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Epidemiological study of parasitic infestations in rural women of Terai belt of Bihar, India

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ABSTRACT

Objective – To determine the prevalence of intestinal protozoal and helminthic infection in rural women populations of Terai belt of Bihar. Method – 404 stool samples from different villages of Terai belt were collected. Stool samples from all subjects were examined on alternate days. Results – The overall prevalence rate of various parasitic infections was 92.32%. The helminth infections (72.25%) were higher than the protozoan infections (15.50%). Entamoeba histolytica (14.25%) and Giardia (1.25%) were the commonest intestinal protozoa parasites identified. Among the helminths, Ascaris lumbricoides (46.25%) and Enterobius (15%) were the common ones. The prevalence rate of Ancylostoma and H. nana was 8.25% and 2.75% respectively. Twenty two samples have mixed infection of Ascaris and Entamoeba. Most cases were infected with a single pathogen except in 22 (5.5%) cases with double infections were noted. Conclusion – Various factors such as source of drinking water, open air defection, habits of moving barefooted, poor socioeconomic conditions, poor sanitation, sandy soil and warm humid climate were found to be responsible for such a high infection. Improvement of safe drinking water supply and sanitation facilities by the construction of toilets could significantly reduce the burden of parasitic diseases in the rural area of the Terai belt of Bihar. In addition, particular importance might be given to health education at the district level.

Key words: Parasitic infection, Poor socioeconomic condition, Open air defection, Habit of moving bare footed, Terai belt

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INTRODUCTION

Intestinal parasitic infestations have a very high prevalence in tropical and subtropical countries and the populations face substantial morbidity on this account [1]. Intestinal parasitic infections, including protozoal infections, remain a major threat to the health. These infections cause chronic conditions, which may progress to serious diseases. Intestinal parasitic infections are globally endemic and have been described as constituting the greatest single worldwide cause of illness and disease [2].The commonest parasitic infections reported globally are *Ascaris* (20%), hookworm (18%), *Trichuris trichuira* (10%), and *Entamoeba histolytica* (10%) [3]. In India overall prevalence rates range from 12.5% to 66%, with varying prevalence rates for individual parasites [4, 5, 6, 7]. The high prevalence of these infections is closely correlated with lack of sanitation, lack of access to safe water, improper food preparation, improper hygiene and impoverished health services [8]. Several studies have reported that the people most infected with intestinal and liver parasites are rural residents, especially those in developing countries in, for example, Africa [9, 10], Asia [11, 12, 13, 14], and South America [15]. It has been found that religion has no effect on the prevalence of intestinal parasites [16].

Terai belt of Bihar is an agricultural zone. Economically it is a backward zone. It was full of jungles and was popularly known as the ‘Paradise of Hunters’. Once upon a time, it was called as ‘Kala Pani’ due to its bad climatic condition. But after earthquake of 1934, there was a drastic change in its climatic condition and migration of people

from different corners of the country started. Slowly urbanization and industrialization begins. In broad sense, there is a drastic change in environmental conditions. It is an agricultural zone and there is abundance of swampy areas. Generally villages are located near agricultural fields or swampy areas. Villages lack proper drainage system. Houses are made up of bamboo and khar having earth floor and are ill ventilated. Majority of women of this area worked as daily labourer in agricultural fields or brick factories. Education in them is almost negligible. All the studied populations have migrated from Bangladesh, Nepal as well as from the neighbouring state of India. As nothing is known about incidence of intestinal parasitic infestation in them, so the present work was undertaken.

MATERIALS AND METHODS

The present study was conducted in different villages of Terai belt of Bihar and the incidence of parasitic infestation was studied only in women. Villagers were given plastic containers labelled with unique identification numbers and invited to return the containers filled with a fresh morning stool sample (10–50 g) the following day. Stool specimens obtained from all participants were examined for the presence of intestinal parasite cysts, eggs, trophozoites and larvae. In the laboratory, slides were prepared directly for wet mount in saline as well as in iodine and then were microscopically examined. Microscopic examination of stool was done under low and high power in unstained preparation for typical parasitic movement and stained preparations (Iodine staining) were used for nuclear details.

RESULTS

During the study period a total of 404 stool specimens were examined. Three hundred seventy three (92.32%) samples were positive. The age-group of the study population varied between 5 – 65 years. Overall, the helminth infections (72.25%) were higher than the protozoan infections (15.50%). *Entamoeba histolytica* (14.25%) and *Giardia* (1.25%) were the commonest intestinal protozoa parasites identified. Among the helminths, *Ascaris lumbricoides* (46.25%) and pin worm (15%) were the common ones (Table 1). The prevalence rate of *Ancylostoma* and *H. nana* was 8.25% and 2.75% respectively. Twenty two (5.5%) samples have mixed infection of *Ascaris* and *Entamoeba*. The most common pathogenic parasite associations in people harbouring double infections were between *E. histolytica* and *Ascaris.* Distribution of both protozoans and helminthic parasites among the various expatriate populations shows that *Ascaris, Enterobius* (Pin worm) and *Entamoeba histolytica* infection was common.

Table – 1 : Prevalence of intestinal parasites in rural women of Terai belt of Bihar, India

Parasites	Number	%
Ascaris	185	46.25
Enterobius	60	15
Entamoeba	57	14.25
Ancylostoma	33	8.25
H. nana	11	2.75
Giardia	5	1.25
Ascaris & *Entamoeba*	22	5.5

DISCUSSION

Human parasitism is a global problem of enormous proportion. The prevalence rates of intestinal parasites exhibit wide variation from country to country; between geographic areas, communities and ethnic groups even seasonal variations are also known [17]. We studied patterns of intestinal parasite infections (i.e. soil-transmitted helminths and intestinal protozoa) rural areas of Terai belt of Bihar. An important aspect of parasitic disease control programmes is the ability to readily identify and reach people at highest risk of infection and associated morbidity. Often, the poorest people are the least accessible ones living in remote rural areas, and hence they are at highest risk of parasitic infection and other conditions of ill-health [18, 19]. Intestinal parasitic infections are endemic worldwide and remain a major public health concern in many tropical and subtropical countries. In Terai belt of Bihar, the prevalence of intestinal parasitic infections is around 92.32% and most of these infections are due to helminths like *Ascaris, Enterobius, Ancylostoma* and *Entamoeba.* The World Health Organization) estimates that approximately 50 million people worldwide suffer from invasive amoebic infection each year, resulting in 40-100 thousand deaths annually [20, 21]. Intestinal helminths rarely cause death. Instead, the burden of disease is related to less mortality than to the chronic and insidious effects on health and nutritional status of the host [22. 23]. In addition to their health effects, intestinal helminth infections also impair physical and mental growth of children, thwart educational achievement, and hinder economic development [24, 25]. The transmission of these parasites occurs via fecal-oral

route, either directly from person-to-person or indirectly by eating or drinking fecally contaminated food and water. The major source of drinking water in the study area is the hand pumps still the prevalence *Entamoeba* and *Ascaris* is very high. The reason is that the hand pumps are located near drainage as well as water level is high (10 – 20') which easily contaminated with surface run off and seepage resulting in high prevalence of the parasites. Generally, the higher percentage of *Ascaris* and protozoa is a common characteristic feature of low socioeconomic group. *Ascaris* is more prevalent in warm moist climate, poor sanitation, overcrowding areas which allow eggs to be present abundantly in soil [26, 27]. The eggs of *Ascaris* remain viable in the soil for months or years under favourable condition. Seeding of the soil by *Ascaris* eggs takes place by the human habit of open air defection The climate of the area is warm and moist as well as the populations belong to low socioeconomic group. The infective stages of helminths have been found on the earth floor of the houses in a slum community of Colombia [28]. Individuals who live in houses having cemented floor have less infection of *Ascaris* in comparison to those living in houses with earth floor. Further, open air defection is a common feature of the studied area as there is no facility of latrines in the houses.

The larvae of *Ancylostoma* are more likely to survive in sandy soil than clay soil [29]. The soil of the area is sandy. Majority of women work as daily labourers in agricultural fields and they move bare footed in the fields. So, infection of *Ancylostoma* is not surprising. The prevalence of *H. nana* in the studied population was found to be 2.75% which might be due to ingestion of food contaminated with eggs of *H. nana*. It might be due to contamination of drinking water with the eggs of *H. nana* as in this area water level is very high [30].

Sanitary conditions are important predictors of intestinal parasitism. The sanitary condition and personal hygiene of the studied women are very poor. Same room is used for living as well as cooking food. The drinking water as well as prepared food remains open which get contaminated with dusts containing cysts of the parasites. There is abundance of cow dung in and around the houses. They do not wash hands with soap before eating and their nails are dirty. A direct relationship between poor sanitation and personal hygiene with prevalence of intestinal parasitism has been reported [31, 32]. Kang *et al*. [32] studied the prevalence of intestinal parasitoses in rural southern Indians and observed that overall parasitic infestations were 97.4% which is 92.32% in case of women of rural areas of Terai belt of Bihar.

The present study confirms that women from a rural setting are at higher risk of intestinal parasitic infections. The remoteness of the rural setting, characterized by the absence of key infrastructures like safe drinking water, toilets, health facilities and basic sanitation which plays important roles as well as pattern of settlement near agricultural fields/swampy areas. Indeed, unsafe hygiene, water and sanitation and inadequate management of the environment exacerbate parasite infections in general and helminth infections in particular. Since open defecation is widely practiced in these areas, efforts must be made to improve sanitation, which in turn will have major ramification on other neglected tropical diseases such as amoebiasis and giardiasis.

Lastly the study indicates that the source of drinking water could be one of the factors associated with the prevalence of intestinal parasitism along with poor environmental sanitation and unhygienic conditions resulting in a public health hazard. As it is causing public health hazard, it should be an eye opener for the public health planners.

CONCLUSION

Parasitic infections are governed by behavioural, biological, environmental, socioeconomic and health systems factors. The prevalence of the parasites in the studied populations can be explained considering the following points–

a) Poor socioeconomic condition and poor sanitation
b) Lack of safe drinking water
c) Contamination of drinking water with sewage water and fecal matter
d) Open air defection
e) Barefooted movement in the field
f) Pattern of settlement
g) Sandy soil
h) Warm and humid climate
i) Lack of health education

There is a need of continued and rigours efforts by control programmes to reach rural women of the Terai belt of Bihar who are devoid of basic facilities (such as safe drinking water, toilets, health education and sanitation etc). Improvement of safe water supply and sanitation facilities by the construction of toilets could significantly reduce

the burden of parasitic diseases in the rural area of the Terai belt of Bihar. In addition, particular importance might be given to health education at the district level. Control programmes should carefully consider the benefits of truly integrated (i.e. inter-programmatic and inter-sectoral) strategies. The findings of the present study may provide useful information for such integrated strategies to overcome the public health burden of intestinal parasitic infections in the rural areas of Terai belt of Bihar.

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