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New endemic foci of schistosomiasis infections in the Philippines

Lydia Leonardo[a,*], Pilarita Rivera[a], Ofelia Saniel[a], Juan Antonio Solon[a], Yuichi Chigusa[b], Elena Villacorte[a], James Christoper Chua[a], Kharleezelle Moendeg[a], Daria Manalo[a], Bobby Crisostomo[c], Louie Sunico[d], Nicasio Boldero[e], Lara Payne[f], Leda Hernandez[g], Raman Velayudhan[h]

[a] College of Public Health, University of the Philippines Manila, Philippines
[b] Dokkyo Medical University, Japan
[c] Philippine Health Insurance Corporation, Philippines
[d] Rural Health Unit of Gonzaga, Philippines
[e] Rural Health Unit of Calatrava, Philippines
[f] London School of Tropical Medicine and Hygiene, London, United Kingdom
[g] Philippine Department of Health Central Office, Philippines
[h] World Health Organization, Geneva, Switzerland

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ABSTRACT

Schistosomiasis affects 28 provinces in the Philippines found along the southeastern part where there is continuous rainfall throughout the year. In 2002 and 2005 respectively, two new endemic foci were reported in the northernmost (Gonzaga, Cagayan) and central (Calatrava, Negros Occidental) parts of the country.

This study conducted in March 2008–March 2009 confirmed the presence of the disease by determining its prevalence using four diagnostic tests – Kato-Katz, circum-oval precipitin test (COPT), ELISA and ultrasonography. *Oncomelania hupensis quadrasi* was identified through snail surveys conducted in possible snail habitats in the seven new endemic villages. Animal surveys through stool examination confirmed the presence of schistosomiasis infection in animals in Gonzaga but not in Calatrava.

Compared to Calatrava, Gonzaga demonstrated markedly higher prevalence of schistosomiasis using all four diagnostic methods. Proximity of snail habitats to human habitation including higher snail density and snail infection rate could be responsible for the high prevalence. Snail sites were more widespread in Gonzaga whereas those in Calatrava were confined only in areas not frequented by the general population except by farmers. GIS maps showing spatial distribution of snails in Gonzaga and Calatrava indicated differences in elevation among the snail sites.

It is hypothesized that the snail intermediate host has been in these sites for sometime but discovered only lately. Migration of people from endemic provinces into Gonzaga and Calatrava brought in cases and in the presence of snail intermediate hosts, emergence of disease was just a matter of time.

1. Introduction

Schistosomiasis japonica is a long-standing problem in the Philippines affecting mostly the poor in primarily rural areas in the country (Blas et al., 2004). It is endemic in 28 provinces, 189 municipalities and 2221 villages that are characterized by the absence of a definite dry season thus making transmission continuous throughout the year (Department of Health, 2007).

The report of new foci of schistosomiasis is a serious problem for many reasons. The new endemic areas, which are already burdened by problems like TB and other infectious diseases, are further weighed down with an equally disabling disease which requires specific resources. A health manpower that is already stretched thin may not be capable to handle an entirely new problem (Poda et al., 2004).

If the characteristics of the new endemic foci are different from the usual profile, it is possible that the snail intermediate host, *Oncomelania hupensis quadrasi*, could have stretched its tolerance range to survive the conditions in the new endemic foci. This can imply increased ability of the snail intermediate host to cope with more extreme conditions in the environment (Garcia, 1972). The existence of favorable microhabitats in the new endemic

* Corresponding author.
E-mail addresses: leonardolydia7@gmail.com, xiaonongzhou1962@gmail.com (L. Leonardo).

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municipalities which are similar to those in traditional endemic areas cannot be ignored, however.

The possibility that new species of snail intermediate host for schistosomiasis japonica could have evolved should not be dismissed since similar events have been reported in some endemic areas in Africa (Akoula et al., 1988a, 1988b). This, of course, has significant implications in the control of the disease (Coura and Amaral, 2004).

The intention of this study was to validate the reported new foci by determining the prevalence of the disease among the human and animal populations and documenting the presence of infected snail intermediate host in the sites. Because of the low sensitivity of Kato-Katz stool examination, serological tests e.g. circum oval precitin test (COPT) and enzyme-linked immuunosorbent assay (ELISA) were used to diagnose both present and past infections to ascertain endemicity of the disease in the new foci. Ultrasonography was done to diagnose chronic infections.

A thorough investigation of possible snail sites was made using both ring samplers and tube samplers to collect the snails. Filter paper traps, banana leaf traps and bamboo pole traps were left overnight in these sites to attract snails that could not have been found during the first visits to the sites. To determine if there were new snail intermediate hosts that could be involved, all species of snails collected were examined for infection. Fecal survey of reservoir hosts such as carabaos, dogs and rats was conducted to determine extent of animal infection.

Reports of these new foci were obtained from news clips from a local daily in Negros Occidental (i.e. Sun.Star Bacolod, May 25, 2006 issue). The new endemic focus in Cagayan Valley was first reported in June 2002 by the Department of Health and eventually a report about it was published in 2005 (Belizario et al., 2005). Using FECT, Belizario et al. (2005) recorded 6% infection from 384 people surveyed in one endemic barangay only. No infected snails were found in the snail survey. Animal survey was not conducted.

This study made a more detailed study of the new foci in Cagayan Valley and Negros Occidental by covering all three endemic barangays in the former and four endemic barangays in the latter. Four diagnostic tools were used to ensure that cases whether past and present were diagnosed. More thorough snail investigation using different techniques was done in possible snail sites in the endemic barangays. In addition, fecal survey of possible reservoir hosts was made to determine extent animal infection.

Fig. 1 shows the location of the new foci of schistosomiasis infection.

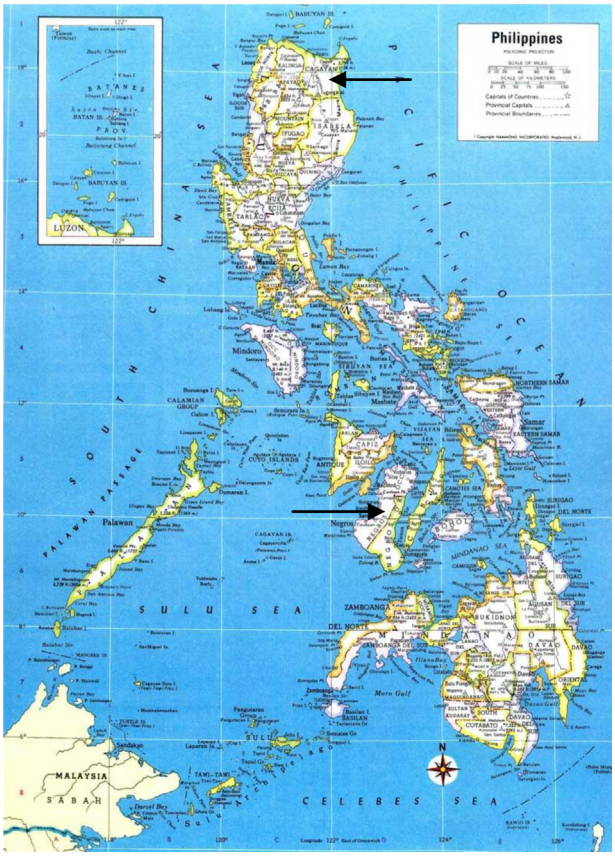

Fig. 1. Map of the Philippines showing Cagayan Valley and Negros Occidental.

2. Materials and methods

2.1. Study design

A descriptive prevalence survey was used in the study. Parasitological, malacological and epidemiological data were collected through surveys in barangays Magrafil, Sta. Maria and Tapel in Gonzaga and barangays Hinab-ongan, Marcelo, Minapasuk and Mina-utok in Calatrava from March 2008 to March 2009.

2.2. Parasitological survey

Four diagnostic tests, namely Kato-Katz stool examination, circum-oval precipitin test (COPT) (Yogore et al., 1976; Kawanaka et al., 1983), soluble egg antigen enzyme-linked immunosorbent assay (SEA-ELISA) (Matsuda et al., 1984; de Oliveira et al., 2005; Hirose et al., 2005) and ultrasonography (Ohmae et al., 1992) were used to determine the prevalence of schistosomiasis. The use of different tests ensured cases that might be missed by the less sensitive Kato-Katz (Yu et al., 1998) are detected by SEA-ELISA, which has 100% sensitivity and 93.8% specificity (Matsuda et al., 1984), and the other tests. A single stool sample per individual was collected for Kato-Katz examination. Other helminth parasites such as soil- transmitted helminthes were also identified in the stool survey (Katz et al., 1972). Whole blood and serum were collected from individuals for SEA-ELISA and COPT, respectively. To determine the possible source of infection, cases were interviewed regarding history of travel or previous residence in endemic areas, description of their current place of residence and previous infection.

Interpretation of ultrasononographic images was made based on guidelines prescribed by Ohmae et al. (1992). Cases were classified into four types based on echogenic band pattern and portal vein wall thickening. Liver ultrasound images were graded as Type 0 (normal), Type 1 (linear pattern or mild echogenic thickening), Type 2 (tubular pattern or moderate to severe echogenic thickening) and Type 3 (network pattern) which is typical in patients with liver cirrhosis due to chronic schistosomiasis. Key informants, including local health workers and long-term residents, were interviewed as sources of qualitative data on the possible origin of the disease in the different endemic barangays and changes in weather patterns in the last two decades.

2.3. Malacological and environmental survey

To identify the snail intermediate host, snail surveys were conducted in possible snail habitats in seven barangays. In each snail site, a 100 m transect line was set along a water course and five sampling techniques, viz. the ring, tube, filter paper, banana leaf (Iwanaga et al., 1977) and bamboo pole methods were utilized in addition to intensive manual search (Tanaka et al., 1975, 1978). All these techniques were performed from the 0 m mark and at 10 m intervals until the 100 m mark. Ocular inspection of habitats,

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