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Original Article

A study of prevalence of intestinal worm infestation and efficacy of anthelminthic drugs

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ABSTRACT

Background: Intestinal worm infestation is a global health problem. Soil-transmitted helminth (STH) infections form the most important group of intestinal worms affecting two billion people worldwide, causing considerable morbidity and suffering, though entirely preventable. The present study was undertaken to measure the parasite load in the target population and evaluate the efficacy of anthelminthic drugs.

Methods: Current study was undertaken from 01 July 2012 to 30 June 2013. All outdoor as well as indoor patients advised stool examination formed the study population and it included 2656 males and 76 females (including 6 children). Investigations included stool examination and blood counts. A single-oral dose of anthelminthic drug was given to all positive cases. Stool tests were repeated after 14–21 days to evaluate cure rate.

Results: Overall prevalence of intestinal worm infection was found to be 49.38%. Ascaris was the most common parasite (46.88%), followed by Taenia (2.1%) and *Hymenolepis nana* (0.21%). Cure rate was found to be 66% for Ascaris and 100% in other cases.

Conclusion: The study reveals high prevalence of intestinal helminths in our subject population and calls for immediate control measures, including preventive chemotherapy and treatment of entire 'at risk' population and improvement of their living conditions including provision of potable water.

Introduction

Intestinal worm infestations are widely prevalent in tropical and subtropical countries and occur where there is poverty and poor sanitation. Soil-transmitted helminth (STH) infections form the most important group of intestinal worms affecting two billion people worldwide and the main species which infect are *Ascaris lumbricoides*, (roundworms), *Trichuris trichiura*, (whip worms) and *Necator americanus/Ancylostoma duodenale* (hookworms)[1] According to World Health Organisation (WHO), globally there are 1221–1472 million cases of Ascariasis, 750–1050 million cases of Trichuriasis and 740–1300 million cases of hookworm infestation.[2] These STHs are also considered Neglected Tropical Diseases (NTDs) as they inflict considerable morbidity and mortality, though entirely preventable.

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The burden of disease due to these intestinal parasites is an estimated 22.1 million disability-adjusted life-years (DALYs) lost for hookworm, 10.5 million for Ascaris; and 6.4 million for Trichuris.[3] Approximately 10,500 deaths each year are due to complications of Ascariasis and 65,000 deaths per year are due to anaemia caused by hookworm infection.[4] WHO recommends periodic administration of albendazole (ALB) 400 mg or mebendazole (MBZ) 500 mg for control of STH. The global target is to eliminate morbidity due to STH in children by 2020.[5]

The present station where this study has been carried out is located in a mountainous region in northern part of the country and is known to be highly endemic for Intestinal worm infestations, mainly STH. With this in the backdrop, the present study has been undertaken to assess the parasite load in the target population with primary focus on STH; and evaluate the efficacy of anthelminthic drugs using a protocol which was standardized in terms of the treatment and follow up i.e. repeat stool test 14–21 days after the administration of standard doses of drugs to evaluate the cure rate (CR).[6]

Material and methods

The current study was carried out from 01 July 2012 to 30 June 2013. All outdoor as well as indoor patients advised stool examination formed the study population. However, owing to the remoteness and the peculiar location of the station, the majority of study population comprised of only adult males, while females and children constituted a very small number i.e. 2656 males and 76 females (including 6 children). Patients suffering from diarrhea/dysentery were excluded from the study. Investigations included macroscopic as well as microscopic stool examination and blood counts.

The patients were provided with wide mouthed clean, dry, labelled plastic containers for collection of samples and were asked to provide 5 g of solid or 10 ml of liquid stool. The fresh stool samples were examined within 1–2 h of collection. Macroscopic examination was carried out to identify structures like proglottids, scolices, adult tapeworm, Enterobius, Ascaris, Trichuris and hookworms. Unstained wet saline mount preparations were done to detect eggs or larvae and Iodine wet mount was done to detect cysts. However cases which were found negative by saline preparation method, Formal-Ether concentration technique was adopted.

A single-oral dose of ALB (400 mg) was given to the patients found positive for *A. lumbricoides* and *T. trichiura*. A single-oral dose of 10 mg/kg body weight of praziquantel was given to those found positive for *Taenia solium/Taenia saginata*. However, *Hymenolepis nana* was treated with an oral dose of 25 mg/kg body weight of praziquantel, and the dose was repeated after one week. Stool tests were repeated after 14–21 days to evaluate CR. The patients were also educated about personal hygiene and the importance of washing hands, wearing shoes, and cleanliness of surrounding area.

In accordance with the WHO guidelines, the following formula was used to calculate the prevalence of infection.[7]

$$\text{Prevalence} = \frac{\text{Number of subjects testing positive} \times 100}{\text{Number of subjects investigated}}$$

Results

A total of 2732 subjects were included in the study comprising of 2656 males and 76 females, including 6 children. The age/sex breakdown revealed that the majority of males i.e. 44.05% (1170/2656), as well as females 53.94% (41/76) belonged to age group 20–29 years. The highest parasitosis was found in the age group 0–9 years (83.33%). Detailed breakdown of parasite prevalence by age and sex has been given in Table 1.

The overall prevalence of intestinal parasitosis was found to be 49.38% (1349/2732). The prevalence of Ascaris lumbricoides was found to be the highest (46.88%), followed by *Taenia* (2.1%) and *H. nana* (0.21%). Relative prevalence of parasites detected in the study is given in Fig. 1. Most of the positive cases were asymptomatic. However, absolute eosinophil counts (AEC) were found to be raised in 47.93% of positive cases. The AEC range was recorded to be between 250 and 1750 cells/cu.mm.

The highest prevalence of parasite was recorded in October (82.7%) while the lowest prevalence was detected in January (30.6%). Month-wise breakdown of the prevalence of various intestinal parasites is given in Table 2.

The study also revealed seasonal variations with the highest prevalence in autumn (80.5%), while it was lowest in the months of spring (43.9%). The breakdown of seasonal variation is given in Table 3.

The CR after one time administration of recommended doses of anthelminthic drugs was found to be 66% for Ascaris lumbricoides and 100% for other parasites.

Table 1 – Breakdown of parasite prevalence by age and sex.

Age in years	Male			Female			Total		
	Total Samples	Positive	%	Total Samples	Positive	%	Total Samples	Positive	%
0–09	4	3	75.00	2	2	100.00	6	5	83.33
10–19	9	4	44.44	8	3	37.50	17	7	41.18
20–29	1170	706	60.34	41	29	70.73	1211	735	60.69
30–39	1006	427	42.45	14	6	42.86	1020	433	42.45
40–49	457	162	35.45	6	2	33.33	463	164	35.42
>50	10	3	30.00	5	2	40.00	15	5	33.33
Total	2656	1305	49.13	76	44	57.89	2732	1349	49.38