

## Occurrence of soil-transmitted helminths in women at the Himalayan region of Nepal

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### Abstract

**Objective:** to find the occurrence pattern and prevalence of the soil transmitted helminths in women of child bearing age group.

**Methods and Materials:** The study was conducted in Jiri, an area of Dolakha district at the altitude of 2100 meter from sea level. The faecal sample of 478 women of childbearing age (15 to 45 years) were taken randomly and examined for the ova of soil transmitted helminths.

**Result:** The occurrence pattern was 53.0%, 20.0% and 2.7% for Hookworms, *Ascaris lumbricoides* and *Trichuris trichiura* respectively. Both *Ascaris* and *Hookworm* prevalence rates noticeably increased with increasing age, with the highest infection rate between the age of 36 - 45 years while *trichuris* infection reached the highest in women of 15-25 years of age.

**Conclusion:** There is a high prevalence of hookworm and ascaris in women of childbearing age and necessary intervention is needed according to WHO guidelines.

**Key words:** soil-transmitted helminth, stool sample, women, himalayan

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Soil-transmitted helminth (STH) infections occur most frequently in under-developed countries. Millions of persons suffer from diseases caused by them, with children and women bearing a particularly heavy pathological burden<sup>1</sup>. The principal public health significance of their infection lies in their chronic effects on health and nutrition. In addition to interferences in digestion and absorption of foods, *Ascaris lumbricoides* has been observed to decrease micronutrients and vitamin A absorption, probably by causing a structural abnormality of the mucosa in the small intestine<sup>2,17</sup>.

Hookworm infection is a recognized major contributor to gastrointestinal blood loss; iron and energy deficiencies, protein and zinc deficiencies and thereby causing malnutrition and anaemia<sup>3, 4</sup>. These effects are most profound in women at childbearing age. Some 44 million pregnancies are currently complicated by maternal hookworm infections, placing both mothers and children at higher risk of death during pregnancy and delivery<sup>5</sup>. In the same way, role of *Trichiuris trichiura* infection in blood loss, malnutrition and immunological disturbances has been established<sup>6</sup>.

Many women in Nepal seem to be vulnerable to the effects produced by STH as they spend a major part of their lives either in pregnancy or as lactating mothers<sup>7, 14, 15, 16</sup>. The prevalence of the STI is high in Nepal. A hospital based study with mean number of 6837 faecal sample per year calendar over period of one decade have revealed a static prevalence of *ascaris* with an average of approximately 35%, the topped STI infestation and the static status was agreeable with the world wide static prevalence of *ascaris* infection reported by Rogers (29% during 1935-1945 and 28 during 1975-1985)<sup>19,20</sup>, but occasional reports showing worms other than *A. Lumbricoides* topping the list of intestinal parasite were also available<sup>18</sup>. The prevalence of STH infections may vary by geographical regions or communities, it is important to conduct a survey to understand their occurrence patterns in their host's ecological and socio-cultural context.

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## Materials and methods

The study was conducted in Jiri, an area of Dolakha district in the Northeast himalayan region of Nepal. It lies on the coordinates 27° 38' N and 86° 14' E and at the altitude of 2100m from the sea level. Major part of the area is covered with sandy soil and rocks with a few trees. Temperature rarely exceeds 26°C or fall below -6°C. Rain fall pattern is characterized by a long rainy season lasting from May to September with heavy rains and by frequent drizzling days in rest of the season.

Houses are scattered over farmlands. Most of the families live under the threshold of poverty where sanitation and healthcare services are very limited. An indigenous tribe *Jirel*, who are the subsistence farmers, makes the main population. Usually women, besides working as mothers, family caretakers and more, work in fields and raise livestock.

The study population was not a random sample, rather almost all woman aged between 15 to 45 years in this area were enrolled in the study. They were participants in a large study - Jiri worm study. Freshly passed stool samples from every woman were collected and examined for the ova of soil-transmitted helminthes<sup>8</sup>. A single dose of Albendazole 400mg was also given to all participants excluding pregnant women.

## Results

In this study, a total of 478-stool samples from women at childbearing age were examined. The ages of the study population ranged from 15 to 45 years, with a mean age of 28 years. Of these, 205 individuals (43.0%) of the total study population were below 25 years of age and 116 (24.0%) were above 36 years. 294 out of 478 women (61.5%) were infected with one or more STH infections while 62(13.0%) had double infections and 8 (1.7%) triple infections. Only 180 (37.6%) stool samples did not contain any STH.

Of the total samples, hookworm (53.0%) was the most common STH identified in this study, followed by *Ascaris* (20.3%) and *Trichuris* (2.7%) (Table1). Among the multiple infection, *Ascaris lumbricoides* and hookworm double infection was the most frequent. Hookworm infection rate remained higher in all age groups. Percentage of both *lumbricoides* and hookworm infections noticeably increased with increasing age (Table2).

**Table 1:** Prevalence of soil-transmitted helminths

Helminth	Positive no./Total no.(%)
<i>Ascaris lumbricoides</i>	97/478 (20.3)
Hookworm	253/478 (53.0)
<i>Trichiuris trichiura</i>	13/478 (2.7)

**Table 2:** Age-specific prevalence of soil transmitted helianthus

Age (years)	Total samples	Positive number (%)		
		Al <sup>a</sup>	Hw <sup>b</sup>	Tt <sup>c</sup>
15-25	205	37(18.0)	91(44.4)	7(3.4)
26-35	157	32(20.4)	90(57.3)	4(2.5)
36-45	116	28(24.1)	72(61.1)	2 (1.7)

<sup>a</sup> *lumbricoides*, <sup>b</sup> Hookworm <sup>c</sup> *trichiura*

## Discussion

Soil-transmitted helminths are widespread in its distribution in under-developed countries. Infection rates tend to be high in regions with high temperature (warm climates)<sup>13</sup> but our place of study belongs to one of the cold part in the himalayan region of Nepal. We found three STH in this population. According to an earlier survey on women of similar age in the

plains of Nepal, occurrence pattern was 78.7%, 56.2% and 7.2% for hookworm, *Ascaris* and *Trichiuris* respectively<sup>9</sup>. The present study also revealed the identical pattern hookworm (53.0%), *Ascaris* (20.3%) and *Trichiuris* (2.7%). However the prevalence rates are lower. Maybe factors such as soil characteristics, altitude dependent micro-ecology,

and variations in host behaviours might have contributed to the prevalence differences, but clear associations between these variables and infections is not yet investigated. The same type of result of decreasing trend of prevalence of the parasite infestation in every successive year was also reported in a university hospital based study<sup>16</sup>.

Like many other studies conducted in Nepal<sup>9,10,11,15</sup>, hookworm remained most common infection followed by *Ascaris*. A number of studies have found that STH prevalence was related to age of the host. Most commonly, *lumbricoides* and *trichiura* prevalence reach maximum at childhood and decreases in the adulthood, while hookworm prevalence increase with age and reaches maximum in the 20-30 years age group and then decrease<sup>12</sup>. But this pattern was not observed in our study. It is interesting to note that both *Ascaris* and hookworm prevalence rates consistently increased with increasing age, with the highest infection occurring between the ages of 36-45 years. This may be due to their more responsibility in their life and increase mobility, more workload in the fields and livestock to fulfil their duty. Pattern of *trichiura* infection, however, resembled those reported else where i.e. the highest in young women (15-25years) and then declined.

### Conclusion

The result of this study shows the occurrence patterns of STH infections in women at himalayan regions of Nepal. Thus, in addition to providing valuable information to the authorities concerned, the results of this study are likely to be of use to public health planners in other areas as well.

This survey demonstrated a high prevalence of hookworm and *Ascaris* in women of childbearing age. Further studies are required to determine what species of hookworm is endemic in this regions and their relation to nutritional status and anaemia. On the basis of our result and according to the guidelines of the WHO, we recommend interventions by antihelminthic treatment targeted to all women of childbearing age, coupled with improvements in sanitation and appropriate health education.

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