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Analysis of Incompatible Crossmatch Results Based on Autoimmune Haemolytic Anemia Characteristics (Aiha) at Pmi Semarang City in 2021-2022

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A B S T R A C T

Crossmatch with positive Major, positive Minor, positive Auto Control results, a DCT examination is carried out whose positive results are suspected to indicate an AIHA diagnosis in the patient, if given there must be a letter from the doctor treating the patient requesting blood to be transfused. Observational descriptive design with a cross-sectional approach, the results of incompatible crossmatch of autoimmune haemolytic anemia patients in 97 patients with elderly characteristics at PMI Semarang City in January 2021-December 2022. Data collection methods using secondary data were analyzed using univariate and bivariate with Microsoft Excel 2010 and SPSS Version 26. Most crossmatch incompatibilities were found at age > 56 years (66%), Major Positive (99%), Positive AutoControl (99%), Diagnosis of Autoimmune Haemolytic Anemia (AIHA). The results of the bivariate test showed that the major crossmatch was -0.073 while the Auto Control was 0.142. This indicates that age does not affect the results of incompatible crossmatches. Most of the needs were met by female sex as many as 118 patients with positive rhesus blood type and dominated by the age of 1-10 years. Analysis of incompatible crossmatch results based on the characteristics of patients with autoimmune haemolytic anemia at PMI Semarang City in 2021-2022 with the result that age can affect the results of incompatible crossmatches.

INTRODUCTION

Autoimmune Haemolytic Anemia (AIHA) is a disorder characterized by an autoantibody reaction produced by the body's own immune system that attacks red blood cells directly so that they undergo lysis. AIHA is classified into 3 types, namely warm type (75%), cold type (15%) and mixed type (5%) whereas, based on the presence or absence of underlying diseases AIHA is divided into two, namely primary and secondary (Gustia, 2019).

Basic Health Research (Riskesdas) in 2013 reported the incidence of anemia in Indonesia was 21.7%. Hemolytic anemia represents about 5% of all anemia. The incidence of AIHA ranges from 1-3 cases per 100,000 people per year, with a prevalence of 17/100,000 people per year. The mortality rate of AIHA ranges from 20-50%, depending on the underlying disease of Autoimmune Haemolytic Anemia (AIHA) (Michel, 2019).

AIHA is usually classified by amplitudenal, warm AIHA is called warm hemolysis caused by IgG antibodies and binds to red blood cells at 37oC or normal body temperature, cold AIHA is called cold hemolysis caused by cold IgM or agglutinins binding to red blood cells at 0oC to 4oC. On laboratory examination, anemia and reticuloctosis were obtained. Red blood cell destroyer is characterized by an increase in unconjugated bilirubin, an increase in LDH and a decrease in haptoglobin levels. In AIHA, erythrocytes with normochrome normocytic morphology and haemolytic signs are found in the form of nucleated erythrocytes and target cells. In AIHA with severe intravascular hemolysis, hemoglobinuria is found which causes brownish-red urine (Oktafany &; Natasha, 2017).

Blood transfusion is one of the important supporting therapies not only for abnormalities in the field of hematology but also in non-hematological cases such as sepsis, pre-operative preparations and other diseases, blood transfusion is related to medical conditions namely large amounts of blood loss caused by trauma, surgery, shock and malfunction of red blood cell formation organs, the use of blood is useful for the purposes of treatment and recovery of health of patients Autoimmune Haemolytic Anemia (Nency &; Sumanti, 2016).

LITERATURE REVIEW

Blood transfusion services as one of the health efforts in the context of healing diseases and restoring health really require the availability of blood or blood components that are sufficient, safe, easily accessible and affordable to the community (Permenkes No. 91 years, 2015).

Blood transfusions are part of the primary health services in the health care system and the people who donate their blood, make a unique contribution to health that saves millions of lives and the survival of others each year, enabling medical and surgical interventions that further complicate and dramatically increase the life expectancy and quality of life of patients with a wide range of acute and chronic conditions (WHO, 2018).H1: Hypothesis one and so on here

Various Blood Components:

a. Whole Blood

Whole blood contains all components of whole blood, both whole blood plasma and red blood cells. divided by 3 :

1) Fresh blood is stored for less than 6 hours and is still full of platelets and clotting factors.
2) Blood stored is stored for more than 6 hours (blood can only be stored for a maximum of 35 days, platelet count and clotting factors have been reduced.

b. Packed Red Cells (PRC)

Packed red cells (PRC) are blood components with a hematocrit of 70-80 percent with a volume produced ± 200 ml (Sumoko, 2019).

This component is obtained from whole blood processed by centrifugation in a refrigerated centrifuge at 375 x G for 15-20 minutes at 220 °C. then separate platelet-rich plasma (PRP) and red blood cells (PRC). This component is stored in a blood bank at a temperature of 4 ± 20 ° C for 35 days with CPDA anticoagulant (Maharani and Noviar, 2018).

c. Thrombocyte Consentrate (TC)

Platelets are made from a complete blood concentrate (buffy coat) and are given to patients who experience bleeding due to thrombocytopenia. Platelet products must be stored under certain conditions to ensure healing and optimal post-transfusion function. Platelet age and function are optimal when stored at room temperature of 20-24oC.

Platelet concentrate is a blood component containing at least 55 x 109 platelets, erythrocytes < 1.2 x 109, leukocytes < 1.2 x 109 per bag with a volume of 50-60 ml ,This component can be obtained from WB with two rounds of refrigerated centrifuge. The first screening was carried out at a temperature of 375 x G for 15-20 minutes at a temperature of 20 ° C for 15 minutes. Platelet concentrate is stored in a platelet mixer at 20-240°C (Maharani and Noviar, n.d.).

d. Fresh frozen plasma (FFP)

Fresh Frozen Plasma (FFP) is a blood component that contains clotting factors, albumin, immunoglobulins and factor VIII. This component was separated from complete blood collected for 6 hours and centrifuged in refrigerated centrifuges at 1500 x G for 30 minutes at 4°C. This component is frozen at -55°C in a blast cooler and stored in a freezer at -18°C for one year (Maharani and Noviar, 2018.).

Autoimmune Haemolytic Anemia (AIHA)

Autoimmune Haemolytic Anemia is a clinical condition in which immunoglobulin G (IgG) and immunoglobulin M (IgM) antibodies bind to antigens on the surface of red blood cells and initiate the destruction of red blood cells through the complement system and reticulodothelial system (Chaudhary &; Das, 2014).

According to its occurrence, AIHA is divided into Primary or idiopathic AIHA and AIHA which is constituted by other diseases is called secondary AIHA. The occurrence of AIHA is more frequent compared to primary

AIHA. AIHA can occur at any age, but is more common in older middle-aged individuals (Roumier et al., 2014).

The basic cause of alloantibody production in AIHA is that the immune system cannot recognize host or self antigens associated with failure of T cells to regulate B cells and tends to cause changes in the structure of antigens in erythrocytes. (Michel, 2014).

Causes of AIHA

White blood cells produce antibodies. Antibodies attach to red blood cells and spread throughout the body to fight bacteria and other foreign substances that should not be present (Lina et al., 2022).

The body of a person with AIHA produces antibodies that attack red blood cells because the body perceives white blood cells as foreign substances that must be destroyed. When red blood cells become lytic or die due to a person's own immune system, the condition is called hemolytic anemia.

AIHA can be triggered by:

a. Exposure to certain toxins or chemicals, for example in medicine
b. Infectious complications
c. receiving blood transfusions with blood types that do not match
d. The blood type of an unborn baby is different from that of its mother
e. certain types of cancer (Park &; Ph, 2016).

AIHA symptoms

The doctor will conduct a medical interview which includes the duration of the main complaint, diet and daily diet, history of traveling to endemic areas, history of bleeding (acute bleeding, dark urine, menstrual cycle, coughing up blood, etc.), medical history, history of chronic diseases, history of surgery, history of pregnancy, and family history. In addition, it is also necessary to ask the history of blood transfusions which are often associated with anemia due to increased hemolysis (Sigbjorn &; Tjonnfjord, 2015).

Primary AIHA is no sign of an underlying condition whereas secondary AIHA is caused by another condition

Common symptoms of AIHA include:

a. Low-grade fever
b. Weakness and fatigue
c. Difficulty thinking and concentrating
d. Pality
e. Rapid heartbeat
f. Shortness of breath
g. Jaundice
h. Dark urine
i. Muscle pain
j. Headache
k. Nausea, vomiting, and diarrhea
l. Dizziness when standing
m. Difficulty breathing

n. Tongue pain
o. Palpitations or rapid heartbeat

METHODOLOGY

The method used in this study is a descriptive research method or descriptive research with a cross sectional approach. The population used in this study is all AIHA patients at PMI Semarang City in 2021-2022, with the inclusion criteria of elderly patients with a population of 97 patients. The sampling technique in this study is a saturated sample The sample of this study was AIHA patients at PMI Semarang City in 2021-2022The method used in this study is a descriptive research method or descriptive research with a cross sectional approach. The population used in this study is all AIHA patients at PMI Semarang City in 2021-2022, with the inclusion criteria of elderly patients with a population of 97 patients. The sampling technique in this study is a saturated sample The sample of this study was AIHA patients at PMI Semarang City in 2021-2022.

The variables in this study are multiple variables . This study used data collection techniques in the form of secondary data. The secondary data in this study is in the form of transfusion blood demand data with the results of incompatible crossmatch examination on AIHA Patients at PMI Semarang City in 2021-2022. The instrument used in this study is Simdondar from crossmatch incompatible examination results of patient blood demand at PMI Semarang City in 2021-2022.

Data obtained from secondary data collection is then processed using statistical programs. Data processing techniques in this study are: Data editing, data coding, data entry, data cleaning, and data tabulating. The data of this study used bivariate analysis.

This research was conducted at PMI Semarang City. This research was conducted from January 2021 to December 2022.

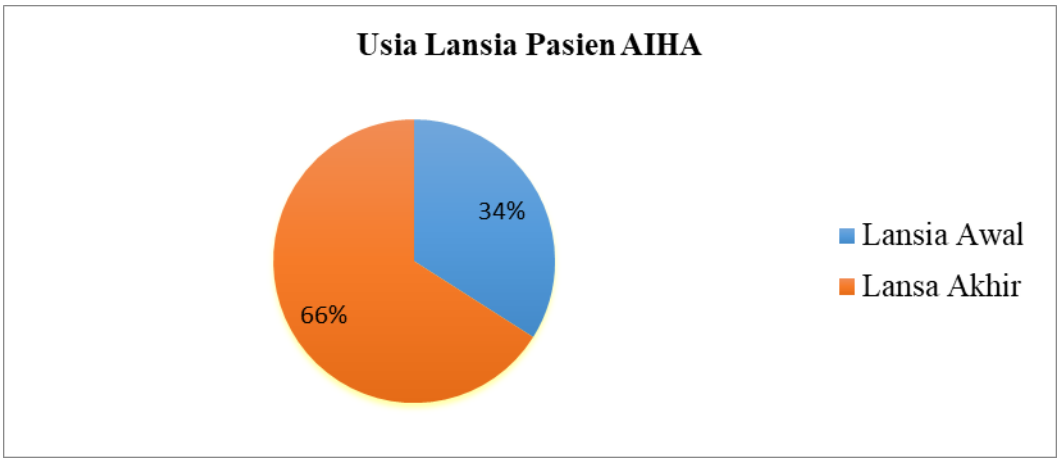
RESEARCH RESULT AND DISCUSSION

This research was carried out from secondary data samples taken from the blood demand symdondar of AIHA patients at PMI Semarang City in January 2021 – December 2022 The data was then grouped based on several categories, including:

a. Presentation of Data Based on Age Categories

Data from grouping based on age and incompatible crossmatch results at UDD PMI Semarang City in February 2021 data obtained as follows: from the diagram below, it can be concluded that the description of the results of crossmatch incompatible examination in AIHA patients based on the age of the elderly during 2021-2022 at UDD PMI Semarang City, the early elderly age of 45-55 years as many as 33 years with a percentage of 34% and the late elderly 56-85 years as many as 64 years with a percentage of 66% due to

elderly patients have immune system or immunity that is susceptible to AIHA.

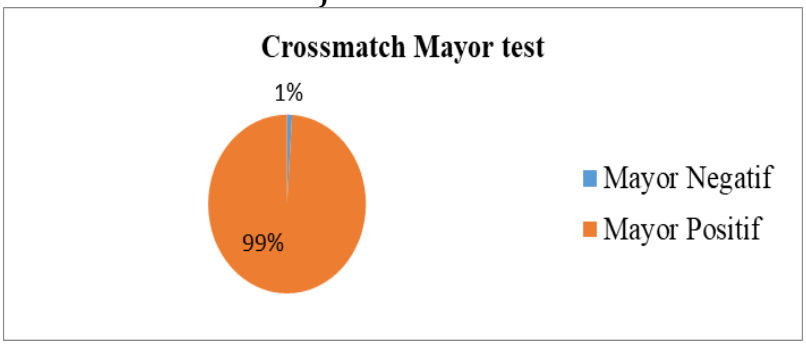


Picture

Table 1.

Usia	Jumlah
Lansia Awal	33
Lansia Akhir	64
Total	97

b.Data Presentation Based on Major Crossmatch Results



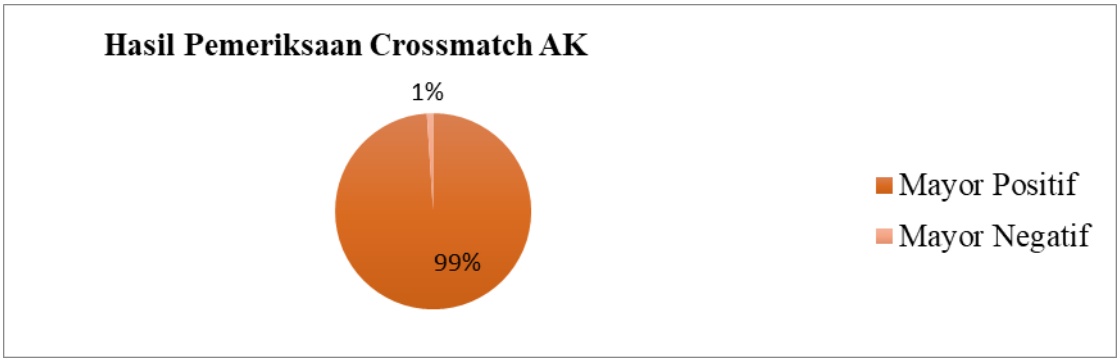
Picture 2. Based on Major Crossmatch Result

Golongan Darah	Frekuensi	Persentase (%)
Mayor Positif	96	99
Mayor Negatif	1	1
Total	**97**	**100**

From the diagram above, it can be concluded from the results of the crossmatch major examination that there are 96 with a percentage of 1% in the results of the crossmtach major test more positive, in the serum of alloantibody patients, namely the immune system that cannot recognize the host or self antigen associated with the failure of T cells to regulate B cells and tends to cause changes in the structure of antigens in erythrocytes.

c. Presentation of Data by Category Auto Control

From the diagram below, it can be concluded from the results of the Positive Crossmatch Auto Control examination there are 96 with a percentage of 99% and Negative Auto Control there is 1 number with a percentage of 1% in the positive crossmatch autocontrol examination more because, in the patient's serum there are alloantibodies, namely the immune system that cannot recognize the host or self antigen associated with the failure of T cells to regulate B cells and tend to cause changes in structure antigens on erythrocytes



d. Bivariate Test Results

Correlations

			Usia	Mayor	AK
Spearman's rho	Usia	Correlation Coefficient	1.000	-.073	.142
		Sig. (2-tailed)	.	.476	.165
		N	97	97	97
	Mayor	Correlation Coefficient	-.073	1.000	-.010
		Sig. (2-tailed)	.476	.	.919
		N	97	97	97
	AK	Correlation Coefficient	.142	-.010	1.000
		Sig. (2-tailed)	.165	.919	.
		N	97	97	97

Age variable Bivariate Test Results with crossmatch incompatible auto control test results Looking at the level of strength (closeness) of the relationship between age variables and the results of crossmatch incompatible autocontrol examination, from the output above, a correlation coefficient of 0.142 is obtained, meaning that the level of relationship strength (correlation) between age variables and the results of crossmatch incompatible auto control examination is 0.142 because the value of the correlation coefficient < smaller than 1, it means that the relationship is very weak.

Looking at the direction (type) of the relationship between age variables and the results of crossmatch incompatible autocontrol examination, the correlation coefficient number in the results above is positive 0.142 so that the relationship between these variables is not unidirectional (type of unidirectional relationship), thus it can be interpreted that age does not affect the results of crossmatch incompatible auto control examination in AIHA patients.

Looking at the significance of the relationship between the two variables, based on the output above, it is known that the signification value or Sig (2-tailed) is major 0.467 and auto control is 0.165 because the value of Sig (2-tailed) > greater than 0.05, it means that there is a significant relationship between the age variable and the results of crossmatch incompatible

Looking at the level of strength (closeness) of the age relationship with the results of the major incompatible crossmatch examination, from the output above obtained a coefficient number of -0.073, meaning that the level of strength of the relationship (correlation) between the age relationship and the results of the major crossmatch examination is -0.073 because the value of the correlation coefficient < smaller than 1 means that the relationship is very weak.

Looking at the direction (type) of the relationship between age variables and the results of major incompatible crossmatch examinations, the correlation coefficient number in the results above, is negative – 0.073 so that there is no relationship between these variables is unidirectional (type of non-unidirectional relationship), thus it can be interpreted that age does not affect the results of major incompatible crossmatch examination in AIHA patients Based on the output above, it is known that the signification value or Sig. (2-tailed) is 0.467 and Auto Control 0.165 because the value of Sig. (2-tailed) > greater than 0.05, it means that there is no significant relationship between the age variable and the results of incompatible crossmatch.

Age discussion based on the results of crossmtach incompatible examination in majors, From the results of data analysis that patients have a late elderly age category of 56-85 years is the largest number of patients, namely 64 with a percentage of 66%, the late elderly age of 56-85 years compared to the early elderly age of 45-55 years less at 33 with a percentage of 34%.

This is because the most demand for blood occurs at that age. Patients with a history of transfusion were found to be higher, as repeated transfusions can stimulate secondary immune responses and increased antibody titers after transfusion. Major that contains donor blood cells glued with the patient's

serum will occur agglutination, hemolysis can occur due to hereditary and acquired disorders.

Age based on the results of crossmatch incompatible examination on auto control, From the results of data analysis that patients have a late elderly age category of 56-85 years is the largest number of patients, namely 64 with a percentage of 66% and the early elderly age of 56-85 years compared to the age of the early elderly 45-55 years less at 33 with a percentage of 34%.

This study is in line with the theory (Michel, 2014) which states that the results of AIHA patients can occur at all ages, however, ≤55 years have a good immune system compared to the late elderly age of ≥56 years, a person does not have various types of cells needed to fight new infections, because the quality of cells that have been owned has decreased. The cells here are examples of naïve T-cells, which are groups of immune cells. Usually these cells will go around and warn when they find an infection, however, as naïve T-cells have aged they will form less and less because the tiny glands behind the breastbone (tyhimus) where they develop, have shrunk, resulting in the range of AIHA.

Age based on incompatible crossmatch examination. That age is not the main factor affecting the results of the incompatible crossmatch examination, this conclusion is obtained from the results of the Spearman rank test where for incompatible crossmatch results based on the major examination there is no relationship with the results of -0.073. Whereas with AK examination there is no relationship with the result of 0.142.

CONCLUSIONS AND RECOMMENDATIONS

Based on research conducted at UDD PMI Semarang City with the title "Analysis of the results of incompatible crossmatch examination based on the characteristics of autoimmune haemolytic anemia patients at PMI Semarang City in 2021-2022" as follows: Based on the results of crossmatch incompatible examination, the study subjects amounted to 97 Autoimmune Haemolytic Anemia patients obtained crossmatch major incompatibility -0.073 while Auto Control 0.142 This indicates that age does not affect crossmatch results.

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