

Risk factors of Schistosomiasis based on the environment in Lindu Plateau, Sigi Regency, Central Sulawesi Province

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Abstract- Schistosomiasis or also known as snail fever is a parasitic disease caused by infection of trematode worms of the genus *Schistosoma japonica* Sp (blood flukes) that live in mesenteric vein or veins of the bladder. The purpose of this study was to determine risk factors of Schistosomiasis in Lindu Plateau, Sigi Regency in Central Sulawesi. This study applied observational analytic study design with case control method. The sample size consisted of 82 people representing 41 people in case group and 41 people in control group obtained with Simple Random Sampling. The results revealed that there were the influence of the use of latrines, with p value 0,043 (OR = 2,597), the use of water resources, with p value 0,000 (OR = 10,939), passing through the focus area, with p value 0,016 (3,013) and the customary activities around the river/ ditch, with p value 0,045 (OR = 3,025) on the incidence of Schistosomiasis while keeping livestock was having no influence on the incidence of Schistosomiasis, with p value 0,822 (OR = 1,107). Therefore it can be inferred that the prevalence of Schistosomiasis was still high because it was related to the environment. There is a need for early prevention efforts against the Schistosomiasis.

Keywords- Environment, Lindu, Schistosomiasis

1. INTRODUCTION

Schistosomiasis is one of diseases which itself is a result of a complex phenomenon. Schistosomiasis is related to many health issues thus affecting the life of community [1]. Schistosomiasis or bilharziasis is a parasitic disease caused by trematode worms of the genus *Schistosoma*. These worms live in the veins of humans and mammals in some tropics and subtropics regions [2].

Schistosoma worms spread across multiple countries with different species, namely *Schistosoma haematobium* which is prevalent in 53 countries in the Middle East and Africa, including Mauritius and Madagascar. *Schistosoma mansoni* is found in 54 countries, including Africa, the Middle East, the Caribbean and South America. *Schistosoma mekongi* is found in Cambodia and Laos and *Schistosoma intercalatum* is found in protected forests and in Central Africa, while *Schistosoma japonicum* is endemic to China, the Philippines and Indonesia [3].

Schistosomiasis in Indonesia is caused by *Schistosoma japonicum* and is found in an endemic area in Central Sulawesi. The disease was first being reported by Brug and Tesch in 1937 but the intermediate host for the worm that causes the disease was discovered in 1971 [4]. Schistosomiasis is recently discovered in a limited area, but with the migration of

the population, regional and economic developments, and the high number of mammals that become host reservoir, it is possible that the disease can spread further [5].

Focus area of snails known able to transmit Schistosomiasis in Lindu Plateau is scattered in the paddy fields, cacao, coffee, mixed farms on the slope edge of the forest, as well as near human settlements [6]. In general, people suffering the disease are likely to have habits or activities related water. Frequent contact with water or entering the water area infected with *Schistosoma* parasites leads to increasing number of Schistosomiasis in surrounding communities [7].

High prevalence of Schistosomiasis in Lindu Plateau is still an ongoing phenomenon faced by the community and the health workers. This illustrates that the health problems faced by the community in Lindu is in need for further study, to understand problems associated with such high prevalence [8].

Therefore the purpose of this study was to obtain epidemiological determining factors in the incidence of Schistosomiasis in Lindu Plateau, Sigi Regency in Central Sulawesi.

2. METHODS

This study applied observational analytic study design with case control study. The population under study was the entire population in Lindu Plateau, Sigi Regency who were declared positive for Schistosomiasis by laboratory personnel after stool examination in 2014-2015, while the control population was the entire population in the Plateau Lindu Sigi declared negative of Schistosomiasis by laboratory personnel after stool examination. The sample size used in this study consisted of 82 people representing 41 people in case group and 41 people in control group.

The simple random sampling technique, together with questionnaires was used in obtaining the data. Analysis of the data to determine the effect of independent variables on the dependent variables applied simple logistic regression test.

3. RESULT

Interviews was carried out in communities living in Lindu Plateau with the number of samples used consisted of 82 people with 41 people included in case group and the remaining 41 people in control group. The results of analysis of this study indicated as follows:

Table 1. The Result of Simple Logistic Regression.

Variable	<i>p</i> value	OR (CI 95%)
The use of latrines	0,043	2,597 (1,032-6,538)
The use of water sources	0,000	10,939 (2,905-41,199)
Passing through focus area	0,016	3,013 (1,225-7,413)
Customary activities on river/ ditches	0,045	3,025 (1,027-8,908)
Keeping livestock	0,822	1,107 (0,458-2,676)

$p < 0,05$ (Significant)*

Table 1. Simple logistic regression analysis showed that there was significant influence between the use of latrines, the use of water resources, passing through focus area and customary activities on river/ ditches on the incidence of Schistosomiasis, indicated by p values $< 0,05$. While keeping livestock was having no influence on the incidence of Schistosomiasis, indicated by p value $> 0,05$.

4. DISCUSSION

The living habitat of snail in Lindu Plain spreads in the area with slow flow of water, with numerous gravels and natural litters derived from the

leaves and twigs, and mud and thus the same characteristic that always appears for snails from species *Oncomelania hupensis lindoensis*. Distribution is primarily in the forest in vicinity to the paddy fields.

Infection risk to Schistosomiasis is associated with the use of land that is home to *Oncomelania hupensis lindoensis*. It is also proven that the land with continuous use can eliminate the habitat of *Oncomelania hupensis lindoensis* [8].

One of the causes of transmission of Schistosomiasis is the habits within the community such as open defecation in the rivers/ ditches and farm/ bushes. This habit can increase the transmission of Schistosomiasis. The results of logistic regression showed a significant influence between the use of a latrine with the incidence Schistosomiasis [9].

Achmadi (2008) states that someone who is infected with Schistosomiasis, by having open defecation as habits in particular in moist or aqueous area is at an early stage in spreading Schistosomiasis, because eggs of *Schistosoma* come out with feces [10].

Diseases can also be transmitted and spread through the water. Such conditions can certainly cause epidemics. The results of logistic regression showed a significant influence between the use of water resources on the incidence of Schistosomiasis.

According Hadidjaja (1985) one of the efforts to combat Schistosomiasis is to provide clean water. Due to the fact that Schistosomiasis is very closely linked with the water, the utilization of clean water is one of the prevention from Schistosomiasis infection [11].

Focus areas can be divided into two types: natural focus area and the focus area that has undergone human utilization. Natural focus is areas free of human utilization, ie. muddy water on the outskirts of the forest, while focus area that has undergone humans utilization ie. wet regions such as chocolate farms, meadow and marsh, former farms and marsh left by inhabitants. The results of logistic regression showed a significant influence between passing through the focus area on the incidence of Schistosomiasis.

According Natadisastra and Agoes (2009), humans and mammals are the host of *Schistosoma*. When contact happens between the host and focus areas of *Oncomelania hupensis linduensis*, it can cause infection of Schistosomiasis to hospes without seeing the frequency of exposure [12].

People who have habits in contacting source of transmission (rivers/ ditches) might have had a greater chance of Schistosomiasis infection compared with those who never in contact with the water stream/ ditches. Activities with contact to the water stream/ ditches includes bathing, washing, fishing, defecation, etc [13]. The results of logistic regression showed a significant influence between customary activities on rivers/ ditches on the incidence of Schistosomiasis.

The more often a person in contact with the source of infection, the greater the likelihood of

developing the disease, as well as the transmission of Schistosomiasis. The more frequent contact with the water stream/ ditches contained cercariae, the more likely to be infected the person with Schistosomiasis japonicum.

Problem regarding Schistosomiasis is quite complex since to exercise a control would involve many factors. The results of logistic regression showed that no significant influence between keeping livestock on the incidence of Schistosomiasis.

Transmission of Schistosomiasis in humans is also caused by the behavior of people when keeping livestock, wherein if the behavior is considered as inadequate, such as barefooted at the time of entry in the cage to feed their livestock and for not keeping the cleanliness^[14].

5. CONCLUSION

Based on the findings above, it can be concluded that there were environmental influences, such the use of latrines (p value 0,043), the use of water resources (p value 0,000), passing through focus area (p value 0,016) and customary activities on rivers/ ditches (p value 0,045) on the incidence of Schistosomiasis, while keeping livestock (p value 0,822) was having no influence on the incidence of Schistosomiasis.

6. SUGGESTIONS

It is expected that the community to perform some prevention efforts from Schistosomiasis by keeping cleanliness and healthy living behavior.

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