

Incidence of Hookworm Infestation amongst School Childrens in Bihar**Nisha Singh¹, Vikash Kumar^{2*}, Hira Lal Mahto³, Ratnesh Kumar⁴**¹Tutor, Department of Microbiology, Nalanda Medical College and Hospital, Patna, Bihar, India²Assistant Professor, Department of Community Medicine, Vardhman Institute of Medical Sciences, Pawapuri, Bihar, India³Professor & Head, Department of Microbiology, Nalanda Medical College and Hospital, Patna, Bihar, India⁴Assistant Professor, Department of Microbiology, Patna Medical College and Hospital, Patna, Bihar, India**Received: 07-10-2020 / Revised: 23-11-2020 / Accepted: 20-12-2020****Abstract**

Background: Ancylostoma duodenale and Necator americanus are the blood sucking nematodes commonly called hookworms. They cause mild to severe anemia in patients especially children. The most common cause for hookworm infection is unhygienic conditions of the surroundings. **Methods:** 780 stool samples were collected from the children from three schools. All the stool samples were subjected to wet mount by iodine and saline. They were also subjected to concentration technique by formalin ethyl acetate solution. Complete Blood Picture, estimation of Hemoglobin was done for all children for anemia and eosinophil testing. **Results:** 10.1% of the stool samples were positive for hook worms with 43 boys and 36 girls. 79.1% of the males and 88.3% of females were anemic. Most of the children were from poor background with unhygienic conditions. **Conclusion:** Since most children belonged to poor background with unhygienic conditions, health education, improvement in sanitation, and mass treatment in affected areas can be tried.

Keywords: Concentration methods, Hookworm, anemia, Unhygienic conditions.

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Introduction

Hook worms are parasitic blood feeding nematodes, all the more ordinarily Ancylostoma duodenale and Necator americanus. These worms live in the small digestive tract of their host, which might be a bird or a mammal, for example, a canine or human.[1] Hookworms are communicated when hookworm eggs discharged in human excrement and incubated in proper soil conditions, brought forth into larvae and enter a human host through cut in the skin.

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As opposed to N americanus, A duodenale can infect people by the oral just as the percutaneous course and may go through arrested development in human organ system in its larval stage.[2]

Today, hookworm contamination is among the main tropical sicknesses in humans,[2] the best number of hookworm cases happen in Asia, trailed by sub-Saharan Africa.[3] They are pervasive generally in preschool and school age children.[4,5] 576-740 million people are estimated to be suffering from hookworm pervasion of which 80 million are seriously tainted. Over portion of the contaminations are from Asia and the Pacific regions.[6]

They cause intestinal blood loss, weakness and protein malnutrition particularly in kids in agricultural nations or immature nations where hookworms are likewise known to cause hindered development, low actual wellness and impeded scholarly and psychological

development.[3,4] Additionally, helminthic contaminations have the ability to lessen the host immune response to immunizations just as to natural and parasitic antigens.[6-8] The outcomes of such hypo-responsiveness may clarify changes in host defenselessness to usually experienced microbes, or other antigens.[9-14]

Canines go about as regular stores for hookworm transmission to people. Hookworm contamination is commonly viewed as asymptomatic however it is an amazingly risky disease since its harm is "quiet and tricky." That is on the grounds that in spite of the fact that the worms suck huge amount of blood from the mucosal layers of the gut, the blood loss is only here and there noticeable in the stools.[15-17] The patient remaining parts asymptomatic till he develops anaemia. This blood misfortune is the most remarkable element of hookworm infection.[18,19]

Therefore, this study was undertaken to evaluate the incidence of hookworm infestation amongst children.

Materials and Methods

The study was conducted at VIMS Pawapuri from December 2019 to February 2020. The study was approved by the institutional research and ethical committee. After taking informed and written consent this study was undertaken.

All the stool samples were properly labelled and subjected to saline and iodine mounts. Approximately 5 g of stool was taken and subjected to concentration by formalin ethyl acetate technique. 10% formalin was added to the stool sample and mixed well. 5ml of the fecal suspension was strained through wetted cheese cloth kept over a disposable funnel in to 15ml conical centrifuge tube. 0.85% saline was added to tube to fill it up. The tubes were centrifuged at 1000rpm for 10 minutes. Sediment was removed and 10ml of 10% formalin was added to the deposit and mixed well. 4 ml ethyl acetate was added and shaken well and centrifuged once again at 1000rpm for 10 minutes. The sediment was removed and few drops of 10% formalin was added to the deposit. Wet mount was made from this suspension and seen under the microscope. The complete blood picture of all the patients was taken to check for anemia and eosinophil count. Hb estimation with cyanmethemoglobin method was performed for all patients.

Results

Of the 780 stool samples, 79(10.1%) of them were positive for *Ancylostoma duodenale* [Figure 1].

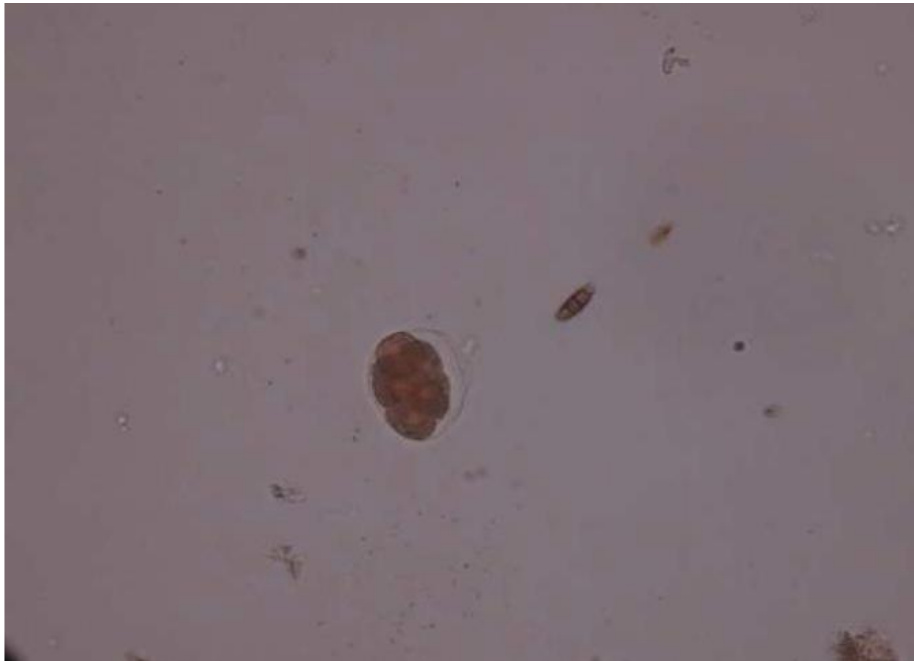


Fig.1:Stool Samples Positive for Ancylostoma duodenale

Most of the positivity was concentrated among schools which had comparatively unhygienic surroundings and children from poor background. Of the 79 positive samples, 43 (54.4%) were boys and 36 were girls (45.6%) [Fig 2].

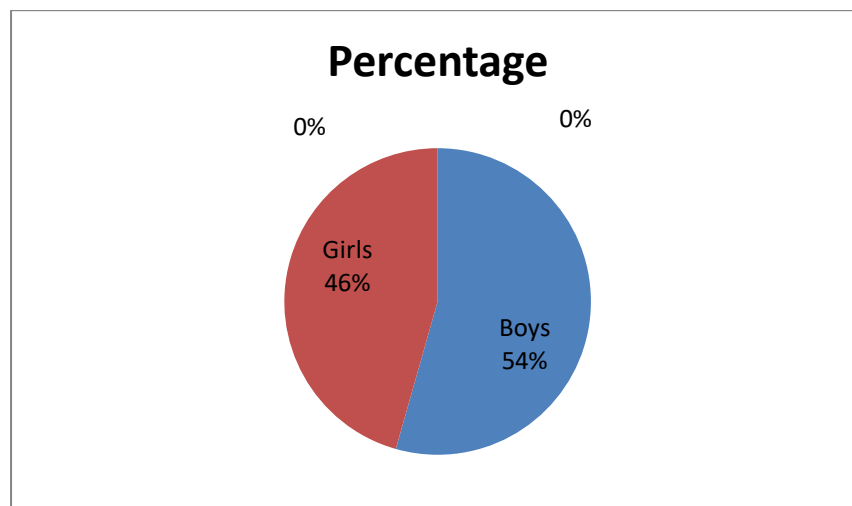


Fig. 2: Gender wise Distribution of Anchylostoma duodenale amongst children

66 (83.5%) of 79 children were anemic, some very severe. Amongst them, 43 were boys and 36 were girls. 34 of the 43 boys and (79.1%) 32 of the 36 girls (88.9%) were anemic. Elevated eosinophil counts were observed in 63.3% of the total cases [Table1].

Table 1: Presence of Anemia and Eosinophilia among Childrens

Boys (N = 43)		Girls (N = 36)	
Anemic	High Eosinophil Count	Anemic	High Eosinophil Count
34 (79.1%)	27 (62.8%)	32(88.9%)	23(63.9%)

Discussion

Our results show the prevalence of Hookworm to be 10.1%, which is consistent with other studies. Vittaya Jiraananku et al in Thailand found the prevalence to be 10.2%,[6] while a study from Vellore found 22.8 per cent of all stool samples positive for hookworm.[20] Another similar study by Deepti et al reported a prevalence of 7.8%.[8]

Anemia was the most common complication among the children. Our study showed a prevalence of 83.5% of anemic cases among the hookworm infected children. More percentage of girls were anemic than the boys. The overall percentage of anemic children with hookworm infestation in a similar study in Kenya coast was 76.3% and the anemic rate was around 80%. [21,22] In another study in Zanzibar, 73% of the children with hookworm infection were anemic.[23]

It is said that the degree of iron deficiency anemia depends on the number of adult worms inhabiting the gut, the duration of infection, the iron storage and intake of the infected individual.[24-27] But since we

had not done a quantitative test or culture by Harada Mori technique, we could not establish this fact.

Helminthic infection may occur in community in clusters or may be isolated. The presence of infections in clusters can be mainly attributed to the fact that most parents in the category were uneducated and slum dwellers. The hygiene in these schools was not properly maintained. No proper sanitation at the homes can also be a contributing factor. The same was noted by Deepti et al in their study in Vellore[8] and by Alemu et al in Ethiopia.[9] This fact of clustering in society can be a problem in treatment as the patients with heavy infection are likely to re-infect the community. All though there have been initiatives of mass administrations of anti-helminthic drugs in some states like in Vellore, a change in the hygiene, behavioral and social environments also need to be improved.

Health education to the patients and relatives, importance of hygiene by the individual as well as the community is of utmost importance to keep this

infection in check. It has been observed that mass treatment with a single dose of albendazole will eliminate a modest proportion of hookworms. Mass treatment needs to balance feasibility and efficacy and impact on health outcomes. A 3-day regimen is unlikely to have high compliance, and a change in the regimen is therefore unlikely to happen in the foreseeable future.[27]

Conclusion

Hookworms are notorious in being asymptomatic while causing severe blood loss from the patient and making them anemic. This is more prevalent among children and pregnant women. It easily spreads among closed communities, schools etc. Mass treatment of these infections are known to be quite effective in bringing down the numbers of the helminthes. But to know the prevalence of these infections, more such studies must be performed to quantify the number of helminthes in an area to effectively treat it. Health education, improvement of hygienic conditions, cleans toilets etc should be made available to the society.

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