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COMPARATIVE VALUE OF OHI-S INDEX BETWEEN WATER USERS OF EX-COAL MINING WATER AND TAP WATER

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ABSTRACT

Background: *Ex-coal mining water is water that contains low pH of 4.31 and high dissolved metal concentration, such as iron (Fe) 2,335 mg/l and manganese (Mn) 10,982 mg / l. Low pH and high metal content in ex-coal mining excavation water can cause some effects if used to brush teeth for long period of time. It can cause dental disease and also affect OHI-S to turn bad.* ***Objective:*** *To analyze the comparison of OHI-S index values between the worker who used ex-coal mining water and tap water at PT. Rahmat Barajaya Utama.* ***Methods and materials:*** *This research was observational analytic study with cross-sectional approach, using simple random sampling technique, consisted of two groups. Each sample consisted of 30 workers who use ex-coal mining excavation water and 30 workers who use tap water. The total of 60 people as samples were examined using Green and Vermillion's OHI-S index.* ***Results:*** *Result of data analysis with Mann Whitney test at p = 0,000, where α value was 0,05. Thus, p> α, ie 0,000> 0.05.* ***Conclusion:*** *The OHI-S index of workers who use ex-coal mining water is worse than those who use tap water at PT. Rahmat Barajaya Utama.*

Keywords: *OHI-S and ex-coal mining excavation water.*

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INTRODUCTION

Dental and oral hygiene have an impact on dental health and oral hygiene of the mouth. Lack of awareness can cause various diseases in the oral cavity as a result of debris and tartar or calculus accumulation.[1] Based on the results of Basic Health Research (Riskesdas) 2007 in South Kalimantan Province, data for dental problem were obtained where the number of oral and dental disease is in the prevalence of 29.2% and it is increase to 36.1% in 2013. Banjar Regency occupies the highest number i.e. 48.6%[2,3]

Water is a natural resource that is needed by all living beings. Therefore, people need to be aware of quality and quantity.[4] Clean water qualification set by health care is should be free from pollution. Meanwhile, the drinking water must meet standards requirements i.e physical, chemical and biological aspects because drinking water which does not comply with quality standards may cause health problems.[5] The Regulation of the Minister of Health Republic Indonesia (Permenkes RI) No.492 / Menkes / Per / IV / 2010 about the quality of drinking water mentioned that drinking water must meet the health requirements for the physical, chemical and microbiological aspects. Drinking water which consumed should fulfill both in physical quality and the requirements. The requirements themselves are not cloudy, colorless, no taste, not foaming and odorless.[3]

According to the research by Solanki et al, the level of oral health workers of coal mine in the city of Jadhpur City is poor.[6] This is based on the results of the DMF-T index examination of coal mine workers who have high caries prevalence i.e. 74% and periodontal status of healthy gingiva only 4.9%.[7] Based on preliminary study results, it was found that some coal miners in PT. Rahmat Barajaya Utama Kabupaten Banjar still use ex-coal mining water for daily use such as feet washing, hands washing before eating or after meals, bathing and teeth brushing; Despite of the high metal content dissolved in the ex-coal mining water. has a Low pH water if contact with the oral cavity can affects the formation of plaque
because it helps the proliferation and colonization

of microorganisms that present on the tooth surface.[8] The purpose of this study is to analyze the OHI-S index score between the workers who use ex-coal mining water and tap water at PT. Rahmat Barajaya Utama.

MATERIALS AND METHODS

This research was an analytic observational research with cross-sectional approach using the technique of simple random sampling, which divided into 2 groups, with each group consisted of 30 workers using ex-coal mining water and 30 workers using tap water. The samples consisted of 60 people were examined to obtain OHI-S index according to Green and Vermillion.[9] The OHI-S index were calculated in the workers who used ex-coal mining water and tap water for brushing teeth in PT. Rahmat Barajaya Utama. The data collection was done by filling the respondent identification sheets. The OHI-S index data were obtained by examining the oral cavity in all samples . In this research, the data was the sum of OHI-S index of debris and the index calculus with categorized as follow: good score = 0.0 – 1.2, moderate score = 1.3 – 3.0, and bad score 3.0 – 6.0. The analysis of the data used in this study was Mann Whitney Test.

RESULTS

This research was conducted to analyze the comparison OHI-S index value between the workers who use ex-coal mining water and tap water based on the preliminary study at PT. Rahmat Barajaya Utama. The number of respondents in this study were 60 workers.

The data collection was the result of the measurement index of OHI-S workers who use ex-coal mining water and tap water at PT. Rahmat Barajaya Utama. Based on the results of research that has been done, besides of the ex-coal mining water and tap water, there are also workers who use river water.

Table 1. Distribution of respondents Of The Workers Who Use Ex-Coal Mining Water, River Water, and Tap Water

Water used	**The number of respondents**
Ex-coal mining Water	42
Tap Water	31
River Water	7
Total	**80**

The total of respondents in this study were 60 people with each group consisted of 30 people. It was based on the Gay and Diehl research which also used a comparative study type where the number of respondents required was 30 subjects per group minimally. [10]

The OHI-S index examination results of ex-coal mining water users can be seen in table 2.

Table 2. OHI-S Index Distribution of Workers Who Use Ex-Coal Mining Water

OHI-S Index	**Number (Subject)**	**Percentage**
Good	0	0%
Moderate	7	23,3%
Bad	23	76,7%
Total	**30**	**100%**
Mean value of debris index		2, 18 (bad)
Mean value of calculus index		1, 916 (bad)
Mean value of OHI-S index 3,777 (bad)		

Based on the distribution of data in table 2, it is known that the mean value of debris index was 2 where 18 respondents were in bad category. The mean value of the calculus index was 1, 916 which also included in bad category. Meanwhile, the mean OHI-S index on the workers who use ex-coal mining water was 3,777 and also classified in bad category.

The level of OHI-S workers who use ex-coal mining water in table 2 with moderate category were 7 workers (23.3%). Workers who had bad OHI-S index category were 23 workers (76.7%) and no worker had a good OHI-S index category. OHI-S index data examination results of workers who use tap water can be seen in table 3.

Table 3. Index distribution Of OHI-S Workers Who Use Tap Water

Indeks OHI-S	**Number (Subject)**	**Persentase**
Good	16	53,3%
Moderate	12	40%
Bad	2	6,7%
Total	**30**	**100%**
Mean value of debris index		1.773 (moderate)
Mean value of calculus index1.516 (moderate)		
Mean value of OHI-S index 1,967 (moderate)		

Based on table obtained, the mean value of debris index was 1, 773 and classified in moderate category. The mean value of calculus index was 1, 516 and classified in moderate category. The mean value of OHI-S index among the workers who use tap water was 1.967 and classified in moderate category. From the level of OHI-S based on table 3, there were 16 workers in good category (53,3%), 12 workers (40%) in moderate category and 2 workers in bad category (6.7%).

Based on Table 2 and Table 3, a bar chart can be made as shown in Figure 1 below:

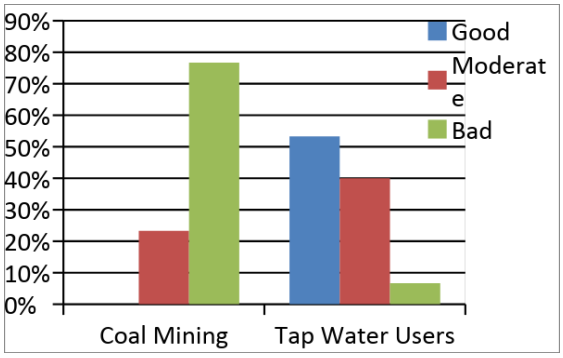

Figure 1. The amount of OHI-S Index distribution In Workers Who Use Ex-Coal Mining Water And Tap Water

Based on the results of Kolmogorov-Smirnov normality test, 0.023 significance value was obtained from workers in ex-coal mining water users group and 0,000 significance value was obtained from workers in tap water users group. It means that the distribution of data in each group was not normally distributed.

The analysis continued with Mann Whitney test because the data distribution was not normal. Based on Mann Whitney statistic test results, it was obtained a significance value of 0,000 where p <0.05. This data concludes that H0 is rejected and H1 is accepted, where the index value OHI-S of the worker who use ex-coal mining water is worse than users of tap water at PT. Rahmat Barajaya Utama.

DISCUSSION

This study aims to analyze the OHI-S index value of the workers who use ex-coal mining water and tap water at PT. Rahmat Barajaya Utama. Dental and oral hygiene has an impact on oral hygiene and dental health, whereas poor oral hygiene can cause various diseases in the oral cavity caused by debris and caries or calculus accumulation.[1] Oral health can be measured by Oral Hygiene Index - Simplified (OHI-S) from Green and Vermilion.[9] This method is generally used to measure hygiene status by measuring the debris and calculus index covering the tooth surface. The environment is one of the factors that may affect the health status of individuals or communities, apart from other factors such as behavior, lineage and community services that included in Blum theory.

Debris is a soft sediment on the tooth that can turn into plaque. Food debris is a soft layer that found on the tooth surface consist of mucin, bacteria, and food waste. Food debris is quickly dissolved by bacterial enzymes and removed from the oral cavity within 5 minutes after eating, but most of it can stayed on the teeth and mucosa.

Calculus formation is largely influenced by oral hygiene habit of an individual, but many other factors also influence the formation of calculus. One of which is the PH of saliva. The human oral cavity is never free from microorganisms that are generally play an important role in the formation and attachment of calculus which began with the formation of dental plaque. The surface of the supragingival calculus and subgingival calculus are always covered by dental plaque. Calculus is a calcified mass that formed and tightly attached to tooth surface of mineral materials such as calcium, ferum, zinc, Cu, Ni, Fe and Al.

Calculus is a plaque calcified. Type of calculus is classified as supragingival and subgingival based on its relation with the gingival margin. Supragingival calculus is the calculus attached on the surface of the tooth crown which start from the peak of the gingival margin and can be seen. The color of calculus is white yellowish or even brownish. Although formation of calculus is largely influenced by oral hygiene habit of an individual, but many other factors which also influence on the formation of calculus, one of which is pH of saliva. Subgingival calculus is a calculus below the margin of gingival margin, usually in the pocket region of the gums and can not be seen at the time of inspection

The ex-coal mining water contain low pH of 4.31 and high concentration of dissolved metals such as iron (Fe) 2,335 mg / l and manganese (Mn) 10.982 mg / l.[10] This did not meet health requirements referring to the Quality of Drinking Water in PERMENKES RI. The oral cavity exposed to ex-coal mining water will show an effect in the degree of saliva acidity. H^+ ions contained in ex-coal mining water will bind to ion PO_4^{3-} of saliva forming HPO_4^{3-}. In this form, HPO_4^{3-} can not balance the saliva and oral cavity condition which causing a decrease in saliva production.[11] Saliva is a complex of oral fluid consist of a secretions mixture from large and small salivary glands on the oral mucosa. The majority of saliva is produced by stimulation of taste and mastication of the food.

Someone who has a good oral hygiene can produce saliva as much as 0.5 ml. This amount of saliva is able to help in the protection of teeth, tongue and mucous membranes of the mouth. The degree of acidity of saliva under normal circumstances ranges from 5.6 to 7.0 with an average pH of 6.7. The decrease in the production of saliva resulted in reduced ability of the buffer capacity to clean up waste and deadly germs. It also results in the reduced of the ability to neutralize acid. A decrease in the secretion of saliva may be accompanied by an increase in the number of *Streptococcus mutans* and *Lactobacillus* germs. If this constantly happens, then it can give a long lasting effect especially in the use of ex-coal mining water for teeth brushing in long periods of time i.e dental health disorders which also results in bad value of OHI-S index.[13] Based on the result

of the research, it can be concluded that the OHI-S index of workers who use ex-coal mining water is worse than the workers who use tap water.

BIBLIOGRAPHY

1. Putri MH, Herijulianti Eliza, Nurjannah Neneng. Ilmu Pencegahan Penyakit Jaringan Keras dan Jaringan Pendukung Gigi. Jakarta: EGC; 2011: 53-107.
2. Badan Penelitian Dan Pengembangan Kesehatan Kementerian Kesehatan RI.2007. RISKESDAS 2007. Jakarta. 131
3. Badan Penelitian Dan Pengembangan Kesehatan Kementerian Kesehatan RI.2013. RISKESDAS 2013. Jakarta. 111
4. Ali A, Soemarno, Purnomo M. 2013. Kajian Kualitas Air dan Status Mutu Air Sungai Metro di Kecamatan Sukun Kota Malang. *Jurnal Bumi Lestari*. 13:265-274.
5. Boekoesoe, L. 2010.Tingkat Kualitas Bakteriologis Air Bersih di Desa Sosial Kecamatan Paguyaman Kabupaten Bualemo. *Jurnal Inovasi*. 7:ISSN 1693-9034.
6. Solanki, J., Gupta, S., dan Chand, S. 2014. Oral Health of Stone Mine Workers of Jodhpur City. *Occupational Safety and Health Research Institute.* (5) 136-139.
7. Abbas, I., Mohammad, Shakeel A., Peddireddy, P., Mocherla, M., Koppula,Yadav R., dan Avidapu, R. 2016. Oral Health Status of Underground aeCoal Mine Workers of Ramakrishnapur. *Journal of Clinical and Diagnostic Researirch*. 10(1): ZC28-ZC31
8. Pintauli S, Hamada T. 2008. *Menuju gigi dan mulut sehat*. Medan: USU Press, 2008. 4-18
9. Green, J. C. dan Vermillion, J. R. 1964. The Simplified Oral Hygiene Index. *J Am Dent Assoc*. 68: 25-31
10. Afrianty, C., Gustin, L., dan Dewi T. K. 2012. Pengolahan Limbah Air Asam Tambang Menggunakan Teknologi Membran Keramik. Jurnal Teknik Kimia No. 3 Vol 18: 20
11. Adhani, Rosihan, dkk. 2015. *Karies Gigi di Masyarakat Lahan Basah.* Yusuf Hidayat (Editor) Ed. Ke-1. Lembaga Penelitian Universitas Lambung Mangkurat. Banjarmasin. P: 10 - 15
12. Speirs, R. 1984. *Saliva and Dental Health*. Dent. Update 11 P: 541-552
13. Effendi, H. 2003. *Telaah Kualitas Air bagi Pengelolaan Sumber Daya dan Lingkungan Perairan*. Cetakan kelima. Kanisius. Yogyakarta. P: 168-169