The Behavior of River Use Towards *Leptospirosis*

Iskim Luthfa[1], Moch. Aspihan[2], Nutrisia Nu'im Haiya[3], Swastika Dwi Saptarini[4]

Sultan Agung Islamic University, Department of Community Nursing
Jl.RayaKaligaweKm.04, Semarang, JawaTengah,Indonesia
iskimluthfa@unissula.ac.id; mochaspihan@unissula.ac.id; haiya@unissula.ac.id

Abstract - The incidence rate of leptospirosis disease is estimated to increase every year, one of the causal factors is the behavior of river water usage. Demak Regency is an area with high leptospirosis incidence, this is because the local community culture is still utilizing river water which has been contaminated leptospira bacteria to meet daily needs. The purpose of this study to determine the relationship between the behavior of river water use with the incidence of leptospirosis. This research method is an observational analit by case control study. The study sample was divided into 2 groups, with 34 case respondents and 34 control group respondents. Samples were taken by using simple random sampling technique. Data analysis using Chi Square. The results showed p value of 0.000 (<0,05) and value of Odd Ratio (OR) equal to 9,257 (CI: 95%). In conclusion, there is a relationship between the behavior of river water use and the incidence of leptospirosis, where respondents using river water have an opportunity 9.25 times affected leptospirosis.

Keywords: *Behavior, Water River, Leptospirosis.*

1. Introduction

Leptospirosis is a disease caused by *leptospira* bacteria, transmitted through animal urine and contaminated environment. Leptospirosis numbers are increasing in tropical and sub-tropical countries with high rainfall. Every year Leptospirosis in sub-tropical countries reaches 0,1-1 per 100,000 population, while in tropical countries, it reaches 10-100 per 100,000 population (WHO, 2003).

Indonesia is a tropical country with the high Leptospirosis case; it is about 2.5% -16.45% exactly at the third ranked after China and India (International Leptospirosis Society). Based on the data from the Head of Disease Control and Environmental Health, the death caused by Leptospirosis in Indonesia had increased during 2010-2012 from 10.51% to 12.13%.

The use of river is one of the Leptospirosis emerging risk factors. Someone working or conducting activities that directly contacted with watery places contaminated with Leptospira microorganisms have a high risk of lepteptiosis infection (Central Java Health Office, 2005). According to one of the nurses who handle Leptospirosis cases in the Bonang Demak, the society use river for some activities like washing, bathing, irigation and defecate.

Various interventions have been carried out to deal with Leptospirosis, like screening for patients, socialization in the village and on the top of that the health workers facilitate the treatment. However, it has not achieved maximum results in dealing with Leptospirosis problems. Therefore, support is needed from all communities to improve Clean and Healthy Life Behavior (PHBS) to prevent Leptospirosis transmission (Demak Health Office, 2012).

2. Research Method

This research is an observational analytic study using case control study with *Chi square* tests (Nursalam, 2011). The samples are 68 respondents, divided into two groups, namely 34 case groups (suffering leptospirosis) and 34 control groups (not suffering leptospirosis). The sampling technique uses Simple Random Sampling, to avoid respondents' different characteristics; the researcher uses *matching* techniques based on pre-determined inclusion and exclusion criteria.

The instrument used to measure river use behavior is questionnaires that have been validity and reliability tested for of 30 respondents in Sayung Health Center 1. The validity test was using *product moment correlation* which obtained r count > r table, between 0.760 - 0.901, the questionnaire is stated valid. The reliability test was using *Alpha Cronbach* which obtained r count > alpha, 0.953> 0.6 and it stated reliable.

Measuring respondents suffering from leptospirosis is based on a medical diagnosis from Bonang Demak Health Center.

3. Result

3.1. Respondents Characteristics

Tabel 1. Respondents Distribution Frequency by Age, Gender, Education and Occupation

Variabel	Case		Control	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
1. Age				
a. 21-30 years	10	29,4	12	35,3
b. 31-40 years	10	29,4	10	29,4
c. 41-50 years	8	23,5	8	23,5
d. 51-60 years	6	17,6	4	11,8
2. Gender				
a. Female	15	44,1	16	47,1
b. Male	19	55,9	18	52,9
3. Education				
a. Not Educated	0	0	0	0
b. Elementary School	15	44,1	4	11,8
c. Junior High School	14	41,2	9	26,5
d. Senior High School	5	14,7	10	29,4
e. Collage	0	0	11	32,4
4. Occupation				
a. Civil servants	0	0	12	35,3
b. Entrepreneur	2	5,9	3	8,8
c. Officers	4	11,8	4	11,8
d. Farmer	14	41,2	5	14,7
e. Fisherman	10	29,4	5	14,7
f. House Wife	4	11,8	5	14,7
5. The use of river				
a. Yes	27	79,4	10	29,4
b. No	7	20,6	24	70,6

Table 1. case group consisting of 34 respondents presented that the oldest were 21-30 years (29.4%) and 31-40 years (29.4%), the most gender is male (55.9%), the most education level is Elementary school (44.1%), most job is

farmers (41.2%), respondents used river are 79.4%. The control group consisting of 34 respondents was presented that the oldest was 21-30 years (35.3%), the most gender were male (52.9%), the highest education level is College (32.4%), the most jobs are Civil Servant (35, 3%), most respondents did not use river (70.6%).

3.2. The relationship between the use of river with the Leptospirosis case *chi square* test

Tabel 2 *Chi Square Test*

	Leptospirosis case				Total		p value	OR
	Case		Control					
The use of water	N	%	N	%	N	%		
Yes	27	79,4	10	29,4	37	54,4	0,000	9,257
No	7	20,6	24	70,6	31	45,6		
	34	100	34	100	68	100		

Table 1.2 shows that the majority of cases (79.4%) used river on the other hand, the overall control (70.6%) did not use river water.

The results of *chi square* tests on river used towards leptospirosis was *p* value 0.000 (<0.05) which means that there is a significant relationship between river used and leptospirosis. The Odd Ratio value (OR) was 9,257 (95% CI: 3,046-28,130) which means that respondents using river had a 9.2 times chance of experiencing leptospirosis compared to respondents who did not use river.

4. Discussion
4.1. Respondents Characteristics
1) Respondents Age

In this study, the data of respondents showed that most age range of respondents was in case group,21-30 years (29.4%) and 31-40 years (29.4%), while for the control group the highest age range of respondents was 21-30 years (35.3%) where in both groups are considered as the productive age period.

WHO (2010) and Sudoyono et al (2006) stated that gender and age actually do not have different level of susceptibility to leptospirosis. However, the average leptospirosis sufferer is more common in men at productive age. It is associated with the occupation and daily activities that are at risk of being exposed to infective animals.

2) Education

In this study, the data showed that respondents with highest level of education were in the case group namely elementary school (44.1%). On the other hand, the education level in control group was collage (32.4%).

This data is in line with the research conducted by Okatini, Purwana & Djaja (2007) the results of the study indicate that education or knowledge has a correlation with leptospirosis. Respondents who have low knowledge are at risk 17.7 times affected by leptospirosis compared with those with high knowledge.

3) Occupation

The data In this study also showed that farmer was the highest number respondents' occupation in case group (41.2%). Whereas, in the control group, Civil Servants was the highest (35.3%).

According to the Indonesian Ministry of Health (2007), occupation is an important factor towards leptospirosis case. Some risky jobs include: farmers, planters, animal farmers, slaughterer, mine workers and other jobs that allow contact with animals. The risk of leptospirosis will also be experienced by someone who has river activities hobby such as swimming.

This research is in line with research conducted by Supraptono, Sumiarto & Pramono (2011) which states that residents with risky occupations will experience leptospirosis pain 8.8 times compared to people who do not have a risky job (95% CI = 4.85 - 16.09) .

4.2. Research Variabel

The data in this study showed that the most dominant respondents in case group were respondents who used river, 79.4%. On the contrary, the most dominant respondents in control group were those who did not use river, 70.6%.

This research is in line with the research conducted by Priyanto et al (2008). The results showed that there was a correlation between the habit of bathing in the river and the leptospirosis casse (p = 0.000) (OR = 5.21 95% CI = 2.31-11, 72). Someone who is use to bathing in the river has a great risk of getting leptospirosis for5.21 times compared to those who do not.

4.3. Bavariate Analysis

Based on the results of *Chi Square* test, it was obtained p value 0,000 (<0,05) which means there is a very significant relationship between the use of river with the leptospirosis case in the Bonang Demak Health Center. While the Odd Ratio (OR) was obtained 9,257 (95% CI: 3,046-28,130) which means that respondents who use river have a 9.2 times opportunity experiencing leptospirosis compared to those who did not.

Leptosprosis is a disease caused by *Leptospira* microorganisms. The disease is known with several names such as *mud fever, swamp fever, slime fever, infectious jaundice, autumnal fever, cane cutter fever, field fever* and others. Leptospirosis is sometimes undiagnosed because clinically it has no specific symptoms and is difficult to confirm the diagnosis before laboratory test. Leptospirosis is one of the diseases which belong to the emerging infectious disease (Sudoyo, Setiohadi, Alwi, Simadibrata & Setiati, 2009).

Factors causing leptospirosis are through contact with water, soil or mud contaminated by the urine of animals infected with leptospira. Widoyono (2008) states that there are three epidemic patterns of leptospira, they are:

1) Transmission due to direct contact with animals such as cows or pigs.
2) Transmission due to contamination in the environment, such as the rainy season or working in areas which are in contact with water.
3) Transmission through infection by rodents such as rats in a slum house environment.

The pathogenesis process begins with the entry of leptospira microorganisms into the body through the skin or mucous membranes, and it spreads widely to the body's tissues through the bloodstream. After infecting, the

body attempts to immunologically suppress by forming specific antibodies. Immunologically isolated microorganisms will survive in the kidneys and are released through urine. After infected, Leptospira can survive in the urine for 8 days until several weeks, months or even years later. Leptospira can be eliminated by phagocytosic and humoral mechanisms. These germs quickly disappear from the blood after the formation of agglutinin. After the leptospiremia phase, 4-7 days, microorganisms can only be found in kidney and ocular tissue (Sudoyo, Setiohadi, Alwi, Simadibrata & Setiati, 2009). Three mechanisms involved in phatogenesis leptospirosis are direct bacterial invasion, due to non-specific inflammatory factors, and immunological reactions (Widoyono, 2008). Clinical manifestations of leptospirosis are divided into three phases:

1) First Phase *(leptospiremia)*

The *leptospiremia* phase lasts for 4-7 days with initial symptoms like headache, pain and tenderness in the thigh muscles, calves and waist. Patients also get fever with chilling, nausea and vomiting, about 25% cases accompanied by the decreasing consciousness. On days 3-4, it is found conjunctiva suffusion signs and photophobia. Quickly treatment will bring good impact to the patient, and the body function recovery will return to normal in 3-6 weeks.

2) Second Phase (imun)

In this phase, the leptospira bacteria attack the body's immunity, so that it is found an antibody titre. Symptoms in this phase is that patients experience general weakness, with a body temperature reaching 40^0C with shivering, feeling pain in the neck, stomach and leg muscles and looking jaundice. Other symptoms are bleeding especially in the gums, 50% patients experience meningitis symptoms. Meningeal signs can persist within a few weeks, but it usually disappear after 1-2 days. In this phase leptospira is found in the urine.

3) Third Phase (konvalesen)

This phase is marked by reducing clinical symptoms that can re-occur and last for 2-4 weeks.

Factors influencing leptospirosis are biological environment such as the presence of rats, social environment (education, occupation and condition of the workplace) and physical environment such as ditches with stagnant water, puddles, the distance of the house to garbage dump and river (Supraptono, Sumiarto & Pramono, 2011).

The existence of river can be an indirect medium of leptospirosis transmission. The transmission of disease through the river is called *Water-Borne Infection.* River has a role as a medium for leptospirosis transmission. It is happen when river water is contaminated by the urine of rats or pets infected with leptospira bacteria. Transmission through rivers is closely related to the habits or activities of societydealing with river use. Various activities related to river that can cause leptospirosis are:

1) Bathing in the river, Leptospira bacteria can enter the body through the soft skin pores due to water contamination, mucous membranes, blisters skin of the feet and hands.

2) Washing clothes and livestock in the river will risk to exposure Leptospira bacteria because the possibility of animals urine contact containing Leptospira will be greater.
3) Consuming water taken from river is directly without filtering process (PAM) which is not cooked properly (until boiling) will cause leptospira bacteria still alive during the process. If you consume water that does not pass the filtration process (PAM) or is not cooked perfectly will cause the development of leptospira bacteria in the body and it can cause leptospirosis.
4) Using river water to defecate can be exposed to leptospirosis bacteria. because it can also enter through the skin pores, other than that dirt from humans or animals exposed to leptospira bacteria can be removed and can cause leptospirosis.

This research is in accordance with research conducted by Priyanto et al. (2008) which states that risk factors that influence leptospirosis case are physical environmental risk factors, biological environmental risk factors, behavioral factors, socioeconomic factors and health service factors. This research is also in line with the r research conducted by Wiharyadi (2004) which stated that watery place has 18 times hogher risk of developing leptospirosis

5. Conclussion
The results of this research "the relationship between the behavior of river use and the leptospirosis case in Bonang Demak Health Center" are drawn these following conclusions:
1. There is a relationship between the behavior of river use and the leptospirosis case in the working area Bonang Demak Health Center.
2. The case group consisting of 34 respondents was observed that the oldest was 21-30 years (29.4%) and 31-40 years (29.4%), the highest gender was male the research of, the highest education was elementary schools, the most occupation was farmers (41.2%), respondents used river for 79.4%. The control group consisting of 34 respondents was presented that the oldest was 21-30 years (35.3%) , 52.9% were male, the highest education was collage (41.2%), the most jobs was civil servants (41.2%), most respondents (70.6%) did not use river.
3. The Odd Ratio (OR) was 9,257 (95% CI: 3,046-28,130) means that respondents who used river had a 9.2 times chance experiencing leptospirosis compared to those who did not.

6. Suggestion
The results of this study indicate that the behavior of clean and healthy living (PHBS) needs to be improved, especially in the use of clean water in meeting daily needs. Nurse has function as an educator. Therefore, it needs to improve planned promotive and preventive efforts to reduce leptospirosis case.

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