ S.D were used to describe the parameters of study.

RESULTS

A total of 978 students were included in this study. (Include paragraph from material and methods). A number of 537 (54.91%) stool samples, out of a total of 978 specimens revealed the presence of either cysts or ova of the intestinal parasites (fig). Five hundred and thirty two students out of 537 positive cases had one parasite, four had 2 parasites and one had three parasites. A total of 543 cysts or ova were isolated from 537 positive samples. Amongst the positive cases 325 (60.52%) were 5-10 years age group and 212 (39.48%) were 11-15 years age group. Out of the 537 positive students, 352 (65.55%) were males and 185 (34.45%) were females. Out of 543 parasites isolated, the most common parasite isolated was Ascaris lumbricoides 193 (35.54%) followed by Giardia lamblia 168 (30.94%), Entamoeba histolytica 59 (10.86%), Trichuris trichura 46 (8.47%), Ankylostoma duodenale 32 (5.89%), Hymenolepsis nana 31 (5.71%), Entrobius vermicularis 11 (2.02%) and Taenia species 3 (0.55%). The distribution of parasites according to age and gender of students (table-1).

The mean hemoglobin was 137g/l with a range between 88g/l and 171g/l. Three hundred and sixty two students (37.01%) had anaemia out of 978 students. Out of these 362 students with anemia, 227 (62.71) were males and 135 (37.29%) were females ($p>0.05$). Two hundred and seventeen (59.94%) students with anemia were from 5 to 10 years of age and 145 (40.06%) were 11-15 years. In this

group out of 118 female students 56 (47.46%) had anaemia. The frequency of anemia in students according to gender and age is tabulated (table-2).

Table-3 shows the frequency of parasites by the presence or absence of anemia. Out of the 362 patients with anemia, 283 (78.18%) were positive for intestinal parasites. Out of 616 students without anemia, 260 (42.21%) were having intestinal parasites ($P<0.05$).

DISCUSSION

The overall percentage of parasitic infestation in our study was 54.91%. The most frequently isolated parasite was A. lumbricoides (35.54%) followed by G. lamblia (30.94%), E histolytica (10.87%) and T. trichura (8.47%). A study from Northern Pakistan in children under 15 years of age revealed 91% of the 89 samples examined contained one or more parasites. Most frequent parasites isolated in that study were A. lumbricoides (66.3%), E. histolytica (27%), B. hominis (27%), G. lamblia (24.7%), and T. trichura (15.7%) [9]. A study carried out at Lahore revealed parasitic infestation in 60% of children less than 12 years of age [10]. A study from Sargodha in children under 12 years of age revealed G. lamblia (26%), E. histolytica (21%), H. nana (18%) and A. lumbricoides (14%) [11]. Percent prevalence of worm infestation was 71.73% in a study from India. The maximum infestation was of A. lumbricoides (23.73%) followed by H. nana (16.36%), E. histolytica (10.34%), A. duodenale (8.46%) and T. trichuria (6.34%) [12]. A study from a village of Guatemala revealed A. lumbricoides (41%) and T. trichura (60%) infestation in children [13].

Out of 623 male and 355 female students 358 (57.46%) and 185 (52.11%) were having parasitic infestations respectively but this was not statistically significant. The frequency of ova/cysts was 325 (51.34%) out of 633 students from 5-10 years age group whereas it was 218 (63.19%) out of 345 students from 11-15 years of age. The frequency of a parasite in our students increased with age and G but this association was insignificant. Children usually become infected with A. duodenale, T. trichura and A. lumbricoides from 6-12 months to 3 years of age and A. duodenale and A. lumbricoides infestations increase with age reaching a plateau in late adolescence and 4 to 10 years of age respectively [14].

The overall percentage of anemia in our study was 37.01%. It was 34.28% and 42.03% in 5-10 and 11-15 years old students respectively which is insignificant statistically. Adolescents during growth spurts have the greatest physiological demands for iron and are at higher risk of developing iron deficiency anemia particularly if associated with worm infestation [15]. The percentage of anemia was 36.44% and 38.03% among male and female students, which is statistically insignificant. The percentage of anemia in girls 11-15 years of age was 47.46% that was statistically insignificant.

There was significant association between the presence of parasites and anemia. Out of 362 students with anemia 283 (78.18%) were having parasitic infestations. Percentage of Intestinal parasites was 42.21% in students without anemia. A. lumbricoides was most common parasite in students with anaemia. A. duodenale was present in 32 students and out of those 25 had anaemia suggesting higher association between A. duodenale and anemia. Hookworm is an important cause of anemia worldwide. The development of anemia with hookworm infection depends on worm load, duration of infection, body iron stores, dietary intake and absorption, and physiological iron requirement [16]. It is documented that children with concomitant A. duodenale and T. trichura have lower hemoglobin level than children with neither or one of these parasites [17]. In a study from Abbottbad 230 children out of 283 (81%) children from 5 to 12 years of

Table-1: Distribution of intestinal parasites according to gender and age of the students (n=543).

Parasite	5-10 years		11-15 years		No (%)
	Male No	Female No	Male No	Female No	
A. lumbricoides	85	49	51	08	193 (35.54%)
G. lamblia	57	38	58	15	168 (30.94%)
E. histolytica	18	14	17	10	59 (10.87%)
T. trichura	17	12	11	06	46 (8.47%)
A. duodenale	06	06	11	09	32 (5.89%)
H. nana	09	05	13	04	31 (5.71%)
E. vermicularis	03	05	01	02	11 (2.03%)
Taenia species	-	01	01	01	03 (0.55%)
Total	195	130	163	55	543

Table-2: Frequency of anemia according to gender and age of the students.

Age group (In years)	Male No (%)			Female No (%)			Total No (%)		
	Anemia	No-anemia	Total	Anemia	No-anemia	Total	Anemia	No-anemia	Total
5-10	138(34.85%)	258(65.15%)	396	79(33.33%)	158(66.67%)	237	217(34.28%)	416(65.72%)	633
11-15	89(39.21%)	138(60.79%)	227	56(47.46%)	62 (52.54%)	118	145(42.03%)	200(57.97%)	345
Total	227(36.44%)	396(63.56%)	623	135(38.03%)	220(61.97%)	355	362(37.01%)	616(62.99%)	978

Table-3: Frequency of parasitic infestations among the children with anemia and without anemia.

Parasite	Children with anemia (%)	Children without anemia (%)
A. lumbricoides	103 (36.40)	90 (34.62)
G. lamblia	70 (24.73)	98 (37.69)
E. histolytica	29 (10.25)	30 (11.54)
T. trichura	28 (9.89)	18 (6.92)
A. duodenale	25 (8.83)	07 (2.69)
H. nana	20 (7.07)	11 (4.23)
E. vermicularis	06 (2.12)	05 (1.92)
Taenia species	02 (0.71)	01 (0.38)
Total	283 (78.18%)	260 (42.20%)

age were positive for various intestinal parasites. The mean hemoglobin level was 9.82 g/dl in males and 9.0 in females [18]. A study from India revealed that out of 281 girls without anemia, 177 (62.98%) had worm infestation. Out of 435 girls with anemia, 334 (76.8%) demonstrated evidence of worms in their stool. Prevalence of worm infestation was 86.66%, 68.16% and 82.97% in mild, moderate and severely anemic groups respectively. In severely anemic children, A. duodenale, E. vermicularis, G. lamblia, and D. latum were demonstrated in 4.76%, 2.76%, 2.16% and 1.1% cases respectively [19].

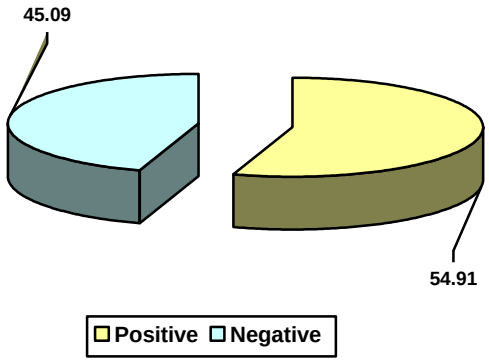

Fig: Frequency of parasitic infestation in Skardu district.

CONCLUSION

The present study revealed the high percentage of intestinal parasitic infestations among the study group. The parasitic infestations are associated with anemia. Further studies are required to find the risk factors of parasitic infestations and anemia in school children so that effective strategies

could be adopted for the prevention of intestinal parasitic infestations and anemia in children.

REFERENCES

1. World Health Organization. Report of the WHO/UNICEF/UNU Consultation on Indicators and Strategies for Iron Deficiency and Anemia Programmes. **Geneva WHO 1994.**

2. Tapiero H, Gate L, Tew KD. Iron: deficiencies and requirements. **Biomed Pharmacother 2001; 55: 324-32.**

3. Stephenson LS. Helminth parasites, a major factor in malnutrition. **World Health Forum 1994; 15: 169-72.**

4. Procop GW. Gastrointestinal infections. Infect Dis Clin **North Am 2001; 15: 1073-108.**

5. Hamedani P, Hashmi K Z, Manji M. Iron depletion and anaemia: prevalence, consequences, diagnostic and therapeutic implications in a developing Pakistani population. **Curr Med Res Opin 1987; 10: 480-5.**

6. Agha F, Sadaruddin A, Khan RA, Ghafoor A. Iron deficiency anemia in adolescent. **J Pak Med Assoc 1992; 42: 3-5.**

7. Qureshi AH, Karamat KA, Qamar RH, Malik IA. Intestinal parasitic infestation Rawalpindi/Islamabad area. A study of 12640 stool samples. **Pak J Pathol 1992; 3: 178-97.**

8. Bilqees FM, Khan A, Ahmad A. A survey of intestinal protozoan and helminth parasites in Karachi. **Pak J Med Res 1982; 20: 6-9.**

9. Waqar S N, Hussain H, Khan R, Khwaja A, Majid H, Malik S, Nadeem T, Beg M A. Intestinal Parasitic Infections in Children from Northern Pakistan. **Infect Dis J 2003; 12: 73-7.**

10. Zarfishan T, Rubeena H, Aizza Z, Samina J. Comparison of prevalence of intestinal parasites in children and adult population. **Biomedica 2002; 18: 74-5.**

11. Ghauri AS, Maqbool A. The pattern of intestinal infestation in Sargodha Area: A comparative study. **Pak J Pathol 1992; 3: 99-101.**

12. Vinod Kumar CS, Anand Kumar H, Sunita V, Indu Kapu. Prevalence of Anemia and Worm Infestation in School Going Girls at Gulbarga, Karnataka. **Indian Pediatrics 2003; 40: 70-72.**

13. Anderson TJ, Zizza CA. The distribution of intestinal helminth infection in a rural village in Guatemala. **Mem Inst Oswaldo Cruz 1993; 88: 53-65.**

14. Anderson RM. The population dynamics and epidemiology of intestinal nematode infections. Transactions of the Royal society of **Tropical Medicine and Hygiene 1986; 80: 686-96.**

15. Armstrong PL. Iron deficiency in adolescents. **Br Med J 1989; 39: 298-99.**

16. Stoltzfus RJ, Dreyfuss ML, Chwaya AHM, Albonico M. hookworm control as a strategy to prevent iron deficiency. **Nutrition Reviews 1997; 55: 223-32.**

17. Robertson LJ, Crompton DW, Sanjur D, Nesheim MC. Hemoglobin concentrations and concomitant infections of hookworm- and Trichuris trichiura in Panamanian primary school children. Transactions of the Royal Society of **Tropical Medicine and Hygiene 1992; 86: 654-656.**

18. Ahmed Akbar K , Malik Babar , Shaheen Babar , Yasmeen Ghazala , Dar Junaid Babar , Mona Altaf K et al. Frequency of intestinal parasitic infestation in children of 5-12 years of age in Abbottabad. **J Ayub Med Coll Abbottabad 2003; 15: 28-30.**

19. Chakma T, Rao PV, Tiwary RS. Prevalence of anaemia and worm infestation in tribal areas of Madhya Pradesh. **Indian Med Assoc 2000; 98: 570-71.**