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ORIGINAL ARTICLE

RISK OF ANEMIA AMONG ELEMENTARY SCHOOL STUDENTS IN EAST KALIMANTAN PROVINCE, INDONESIA: A CASE CONTROL PROTOCOL STUDY

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ABSTRACT

The issue of anemia in Indonesia still remains a homework for the Ministry of Health, as well as other related sectors. According to data from the Basic Health Research (Riset Kesehatan Dasar) in 2013, there are 31% female adolescents in Indonesia who suffers from anemia. However, this number increased to 48.9% according to data from the Basic Health Research in 2018, with the most proportion of anemia found in the 15-24 and 24-34 age groups. These cases clearly confirms that the health state of adolescents highly determines the success of health development, especially in the effort to establish the quality of the next generation in the future. This research uses case control design, where the case group population are students at Muhammadiyah Elementary Schools located in the city of Samarinda, East Kalimantan Province, whereas the control group population are students from Islamic Elementary Schools in the city of Samarinda, East Kalimantan Province. The statistic analysis being used is the multiple regression analysis to look for risk factor with the highest effect. This is a retrospective research, that is extracting past variable information from respondents so recall bias, which can cause wrong information, is at risk of occurance. Furthermore, the bias that might occur is that the respondent is bias by giving false answers. Another mistake is in the form of other cofounding variables not included in the research, which results in risk estimation value error.

Keywords*: Anemia, Students, Elementary School*

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INTRODUCTION

Anemia is a condition marked by a deficiency of eritrosit mass, indicated by the declining level of haemoglobin, haematocrit and erythrocyte counts. Anemia can damage the body's immunity and it can increased morbidity which is characterized by fatigue, low levels of productivity and unpleasant feelings[(1)] Anemia that occurs in children and adolescent can increase the risk of physical and mental function disorders[(2)]. World Health Organization states that more that half of the world's population of pre-school age and pregnant women are located in countries where anemia is a major health problem, with a percentage of around 56.3% and 57.5%[(3)]. Data relating to the general course of anemia in the world also indicated that there is no dramatic change in the statistics of anemia even though there has been a variety of interventions between 1995 and 2013. This is seen to be caused by anemia due to iron disorders. If iron deficiency anemia is left untreated, it can effect the life expectancy and the quality of life significantly[(4)]

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The World Health Organization states that the most anemia occurs among school children[5]. The issue of anemia in Indonesia still remains a homework for the Ministry of Health, as well as other related sectors. According to data from the Basic Health Research (Riset Kesehatan Dasar) in 2013, there are 31% female adolescents in Indonesia who suffers from anemia. However, this number increased to 48.9% according to data from the Basic Health Research in 2018, with the most proportion of anemia found in the 15-24 and 24-34 age groups[6]. These cases clearly confirms that the health state of adolescents highly determines the success of health development, especially in the effort to establish the quality of the next generation in the future[6]. Prevalence of anemia in adolescents indicates problems beginning in pre-teen, which is the elementary school age group. Fulfilment of nutrition since the early years can decrease the prevalence of anemia in the pre-teen age group.[7]

According to the Basic Health Research in 2018, the prevalence of anemia in the East Kalimantan Province is still around 14.2%, this matter need to receive attention from all related sectors. Meanwhile in Samarinda, the prevalence of anemia gathered from mothers' visit to health services to receive intervention for anemia, 11.6% suffer from anemia. To overcome anemia, early intervention and detection is needed so that anemia, which can interfere with the birthing as well as growing process, can be ruled out as an adolescent or adult. By understanding which cause of anemia has the biggest effect, anemia intervention programs can be developed more precisely and with more impact.[8] Research carried out by Sirajudin and Masni[9] stated that the heme source food pattern (OR=5.09 and 95% CI 1.98-13.08) and consumption pattern of iron-blocking food sources (OR=4.53 and 95% CI 1.65-12.43), are predisposing determinant factors for the prevalence of anemia among elementary school students after multivariate analysis was conducted.

Anemia is also caused by a lack of other micronutrient[10,11] substances such as lack of vitamin A, folic acid and vitamin B12[12]. Besides that it is also caused by socio-economic conditions such as maternal education, low income, infectious diseases such as malaria, schistosmiasis.[13-15] Female adolescents are easier to suffer from anemia, because first, they usually consumes more vegetables with low iron content compared to eating meat so that their body's iron needs are not met[16]. Secondly, female adolescents generally wants to be slim, thus limiting their food intake. Third, every human loses 0.6 iron through secretion, especially through feces. Fourth, every month, female adolescents experience menstruation, where they lose ±1.3 mg of iron each day so that their need for iron is higher that adolescent boys[17]

The result of the research showed that a fourth of elementary school students suffer from anemia. The prevalence of anemia among elementary school student is 27.1%, with details 13.8% suffer from mild anemia, 10.8% suffer moderate anemia, and 2.3% suffer from severe anemia. The prevalence of anemia in the 5-9 age group is 188 (34.9%) and 287 (23.6%) in the 10-14 age group. There is no significant difference statistically in the prevalence of anemia between men and women (27.3% and 26.8%).[18] Risk of anemia can also be found among children suffering from malaria as well as with low social-economy[19]

METODE

Based on literature consideration and anemia cases in the city of Samarinda, Capital City of East Kalimantan Province; the aim of this research is to discover the most influential factor in the prevalence of anemia. A few variables being checked are family eating habit, consumption of fruits and beverages, completeness of dental status, unhealthy snacking habits, and history of illness.

Dependent Variable is Anemia cases among students in Muhammadiyah Elementary Schools in the city of Samarinda. Independent Variable is Family eating habit, fruits and vegetables consumtion, breakfast habit, loss of teeth, unhealthy habits, and also history of illnes.

This research uses the Control Case design, consisting of two groups: anemia and non anemia[20]. The case group is made up of students from Muhammadiyah Elementary Schools that are located in the city of Samarinda, where data on anemia cases have been gathered through health status examination by the Public Health Center (Puskesmas) in Samarinda. For the control group, data is gathered from students attending Islamic Elementary Schools throughout the city of Samarinda.

Research instruments are used to gather variable information, where information is obtained through questionnaire by interviewing the students and their parents. Whereas especially for the variable of tooth completeness, an instrument in the form of observation sheet is used by examining the condition of each respondents' teeth. However, beforehand, a validity and reliability tests were held in Islamic Elementary Schools in the city of Tenggarong with the same characteristics as the target respondents in this research.

The minimum sample is 300 which is obtained through calculating the formula for the sample of two population proportions. Sampling in this research is done using Proportionate Random Sampling in both in the case and control groups, where the research sample frame was obtained from the Education Office of the city of Samarinda, while data on anemia cases was obtained from surveillance data gathered by the Public Health Center thoroughout Samarinda. Whereas the control group was selected by considering similar characteristics to those in the case group. The said characteristics covers age, grade of students, the school's social economic status, and the school's location. Control group retrieval is 1:3 from the case group. As for the selection of case and control groups refers to the criteria below.

Data collection is done through interview and observation on respondents, however the family eating habit and illness history variables are done by questioning the parents by phone or by meeting the parents directly when dropping off or picking up their children at school. Parents' phone numbers are obtained from data owned by the schools.

This research is voluntary for the respondents. Before retrieving data, respondents are given informed consent which contains their willingness to take part in the research process. Respondents are also able to terminate the process if they feel their health or wellbeing is threatened by the research process.

Informed consent is filled out by the respondents before the research process starts. The informed consent consists of the research purpose and

benefits the respondent will receive especially in terms of their health. If the respondent approve of the consent, then they will sign it. Informed consent directed for the parents can be done through phone call.

Data analysis in this research is done using computer software, where multiple logistic regression analysis is used to acquire Adjust Odds Ratio value on the variable with the highest risk factor for anemia among school age children in the city of Samarinda.

RESULT AND DISCUSSION

This is a retrospective research, that is extracting past variable information from respondents so recall bias, which can cause wrong information, is at risk of occurance. Furthermore, the bias that might occur is that the respondent is bias by giving false answers, this happen because the variables being studied do not have authentic evidence. Bias that occurs will cause the research result not accurate and invalid. Another error that has the potential to occur is the presence of confounding factor not included in the research. This confounding variable will result in the outcome of the research being false and under or overestimated[21,22]

Conflict of Interest

The authors states that there is no conflict of interest in the publication process of this article.

Authors Contribution

PSN, KF, YW, LK, NAT have the responsibility to write the article, whereas SS, NA, G, LWO, FFR, EWS, AR have the responsibility to review the article so that it will be suitable for journal publications, and also strive for correct English structure.

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