

ORIGINAL ARTICLE

FREQUENCY OF ABO BLOOD GROUP DISCREPANCIES AND ITS CLASSIFICATION INTO GROUPS IN TERTIARY CARE HOSPITAL, KARACHI

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ABSTRACT

Background: The aim of this study was to document the frequency of ABO discrepancies through ABO blood group test performed by the tube technique method. It was conducted on residents of Karachi in Ziauddin hospital, which were then categorized into four groups.

Methods: Descriptive, cross-sectional type of study was conducted at the Blood Bank of Dr. Ziauddin Hospital, North Nazimabad and Clifton campuses in Karachi Pakistan. A total of 1522 samples were included with the exclusion criteria of neonates and infants of up to the age of 6 months. The time frame was from September 2016 to March 2017. Blood samples were collected from a superficial vein by trained phlebotomists and submitted to the blood bank department in 2 tubes, purple top vacutainer tube containing Di-potassium Ethylene Diamine Tetra Acetic Acid (K2 EDTA) anticoagulant and red top vacutainer tube containing clotted blood. Blood group testing was done by tube technique by a researcher and then redone by the senior technologist of blood bank to control bias.

Results: 1557 hospitalized patients (854 males and 703 females) from various clinical specialties in Ziauddin Hospital, Karachi and other hospitals were included for ABO blood grouping. The male to female ratio was 1.2:1 with the age range from 9 months to 92 years. ABO discrepancies were positive in 18 out of 1557 Patients (1.1%). Male to female ratio among positive ABO discrepancies were 1:5 (11 males and 7 females out of 18 patients). Four groups of ABO discrepancies were formed. The most common one being group I discrepancies which had 12 out of 18 Patients (66.7%). Group II discrepancies had 2 out of 18 Patients (11.1%). Group III discrepancies had 1 out of 18 Patients (5.5%) and Group IV discrepancies consisted of 3 out of 18 Patients (16.7%).

Conclusion: Forward and reverse groupings are essential to blood group testing for assigning the correct ABO blood group to the individual. Those ABO discrepancies in which forward and reverse grouping are not matched to each other can cause severe transfusion reactions resulting fatal for life. Therefore, it is necessary to ensure that the correct ABO blood product is transfused to save a life. Thus, reverse grouping should be strictly adopted in every blood bank and transfusion services as a routine practice.

KEYWORDS: Forward and Reverse grouping, ABO discrepancies.

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INTRODUCTION

About 400 blood group antigens have been report-

ed inside a human body, in which ABO and Rh systems are recognized as the most significant ones.¹ There are two components of ABO blood

grouping; forward and reverse grouping.² To detect ABO antigens on red cells, forward grouping is performed using commercially available monoclonal anti-A and anti-B antisera. To detect the presence or absence of anti-A and anti-B antibodies in the serum, reverse grouping is done using red cell reagents of known ABO groups. Reverse grouping is performed to verify the results of forward grouping. When sudden reactions appear in the forward and reverse grouping, assigning of a true blood group becomes difficult. This is referred as an ABO discrepancy^{2,3}.

The frequency of ABO discrepancies ranges from 0.05% to 0.09%⁴. ABO Discrepancies are divided into four major types: Group I, II, III and IV. Unexpected reactions in the reverse grouping due to the missing antibodies are labeled as Group I discrepancies. Discrepancies are associated with missing antigens in forward blood group testing. Group III discrepancies occur due to abnormalities present either in the plasma or proteins and group IV discrepancies occur due to miscellaneous problems².

The aim of detection and resolution of ABO discrepancies is to make sure that correct blood group label to an individual and safe blood product is transfused. Errors in ABO testing i.e. either forward or reverse grouping occur as a result of assigning a wrong ABO group to the individual⁴. A wrong transfusion of a mismatched blood group can be lethal and causes significant transfusion reactions^{5,8}.

There is paucity of data regarding frequency and various types of ABO discrepancies in our population. This is because reverse grouping is not routinely performed in all the blood banks of Pakistan. Since there is no local data available regarding various types of ABO discrepancies therefore, this prospective study sets out to evaluate the frequency of ABO discrepancies and its types in the individuals presenting to a blood bank in a tertiary care center of Karachi enabling comparison of data with the western world. Thereby, appropriate measures could be taken to minimize ABO discrepancies.

METHODS

This study was conducted at the Blood Bank of Dr. Ziauddin Hospital, North Nazimabad and Clifton Campuses Karachi Pakistan.

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration.

A total of 1522 samples were included and neonates and infants up to the age of 6 months

were excluded. This is a cross-sectional descriptive type study. Statistical analysis was done through SPSS version 2.0. All blood samples were collected from a superficial vein by trained phlebotomists and submitted to the blood bank department in 2 tubes, purple top vacutainer tube containing Di-potassium Ethylene Diamine Tetra Acetic Acid (K2 EDTA) anticoagulant and red top vacutainer tube containing clotted blood. Blood group testing was done by tube technique by a researcher and then redone by the senior technologist of blood bank to control bias.

1. ABO group (Forward Grouping) was determined by testing sample RBCs with Anti-A and Anti-B monoclonal antisera reagents. This was performed for detecting ABO antigens. Reverse grouping was performed by testing serum with known reagent A, B and O red blood cells (RBCs) for detection of expected reciprocal ABO antibodies.

2. When identified, ABO discrepancies were categorized into groups according to types and resolving by auto controls, reaction of serum with O reagent cells, variable incubations at variable temperatures (room temperature, 37°C and 40°C), increasing serum to cell ratio, saline replacement technique, pre-warm technique, red cell allo-antibody screening, identification and adsorption-elution techniques.

RESULTS

From various clinical specialties in Ziauddin Hospital, Karachi and other hospitals, total 1557 hospitalized patients (854 males and 703 females) were included for ABO blood group testing. The male to female ratio was 1.2:1 (Table 1) and age ranges from 9 months to 92 years. ABO blood group discrepancies were detected in 18 patients out of 1557 (1.1%) (Table 2).

TABLE 1: GENDER DISTRIBUTION OF INDIVIDUALS PRESENTED IN TERTIARY CARE HOSPITAL SCREENED FOR BLOOD GROUP TESTING

PARAMETERS	N	%
TOTAL PATIENTS	1557	-
FEMALE	703	45.2
MALE	854	54.8

TABLE 2: TOTAL FREQUENCY OF ABO DESCRIPENCIES IN TERTIARY CARE HOSPITAL IN KARACHI

PARAMETERS	N	%
TOTAL PATIENTS	1557	-
ABO DISCREPANCIES (POSITIVE CASES)	18	1.1
ABO DISCREPANCIES (NEGATIVE CASES)	1539	98.9

Four groups of ABO discrepancies were present. Most common one was group I discrepancies which had 12 out of 18 Patients (66.7%). Group II discrepancies had 2 out of 18 patients (11.1%). Group III discrepancies had 1 out of 18 patients (5.5%) and Group IV discrepancies consisted of 3 out of 18 patients (16.7%) (Table 3).

TABLE 3: VARIOUS GROUPS OF ABO DISCREPANCIES

VARIOUS GROUPS OF ABO DISCREPANCIES	N-18	%
GROUP I	12	66.7
GROUP II	2	11.1
GROUP III	1	5.5
GROUP IV	3	16.7

DISCUSSION

Very few studies have been published concerning the analysis of frequency of ABO discrepancies due to the lack of data regarding frequencies of ABO discrepancies in Pakistan's blood bank centers.

This study was a possible effort for the evaluation of frequency of ABO discrepancies by meeting the required criteria as per international guidelines. The overall incidence of ABO discrepancies in a tertiary care hospital of Karachi was 1.1% (Table 2) which was much larger than those studies reported in other regions of the world. In this study, I excluded technical errors which occur during testing and I addressed frequency of ABO discrepancies in its various groups from group I to IV.²

Bashawri et al. studied analysis of ABO discrepancies in the Middle East, Saudi Arabia. In that particular study frequency of ABO discrepancies ranged from 0.05 to 0.09% which was very small in contrast to my study. This could be due to the large sample size i.e. 549,229 and more positive cases i.e. 261. Furthermore, Bashawri also included technical errors such as phlebotomical and handling errors of blood group testing. In his study he did not categorize groups of ABO discrepancies although he did include causes of ABO discrepancies. The most common cause of ABO discrepancies in that study was ABO subgroups and alloantibodies which were 81.6%. Second most common cause was because

of technical errors i.e. around 18.4%. This frequency is a little bit similar to my own as my study showed the most common group of ABO discrepancies was Group I.

Chiaroni et al. analyzed frequency of ABO discrepancies in 35 French hospitals and he found 0.03% of frequency of ABO discrepancies which is similar to Bashawri et al. study but again very smaller value than my study. In that study he also included technical errors and the most common cause was clerical errors and phlebotomical errors. He also included a large sample size i.e. 407,769 as compared to my study i.e. 1557.

CONCLUSION

Forward and reverse groupings play a vital role to assigning the correct ABO blood group to an individual. ABO discrepancies in which forward and reverse grouping are not matched to each other can cause fatal transfusion reactions. Therefore, it is necessary that the correct blood product is transfused to save a life. Thus, reverse group test should be strictly adopted by every recognized blood bank and transfusion services as a routine practice for patient's saving life.

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