



Original Research Article

Study of incidence of helminthic infestation in children aged 1 to 15 years attending to a tertiary care hospital

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Abstract

Background: Helminthic infestation is common in children because of their habits and opportunity for exposure. The present study was undertaken in the Narayana Hospital, Nellore to determine the incidence of various helminthes, the symptomatology and clinical manifestations of various helminthes and to correlate type of helminthic infestation.

Material and methods: This is a prospective study, was done in 1 to 15 years children who attended O P D or admitted to the pediatric ward, Narayana Hospital, Nellore. The material for the study comprises of 500 children's, who attended OPD or admitted to the Pediatric ward belonging to 1 to 15 years age groups. A detailed clinical examination including stool examination was done for all the 500 children. Blood examination was done for knowing the degree of anemia.

Results and discussion: Out of 500 children examined in various age groups, 275 children's were found to be positive for one or other helminthic ova in the stool samples examined giving an overall incidence of 55%. Number of stool samples examined Number of stool samples infested with Helminths. Out of 500 children examined, 235 were males and 265 were females, of which 130 males and 145 females were found to be infested for one or other helminthic ova. Out of 500 stool examples examined 275 were positive for one or other helminthic ova, 160 were positive for ascariasis, 20 were positive for Hookworm, 40 were positive for Trichuris trichura, 10 were positive for hymenolepis nana and 5 was positive for Taenia infestation. Out of 500 children studied, 130 children belong to class V Socio –economic class, 150 children belong to class IV socio – economic class, 120 children belong to class III Socio – economic class and 100 children belong to class II Socio – economic class, giving a percentage of infestation according to socio –economic class as 80% in class V, 63.3% in class IV, 41.7% in class – III and 30% in class II respectively. Anemia in hookworm



infestation was of mild degree in all 15 children. Anemia in mixed infestation was of mild degree in 20 children and moderate degree in 5 children. Out of 500 children studied 300 children had normal nutritional status and positive percentage of helminthic infestation in them was 26.7%, 140 children had Grade – I malnutrition and positive percentage of helminthic infestation in them 96.4. 40 children had Grade-II and 20 children had Grade – III malnutrition. Positive percentage of helminthic infestation in Grade – II and Grade – III malnutrition was found to be 100%.

Conclusion: This study confirms the finding of the other authors all over India regarding helminthic infestations in respect to epidemiology, clinical manifestations and relation with nutritional status. There was a high co-relation with poor nutritional status.

Key words

Malnutrition, Socio economic, Helminthic, Ascariasis.

Introduction

Intestinal Parasite infestations are worldwide in distribution. Among young, in tropical and subtropical regions in particular, these constitute a major health problem. In 1947, it was the first to shock the world by declaring that in a human population of 2167 million, parasite number 2257 millions, an infestation index of 104. In our country, it is one of the major health problems, because of poor sanitary conditions. Habits of eating of uncooked food which may be contaminated, promiscuous defecation on the surface of ground, ignorance of hygiene and sanitation favour high incidence of helminthic disease, social factors such as lack of health consciousness, illiteracy may cause a rapid spread of infestation in the community. In 1977, conducted a survey in the rural area near Aligarh observed that the problem of parasitic infestations become more acute in rural areas because of the indifferent attitude of the population towards personal hygiene and prevailing poor environmental conditions along with low socioeconomic and low literacy status.

Helminthic infestation is common in children because of their habits and opportunity for exposure. Children are usually more heavily infested than adults and they are also principal seeders of the soil with ova of the roundworm,

whip worm, pinworm and hook worm because of promiscuous defecation. Ascaris, is the largest intestinal nematode, is most prevalent, and with more than 1 billion people infected worldwide [1]. The prevalence of Pinworm infestation is more among school aged children due to poor personal hygiene and exposure to infected peers [2]. Intense infection with Whipworm is associated with colitis and dysentery and moderate infection can impair development in childhood [3]. Intestinal parasitic infestations cause a variety of clinical conditions, ranging from asymptomatic infestations to life threatening situations. Majority of the symptoms are related to gastrointestinal tract. They may present with manifestations like pain in abdomen, loose stools, vomiting. In some cases, an enlargement of liver or a palpable abdominal mass may be observed. Intestinal parasitic infestations also cause generalized manifestations such as fever, breathlessness, and allergic manifestations like urticarial rash, eosinophilia and anemia. They may also manifest as surgical emergencies, when infestations become advanced. The roundworms may cluster in a loop of the intestine and may present as a cause of acute intestinal obstruction [4]. Parasitic infestations often occur in conjunction with malnutrition. Malnutrition is a major pediatric problem, and it is responsible for high rates of morbidity and mortality. Hook



worm infection is a global cause of anemia and malnutrition [5]. At any given time, there are 80 million children suffering from malnutrition in India of which 3-4 percent suffers from severe degree of malnutrition. It is estimated that 80 percent of pre-school children are undernourished. In a vast majority of children mild to moderate malnutrition remain undetected and are hidden in the community, due to limited orientation and lack of awareness on the part of medical and para medical workers to detect early malnutrition. A large proportion of pediatric problems are due to malnutrition and in considerable number of these, parasites are directly or indirectly responsible by using up nutrients, preventing the absorption of essential metabolites or by producing toxic reactions affecting efficient erythropoiesis [6].

Careful and repetitive stool examination is necessary for the diagnosis of parasitic infestation. C.C. Dobell 1964 observed that at least two thirds of infestations might be missed by one microscopic examination of faeces by an unconcentrated film technique. Various concentration methods were devised to increase the sensitivity of stool examination and to save the labor of repetitive stool examination.

The present study was undertaken in the Narayana Hospital, Nellore to determine the incidence of various helminthes, the symptomatology and clinical manifestations of various helminthes and to correlate type of helminthic infestation.

Objectives

- To estimate the overall incidence of helminthic infestation in children of 1 – 15 years age group, who attended Narayana Hospital, Nellore at outdoor patient department (OPD) or admitted to the pediatric ward.

- To determine the differential prevalence in relation to age, sex, Socio economic status, living condition and type of diet.
- To correlate type and degree of anemia with the type of helminthic infestation.

Material and methods

This is a prospective study, was done in 1 to 15 years children who attended OPD or admitted to the pediatric ward, Narayana Hospital, Nellore. The material for the study comprises of 500 children's, who attended OPD or admitted to the Pediatric ward belonging to 1 to 15 years age groups from November 2011 to October 2013.

Inclusion criteria

All the children aged between 1-15 years, who attend OPD or admitted in Pediatric ward in Narayana general hospital.

Exclusion criteria

- Age < 1 year and > 15 years
- History of (H/O) any chronic illness
- H/O Suggestive of structural anomalies GIT
- H/O Suggestive Severe systemic disease

A detailed clinical examination including stool examination was done for all the 500 children. Blood examination was done for knowing the degree of anemia. Examination according to the attached proforma was done for all the children.

Stool samples were collected in empty clean bulbs and examination will be done within two hours of collection.

Macroscopic examination

Macroscopic examination for color, consistency and smell of the stool, presence of parasites, done and the findings will be noted. All stool sample was subjected to saline and iodine



examination. To a clean slide, a drop of normal saline and the drop of Lugol's iodine will be put on either ends. To both of this a small quantity of stool was mixed to make a thin and uniform film. Cover slips were applied on these smears and they were examined under the microscope.

All the stool samples were later subjected to formal Ether sedimentation technique. In the present study the modified method of D.S. Ridley and B.C. Hawgood was employed.

Nutritional assessment

Nutritional status of children in the study will be assessed by standard anthropometric measurements of weight, height head circumference, and chest circumference and mid arm circumference will be noted.

Blood examination

Hemoglobin percentage, W.B.C. Total differential count was done.

Results

Out of 500 children examined in various age groups, 275 children's were found to be positive for one or other helminthic ova in the stool samples examined giving an overall incidence of 55%. Number of stool samples examined Number of stool samples infested with helminthes (**Table – 1**).

Out of 500 stool examples examined 275 were positive for one or other helminthic ova, 160 were positive for ascariasis, 20 were positive for Hookworm, 40 were positive for Trichuris trichura, 10 were positive for hymenolepis nana and 5 was positive for Taenia infestation. Out of 275 children positive for one or other helminthic ova, incidence of different types of helminthic infestation is positive stool sample is shown in the **Table - 2**.

Out of 275 children with helminthic infestation, 40 children showed mixed infestation, ascaris + trichuris were observed in 20 children, Trichuris + Hookworm was observed in 5 children, Ascaris + Hookworm was observed in 5 children and Ascaris + Hookworm + H. Nana were observed in 10 children.

Out of 500 children examined, 235 were males and 265 were females, of which 130 males and 145 females were found to be infested for one or other helminthic ova.

Out of 500 children examined, 350 children were vegetarian and 150 children were non-vegetarian. Among them, 170 of vegetarian group were infested and 105 among non-vegetarian group were infested and the positive percentage of vegetarian group is 48.6% and the percentage among non-vegetarian group with infestation is 70%. Out of 500 children studied, 130 children belong to class V Socio – economic class, 150 children belong to class IV socio – economic class, 120 children belong to class III Socio – economic class and 100 children belong to class II Socio – economic class, giving a percentage of infestation according to socio – economic class as 80% in class V, 63.3% in class IV, 41.7% in class – III and 30% in class II respectively (**Table – 3**).

Abdominal pain: 20 children (50%) had dull aching abdominal pain and 20 children (25%) had distension of abdomen.

Loose motions: 25 children (62.5%) had loose motion without blood and mucus. History of passing worms was present in the stool in 30 children (75%) and history of pica was present in 20 children (50%).

Vomiting: 10 children (25%) had vomiting, 25 children (62.5%) were irritable and had history of loss of weight, 10 children (25%) had symptoms of cough and flatulence and 5 children (12.5) had symptoms of cough and



wheezy chest.

Anemia: 10 children (62.5%) had anemia of mild to moderate degree.

Hepatomegaly: 15 children (37.5%) had palpable liver. It ranged from 1-2cm soft, smooth consistency and non-tender.

Symptoms and signs observed in 8 children infested with mixed infestation (14.5%).

Hymenolepis nana: 10 children (3.6%) of 275 children with helminthiasis were infested with hymenolepis nana infestation and both presented with loose motion, vomiting. Appetite was normal in both the infested cases.

Taenia Saginata: Children had Taenia saginata infestation (1.8%). Symptomatology and signs observed were history of passing proglottids, nausea, and vomiting and vague abdominal pain. History of beef intake was present. Liver was palpable 2-3 cm below right costal margin. Child passed the worm with Niclosamide.

Out of 275 children with helminthic infestation, 150 children were anemic. Out of 160 children infested with ascaris, 110 children were anemic. Out of 20 children infested with Hookworm in that 15 children were anemic. Out of 40 children infested with mixed infestation, 25 children were anemic. Percentage of anemia in different types of helminthic infestation was as per **Table - 4**.

Out of 160 children infested with ascariasis, only 10 children had frank clinical features of iron deficiency anemia and 100 children infested with ascariasis had anemia but had neither frank clinical features of iron deficiency anemia or megaloblastic anemia. Out of 20 children infested with hookworm, 15 children had frank clinical features of iron deficiency anemia. Out of 40 children infested with mixed infestation, 5 children had frank clinical features of iron deficiency anemia and 20 children had anemia but had neither frank clinical features of iron

deficiency nor megaloblastic anemia. The percentage of clinical type of anemia is given in the table above. Out of 160 children with ascariasis, 110 children were found anemic. Anemia in ascariasis was of mild degree in 75 children and moderate degree in 35 children.

Anemia in hookworm infestation was of mild degree in all 15 children. Anemia in mixed infestation was of mild degree in 20 children and moderate degree in 5 children (**Table - 4**).

Out of 500 children studied 300 children had normal nutritional status and positive percentage of helminthic infestation in them was 26.7%, 140 children had Grade - I malnutrition and positive percentage of helminthic infestation in them 96.4. 40 children had Grade-II and 20 children had Grade - III malnutrition. Positive percentage of helminthic infestation in Grade - II and Grade - III malnutrition was found to be 100%. Grade - IV malnutrition was observed in one child.

Discussion

Helminthic infestation is a major public health problem not only in India but in other developing countries also. The prevalence of helminthiasis is dependent on the environmental and personal hygiene. Though the helminthiasis is considered to be a disease of sanitation, little has been done to improve the sanitation and thereby reduce their prevalence in the developing countries.

Of the 500 children included in this study and who all attended OPD or admitted to the pediatric ward, 55% had helminthiasis.

The incidence has been found to vary from place to place in our country, and this may be due to many factors like type of population taken for the study - rural population, hospital population, environmental hygiene, sanitary facilities,



personal hygiene, and methods of stool examination. The overall incidence observed in the present study matches well with reports given by Rao, et al. – 55% and Suraj Gupte – 59% but it is a little more than the incidence reported by Narmada, et al. – 33.8% and B. Bandari, et al. – 45.5% [1, 3, 7, 8, 9].

K.D. Ajwani, et al. recorded a low incidence, of just 18% while the study conducted by Subbannayya, et al. showed the highest of 80.9%. S.K. Kandle, et al. showed 22.5% and M. Mahajan, et al. showed 21.5%. But the population under the study was different in each [6, 10].

Ascaris was the most prevalent infestation in this study with an incidence of 32% (160 positive cases out of 500).

A similar incidence of 32.2% was reported by R. Narmada, et al. On the contrary the study by M. Mahajan, et al. in Delhi found incidence to be 3.2% [9, 10]. This variability in incidence among different studies might be due to difference in locality - rural or urban, Socio- economic status, nutritional status, housing, sanitary conditions, personal hygiene and the different population under study – hospital or general.

Infestation by trichuris trichura was 8% (40 positive out of 500) next only to ascaris. This incidence agrees with the K.S. Ajwani, et al. study where the incidence was 11.6%. The incidence reported by R. Narmada, et al., M. Mahajan, et al., showed a low of 1.8% and 0.25% respectively, as against the incidence shown by K. Subbannayya, et al. as 58.7% [9, 10].

Out of 275 children with helminthiasis, 150 children (54.5%) were anemic, 110 children (68.8%) of 160 infested with ascariasis, 15 children (75%) of the 20 infested with hookworm and 25 (62.5%) of the 40 infested with a mixed

infestation were anemic. Frank clinical features of iron deficiency anemia like pale bald tongue, platynychia and koilonychia were noted in 10 children (6.2%) infested with ascaris, 15 children (75%) infested with Hookworm and in 5 children (12.5%) infested with mixed infestation. 100 children (62.5%) infested with ascaris and 20 (50%) infested with mixed infestation were anemic but did not have frank clinical features of iron deficiency anemia or megaloblastic anemia.

Anemia in helminthic infestation was of mild to moderate degree. In helminthic infestation mild degree anemia (Hb 7-9 gm%) was found in 110 children (73.3%) and moderate degree (Hb 4-6 gm) in 40 children (26.7%), of the 150 anemic children with helminthic infestation.

Anemia in hookworm infestations is due to blood sucked by the worms for their nourishment and also due to the ooze from the spots, which the worms leave behind, when they change their position. Chronic hemorrhage results in iron loss from the body and if they dietary intake of iron is deficient, it results in microcytic hypochromic anemia. Anemia noted in ascaris is due to severe infestation resulting in dietary deficiencies like iron and protein etc. by interfering with absorption of food material. K.D. Ajawani, et al. (1974) study shows cases of worm infestation and anemia was commonly found in children with hookworm infestation (95.3%) round worm 87.2% and mixed infestation 69.2%. Present study showed low incidence of anemia in helminthic infestation as compared to K.D. Ajawani, et al.

In the present study, anemia was found commonly in hookworm infestation followed by roundworm and then mixed infestation. Clinically iron deficiency anemia was found more commonly associated with hookworm infestation. Mild degree of anemia was common in helminthic infestation.



Conclusion

This study confirms the finding of the other authors all over India regarding helminthic infestations in respect to epidemiology, clinical manifestations and relation with nutritional status. There was a high co-relation with poor nutritional status. In a developing country like ours, this finding is significant in that $\frac{3}{4}$ of our childhood population below the age of 5 years are undernourished. Helminthic infestation will further precipitate the malnutrition. Helminthic infestation can be brought down by simple measures such as mass education, safe disposal of fecal wastes, good personal hygiene, proper sanitation, clean eating habits and by periodic de worming of children in endemic areas.

References

1. de Silva NR, Brooker S, Hotez P, et al. Soil-transmitted helminths: Updating the global picture. *Trends parasitol*, 2003; 19: 547-51.
2. Wang LC, Hwang KP, Chen ER. *Enterobius vericularis* infection in school children: A large scale survey 6 years after a population-based control. *Epidemiol Infect*, 2010; 38: 28-36.
3. Bundy DAP, Cooper ES. Trichuris and Trichuriasis in humans. *Adv parasitol*, 1989; 28: 107-73.
4. de Silva NR, Guyat HL, Bundy DAP. Morbidity and mortality due to Ascaris induced intestinal obstruction. *Trans R Soc Trop Med Hyg*, 1997; 91: 31-6.
5. Hoetz PJ, Brooker S, Bethony JM, et al. Hookworm infection. *N Engl J Med*, 2004; 351: 799-807.
6. Ajawani K.D., Saxena H., Kumar. Corpological survey of parasitism in children in Kanpur: *Indian J. Pediatrics*, 1974; 41: 209.
7. Rao CK, et al. *J.Com. Dis.*, 1973; 5(2): 80-86.
8. Gupte S, Mohinder Pal, Gupta CL. Prevalence of intestinal parasitic infestations among children attending hospital, Jammu. *Indian J, Pediatr*, 1978; 45.
9. Narmada R, Athinarayanan D., Balgopal Raju V. Study of Helminthiasis in children and evaluation of Tetramisole in ascariasis. *Indian Pediatr*, 1975; 12(8): 685.
10. Mahajan RC. Geographical distribution of human cysticercosis. In: Flisser A, Wilms K, Lacleste JP, et al. eds. *Cysticercosis. Present state knowledge and perspectives*. New York: Academic press, 1982.

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Table – 1: Incidence of helminthic infestation of Total Stool samples examined.

Type of helminthic infestation	Number of children showing Positive stools	Positive percentage of Helminthic Infestation
Overall incidence	275	55%
Ascaris	160	32%
Hookworm	20	4%
Trichuris Trichura	40	8%
Hymenolepis Nana	10	2%
Taenia Saginata	5	1%
Mixed infestation	40	8%

Table – 2: Incidence of different type of Helminthic infestation in positive stool samples.

Type of Helminthic Infestation	Number of Positive	Positive percentage of Helminthic Infestation
Ascaris	160	58.2%
Hookworm	20	7.3%
Trichuris Trichura	40	14.5%
Hymenolepis Nana	10	3.6%
Taenia Saginata	5	1.8%
Mixed infestation	40	14.5%

Table – 3: Relation of Socio-economic status and Helminthic infestation.

Social Class Classification per capita income per month	Number examined	Number positive	Percentage
I. (Rs. > 5000)	-	-	-
II. (Rs. 2500-2999)	100	30	30%
III.(Rs. 2000-2499)	120	50	41.7%
IV.(Rs. 1500-1999)	150	95	63.3%
V. (<1000)	130	100	80%

**Table – 4:** Relation between anemia and type of helminthic infestation.

Type of Helminthic Infestation	Number Infested	Number Anemic	Total	
			No	Percentage
Ascaris	160	110	110	68.8%
Hook worm	20	15	15	75.0%
Trichuris	40	-	-	-
H. Nana	5	-	-	-
T.Saginata	10	-	-	-
Mixed Infestation	40	25	25	62.5%
Total	275	150	150	54.5%