

# Characterization of hemolysins in type O blood donors, blood bank. General public health hospital

## Abstract

The objective of this study is to analyze the characterization of hemolysins in type O blood donors who come to the Blood Bank of the Barquisimeto General Hospital, Lara State. The research methodology is a quantitative approach, descriptive type of field design, non-experimental cross-sectional type, the population was 210 samples between men and women for the total number of blood donors received and the sample 98 group O sera, carried out the data collection and the results reflect that 29% are male and 35.71% female, 83.67% Rh positive and 16.33% Rh negative and the predominant age is 41.84% from 18 to 29. years, 10.20% there is presence of hemolysin and 89.80 there are no hemolysins, the characteristics of the sample with hemolysins present were 50% male and 50% female, 90% Rh positive and 10% Rh negative and the age that predominates. It is 60% from 18 to 29 years old and is concluded regarding the epidemiological characteristics of O blood donors; a high percentage are male, Rh positive and the predominant age is 18 to 29 years, in a low percentage there is the presence of hemolysins and the characteristics of O blood donors with hemolysins present, half are male and half female, a high percentage They are Rh positive and the predominant age is 18 to 29 years.

**Keywords:** hemolysins, type O blood donors, nursing

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## Introduction

Blood donation is an act that reflects selfless love towards the person receiving the donation. This fact involves many aspects and perhaps many donors do not know that this act makes them heroes. Donating seems to simultaneously establish a double relationship between the one who donates and the one who donates receives.<sup>1</sup> A relationship of solidarity, since the donor shares what he has, donating seems to establish a difference and an inequality of status. Blood donation is, above all, a social fact, presided over by a certain cultural attitude, in which all types of convictions influence religious, solidarity, compensation and economic relations.<sup>2</sup> This act must be carried out in appropriate spaces. These spaces are the blood banks, a physical area equipped and appropriately distributed for the care of the blood donor. Some of the most important areas according to the Venezuelan hemotherapy society are: interview and selection area for the blood donor, blood extraction area blood, separation area of blood components and laboratory area to carry out immunohematological studies before transfusion, apart from the fact that it must comply with a series of regulations and requirements demanded by the law of each country, in Venezuela who governs the regulations is SOVEHEM.<sup>3</sup>

Each blood donor has protein substances and sugars in the membrane of their red blood cell that act as an antigen which determine the composition of the different blood groups that are currently known. According to studies carried out, there are more than 200 blood groups, each a human being has a certain antigen on the membrane of its red blood cell and in the plasma it has antibodies for the antigen that it does not have and recognizes it as foreign. For example, if the red blood cell has antigen A on its membrane, it will have antibodies circulating in the plasma, anti B, this discovery was described by Karl Landsteiner in 1900. The discovery of the ABO blood group system was fundamental for the development of blood transfusion Landsteiner 1900-1901 after separating the serum from the blood and mixing with the samples obtained, he observed reactions different, which allowed him to identify the characteristics present in the membrane of red blood cells and establish blood groups: group A express antigen A and

develop antibody against antigen B in the plasma, group B express antigen B and develop antibody against antigen A, group O do not have antigen on the red blood cell membrane but in the plasma they develop antibodies for antigen A and B, group AB have both antigens on their erythrocyte membrane and in their plasma they do not develop antibodies. Type O blood donors do not have any antigen on the membrane of the red blood cells, in this sense in 1908, Ottenberg stated that the Universal Donor is the type O blood group. By not inducing an immunological reaction due to the absence of antigen A and B antigen, this blood group is currently in high demand as an alternative in hospital emergencies, however this blood group has anti A and anti B antibodies in its plasma capable of reacting against A, B or AB cells. The importance of identifying these antibodies is given by the risk of producing hemolysis.<sup>4</sup> The prevalence of IgG type hemolysins is a very old problem that for a long time has not been given due importance, due to the little information available on the subject and because strict monitoring is not carried out, hemolysins have proven to be fatal for patients who receive transfusions from these donors due to these risks, the official gazette of Venezuela 1997 chap. V art 18, blood used for therapeutic purposes must be previously subjected to the different tests that the Ministry of Health and Social Assistance indicates for the determination of blood groups or factors and their antibodies, among the relevant tests is the control test of hemolysins.<sup>5</sup>

The ideal personnel to carry out immunohematological studies and perform blood compatibility tests is the nurse specialized in hemotherapy according to Dr. Linares 1984, in 1945 there were not many specialties in the field of health services, so the founders of the Municipal Blood Bank in Venezuela where they considered that the ideal personnel for the care of blood donors, the study of blood groups, the preparation of transfusions and their administration was the nursing professional. This is how the figure of the hemotherapist nurse emerges, unique in the world, worthily represented by Hilda Josefina Pérez, who had the honor of being the first hemotherapist nurse in Venezuela. The Dr. Pastor Oropeza Riera General Hospital in Venezuela has a hemato-oncology unit in which the blood

bank facilities are located. It is in charge of the coordination of a hemotherapist nurse, where the different procedures are carried out competent activities in the field of hemotherapy, such as donor selection, blood extraction, separation of blood components. Typing and cross-matching are performed on the blood bags, however, some of the tests that should be performed on the blood components of type O blood donors, such as hemolysins, are not performed and some cases of adverse reactions are reported in the recipient that is inferred could be related to the presence of hemolysins and due to the above, the question arises: what is the characterization of hemolysins in type O blood donors who come to the blood bank of the Dr. Pastor Oropeza general hospital? Laughter. General Objective to analyze the characterization of hemolysins in type O blood donors who come to the blood bank of the Dr. Pastor Oropeza Riera general hospital.

## Materials and methods

### Study design

Research with a quantitative, field, descriptive, non-experimental, observational, transversal approach. The population is made up of 210 donors between men and women for the total number of blood donors received and the sample contains 98 O positive samples. A data collection survey used in the research work Hemolysins and Neutralizable Antibodies in donors was used<sup>6</sup> said instrument was contextualized and validated; where the data obtained from the donor selection sheets were recorded, during the procedure it was carried out in the blood bank area to find hemolysins present in the serum of volunteer donors, the method used for the dosage of hemolysins It was performed using the serum tube test, where the presence of hemolysins in type "O" blood (universal donor) was detected. The dosage of hemolysins is based on the activation of complement by the formation of the antigen-antibody complex, between the erythrocyte surface antigen and the hemolysin, placing test serum before suspensions of red blood cells "A" and "B".<sup>7</sup> Data collection was obtained from the donor selection form, from which the assigned donor number, blood group, age and sex were taken, since a series of questions were asked during the donor selection process and also because it was a process where the identity of the applicant must be safeguarded. During the blood extraction process, the sample was collected in red tubes without anticoagulant, with silicone coagulation activator in order to obtain serum from the donors.

### Procedure

Once the samples were obtained in the red tubes, they were centrifuged at 5000 rpm for 5 minutes to obtain the serum. 2% suspensions in saline solution of erythrocytes "A" and "B" were prepared. Test tubes were labeled with the letter "A" and "B" which correspond to the blood type. 100uL of test serum and 100uL of the erythrocyte suspension from each group were deposited into the corresponding tube. Finally, each tube was taken to the centrifuge and centrifuged at 2500 rpm for 2 minutes and immediately read once the centrifugation was completed to observe whether there was presence of hemolysis or not.

## Ethical considerations

Participant confidentiality was ensured at all times. None of the ethical and bioethical principles will be violated.

## Results

### Descriptive analysis

According to the results of the samples examined, the characteristics of the O donors where 64.29% are male and 35.71%

female, in addition 83.67% Rh positive and 16.33% Rh negative and the predominant age is 41.84 % from 18 to 29 years old (Table 1). On the other hand, in 10.20% there is presence of hemolysin and 89.80% there are no hemolysins Table 2 in the sample 50% are male and 50% female, 90% Rh positive and 10% Rh negative and the age predominance is 60% from 18 to 29 years in Table 3.

**Table 1** Distribution of absolute and percentage frequencies of donor characteristics O donors

Characteristics of O donors		
Sex	f	%
Feminine	35	35,71
Males	63	64,29
RhD	f	%
RhD positive	82	83,67
RhD negative	16	16,33
Age	f	%
18-29 years	41	41,84
30-40 years	37	37,76
41-50 years	14	14,29
≥ 50 years	6	6,12

**Table 2** Distribution of absolute and percentage frequencies of the presence of hemolysin in O donors

	Presents		Absents	
	f	%	f	%
Hemolysin	10	89,80	88	10,20

**Table 3** Distribution of absolute and percentage frequencies of characteristics of O donors with hemolysins present

Characteristics of O donors with hemolysins present		
Sex	f	%
Females	5	50
Males	5	50
RhD	f	%
RhD positive	9	90
RhD negative	1	10
Age	f	%
18-29	6	60
30-40	2	20
41-50	0	0
≥ 50	2	20

## Discussion of results

Hemolysins are anti A and anti B antibodies that will cause hemolysis in the erythrocytes of recipients of blood groups A, B, and AB as long as the blood donor has high titers ( $\geq 1/64$  or  $\geq 1/256$ ) in their plasma.<sup>8</sup> On the other hand, studies carried out describe that the presence of these hemolysins is related to the production of a hemolytic reaction in the use of concentrates from group O donors with the unusual presence of high titers of anti-A and anti-B and transfused to group patients. A, B and AB. The methods suggested to improve the safety of transfusions to people of other blood groups have focused on defining a level of antibodies to avoid the risk of hemolysis. In RTHA, 2 types of hemolysis are present: intravascular and extravascular, so it is related to the type of immunoglobulin, the concentration of antibody and the state of the immune system.<sup>9</sup> A study carried out in Colombia coincides with similar results since it was identified that the population group aged 19-29 years, 32% female and 68% male<sup>10</sup> in addition to the study where 55% were men and

45% women, 93% O positive and 7% O negative<sup>11</sup> likewise, in Costa Rica their results were 52.88% men and 47.12% women and the age group of 30 to 45 years represented the majority of donations<sup>12</sup> and in Paraguay in a study they found that 67% were male and 33% female, the age range between 28 and 45 years was the most frequent.<sup>13</sup>

A research work named Titration of hemolysins in platelet concentrates from voluntary blood group O donors where when analyzing the samples the existence of hemolysins was determined<sup>14</sup> it also coincides with their research titled Prevalence of hemolysins in voluntary blood donors type O blood from the Ramiro Prialé National Hospital, the result obtained was from the 80 sera in the study 2.5% which is equivalent to two cases of type IgM hemolysins conclusion that there are voluntary donors with a low prevalence of hemolysins but present in the serum.<sup>5</sup> Similarly, an investigation entitled the presence of hemolysins in platelet concentrates obtained from blood group O blood donors, results determined a prevalence of 59% of hemolysins. Conclusion the production of high titers of hemolysins is related to the study variables, both the IgG and IgM isogroups, so it is recommended that isogroup platelet concentrate should be transfused if possible.<sup>15</sup> In Peru, a study on the titer of natural anti-A and anti-B antibodies stands out. It determines that platelet concentrates obtained by apheresis, coming from donors with a high titer of antibodies, should be transfused into isogroup recipients whenever possible to avoid post-reactions transfusions, for this, each institution should establish a policy for the management of these blood components.<sup>16</sup>

## Conclusion

It is concluded in relation to identifying the presence of hemolysins in type O blood donors who go to the blood bank of the Public Health Hospital to a large number of O donors; There is no presence of hemolysin, when describing the characteristics of O blood donors with hemolysins present, the results of the samples examined, half are male and female, a high percentage are Rh positive and the predominant age is 18 to 29 years.

## Acknowledgments

None.

## Conflicts of interest

The author declares that there are no conflicts of interest.

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