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PREVALENCE OF HOOKWORM INFECTION IN A SLUM AREA, VANGAYAGUDEM, WEST GODAVARI DISTRICT, (ANDHRA PRADESH)

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ABSTRACT
The prevalence of hookworm infection was ascertained in the rural areas of Eluru, West Godavari District, A.P. that are represented by only scheduled caste population at different periods of the year i.e. summer season, rainy season and winter season. Majority of the inhabitants are illiterate and coolies living in poor hygienic conditions. All the positive disease cases were found lodging *Ancylostoma duodenale*. The prevalence of hookworm infection was 17.3%, 29.3%, 16.3% in children and 37.2%, 48.2%, 17.4% in adults in summer, winter and rainy seasons respectively. *Ancylostoma duodenale* is the only infection in 264 samples, 92 children and 172 adults showed 41.6% of ancylostomiasis in rainy season. Different age groups like10-19, 20-29, 40-49, 50-59 and >60 years showed highest prevalence of ancylostomiasis. The infected individuals were treated with Albendazole just after rainy season. Antihelminthic treatment together with health education reduced the infection and promoted environmental health in the study area.

INTRODUCTION

The prevalence of hookworm infection is as high as 95% in certain communities of developing countries particularly in the tropical and sub tropical areas (Hoagland and scad, 1978; walsh and warren, 1979). The chronic internal blood loss caused due to hook worm infection is associated with iron deficiency anaemia, protein, folic acid and vitamin B12 (Roche and Layrisse, 1996; Woodruff, 1982; Li, 1990). Hookworm infection alone is causing 50,000 deaths per year worldwide (Walden, 1991). Heavy hookworm infections may lead to retarded growth of children (Hotez and Pritchard, 1995; Stoltfus *et al.,* 1997). A direct relationship between the intensity of hook worm infection and anaemia (Lwambo *et al.,* 1992).Climate, socio-economic, educational and environmental sanitary conditions may influence the prevalence and severity of hook worm infections (Kan, 1989; Bakta *et al.,* 1993). *Necator americanus* and *Ancylostoma duodenale* occur commonly in tropical and sub-tropical regions of human population. Of these *A. duodenale* was found to be abundant in rural and urban communities (Gallies, 1985; WHO, 1994). Information regarding prevalence of hookworm infection in South India is lacking. Hence, a new vista has been opened to asses the occurrence and clinical significance of the hook worm infection in rural population living in Vangayagudem.

MATERIALS AND METHODS

Study area

This slum is located about 3 kilometers of Eluru Municipal Corporation (West Godavari District) and comprised of only scheduled caste population with a total of approximately 590 individuals. This area is consisting of paddy fields. Majority of population (95%) are illiterate with poor living conditions thatched roofs. Only 60% of households are having proper latrines while rests defecate in fields. There is no water supply to houses. A common community water tap or open wells are the source of water. 60% of the children are going to school.

Survey and analysis

Sampling Design: Stool sample from 264 subjects including 92 children (36 males and 56 females) and 172 adults (92 males and 80 females) belonging to Vangayagudem were collected. Each of the stool samples were examined for helminthic infection.

Stool sample collection

The procedure for faecal sample collection and smear preparation was explained else where (Indira and Vardhani, 2009). Samples were examined for eggs of hook worms and other intestinal helminthes, by using direct smear method (Beaver, 1950). The intensity of infection was assessed by counting the number of eggs per gram (EPG) of faecal sample, following Stoll method (WHO, 1963). The egg counts in each sample forms a basis to classify infections as heavy, moderate or light (Regananathan *et al.,* 1995). The present epidemiological survey was carried out from March 2004 to April 2005 (on alternate days within 10 day period). The prevalence of infection was recorded in summer (March-June,

2004), rainy (July-Oct. 2004) and winter (Nov. 2004 – Feb. 2005) seasons. Immediately after the survey in rainy season, the infected individuals were tested with a single dose of Albendazole (500mg) under the supervision of a Government medical practioner. Stool examinations were carried out again and the prevalence of infection was recorded after 3 weeks period.

RESULTS

Prevalence of helminthic infection in summer season

Of 92 children (Comprising 36 males and 56 females) of Vangayagudem screened for helminthic infection, all the males of different age groups did not show the presence of helminthic infection (Table 1). Where as females of 5-9 and 10-19 age groups showed 25% and 37.5% infection respectively. Out of 172 subjects examined, 92 males and 80 females showed 30.4% and 45% helminthic infection (Table 2). Males of 20-29, 30-39, 40-49 and 50-59 age groups showed 25%, 20.0%, 75% and 50.0% infection respectively. Males of above 60 years did not show helminthic infection. Females of 20-29, 30-39 and 40-49 showed 50.0% each and above 60 years age group harbored 33.3% helminthic infection. 50-59 age groups were found negative for helminthic infection. *A. duodenale* is the most prevalent helminthic parasite in this slum. The prevalence of hookworm alone was 20-75% in this study. The infection was 25% (20-29 years, males), 20% (30-39 years, males), 75% (40-49 years males) and 50% (50-59 years) in males.

Prevalence of helminthic infection in rainy season

Out of 92 children (Table 3) screened for the prevalence of helminthic infection, males of 5-9 and 10-19 age groups showed 33.3% and 50.0% respectively, while the children of 0-4 years were free from infection. Females of 5-9 and 10-19 age groups were negative for infection. Of 172 adults (Table 4) examined for the prevalence of helminthic infection, males of 40-49 age group in males showed 100 of infection 20-29,

Table 1: Prevalence of *Ancylostoma duodenale* among children of Vangayagudem in Eluru Town according to age and sex in summer season. (Number in parenthesis indicates the sample size)

Sex	Groups 0 - 4	5 - 9	10 - 19	Total
Boys	0% (8)	0% (24)	0% (4)	0% (36)
Girls	0% (8)	25% (16)	37.5% (32)	28.5% (88)
Total	0% (16)	10% (40)	33.3% (36)	17.3% (92)

Helmenthic Infection	Prevalence % Males			Females			Total
	0-4	5-9	10-19	0-4	5-9	10-19	17.3% (92)
Ancylostoma duodenale	0% (8)	0% (24)	0% (4)	0% (8)	25% (16)	37.5% (32)	

No. of children tested – 92; No. of children infected – 16; % of infection – 17.3%

Table 2: Prevalence of *Ancylostoma duodenale* among adults of Vangayagudem in Eluru town according to age and sex in summer season. (Number in parenthesis indicates the sample size)

Sex	Groups 20-29	30-39	40-49	50-59	>60	Total
Men	25% (16)	20% (40)	75% (16)	50% (8)	0% (12)	30.4% (92)
Women	50% (04)	50% (16)	50% (8)	0% (4)	33.3% (12)	45% (80)
Total	42.8% (56)	28.5% (56)	66.6% (24)	33.3% (12)	16.6% (24)	37.2% (172)

Helminthic Infection	Prevalence% Males					Females					Total
	20-29	30-39	40-49	50-59	>60	20-29	30-39	40-49	50-59	>60	
Ancylostoma duodenale	25% (16)	20% (40)	75% (16)	50% (8)	0% (12)	50% (40)	50% (16)	50% (8)	0% (4)	33.3% (8)	37.2% (172)

Table 3: Prevalence of *Ancylostoma duodenale* among children of Vangayagudem in Eluru town according to age and sex in rainy season. (Number in parenthesis indicates the sample size)

Sex	Groups 0 – 4	5 - 9	10 - 19	Total
Boys	0% (8)	33.3% (24)	50% (40)	27.7% (36)
Girls	0% (8)	31.2% (16)	37.5% (32)	30.3% (56)
Total	0% (16)	32.5% (40)	38.8% (36)	29.3% (92)

Helmenthic Infections	Prevalence % Males			Females			Total
	0-4	5-9	10-19	0-4	5-9	10-19	
Ancylostoma duodenale	0% (8)	33.3% (24)	50% (40)	0% (8)	31.2% (16)	37.5% (32)	29.3% (92)

No. of children tested – 92; No. of children infected -27; % of infection – 29.3%

Table 4: Prevalence of *Ancylostoma duodenale* among adults of Vangayagudem in Eluru town according to age and sex in rainy season. (Number in parenthesis indicates the sample size)

Sex	Groups								Total			
	20-29		30-39		40-49		50-59		>60			
Men	50%	(16)	20%	(40)	100%	(16)	50%	(8)	33.3%	(12)	43.4%	(92)
Women	40%	(40)	56.2%	(16)	87.5%	(8)	100%	(4)	58.3%	(12)	53.7%	(80)
Total	42.8%	(56)	30.3%	(56)	95.8%	(24)	66.6%	(12)	45.8%	(24)	48.2%	(172)

No. of adults tested – 172;No. of adults infected – 83; % of infection – 48.2%; Over all percentage in Vangayagudem - 41.6%

Helminthic Infections	Prevalence% Males					Females					Total
	20-29	30-39	40-49	50-59	>60	20-29	30-39	40-49	50-59	>60	
Ancylostoma duodenale	50% (16)	20% (40)	100% (16)	50% (8)	33.3% (12)	40% (40)	56.2% (16)	87.5% (8)	100% (4)	58.3% (12)	48.2 % (172)

Table 5: Prevalence of *Ancylostoma duodenale* among children of Vangayagudem in Eluru town according to age and sex in winter season. (Number in parenthesis indicates the sample size)

Sex	groups			Total
	0 - 4	5 - 9	10 - 19	
Boys	0% (8)	12.5% (24)	25% (4)	11.1% (36)
Girls	0% (8)	18.7% (16)	25% (32)	19.6% (56)
Total	0% (16)	15% (40)	25% (36)	16.3% (92)

No. of children tested – 92; No. of children infected –15; % of infection – 16.3%

Helmenthic Infection	Prevalence % Males			Females			Total
	0-4	5-9	10-19	0-4	5-9	10-19	
Ancylostoma duodenale	0% (8)	12.5% (24)	25% (4)	0% (8)	18.7% (16)	25% (32)	16.3% (92)

compared to the observations of before treatment. The age group of 0-4 years did not show helminthic infection females of 5-9 and 10-19 age groups showed 18-7% and 25% infection.

Of 172 adults screened, (Table 6), the prevalence rate was low both in males and females. 15.2% of males and 20.0% of females were found infected. Males of 20-29, 30-39, 40-49, 50-59 and >60 years age groups showed 18.7%, 7.5%, 13.2%, 25%, and 8.3% infection respectively. In females of 20-29, 30-39, 40-49, 50-59 and >60 year age groups the infection rate was declined to 17.5%, 25.0%, 25.0%, 25.0%, 16.6% respectively.

Season wise prevalence

The percent of prevalence of infection increased from summer season to rainy season in all the age groups (except 0-4 age group) with a maximum prevalence of 66.6% in summer season and 95.8% in rainy season in the age group of 40-49 years in

Table 6: Prevalence of *Ancylostoma duodenale* among adults of Vangayagudem in Eluru town according to age and sex in winter season. (Number in parenthesis indicates the sample size)

Sex	groups					Total
	20-29	30-39	40-49	50-59	>60	
Men	18.7% (16)	7.5% (40)	31.2% (16)	25% (8)	8.3% (12)	15.2% (92)
Women	17.5% (40)	25% (16)	25% (8)	25% (4)	16.6% (12)	20% (80)
Total	17.8% (56)	12.5% (56)	29.1% (24)	25% (12)	12.5% (24)	17.4% (172)

No. of adults tested – 172; No. of adults infected - 30;% of infection – 17.4%; Over all percentage in Vangayagudem = 17%

Helminthic Infection	Prevalence% Males					Females					Total
	20-29	30-39	40-49	50-59	>60	20-29	30-39	40-49	50-59	>60	
Ancylostoma duodenale	18.7% (16)	7.5% (40)	31.2% (16)	25% (8)	8.3% (12)	17.5% (40)	25% (16)	25% (8)	25% (4)	16.6% (12)	17.4% (172)

30-39, 50-59 and >60 years age groups showed 50%, 20%, 50% and 33.3% of infection respectively. Females of 40-49 years had 100% of infection and that of 20-29, 30-39, 40-49 and >60 year age groups showed 40%, 56.2%, 87.5% and 58.3% of infection respectively. *A. duodenale* is only parasite detected in this slum.

Prevalence of helminthic infections in winter season

The prevalence of helminthic infection was found to be low in males of 5-9 (12.5%, 10-19 (25.0%) age groups (Table 5) when both males and females (Table 7). Next higher prevalence (45.8%) was noticed in the age group of >60 years in rainy season. The minimum prevalence of 12.5% was found in both the age groups of 30-39 and >60 years in winter season.

DISCUSSION

The occurrence of intestinal parasitic infections, the lower socio-economic conditions that prevail in Indian population may favor the present survey on intestinal parasitic infestation

Table 7: Age and season wise prevalence and intensity of ancylostomiasis in the study area (based on stool examination) Vangayagudem

Age Group	No. of Subjects	*A. duodenale* Infection Summer Season	Rainy Season	Winter Season
0-4	16	0%	0%	0%
5-9	40	10.0%	32.5%	15%
10-19	36	33.3%	38.8%	25%
20-29	56	42.8%	42.8%	17.8%
30-39	56	28.5%	30.3%	12.5%
40-49	24	66.6%	95.8%	29.1%
50-59	12	33.3%	66.6%	25%
>60	24	16.6%	45.8%	12.5%

in a rural slum explains that the infection may go up to 67-100%. The unhygienic environment, consumption of improperly cooked or contaminated food / water may contribute to high prevalence of intestinal parasites as suggested by fernandez *et al.,* (2002) in rural children living in and around Chennai. The high prevalence of *A. duodenale* and its occurrence throughout the year in all the subjects. (except in 0-4 and 5-9 age groups) suggests the primary role of bad habits in people of study area. The high prevalence of infection in male children and male adults relates to the social habits of the slum people. The male folk work more in the fields and outdoors, and therefore, are prone to more infection as compared to females.

The % of prevalence of ancylostomiasis was found low in the non tribals of Vangayagudem.

The prevalence of 33.3% (5-9) and 50.0% (10-19) of infection indicates that children lodged more infection than adults. Yadav and Tandon (1989) reported a high prevalence of hookworm eggs/larvae in places where children are exposed. Also Toma *et al.,* (1999) identified the age group of 4-14 years as the high risk group.

It is interesting to note that in both children and adults the intensity of infection showed a decline by winter season therefore, it can be concluded that the control of transmission of hookworm infection can be achieved with good medication, health education and promoting their social status.

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