

Schistosoma mansoni Infestation Rate Evaluation by Kato Katz's Method in Haute Matsiatra Region (Madagascar) School Environment

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Abstract Schistosomiasis infestation rate evaluation achieved to Public Primary School by the Kato-Katz's method in Haute Matsiatra Region (Madagascar) showed that on 968 examined, 185 are carriers of *Schistosoma mansoni* eggs. Isandra and Vohibato districts are the more touched with an infestation rate to 37.86% and 35.97%. The weak infestation rate is in Fianarantsoa district (9.92%). This intestinal parasite scattering of the aforesaid region is in extension. It is therefore important to recommend the means to reduce this expansion. This survey gives bases on the future geoschistosomiasis of *Schistosoma mansoni* in Haute Matsiatra region.

Keywords Haute Matsiatra, Kato-Katz's, Madagascar, *Schistosoma mansoni*

1. Introduction

The schistosomiasis is a chronic illness provoked by parasitic worm. The victims are infected in the setting of current agricultural activity, domestic, professional or recreative, including exposition to a contaminated water. Lack of hygiene and some habits of children school-age game, as swimming or fishing in infested waters make children vulnerable to the infection. The struggle against the schistosomiasis focuses on patients' number reduction of population periodic treatments by Praziquantel; as well as struggle against gastropods should also make regress the transmission [1]. In 2014, at least 258 million people in the world needed a preventive treatment against schistosomiasis. More of 61.6 million have been treated. Mortality due to schistosomiasis varies between 20 000 and 200 000 deaths per year [2].

Schistosomiasis prevalence area is located in tropical and subtropical regions, at resourceless communities. Less than 90% of people need treatment live in Africa. Schistosomiasis touches particularly agriculturists and fishers poor populations. Women doing their domestic tasks in the infested water are also exposed to the risk [3].

In Madagascar, according to the statistics held by Ministry

Health and CHU/F statistical service in Fianarantsoa, the topics parasitized by *Schistosoma mansoni* number is estimated to 2 million of which fourth (25%) at Haute Matsiatra region [4].

The intestinal schistosomiasis is much spilled in tropical zones, it explains by fecal hygiene lack of population especially the children. Consequently, the survey has been fixed to children at Public Primary school.

The objective is to evaluate *Schistosoma mansoni* infestation rate in school environment, in order to put an efficient and perennial local strategy to fight against this parasite.

2. Materials and Methods

2.1. Study Population

Children from seven districts (Ikalamavony, Ambalavao, Vohibato, Isandra, Lalangina, Ambohimahaso, Fianarantsoa I) constituted the cohort of study. The first step method consisted of an information session about schistosomiasis offered to pupil's parent in each Public Primary School. The parents were asked to participate voluntarily in the study by filling out a questionnaire of requesting age and the different factors and cofactors that can contract the schistosomiasis of their children.

The consent form, the questionnaire and the information pamphlet were written in Malagasy language to facilitate the communication. Sterile plastic bags (10 x15 cm) were used

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Published online at <http://journal.sapub.org/ijpt>

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for fecal withdrawal.

All specimens and corresponding questionnaires were carried out to laboratory for analysis.

Schistosomiasis eggs research at the fecal is done according to the Kato - Katz's method (**Kato Katz's Kit** from Department of Helminthology, Faculty of Tropical Medicine, Mahidol University Thailand) (figure 1). Briefly, a small amount of fecal material was placed on absorbable paper and a piece of nylon screen was pressed on top so that some of the feces sieved through the screen and accumulated on top. A flat-sided spatula was scraped across the upper surface of the screen to collect the sieved feces. A template was placed on the slide and the sieved feces were added with the spatula so that the hole in the template was completely filled. The spatula was passed over the filled template to remove excess feces from the edge of the hole. The template was removed carefully so that a cylinder of feces was left on the slide. The fecal material was covered with a pre-soaked cellophane strip.

The slide was inverted and the fecal sample was pressed firmly against the hydrophilic cellophane strip to spread evenly. The slide was placed on the bench with cellophane upwards to enable the evaporation of water while glycerol cleared the feces. For all helminthes, except hookworm eggs, the slide was kept for one or more hours at room temperature to clear the fecal material, prior to microscopic examination. Each sample are examined 5 times ($n = 5$).



1. Plastic bags approx. 10 x15 cm
2. Absorbable paper
3. Wire net (stainless steel)
4. Cellophane soaked in glycerine-malachite-green solution
5. Plastic spoon
6. Card board paper with 6 mm diameter hole

Figure 1. Kato Katz's kit

2.2. Statistical Analysis

Comparison *Schistosoma mansoni* rate infestation and Praziquantel treatment rate involvement of 7 districts ($n=7$) has been studied. The statistical analysis of the qualitative and quantitative variables was either of monovaried type, or of multivariate type using a software Epiinfo version 6. The Student test was used for the comparison of the averages

and the variances and the test of Chi-2 for the comparison between the rates and a significant value if $p < 0.05$.

3. Results and Discussions

During the study, 968 pupils have been appropriated that 162 Ikalamavony, 145 Ambalavao, 164 Ambohimahaso, 124 Lalangina, 103 Isandra, 139 Vohibato and 131 Fianarantsoa. Among the 968 pupils, 185 are carriers of *Schistosoma mansoni* eggs (Table 1).

Table 1. *Schistosoma mansoni* Infestation rate of district

District	Participant	Infest	Infestation Rate
Ikalamavony	162	19	11.73
Ambalavao	145	20	13.79
Ambohimahaso	164	22	13.41
Lalangina	124	22	17.74
Isandra	103	39	37.86
Vohibato	139	50	35.97
Fianarantsoa	131	13	9.92
TOTAL	968	185	19.11

These results show that *Schistosoma mansoni* infestation rate varies from a district to the other. It is of (39/103, 37.86%) in Isandra. This rate is slightly superior in Vohibato (50/139, 35.97%). It is superior in Lalangina (22/124, 17.74%), Ambalavao (20/140, 13.79%) and Ambohimahaso (22/164, 13.41%). It is extensively superior in Ikalamavony (19/162, 11.73%) and especially in Fianarantsoa I (13/131, 9.92%). The difference is statistically meaningful.

These results confirm that Isandra and Vohibato is a *Schistosoma mansoni* endemic area in Haute Matsiatra Region.

Schistosoma mansoni infestation rate in two districts can explain itself by the population daily activity especially to school age children. Questionnaires answer statistical analysis show that 80% of homes don't possess any Water-Closets (WC) and use nature for all physiological needs [5]. This habit can entail parasite eggs scattering in environment that infects on its turn the intermediate host following the *Schistosoma mansoni* biologic cycle [5]. This analysis also shows that 90% of the pupils carriers of *Schistosoma mansoni* eggs have habit to pass in stagnant waters, rice fields and river at least two times a week going to work and/ or to play. On the other hand, the infestation rate less elevated in Fianarantsoa can explain by stagnant waters rarity in Haute Matsiatra capital. Besides, hygiene and health education level of Fianarantsoa population is more raised than the other districts. Therefore, stools scattering that is bilharzias probable first source is rare. Thirteen children carriers *Schistosoma mansoni* eggs have been lived in Isandra and Vohibato districts since their birth and they live in Fianarantsoa 4 to 6 months before the survey.

Table 2. Pupils Participation rate to Praziquantel mass treatment campaign

District	Deducted	Infest	Participant	Participation Rate (%)
Ikalavavony	162	19	127	78.40
Ambalavao	145	20	95	65.52
Ambohimahasoa	164	22	108	65.85
Lalangina	124	22	53	42.74
Isandra	103	39	15	14.56
Vohibato	139	50	21	15.11
Fianarantsoa	131	13	102	77.86
TOTAL	968	185	521	53.82

These differences infestation rate of a district to other could be also the children bilharzias mass treatment campaign effect in this region by Malagasy Ministry Health during two successive years before the survey.

Questionnaires result analysis show that among 968 volunteers, 521 took medicine [**Praziquantel, 40 mg/kg**] during these two successive campaigns. Fianarantsoa and Ikalavavony have low infestation rate but elevated involvement rate (102/131, 77.86% and 127/162, 78.40%). Contrarily, it is very low for Isandra and Vohibato (15/103, 14.56% and 21/139, 15.11%) (Table 2).

Forty years ago, Praziquantel has been used with success to fight against schistosomiasis in Saudi Arabia, Brazil, Cambodia, China, Egypt, Mauritius and in Iran Islamic Republic. The transmission seems have been interrupted in Morocco [2] [6] [7].

4. Conclusions

This survey confirms that Schistosomiasis infection exists in Haute Matsiatra region. Even that the study is centered only on Public Primary School pupils, the results permit to say that this parasite disperses itself in rural area. The survey also shows that schistosomiasis infection depends on population daily activity and socioeconomic statute. Questionnaire analysis of Praziquantel treatment and local population behavior was not conclusive to the effect on schistosomiasis infection. From this survey, tracking program feasibility for all population using Kato Katz's technique is an essential question. In perspective, different probable sources and schistosomiasis high risk infection analysis will be important in order to determine efficient preventive struggle in this region.

ACKNOWLEDGMENTS

This work was made possible with the "Fondation Mérieux – Lyon (France) and Center Hospital University of Fianarantsoa (Madagascar).

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