

## Effect of Anthelmintic/Anti Protozoal Treatment on the Nutritional Status of School Children in a Sub Urban Area of Orissa, India

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**ABSTRACT** Intestinal parasitic infestation is one of the multiple aetiologies of malnutrition amongst school children in India. To determine whether successful deworming treatment improves physical growth, 297 school children (aged 4-15 years) in a suburban area were followed for one year. No other intervention programme was instituted during this period. Height and weight were measured at the baseline and one year after the study. Growth was measured in terms of change in weight-for-age and height-for-age. Stool samples were examined at the baseline and subsequently at one month interval. Metronidazole, 600mg daily in three divided doses for 7 days and/or mebendazole, 100mg twice daily for 3 consecutive days was administered to the infected individuals depending on the species of parasite found. The prevalence of various intestinal parasitic infestation at the baseline was 81.1%; protozoa, 41.7%; helminths 19.5% and both protozoa and helminth, 19.9%. Two hundred forty-one children who revealed various parasitic infestations were given appropriate treatment. The de-worming treatment significantly reduced parasitic infestations to 25.9%; Protozoal to 17.5%, helminthic to 5.7% and combined infection to 2.7%. Successful removal of intestinal parasites did not cause any significant improvement in the growth of treated children which is similar to their untreated counterpart in terms of the change in SD-score of weight-for-age and height-for-age.

### INTRODUCTION

The intestinal parasites of man are of considerable medical importance through out the developing world (Waren and Mahmoud, 1985). An estimated 800-1000 million people are infected with *Ascaris lumbricoides* (round worm), 700-900 million with hook worm, and 500 million with whip worm (*Trichuris trichiura*). The prevalence of intestinal worm infestation in India varies from 5% to 76% which is similar to that in other developing countries (Ananthakrishnan et al., 1997). The impact of intestinal helminthiasis

on health and economy have been largely underestimated. Worm infestation, widely prevalent in children of school going age, directly or indirectly cause undernutrition, growth retardation, anaemia and impaired cognition (Savioli et al., 1992; Nokes et al., 1992). Although the pathological changes associated with these parasites are rarely acute, the prolonged infection imposes considerable strain on the health of the host particularly when coupled with malnutrition (Berding, 1986). It has been suggested that administration of intermittent deworming treatment is effective in mass parasite control programme (Trainer, 1985).

In the present study efforts were made to find out the effect of anthelmintic / anti protozoal treatment on the nutritional status of the children in a sub urban area of Orissa.

### SUBJECTS AND METHODS

The study was conducted in a sub urban village (Gangapada) about 22 km away from Bhubaneswar, the capital city of Orissa state. It has three schools; one Primary, one Middle English and one High school having students between 4-15 yrs of age. The socio-economic conditions of all children are almost similar and had the identical environmental condition. The study period was 12 months. It was ensured that no intervention programme other than anthelmintic and anti-protozoal treatment was instituted during this period. Faecal samples were examined microscopically by formol-ether concentration technique (WHO, 1980). Out of the 297 children examined, 241 students revealed various parasitic infestations after three consecutive stool examinations and received treatment. 56 students were

found to be normal, who had no parasitic infections through out the study period on monthly stool examination.

Appropriate treatment was administered - to those having parasitic infections - depending on the species of parasites detected: (i) for children with mixed or single helminthic infection, mebendazole one tablet (100 mg) twice daily for three consecutive days was given and (ii) for children with only protozoal infection; metronidazole 200 mg three times daily was given for seven days. Students having combined helminthic and protozoal infection were first treated with mebendazole and subsequently with metronidazole one week later. The stool samples of children who received treatment for various parasitic infections were re-examined within a week of administration of proper treatment were found to be negative. The stool samples of both positive and negative children were re-examined at monthly intervals and one year later. Students were administered with appropriate treatment schedule when found positive for parasitic infection during repeat monthly stool examination during the follow up study.

#### Recording of Anthropometric Data

The exact date of birth of individual students were recorded from the concerned school register. The height and weight of all children were measured by using standard procedures (Weiner and Lourie, 1969). Height was measured with anthropometric rod and body weight taken by fulcrum balance with minimum clothing and without footwear. An accuracy level of one millimetre for height and 100 gms for weight was main-

tained. The mean of the three consecutive readings were recorded.

#### Calculation of Various Anthropometric Data

The comparison of anthropometric indices of individual children were made with the NCHS (National Centre for Health Statistics) reference population of WHO (1983). Weight/Age and Height/Age of all children were expressed in SD score values. The values of the indicators below -2SD of the median considered to be undernourished.

The change in percentage of Weight/age and Height/age in infected / treated as well as normal groups were compared using  $\chi^2$  test of significance.

### RESULTS AND DISCUSSION

The distribution of different intestinal parasitic infections in the study population is shown in table 1. The initial prevalence of various parasitic infection was 81.1%; 41.7% had protozoal infection, 19.5% had helminthic and 19.9% had mixed infection. The high rate of prevalence of intestinal parasitic infection in the present study agree with the results of similar studies conducted in the neighbouring states (Chowdhury and Schiller, 1968; Rao et al., 1971). Periodic and one year after the administration of the prescribed effective treatment the overall prevalence rate was found to be 25.9%; 5.7% had helminthic infection, 17.5% had protozoal infection and 2.7% had mixed infection.

As would appear from table 2, 37.5 %, 30.4% children in normal (untreated) group and 50.2%,

Table 1: Age wise distribution of different intestinal parasitic infection

Age in years	Total	Initial Study				Final Study			
		Protozoa	Helminth	Protozoa + helminth	Total	Protozoa	Helminth	Protozoa + helminth	Total
4 - 7	72	41 (56.9)	7 (9.7)	17 (23.6)	65 (90.3)	22 (30.6)	3 (4.2)	4 (5.6)	29 (40.3)
8 - 11	191	76 (39.8)	41 (21.5)	36 (18.8)	153 (80.1)	27 (14.1)	10 (5.2)	2 (0.1)	39 (20.4)
12 - 15	34	7 (20.5)	10 (29.4)	6 (17.6)	23 (67.6)	3 (8.8)	4 (11.8)	2 (5.9)	9 (26.5)
Total	297	124 (41.7)	58 (19.5)	59 (19.9)	241 (81.1)	52 (17.5)	17 (5.7)	8 (2.7)	77 (25.9)

\*Figures in parantheses indicates percentage.

43.6% in infected (treated) group were underweight and stunted respectively at the beginning of the study. The reason for poorer growth status in the infected (treated) group compared to the normal (untreated) group of children may be attributed to high prevalence of different parasitic infections (81.1%). Similar to our observation earlier workers have found giardial infested children to weigh less than the non-infested ones (Solomons, 1982; Gupta et al., 1990; Sullivan, 1991). However, Awasthi and Pande (1977) have reported that there is no association between weight or height and parasite positivity.

**Table 2: Distribution of nutritional indicators (<2SD) before and after intervention**

Nutritional Parameter	Normal (Untreated) n=56		Infected (Treated) n=241	
	Initial no (%)	Final no (%)	Initial no (%)	Final no (%)
Weight/Age (underweight)	21 (37.5)	20 (35.7)	121 (50.2)	105 (43.6)
Height/Age (Stunting)	17 (30.4)	17 (30.4)	105 (43.6)	101 (41.9)

Taking the above indicators as criteria of health it was observed that there is only a slight change in percentage of underweight and stunting both in normal (35.7% and 30.4%) and in treated group (43.6% and 41.9%) after intervention. The marginal improvement seen may be due to the normal growth process in the children, since most of them were in the growing age. The prevalence of malnutrition using weight for the age criteria amongst preschool age children in India is approximately 45% (ICMR, 1980). Because of the variable timing of the pubertal growth spurt the indices of weight and height in relation to age are of little value for assessment of nutritional status in the adolescent groups (WHO, 1986).

No statistical significant change ( $P > 0.05$ ) in the nutritional indicators was marked after one year in both normal and treated groups. Contrary to this finding, Gupta et al. (1977) have described striking improvement in nutritional status of preschool children after one year of periodic deworming treatment. In their study however, they have given the treatment along with the supplementary feeding. Of course the indi-

cators such as weight for height, height for age etc. have their limitation and they are none the same recommended by the WHO (1986). Height for age is important as a measure for overall social deprivation.

Although parasitic infections adversely affect the health by reducing appetite, affecting intestinal absorption and accelerating intestinal transit of food, yet other factors such as climatic changes, socio-economic condition, sanitation and health education etc., play their respective roles (Victoria, 1986). So eradication of the helminthic and protozoal infection in these children was expected to eliminate one of the major causes of malnutrition. While the other factors still operate in the particular community. The anthelmintic/anti protozoal treatment was carried out as advocated by Trainer (1985) for the mass parasite control programme. An effort was made to study the effect of this on the nutritional status of the children. The marginal benefit observed suggests that periodic deworming of the children having heavy load of intestinal parasites may promote their health in a tropical area provided other factors governing nutritional status are also taken care of.

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