

Abstract

This study includes a survey of the presence of hookworm eggs and larvae in soil, bionomics and biology of free living larval stages, estimation of prevalence rate of human infections and a possibility of an effective control method.

The distribution of hookworm eggs in soil was studied. Locations suspected to be having a high degree of contamination in the Jaffna District, have been included in the study. Selection of sites was based on the lack of latrines and the practice of indiscriminate defaecation by the householders in the area. Soil samples were taken from 30 different sites. Centrifugal floatation technique described by Dada, 1977 was employed to isolate hookworm eggs from soil samples.

The highest percentage of locations (27 – 37%) which were positive for the eggs were observed during wet season (January to march 1999). Low or nil percentage of locations, positive for eggs were noted in the dry season. The eggs would have been either destroyed by direct sunlight or their survival period would have been reduced to one month by the dry weather (31.08°C).

The increase in the percentage of positive locations in wet season, is suggestive of an adaptation to natural condition and coincides with the high transmission period.

The prevalence and distribution of hookworm larvae in soil was studied in a similar manner. The larvae were extracted, using Baermann's apparatus. Samples collected during the period from September 1998 to March 1999 showed many hookworm larvae. Some soil samples in Sept. 1998 showed 5 out of 6 isolated *Necator americanus* larvae to be Rhabditiform larvae. This indicated recent hatching of hookworm eggs. Samples collected in Nov.98 and Jan.99 from one location showed 5 filariform larvae in all suggesting that there were no recent hatching. In the dry season soil samples did not show any larvae. The optimum environmental temperature was found to be between 28 - 29°C

Stool specimens were taken from hookworm positive subjects. Faecal culture was done using Harada Mori Technique. The first stage rhabditiform larvae were obtained on the third day of incubation.

The culture solution was then taken on the 12th day of incubation and the centrifuged sediment was examined for the infective filariform larvae. The morphology and biology of the rhabditiform first stage larvae and that of the filariform third stage larvae were carefully studied.

The prevalence rate of hookworm infection was estimated to be 19%. The Mean Haemoglobin Concentration in hookworm positive subjects was noted to be 10.58 g./ 100 ml.

Anthelmintic treatment repeated three times with pyrantel pamoate, at 3 weeks interval brought the initial prevalence 19 % to nil.

Control of *Necator americanus* infection could be achieved by the following (1) Anthelmintic treatment, (2) proper disposal of human faeces and use of sanitary latrines, (3) use of foot ware while walking on ground. The latter could be achieved by encouraging people to wear protective slippers or wooden sandals.

A total of five hundred subjects in two villages were given chemotherapy until they became negative for *Necator americanus* infection and no further anthelmintic treatment was given to them during the rest of the study period. All of them were from households which lack latrines, and they all have the habit of stepping barefoot into defaecation grounds. Two hundred and fifty of them formed the experimental group and were provided with wooden sandals and advised to use same whenever they walk into defaecation yards. The control group formed of two hundred and fifty subjects, were not given wooden sandals and they all continued to go barefoot into defaecation grounds. Stool examination was done on all subjects after a period of one year and repeated after another three months period and the rate of re-infection was calculated. A significant difference was found in the re-infection rates among the two groups. The use of wooden sandals by the experimental group had prevented the re-infection with *Necator americanus* and kept the prevalence rate at 3% whereas the prevalence rate had risen to 8.8% in the control group, which was not using wooden sandals.

Statistical analysis shows that there is significant reduction ($\chi^2 = 6.94$; $df = 1$; $p < 0.05$) in the rate of re-infection with *Necator americanus* in the experimental group.

It is noted that wearing of wooden sandals by the experimental group does have a significant impact on the control of *Necator americanus* in households which lack latrines.