

ABSTRACT

The plantation sector of Sri Lanka has long been recognized as a high risk area for soil-transmitted helminth infections (STHI). However, no STHI prevalence estimates have been published during the last decade in relation to up-country plantations. The objective of this descriptive cross-sectional study was to estimate the prevalence and intensity of STHI and to describe the factors associated with STHI among primary school children in plantation sector of Nuwara Eliya District.

In order to estimate STHI prevalence of 20% or above, a sample size of 420 children was identified, using cluster sampling with design effect of 1.5 and 70 % response rate to bringing stool sample. Sixteen schools were selected by cluster sampling with probability proportionate to size, from 230 Tamil medium primary schools located inside the estates of plantation sector in the district, with primary sections having more than 60 but less than 400 children. Within each school, 27 Grade four students were randomly selected for the study. All the students in Grade four were included if there were less than 27 students and the rest were selected from Grades five and three by random sampling. Ethical clearance and managerial clearance were obtained. Informed written consent was obtained from parents or guardians. Trained pre-intern medical graduates and local youth collected the data under supervision of the principal investigator, by using interviewer administered questionnaires, clinical examinations, anthropometric measurements, laboratory investigations, Geographical Information System (GIS) mapping and observations during July to August 2009. Prior to data collection for the full study, a pilot study was conducted in a school in the Nuwara Eliya district, which had not been selected for the study proper. The team visited each school as well as the students' houses and interviewed the parents or guardians to administer the questionnaire. Weight was measured using digital scales and height using anthropometric rods. Stool samples were examined using the Kato-Katz method on the same day. Haemoglobin levels were measured using WHO recommended colour scales. Eventually, all children in the selected classes were given deworming and health education material. Data was entered, cleaned and analysed using SPSS. GIS mapping was done using ESRI ArcMap software and z scores of the anthropometric data was obtained using WHO standards and STATA software. Anthropometric data were converted to z scores and categorised into more than two standard deviations (SD) below the mean and more than three SD below the mean. Point and interval estimates were calculated for descriptive data. Chi square test, Mann-Whitney test and Independent t-test were done to determine statistical significance and a p-value of 0.05 or less was considered as significant. Of the 421 selected children, 377 (89.8%) students brought a satisfactory stool sample. Overall 34.2% (129/377) had round worm mono-infections, 1.3% (5/377) had whipworm mono-

infections, and 2.7% (10/377) had co-infections with roundworm and whipworm. The combined prevalence of infection was 38.2 % (95% CI: 33.4 – 43.2). Light infections of round worm and whip worm were observed in 15.9% and 3.7% of the children, respectively; while moderately heavy infections were seen in 18.6% and one case respectively; and heavy infections in 2.4% and 0% respectively. Mean egg per gram stool for round worm was 4717. Thus Nuwara Eliya district can be categorized according to WHO criteria as a low-risk community with endemic STHI. No latrine was available for 8.1% (n = 34) of the students. Observations showed dirty, overgrown fingernails among 23.3% (n = 87) and lack of shoes among 14.4 % (n = 54). Only 46.6% (n = 176) had been dewormed within last six months. Anthropometric measurements showed that 59.8% and 19.9% had weight for age z-scores below -2.00 and -3.00 respectively, while 37.8% and 6.4% had BMI for age and sex z-scores below the same cut-offs. Haemoglobin level was found to be less than 12 g/dl among 34.9%. Bivariate analyses showed significant association between infection with any parasite (roundworm / whipworm) and low maternal education (Prevalence Risk Ratio – PRR = 1.6, p = 0.002), dirty, overgrown nails (PRR = 1.7, p = 0.001), non-use of shoes (PRR = 1.5, p = 0.011), absence of worm treatment within six months (PRR = 2.1, p = 0.001) and living in higher than 1500 altitude (PRR = 1.7, p = 0.001). No association was found in bivariate analysis between infection with any parasite and sex of the child, age of the child, paternal education, family size, perianal itching, passage of worms in stool, type of house and access to private latrine. GIS maps were produced to show the spatial distribution of STH prevalence and intensity among the schools studied in Nuwara Eliya district.

In summary, nearly 40% of the children examined in this study were infected with soil-transmitted helminths. Roundworm was predominant; with most children having infections of moderate or light intensity. Whipworm infections were also present, but not hookworm. One in twelve children did not have access to sanitary latrines. About 60% of the children showed evidence of acute malnutrition, while about 40% showed evidence of chronic malnutrition. Nearly 35% of the children were anaemic. These findings indicate a need for regular annual mass deworming of all children aged one year and above in Nuwara Eliya district. Parents and teachers should be sensitised on their responsibilities in maintaining the personal hygiene of the children. The situation of lack of latrine facility should be eliminated. Improvements in infrastructure to provide easy access to sanitary latrines for all residents, regular water supplies for washing, and arrangements for emptying of filled latrine pits are recommended. Risk factors leading to the nutritional problems in Nuwara Eliya district should be identified and addressed.

Key words: Soil transmitted helminth infection, plantation sector, school children