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Original Research

ABO system blood group determination in genetics class

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Abstract

This study aims to determine the blood type of genetics class students based on the ABO system. Blood type is a grouping of human blood based on the presence of agglutinogen on the surface of red blood cells and agglutinin in blood plasma. The activity was carried out in the laboratory of the Faculty of Tarbiyah and Teacher Training, Sulthan Thaha Saifuddin State Islamic University of Jambi, using the slide test method using Anti-A, Anti-B, and Anti-AB reagents. The results of the observation showed that the majority of students had blood type O (63%), while blood types A (18%), B (9%), and AB (9%). This examination utilizes the principle of agglutination, where a clotting reaction occurs if agglutinogen on red blood cells reacts with the relevant agglutinin in the reagent. Determination of blood type is very important for blood transfusions, organ transplants, and medical identification. This study provides students with a practical understanding of the blood type examination procedure and its significance in the health

Introduction

Blood group is a system of categorizing human blood based on the presence of agglutinogens on the surface of red blood cells and agglutinins in the blood plasma. The ABO blood group system is divided into four types, namely blood groups A, B, AB, and O. This classification is determined by the presence or absence of A or B agglutinogens on the surface of red blood cells and Anti-A or Anti-B agglutinins in the blood plasma (Susilawati & Bachtiar, N., 2018).

The blood group test is carried out by examining the reaction to the agglutinogen on the surface of red blood cells to the same agglutin in the antisera reagent (Nasution et al., 2022). Blood type is an important requirement if you want to become a donor or in blood transfusion because there must be blood compatibility (National Institute of Health 2020). Blood tests can be done at hospitals, health centers and health clinics. blood group checking is very necessary because it functions to find out the blood type. (Hardani et al., 2018).

Blood groups are a classification of blood that exists in humans, especially based on the presence of agglutinogens due to differences in carbohydrates and proteins on the surface of the red blood cell membrane and the presence of agglutinins in blood plasma (Susilawati and Bactiar N., 2018). ABO system blood classification is very important when we do blood transfuse or transplantation. This is important because the process of transfusing ABO system blood that is not compatible can cause death (Alivameita A., & Puspitasari 2020).

According to Rahfeld & Withheld (2020) the blood grouping and blood type of the ABO system consists of several things including:

1. A person who has blood type A means that they have agglutinogen A on the surface of their red blood cells and produce anti-B agglutinogen in their blood serum. People who have blood type A must get or receive fellow blood type A.
2. A person with blood type B has B agglutinogens on the surface of his red blood cells and produces anti-A agglutinogens in the blood serum. People with blood type B must get or receive fellow blood type B.
3. A person who has blood type AB has agglutinogens A & B on the surface of his red blood cells and does not produce agglutinins in his blood serum. so that people who have AB blood groups can receive blood from people with ABO blood groups or commonly referred to as universal recipients.
4. A person with blood type O has red blood cells without agglutinogens, but produces anti-A and anti-B agglutinogens. So that people with O-negative blood type can donate their blood to people with ABO blood type.

There are several reasons why it is important for us to check our blood type according to Amelia & Widuri (2020) are: (1). It is important when we are going to carry out the blood transfusion process for several medical conditions such as when losing a large amount of blood or surgery. Incompatible blood groups between recipients and donors can cause serious immunological reactions and can even be life threatening. (2). In the process of organ transplantation, the donor and recipient must have compatible blood types for the transplantation process to be successful. (3). Important in medical identification. (4). And important for influencing reactions to certain drugs.

Method

This blood group determination activity was carried out in the tarbiah and keguruan faculty laboratory at Sulthan Thaha Saifuddin Jambi State Islamic University Jl.Jambi Muara Bulian KM 16, Sei Duren, Mendalo Darat, Kec. Luar Jambi.This blood group determination was carried out by Biology students in semester 3 (three) of the faculty of science and technology.This blood group determination activity was carried out on October 16, 2024 at 07.30-10.00.Before determining blood groups there are several stages that need to be explained, namely: The first stage is the delivery of material first explained by the lecturer regarding material related to the classification and characteristics of the ABO system blood group. The second stage is an explanation related to the methods and methods that will be carried out, this is exemplified or practiced directly by the lecturer and one of the students on how to check the blood type system properly and correctly. The next stage is a question and answer session given by the lecturer to students if there are those who do not understand how to check blood groups.

With several procedures carried out including

1. Each student must prepare a blood type test card and be given a biodata first.
2. After that, sterilize one of the student's fingertips using a cotton swab that has been moistened with 70% alcohol.
3. Squeeze the side of the finger that will be taken blood
4. After that, prepare a lancet and puncture the lancet into the tip of the finger that has been sterilized until the blood comes out.
5. After the blood comes out, drop the blood into the blood type test paper with an equal amount.
6. When finished, cover the student's wound using cotton or tissue.
7. Return to the blood group paper that has been dripped with blood and then dripped with anti-A, anti-B and anti-AB reagents in each column found on the test paper as much as 1 drop.
8. After observing this observe the clotting that occurs and we can only determine the blood type.

After performing the ABO system blood group checking stage, students are expected to know their respective blood groups and be able to check blood groups. After checking blood groups, students can store blood group cards and are expected to be able to make blood grouping tables.

Results and Discussion

Table.1: Blood group determination

Sample	Anti-A	Anti-B	Anti-AB	Blood Type
1	-	-	-	O
2	-	-	-	O
3	-	-	-	O
4	+	-	-	A
5	-	+	-	B
6	-	-	-	O
7	+	-	-	A
8	+	+	+	AB
9	-	-	-	O
10	-	-	-	O
11	-	-	-	O

From the results of our research, determining the blood type of genetics class, the majority of students have blood type O (7 people) with a percentage of 63%, while in blood type A (2 people) a percentage of 18%, and in blood type B 9% (1 person) and AB has a percentage of 9% (1 person).

In principle, blood group examination aims to check the agglutination between agglutinogens in blood samples with agglutinins contained in serum reagents (Nasution et al., 2022; Oktari, A., & Silvia, N.D., 2016). The results of the blood type examination of biology class 3A contained in table 1, show that blood samples with blood type A will be agglutinated by Anti-A serum, blood samples with blood type B will be agglutinated by Anti-B serum, blood samples with blood type O will not be agglutinated by both Anti-A and Anti-B serum, and blood samples with blood type AB will be agglutinated by both Anti-A and Anti-B serum. Clumping or agglutination occurs because agglutinogens react with the same type of agglutinin. Conversely, clumping or agglutination will not occur if the agglutinogen is different from the agglutinin. So that the ABO system blood group examination is easily detected using the slide method by adding Anti-A and Anti B serum reagents to the blood sample Naturally, the human body has agglutinins in its blood plasma (serum) to fight agglutinogens that enter the body. When there is an agglutinogen that enters the body and is relevant to the agglutinin in the serum, an agglutination reaction will occur.

Overall, the student practicum in the form of blood type examination, was successfully carried out well. This success can be seen by increasing student knowledge about the importance of blood type examination and students who do not know their blood type can be facilitated.

Conclusion

Based on research conducted by genetics class students who determine blood type, it can be concluded that through this examination activity can help increase student knowledge about the ABO system blood classification system. Through this research activity, students are also facilitated to know their blood type through the process of checking blood type. In checking the blood type of the genetics class, the data obtained were 18% blood type A, 9% blood type B, 63% blood type O, and 9% blood type AB. And blood type checks using blood type A serum, blood type B serum, and blood type O serum can be done, based on experimental results and based on existing theory. the majority in the genetics class have blood type O.

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