36. Comparison Of Blood Group Based On Bleeding Manifestation In Pediatric-Dengue Cases

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Comparison of blood group based on bleeding manifestation in pediatric-dengue cases

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Abstract

Bleeding manifestation in dengue cases presents due to the impairment of blood homeostasis. Previous studies mentioned that blood group O have higher bleeding risk because of lower blood coagulation von Willebran Factor (vWF) and factor VIII (FVIII) compared to non-O blood groups. This study was aiming to identify the comparison of blood group based on bleeding manifestation in pediatric dengue cases. The method used was a cross-sectional study with consecutive sampling in Pediatric Inpatient Ward Dr. Soetomo General Hospital, Surabaya, Indonesia, during March – September 2016. The study involved 86 dengue pediatric patients with 52 patients that fulfilled the inclusive criteria. The blood group, diagnosis, and the presence of bleeding manifestation data were collected from medical records and analyzed using chi-square test with p-value <0.05 and confidence interval 95 %. Blood group was divided based on ABO blood group system and based on blood group O and non-O. The results showed that there was no significant difference between ABO blood group based on the presence of bleeding manifestation (p=0.579), and there was no significant difference between blood group O and non-O based on the presence of bleeding manifestation (p = 0.600). In this study, there was no significant difference between blood group based on bleeding manifestation in pediatric dengue cases. The previous bleeding risk theory based on blood coagulation factor was not proven based on this research.

Keywords

bleeding manifestation, blood group, dengue, pediatric, Surabaya

1 Introduction

Dengue infection is actually a self-limiting disease, however its rapid and unpredictable clinical manifestation become the main cause on how the disease become worsen [1–2]. The clinical manifestation of dengue presents due to the impairment of blood homeostasis such as high hematocrite, low white blood cells, low neutrophils, high lymphocyte, low platelets, slightly prolonged activated partial

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thromboplastin time, prothrombin time, and thrombin time. The activities of coagulation factors including prothrombin, V, VII, VIII, IX, and X can also be reduced. Patients with excessive depletion of intravascular volume from plasma leakage and/or massive bleeding from endothelial dysfunction (vasculopathy), thrombocytopenia, platelet dysfunction, and coagulopathy may exhibit shock, prolonged shock and repeated shock. The manifestation of vasculopathy are petechial, positive Rumple-Leed test, and the increase of vascular permeability causing the mediators release that leading to plasma, electrolyte, and protein leakage into the extravascular space. While the manifestation of thrombocytopenia and coagulopathy is bleeding in many forms, such as epistaxis, hematemesis, or melena [2–4].

Some studies mention that the level of von Willebrand Factor (vWF) and factor VIII (FVIII) in blood group O is lower compared to non-O blood group (A/B/AB). A study from Kremers et al. in 2015, stated that individuals with blood group O has lower levels of Factor VIII/Anti-Hemophilic Factor (FVIII) and von Willebrand Factor (vWF) compared to non-O blood groups [5]. Colonia et al. in 1979 conducted a coagulation test to see levels of factor VIII (PTT, PTTK) in 300 donors, the result showed coagulation tests on blood group O were lower than other blood type [6]. Gill et al. in 1987, conducted an examination of 1117 volunteers with quantitative immunoelectrophoresis, the results of blood group O has average levels of vWF:Ag were low (74.8 $U \cdot dL^{-1}$) compared to blood group non-O blood group A (105.9 $U \cdot dL^{-1}$), the blood group B (116.9 $U \cdot dL^{-1}$) , and AB blood group (123.3 $U \cdot dL^{-1}$) [7]. Sweeney et al. in 1989 conducted a study on 20 respondents and 20 blood group O blood group A obtained those respondents vWF and FVIII levels are low on blood group O [8]. Gallinaro et al. in 2008 found that the levels of vWF propeptide that accelerate clearance was higher in blood group O compared with non-O [9]. Choi et al. in 2010, compared the coagulation factor and blood loss between O blood group and non-O blood group using hydroxyethyl starch infusion showed a lower baseline FVIII and longer aPTT in O group patient [10]. In other words, individuals with blood group O have a higher bleeding risk than non-O blood groups.

Knowing that blood homeostasis is conducted by blood clotting factors, whereas FVIII and vWF holding important factor within, there was urgency to explore more whether the blood give different specific pattern of bleeding manifestation in dengue infection cases. Thus, the hypothesis can be formulated as follows:

H0: there is no significant difference between blood groups based on bleeding manifestation in pediatric dengue viral infection;

H1: there is significant difference between blood groups based on bleeding manifestation in pediatric dengue viral infection.

2 Materials and Methods

2.1 Materials

The inclusive criteria in this research subjects were: 1) children within age (0–18) y.o.; 2) diagnosed by World Health Organization (WHO) 2011 criteria for dengue infection, there are dengue fever, dengue hemorrhagic fever grade I, dengue hemorrhagic fever grade II, dengue hemorrhagic fever grade III, dengue hemorrhagic fever grade IV, and expanded dengue syndrome [11]; 3) treated in Pediatric Inpatient Ward Dr. Soetomo General Hospital Surabaya; and 4) treated during March–September 2016. While the exclusion criteria were: 1) had history of liver disease before the admission; and 2) had history of blood disorder before the admission.

The independent variable were: 1) Blood group A/B/O/AB, nominal scale which was divided based on ABO system blood grouping criteria (A/B/O/AB); and 2) Blood group non-O, nominal scale which was the total number of blood group A + B + AB based on ABO blood grouping criteria. While the dependent variable was a nominal scale counted by the presence of bleeding manifestation in dengue infection cases.

2.2 Methods

This research was approved by Ethical Committee for Health Research Dr. Soetomo General Hospital, Surabaya. The method used in this study was cross-sectional study, while the sampling was using consecutive sampling. The data collected was from anamnesis, physical examination, blood group data, and patient complaints which were recorded in medical records.

2.3 Data Analysis

The blood group and bleeding manifestation data was analyzed using chi-square test, with p-value (p) <0.05 and confidence interval (CI) 95 %. The chi-square test was chosen to determine the presence of significant correlation between two categorical variables (blood group and the presence of bleeding manifestation) in dengue cases. The correlation was tested using SPPS program.

3 Results

There were 86 subjects that involved in this research. However, only 52 patients were fulfilled the inclusive and exclusive criteria and chosen as the subjects in this research. There were 25 subjects excluded because it had incomplete medical record data, 3 subjects excluded because of previous blood disease history, and 6 subjects excluded because of incomplete blood group data.

Table 1 Comparison of ABO blood group system with bleeding manifestation

		Bleeding Manifestation (%)		N	P (Fisher Exact Test-Chi-Square Test)
		Yes	No		
Blood Group	A	16.7	83.3	6	0.579
	B	41.2	58.8	17	
	AB	28.6	71.4	7	
	O	22.7	77.3	22	
Total				52	

Table 2 Comparison of blood group O and non-O with bleeding manifestation

		Bleeding Manifestation (%)		N	P (Continuity Correction-Chi-Square Test)
		Yes	No		
Blood Group	O	22.7	77.3	22	0.600
	Non-O	26.7	77.3	30	
Total				52	

The characteristics of subject blood group can be observed on Table 1 and Table 2. Based on Table 1, Fisher Exact Test was chosen because the sample number was too small. The p value from Fisher Exact Test (0.579) is more than the alpha value (0.05), meaning that H0 was accepted. There was no significant difference between ABO blood group system based on bleeding manifestation in this research. Based on the Table 2, the p value (0.600) was more than alpha value (0.05), the interpretation was that H0 accepted, there was no significant difference between blood group O and non-O based on bleeding manifestation in dengue viral infection within this research.

4 Discussions

The analysis using the Chi-square statistic method, there was no significant difference between blood group with bleeding manifestation, whether the comparison using ABO blood group system category (p = 0.579) or O and non-O category (p = 0.600). However, there was no other study can be compared because this research was the first study to know the comparison between blood group based on bleeding manifestation. Although there is difference in the level of von Willebrand Factor (vWF) and factor VIII (FVIII) in blood group O is lower compared to non-O blood group (A/B/AB), but the role of bleeding manifestation in dengue infection is might related to the other mechanism which is the presence of thrombocytopenia. It is supported by the study result in Sudan by Elzinandes et al. in 2015, which mentioned that the vascular leakage has implication to the presence of thrombocytopenia [12]. The thrombocytopenia is because of decreasing production of platelet and increasing destruction of platelet in dengue viral infection, which will lead to the presence of bleeding manifestation in dengue infection. Thus, the difference of vWF and FVIII level among blood group itself cannot be the factor of form of bleeding in dengue infection.

5 Conclusions

The conclusion of this study is, there was no significant difference between ABO blood group system with bleeding manifestation in dengue cases. There was no significant difference between blood group O and non-O with bleeding manifestation in dengue cases. The previous bleeding risk theory based on blood coagulation factor was not proven based on this research.

There were some unavoidable limitations in this research. First, this research data source was from medical records, so some incomplete data couldn't be counted and excluded. Second, this research was conducted in one hospital, different result and distribution may present in other health facilities. It is suggested to consider the limitations before executing the future research.

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