

ABSTRACT

Studies of the epidemiology of human *Strongyloides stercoralis* infection at endemic foci in Jamaica.

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Strongyloides stercoralis infection is one of the least understood gastrointestinal helminthiases. The parasite which is endemic in the Caribbean, is responsible for significant morbidity and mortality, and is more refractory to treatment and control than other geohelminths.

The epidemiology of *S. stercoralis* infection was studied at endemic foci in Jamaica. Given the low prevalence of the parasite in the island (0.1 - 3.6%), a special survey technique was developed whereby hospital presenters (index cases) with clinical strongyloidiasis were followed-up in the community.

Thirteen (13) geographical areas (endemic foci) were identified on the basis of residency of a parasitologically-proved case of strongyloidiasis who presented at the University Hospital of the West Indies, Kingston. All persons belonging to the household of the index case were invited to participate in the study as were the occupants of the four most proximal dwellings at each of the foci. The latter households represent spatially isolated controls for the index household.

Of 312 persons contacted, 244 (78.2%) donated stool samples. Compliance for donation of blood was slightly lower, (66.3%; n = 207). More than 50% of the population was less than 20 years old and the ratio of males to females (1:1.3) was not age-dependent ($r_s = 0.093$, $p = 0.161$).

Individuals were studied by duplicate examination of stool samples (formol-ether concentration and charcoal copro culture) and ELISA for *S. stercoralis*-specific IgG. In addition, socioeconomic and demographic data were collected by questionnaire. An index to assess socioeconomic status was also designed.

The ELISA was 100% sensitive, and although there appeared to be no immunological cross-reactivity with other geohelminths, the specificity based on stool examination was 77%.

Prevalence of *S. stercoralis* infection (index cases excluded) for the pooled endemic foci was 3.5% (n = 231) and 25.5% (n = 196) based on stool examination and ELISA, respectively. The values were similar to those reported from cross-sectional studies in Jamaica employing similar diagnostic techniques.

Index cases were significantly older than the general study population (Fisher's exact test; $p < 0.001$). However, there was no significant difference in the age of persons who were passing larvae in their stool (index cases omitted) and those who were not (Kruskal Wallis; $H = 1.7$, $p = 0.19$). Similarly, seroprevalence was not age-related ($H = 2.3$, $p = 0.13$), although there was a weak trend towards increase in prevalence with age using either method.

Index cases tended to pass larger numbers of larvae in their stool (mean = 140.8 ± 43.35 lpg) than subclinical cases (28.0 ± 7.5 lpg). The log (intensity + 1) transformed means, however, were not significantly different (Student's $t = 0.364$, $p = 0.7202$). There was no association

between the number of larvae per gram of stool and reciprocal titre (anti-*S. stercoralis* IgG) ($r_s = 1.47$, $p = 0.548$) nor were these measures age-related (lpg: $r_s = -0.053$, $p = 0.81$ and ELISA: $r_s = -0.029$, $p = 0.867$). On the other hand, persons passing larvae in their stool tended to have higher anti-*S. stercoralis* titres than individuals who were seropositive only (Mann Whitney; $Z = -1.75$, $p = 0.08$).

As expected, socioeconomic status and sanitation were positively related (Kendall's tau = 0.629, $p < 0.001$). Seroprevalence of *S. stercoralis* infection increased with sanitation independently of socioeconomic status (Kendall's Partial tau = 0.222, $p < 0.0001$). No correlation was found between presence of larvae in the stool and sanitation (Kendall's tau = 0.028, $p = 0.5159$) or socioeconomic status (tau = 0.0473, $p = 0.277$).

Positive antibody titres to *S. stercoralis* were not related to ownership of dogs, residence in an urban or rural area or occupation of the participants. There was, however, a significant negative association between seroprevalence and household crowding (Kruskal Wallis; $H = 6.03$, $p = 0.013$).

S. stercoralis infections were clustered within households in the community. Based on stool examination, cases were found more frequently in index households (6.9%) than in control units (1.9%) (Fisher's one tailed test; $p = 0.026$). Similarly, seroprevalence was significantly higher in index households (43.4%) compared to the spatial controls (18.9%) (Chi square = 10.97, $p < 0.0001$).

Prevalence of infection decreased significantly and linearly with increasing spatial separation from the index case: persons sharing a bedroom with an index case were more likely to be seropositive and pass larvae in their stool than persons in the same household or neighbouring dwellings. The pattern was revealed by examining stool examination and ELISA data using Analysis of Linear Trends in Proportions. Results were: Stool examination (Slope: Chi square = 3.06, $p < 0.0001$ & Linearity:

Chi square = 0.683, $p > 0.05$) and ELISA (Slope: Chi square = 9.12, $p < 0.0001$ & Linearity: Chi square = 0.05, $p > 0.05$).

The pattern of spatial distribution of cases of strongyloidiasis was similar to that recorded from studies elsewhere. Whereas clustering of cases was related to socioeconomic factors in other endemic areas, this study suggests that transmission of *S. stercoralis* at endemic foci in the Jamaican community is a chance event which increases in probability with increasing intimacy with a clinical case.