The Relationship between the Bacteriological Quality of Drinking Water and the Occurrence of Diarrhea in Children Under Five Years Old in Sub District Singorojo, Distric Kendal

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Abstract
The number of diarrhea oocurrence in Sub District Singorojo, District Kendal is one of the highest among districs in Kabupaten Kendal. The incidence of diarrhea in 2017 has reached 1,081 cases, with Incidence Rate (IR) 24.89% per 1,000 population.(1) In 2017, the percentage access of peoples with adequare sanitation is only 92,57%, access to drinking water is only 92,8%. Only 52.7% of drinking water that have been consumed by people, that qualified of the bacteriological quality. To determine the relationship between the bacteriological quality of drinking water and the occurrence of diarrhea in children under 5 years old in Sub District Singorojo, District Kendal. This research is an observational research which is the causal explanatory, by using Cross Sectional data collection technique. The population consisted of 1,128 children under 5 years old, with 42 samples of research have been selectectd by Simple Random Sampling Technique. Data have been collected by taken the samples of drinking water, the drinking water storage, source of drinking water, interviewed the respondents, observation, and distance measurement on the field. Analysis of data used Chi-Square test. There is a relationship between the bacteriological quality of drinking water and the occurrence of diarrhea in children under five years old (p-value = 0.006 <α = 0.05). There is no relationship the bacteriological quality of the storage of drinking water (100% samples are negatif of contaminated of E. coli), the bacteriological quality of source of drinking water (p-value = 0.583 >α = 0.05), distance of family's toilet (p-value = 1.000 >α = 0.05), distance of SPAL (p-value = 1.000 >α = 0.05), distance of garbage disposal facility (p-value = 1.000 >α = 0.05) to source of drinking water, or personal hygiene –hand washing with soap (p-value = 0.126 >α = 0.05) and the occurence of diarrhea in children under 5 years old. There is a relationship between the bacteriological quality of drinking water and the occurrence of diarrhea in children under five years old in Sub District Singorojo, District Kendal.

Keywords: *the quality of bacteriological of drinking water, the occurrence od diarrhea, children under 5 years old, Kendal.*

I. INTRODUCTION

Diarrhea is still an endemic disease in Indonesia that has potential for Extraordinary Occurrence, as it often leads to death. The Riskesdas report of 2013 states that the prevalence of diarrhea is 3.5% with 2.2% who have been diagnosed with diarrhea. The highest occurrence of diarrhea in infants (7.0%), children under five years old (6.72%). (2) Outbreaks of diarrhea in 2013 occurred in six (6) provinces with the number of diarrhea occurrence reaching 646 cases. Central Java province has the most diarrhea patients with the estimated number of cases reached 1,407,082 cases. (2)

Sub District Singorojo is one of the districts in Kendal District, with high diarrhea occurrence rate. The number of diarrhea occurrence in 2015 reached 970 cases, in 2016 reached 1.008 cases, and in 2017 reached 1,081 cases. These data show that the number of diarrhea occurence during the period 2015 - 2017 has increased from year to year. Based on the health profile data of Kendal District in 2017, access to decent sanitation reached 92.57%. Access of people with decent drinking water also only reached 92.8%. In addition, only 52.7% of the drinking water of the people living in the Singorojo sub-district fulfill the bacteriological quality of drinking water. (1)

II. RESEARCH METHOD

This type of research is observational research. The technique to collect the samples of research using Cross Sectional approach. While, the technique of selecting research sample using Simple Random Sampling. The data were analyzed using Chi - Square test (95%, $\alpha = 0,05$). Samples of drinking waters, the storages of drinking water, and the sources of drinking water are taken directly from the field. The distance family's toilet, SPAL's, and garbages disposal facility to the source of drinking water have been measured directly from field. Data of personal hygiene (handwashing with soap) has been collected via interview with respondents using questionnaire.

The population consisted of 1,128 children under five years old, with 42 research samples. The formula to calculate the number of research sample as follows: (3)

$$n = \frac{Z^2_1 P.(1-P).N}{d^2.(N-1) + Z^2_1.P.(1-P)} = 41,2 \sim 42$$

n: The number of sample

Z_1: The coefficiet of significant level (95% = 1,96)

P: Proportion population = 0,5

D: Precision = 0,1 – 0,25

III. RESULT AND ANALYSIS

A. The Relationship between The Bacteriological Quality of Drinking Water and The Occurrence of Diarrhea in Children Under Five Years Old

Table 1. The Relationship between The Bacteriological Quality of Drinking Water and The Occurrence of Diarrhea in Children Under Five Years Old

		Diarrhea	Not Diarrhea	Total	*p – value*
The bacteriological Quality of Drinking Water	Qualified	13 61,9%	8 38,1%	21 100%	0,006
	Not Qualified	21 100%	0 0%	21 100%	
Total		34 81,0%	8 19,0%	42 100%	

The result of statistical calculation with Chi Square is obtained the value of probability (p-value) = 0.006 < α : 0.05. Hypothesis Null (Ho) is accepted. There is a relationship between bacteriological quality of drinking water and the occurrence of diarrhea in children under five in Sub District Singorojo, District Kendal.

This research is in line with the research of Nurpauji et al. (2016) in Community Health Center, Lamper Tengah Semarang, 2. The result of Chi Square is probability value (p-value) = 0.001 < α = 0.05. This means, there is a significant relationship between bacteriological quality of drinking water and the occurrence of diarrhea in children under five. [(4)]

The research is not in line with the research of Aini et al. (2016) in Banyuasin Community Health Center, Sub District Loano, District Purworejo. The result of Chi Square is probability value (p-value) = 0,764 (> 0,05). This shows no relationship between the bacteriological quality of drinking water and the occurrence of diarrhea in children under five. [(5)] Hasil perhitungan *Exact Sig. (2 sided)*

B. The Relationship between The Bacteriological Quality of The Storage of Drinking Water and The Occurrence of Diarrhea in Children Under Five Years Old

Table 2. The Relationship between The Bacteriological Quality of The Storage of Drinking Water and The Occurrence of Diarrhea in Children Under Five Years Old

		Diarrhea	Not Diarrhea	Total	*p – value*
The Bacteriological Quality of The Storage of Drinking Water	Qualified	34 81,0%	8 19,0%	42 100%	-
Total		34 81,0%	8 19,0%	42 100%	

The result of Analyze Descriptive Statistic Crosstabs is tabulation 1 x 2. It is due to the data constant of bacteriological quality the storage of drinking water (100% negative from E. coli). Based on the expert judgment technique then Hypothesis Null (Ho) is Rejected. Thus, it is concluded that there is no relationship between the bacteriololgical quality of the storage of drinking water and the occurrence of diarrhea in children under five in Sub District Singorojo, District Kendal.

This research is in line with similar research by Kusumadewi and Hermawati (2014) by conducting laboratory test of the bacteriological quality against the result of swabs of cutlery or drinking of children under five. The results showed that E. coli presence on feeding or drinking equipment of children under five years old was not significantly related to diarrhea at Tugu Health Center, Depok City (p value = 0,108; OR = 7,250; CI = 0,815 - 64,457). Odds Ratio (OR) = 7,250 means that children under five who use cutlery or drink contaminated with E. coli have a 7,250 greater risk of occurrence from diarrhea than children under five years old whom not contaminated by E. coli. (6)

The research is not in line with the research of Nurfadhila (2014) in Community Health Center, 23 Ilir, Palembang. The results od research, there is a significant relationship between the habit of washing eating equipment with the occurrence of diarrhea in children under five years old. The probability value obtained is 0,024 (<0,05). (5)

C. The Relationship between The Bacteriological Quality of The Source of Drinking Water and The Occurrence of Diarrhea in Children Under Five Years Old

Table 3. The Relationship between The Bacteriological Quality of The Storage of Drinking Water and The Occurrence of Diarrhea in Children Under Five Years Old

		Diarrhea	Not Diarrhea	Total	*p – value*
The bacteriological Quality of The Source of Drinking Water	Qualified	29 78,4%	8 21,6%	37 100%	0,583
	Tidak Memenuhi Syarat	5 100%	0 0%	5 100%	
Total		34 81,0%	8 19,0%	42 100%	

The resut of statistical calculation with Chi Square is obtained the value of probability (p-value) = 0,583 > α = 0,05. This means that the Hypothesis Null (Ho) is rejected. There is no relationship between the bacteriological quality of the source of drinking water sources and the occurrence of diarrhea in children under five in Sub District Singorojo District, Kendal District.

This research is in line with the research of Aini et al. (2016) Banyuasin's Community Health Center, Sub District Loano, District Purworejo. The result of Chi Square is the value of probability (p-value) = 0,141 > 0,05. There is no relationship between the source of drinking water and the occurrence of diarrhea in children under five. (5)

This research is not in line with the research of Nurpauji et al. (2015), Community, Lamper, Semarang. The result of Chi Square is the value of probability (p-value) = 0.003 < 0.05. There is a relationship between the type of source of drinking water and the occurrence of children under five. (4)

D. The Relationship between The Distance of Family's Toilet to The Source of Drinking Water and The Occurrence of Diarrhea in Children Under Five Years Old

Table 4. The Relationship between The Distance of Family's Toilet to The Source of Dirnking Water and The Occurrence of Diarrhea in Children Under Five Years Old

		Diarrhea	Not Diarrhea	Total	*p – value*
The Distance of Family's Toilet	Qualified	23 79,3%	6 20,7%	29 100%	1,000
	Not Qualified	11 84,6%	2 15,4%	13 100%	
Total		34 81,0%	8 19.0%	42 100%	

The result of statistical calculation with Chi-Square is obtained the value of probability (p-value) = 1,000 > α = 0,05. This shows that the Hypothesis Null (Ho) is rejected. The is no relationship between the distance of family's toilet to the source of drinking water and the occurrence of diarrhea in children under five in Sub District Singorojo, District Kendal.

This research is in line with the research of Meithyra et al. (2016), in Terjun, Sub District Medan Marelan, Medan. The value of probability (p-value) = 1,000 > 0,05. So, there is no relationship between the condition of toilet and the occurrence of diarrhea o in children under five. (7)

This research is not in line with the research of Sidhi et al. (2016) in Community Health Center, Sub District Adiwerna, District Tegal. The result of Chi Square is the value of probability (p-value) = 0.002 < α = 0,05. It is concluded that there is a relationship between the condition of family's toilet and the occurrence of diarrhea in children under five years old. (8)

E. The Relationship between The Distance of SPAL to The Source of Drinking Water and The Occurrence of Diarrhea in Children Under Five Years Old

Table 5. The Relationship between The Distance of SPAL to The Source of Dirnking Water and The Occurrence of Diarrhea in Children Under Five Years Old

		Diarrhea	Not Diarrhea	Total	*p – value*
The Distance of SPAL	Qualified	25 80,6%	6 19,4%	31 100%	1,000
	Not Qualified	9 81,8%	2 18,2%	11 100%	
Total		34 81,0%	8 19,0%	42 100%	

The results of statistical calculation with Chi Square shows that Hypothesis Null (Ho) is rejected. The value of probability (p-value) is 1.000 > α = 0,05. This means, there is no relationship between the distance of SPAL and the occurrence of diarrhea in children under five in Sub District Singorojo, District Kendal.

This research is in line with the research of Rofiana (2017) in Empang, Muara Angke, North Jakarta. The value of probability value (p-value) = 0,444 < 0,05. It is concluded that no relationship between SPAL and diarrhea in children under five. (9)

This research is not in line with the research of Sidhi et al. (2016) in Community Health Center in Sub District Adiwerna, District Tegal. The result of Chi Square is the value of probability value (p-value) = 0,03 < α = 0,05. There is a relationship between the condition of SPAL and the occurrence of diarrhea in children under five. (8)

α = 0,05). Hasil penelitian menyatakan ada hubungan antara kondisi Sarana Pembuangan Air Limbah (SPAL) dengan kejadian diare pada anak balita. (8)

F. The Relationship between The Distance of Garbage Disposal Facility to The Source of Drinking Water and The Occurrence of Diarrhea in Children Under Five Years Old

Table 6. The Relationship between The Distance of Garbage Disposal Facility to The Source of Drinking Water and The Occurrence of Diarrhea in Children Under Five Years Old

		Diarrhea	Not Diarrhea	Total	*p – value*
The Distance of Garbage Disposal Facility	Qualified	28 80,0%	7 20,0%	35 100%	1,000
	Not Qualified	6 85,7%	1 14,7%	7 100%	
Total		34 81,0%	8 19,0%	42 100%	

The result of statistical calculation with Chi Square is obtained the value of probability (p-value) = 1.000 > α = 0.05. Hypothesis Null (Ho) is rejected. It is concluded that there is no relationship between the distance of garbage disposal facility and the occurrence of diarrhea in children under five years old in Sub District Singorojo, District Kendal.

This research is in line with the research of Sidhi et al. (2016) in Community Health Center, Sub District Adiwerna, District Tegal. The result of Chi Square test is the value of probability value (p-value) = 0.063 > α = 0,05. The result of research stated there is no relationship between the condition of garbage disposal and the occurrence of of diarrhea in children under five. [8]

This research is not in line with the research of Rofiana (2017) in Empang Muara Angke, North Jakarta. The value of probability (*p-value*) = 0.038 < α = 0.05. The result of research stated that there is a relationship between garbage disposal facility and the occurrence of diarrhea occurrence in children under five. [9]

G. The Relationship between The Personal Hygiene (Handwashing with Soap) and The Occurrence of Diarrhea in Children Under Five Years Old

The results of statistical calculation with Chi Square is obtained the value of probability (p-value) = 0.126 > α : 0.05. The Hypothesis Null (Ho) is rejected. There is no relationship between personal hygiene (handwashing with soap) and the occurrence of diarrhea in children under five in Sub District Singorojo, District Kendal (Table 7).

Table 7. The Relationship between The Personal Hygiene (Handwashing with Soap) and The Occurrence of Diarrhea in Children Under Five Years Old

		Diarrhea	Not Diarrhea	Total	*p – value*
Personal Hygiene (Handwashing with Soap)	Good	25 89,3%	3 10,7%	28 100%	0,126
	Not Good	9 64,3%	5 35,7%	14 100%	
Total		34 81,0%	8 19,0%	42 100%	

This research is in line with the research of Kusumadewi and Hermawati (2014) in Tugu Health Center, Depok. In their research stated that there is no relationship between the practise of handwashing with soap and the occurrence of diarrhea in children under five (p-value = 1 > α = 0,05; OR = 0,624). [6]

The research is not in line with the research Nurpauji et al. (2015) in Community Health Center, Lamper, Semarang. The result of research stated that there is relationship between the habit of mother on handwashing before served the meal to the children and the occurrence of diarrhea in children under five (p - value = 0,008 < α : 0,05). In addition, there is also a relationship between the habit of mother on handwashing after defecation and the occurrence of diarrhea in children under five (p-value = 0.015 <α: 0.05). [4]

IV. CONCLUSION

There is a relationship between the bacteriological quality of drinking water and the occurrence of diarrhea in children under five years old in Sub District Singorojo, District Kendal (p-value = 0.006 < α = 0.05).

There is no relationship between the bacteriological quality of the storage of drinking water and the occurrence of diarrhea in children under five years old in Singorojo District, District Kendal. The storages of drinking water are 100% uncontaminated Escherichia coli (Lab.

Test stated 100% negatif Escherichia coli).

There is no relationship between the bacteriological quality of the source of drinking water and the occurrence of diarrhea in children under five years old in Sub District Singorojo, District Kendal (p-value = 0.583 > α = 0.05).

There is no relationship between the distance of family's toilet to the source of drinking water and the occurrence of diarrhea in children under five years old in Sub District Singorojo, District Kendal (p-value = 1.000 > α = 0.05).

There is no relationship between the distance of SPAL to the source of drinking water and the occurrence of diarrhea in children under five years old in Sub District Singorojo, District Kendal (p-value = 1.000 > α = 0.05).

There is no relationship between the distance of garbage disposal facility to the source of drinking water and the occurrence of diarrhea in children under five years old in Sub District Singorojo, District Kendal (p-value = 1.000 > sym

There is no relationship between the personal hygiene (handwashing with soap) and the occurrence of diarrhea in children under five years old in Sub District Singorojo, District Kendal (p-value = 0.126 > α = 0.05).

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