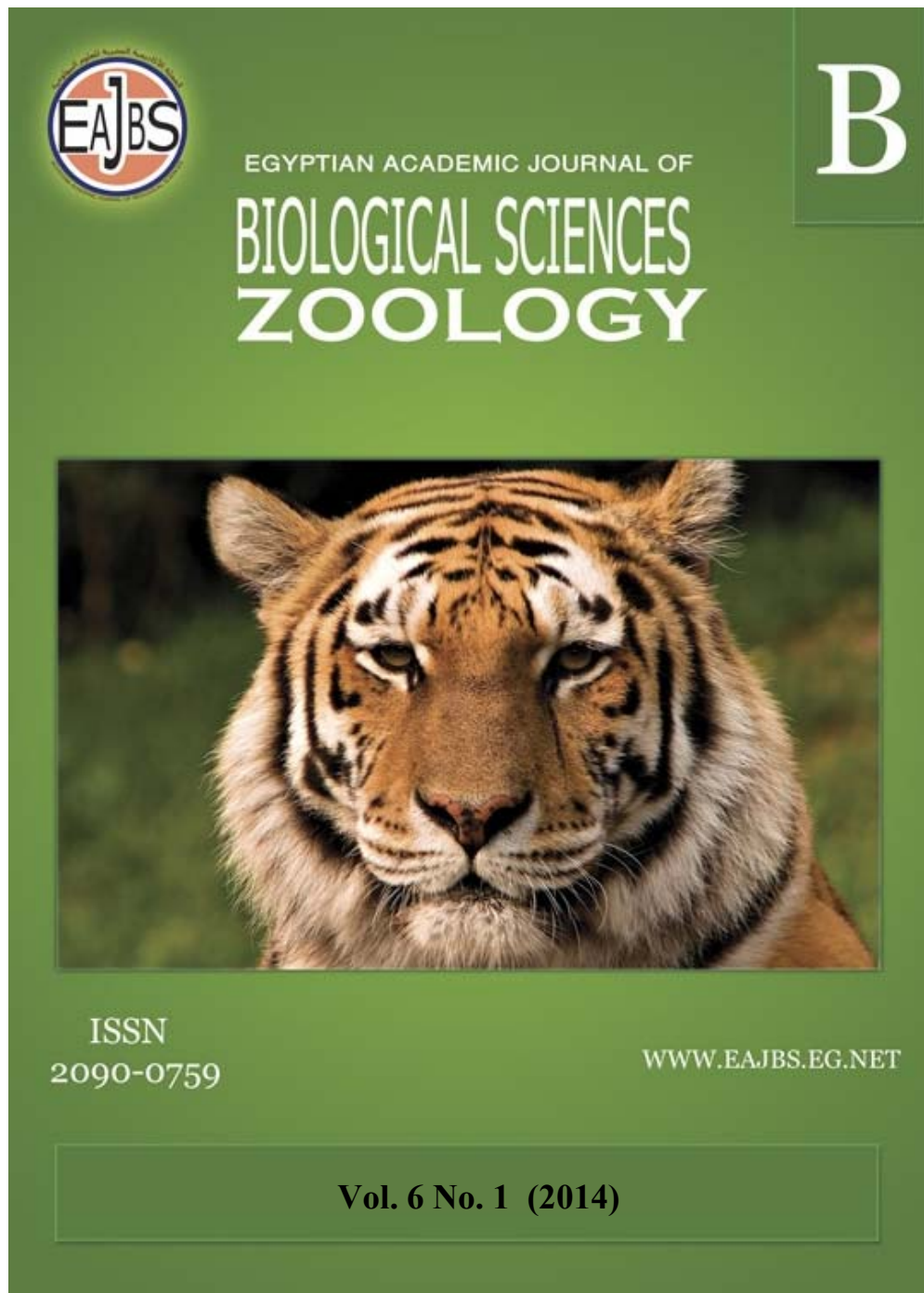


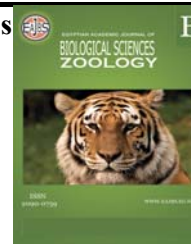
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ABO-Rh Blood Groups Distribution among King Khalid University Girls Students: A Prevalence Study

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ABSTRACT

Objective: A questionnaire-based prevalence study was carried out on a random sample from various girls' science college, King Khalid University, to find out the distribution pattern of ABO and Rh blood groups among Saudi females, which would not only help in blood transfusion services but also eliminate the risk of erythroblastosis fetalis in the neonates.

Method: The procedure for this study was done by giving the questionnaire to 3287 female students. Each participant filled out the questionnaire and gave it back after answering all the questions. The participants were volunteered to fill out the questionnaire.

Results: Of the 3287 female students enrolled in this study, 965 students know their blood groups. Amongst ABO system, blood group O was the most common (57.31%) followed by A (32.74%), B (9.22%), and AB (0.73%), respectively. Regarding rhesus system, Rhesus positive was more common (90.3%) than Rhesus negative (9.7%).

Conclusion: The current study documents ABO and Rhesus blood group distribution pattern amongst King Khalid University Girls Students. Findings ensured that there is need for educational and community support program for effective management of medical emergencies.

Keywords: Blood groups; Rh factor; Transfusion; ABO antigens; Saudi Arabia

INTRODUCTION

Everybody has a blood group type. The most common blood group classification system is the ABO system discovered by an Austrian scientist, Karl Landsteiner in the early 1900s (Landsteiner, 1900). He found three different blood groups (A, B, and O) from serological differences in blood. In 1902, von Decastello and Sturli discovered the fourth blood group, AB (von Decastello and Sturli, 1902). Blood groups are of great clinical importance in blood transfusion and in transplantation. In fact, the discovery of the blood group system was one of the most important factors in making the practice of blood transfusion possible (Pasha *et al.*, 2009). Human have 29 known blood group systems (recognized by International Society of Blood Transfusion, ISBT, <http://blood.co.uk/ibgri/>)

(Hosoi, 2008). Each blood group system is represented by definite antigens found on the surface of red blood cells. The popular blood grouping systems are ABO blood group system, Rhesus blood group system, MNS system, Kell system, Lewis system, etc. However, ABO blood group system and Rhesus blood group system are the most common in human (Fauci *et al.*, 2008).

ABO is the most important blood group system in transfusion medicine, because transfusion of ABO incompatible red cells will almost result in symptoms of a haemolytic transfusion reaction (HTR) and may cause disseminated intravascular coagulation, renal failure, and death (Fauci *et al.*, 2008). The four phenotypes A, B, O, and AB are present in most populations, but their frequencies differ substantially throughout the world. The second most popular known blood group system is the Rh factor system. This one refers to whether an Rh antigen is or is not present on surface of the red blood cells. People who are rhesus positive (Rh+) have a protein known as D antigen on the surface of their red blood cells, and they are said to be RhD-positive. People who do not have the D antigen are known as RhD-negative (Rh-). Rh-positive is the predominance among people but this varies with race; 85% of Caucasians, 94% of Africans, and about 90% of Asians are Rh-positive (Ganong 2005; Guyton and Hall, 2005).

The importance of Rh factor blood type in pregnancy can be seen in babies of mothers who are Rh- and receive an Rh+ gene from their fathers who are Rh+, and the pregnancy is characterized by maternal-fetal Rh incompatibility. If an Rh- mother has already had a prior pregnancy with an Rh+ fetus, and has another Rh+ baby, the baby is susceptible to Erythroblastosis fetalis if the first baby's blood inadvertently mixed with the mother's blood and the mother produced antibodies against Rh+ blood cells of her baby, which the mother's immune system recognizes as "foreign". Production of these antibodies is called sensitization or isoimmunization (Murray and Roberts, 2007).

Erythroblastosis fetalis is a hemolytic anemia of the fetus or newborn due to transplacental transmission of maternally formed antibody against the fetus erythrocytes, usually secondary to an incompatibility between the mother's Rh blood group and that of her offspring. Although more than 60 RBC antigens can stimulate antibody formation, erythroblastosis fetalis usually results from Rh isoimmunisation. When the mother's antibodies attack the baby's red blood cells, the blood cells swell and burst, and are destroyed. The disease can be inconsequential, producing mild anemia and jaundice, or severe, resulting in long term morbidity or death (Maisels, 2006). Intrauterine transfusions can save 40% of fetuses with erythroblastosis fetalis. However, in severe, untreated erythroblastosis fetalis, prognosis is poor, especially if kernicterus (a condition with severe neural symptoms associated with high unconjugated bilirubin in the blood) develops resulting from extensive hemolysis. (American Academy of Pediatrics Subcommittee on Hyperbilirubinemia, 2004) Gamma globulin that contains anti-Rh-positive antibody can provide passive immunization, which prevents maternal Rh isoimmunization in Rh-negative females. However, it is ineffective if sensitization has already resulted from a previous pregnancy, abortion, or transfusion (Mundy, 2005).

The objective of this study was to determine the frequency of different blood groups among Saudi females, which would not only help in blood transfusion services but also eliminate the risk of erythroblastosis fetalis in the neonates.

MATERIALS AND METHODS

Students from different girls' colleges at King Khalid University were invited to participate in this questionnaire survey. Each participant was asked to fill out the questionnaire as honestly as possible. The questionnaire included questions that will identify the blood group, marital status (single or married) of the participant, and the reason for knowing her blood group.

RESULTS

Of the 3287 female students enrolled in this study and fill the questionnaire; only 29.36% (965 students) know their blood groups. The highest percentage was among girls students of Medicine College (Figure 1).

Table 1 shows distribution of ABO blood groups. Among students who know their blood groups, the percentage of O blood group was 57.31% (553 out of 965 students) while it was 32.74% for A (316 out of 965 students), 9.22% for B (89 out of 965 students), and 0.73% for AB (7 out of 965 students). Frequencies of ABO groups in this study showed that blood group O is predominant among girls students in order of O > A > B > AB which is similar to those reported in southwest population of Saudi Arabia (Sarhan *et al.*, 2009).

Table 1: Distribution of Blood groups according to ABO system and Rh factor among female students at King Khalid University in 2009.

Blood group	A+	A-	A	B+	B-	B	AB+	AB-	AB	O+	O-	O
% of blood group	29.1	3.31	0.31	8.49	0.72	0	0.62	0.03	0	51.3	5.59	0.41
Total	32.74			9.22			0.73			57.31		

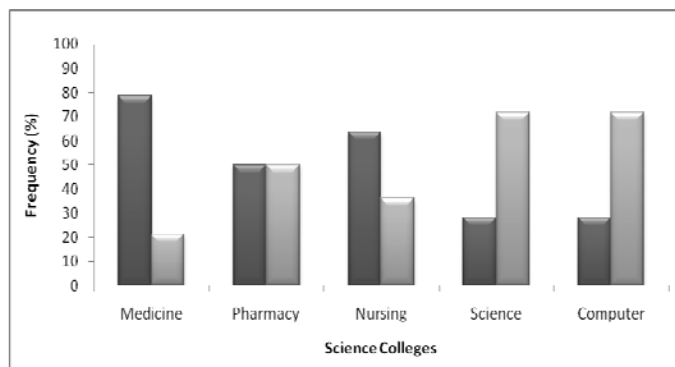


Fig. 1: Bar chart showing the percentage of girls students in different science colleges who know their blood groups (■) and those who do not know (□).

Rhesus blood groupings revealed 90.3% (871/965) of Rh-positive and 9.7% (94/965) of Rh-negative phenotypes (Figure 2). In the combined ABO and Rhesus blood groups, O positive was most the common (52%) followed by A positive (29%), B positive (8%), O negative (5%), A negative (3%), and AB positive (1%) which is equal to B negative (1%) respectively (Figures 2 and 3). The majority of those who know their blood groups were single 82.5% (796 out of 965 students) (Figure 4).

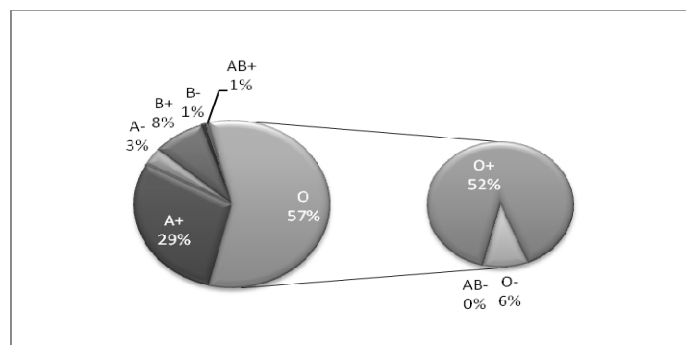


Fig. 2: Pie chart showing the percentage of blood groups among students who know their blood groups.

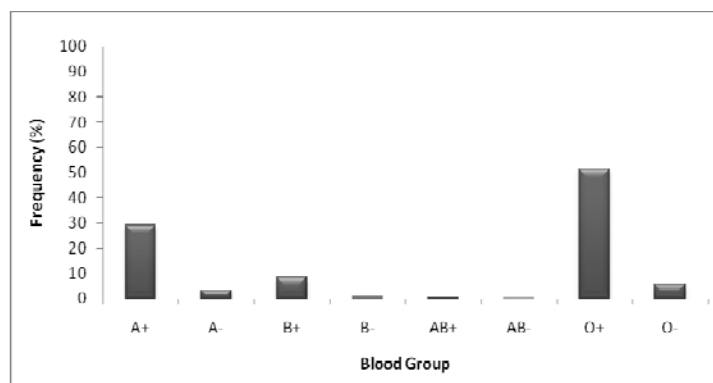


Fig. 3: Distribution of ABO and Rh factor among girls students who know their blood groups (■).

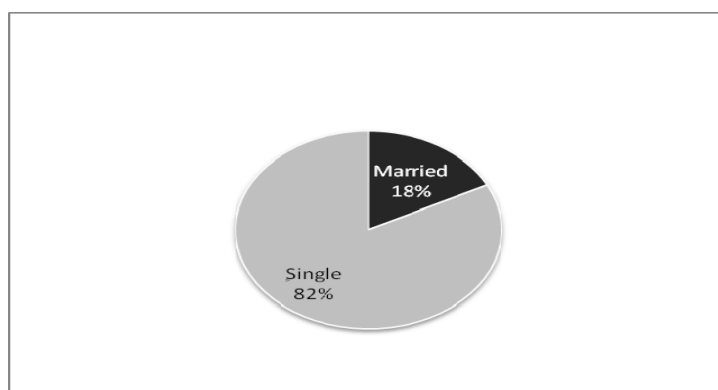


Fig. 4: Pie chart showing the percentage of marital status among students who know their blood groups.

About a quarter (25.8%) knows their blood groups by routine laboratory analysis, while the others know it for different purposes including pregnancy (7.7%), blood donation (5.3%), test before marriage (3.7%), blood transfusion (0.26%), without reason (5.05%), and other reasons (10.5%). Nearly 41% know their blood groups when they were admitted to the medical colleges.

DISCUSSION

Knowing of ABO and Rh distribution in population is crucial as the distribution of this blood group system varies from race to race (Ganong, 2005; Guyton and Hall, 2005; Keele *et al.*, 1996). Many people know what their blood group is and understand that blood groups must be matched in a medical emergency. The ABO-Rh blood groups are the most important blood factors in clinical applications involving blood transfusions (Fauci *et al.*, 2008).

When the present results compared with the results of other studies; particularly the results of the study conducted in the South West region of the Saudi Arabia (Sarhan *et al.*, 2009), which showed that the percentage of O, A, B, and AB blood groups among studied male subjects were 56.8%, 33.4%, 6%, and 3.8%, respectively. In this study, the percentages of ABO blood groups in females were (57.31%), (32.74%), (9.22%), and (0.73%), respectively. These results show no significant difference in distribution of ABO blood groups between male and female subjects.

Regarding rhesus system, there was no significant difference in distribution of Rh blood groups between male and female subjects. The percentage of Rh positive and Rh negative blood groups among studied male subjects in the South West region of the Saudi Arabia were 92.8% and 7.2%, respectively (Sarhan *et al.*, 2009). For studied females in this study, the percentage of Rh blood groups was 90.3 and 9.7% for Rh positive and Rh negative groups, respectively.

The high percentage of female students who knows their blood group in the college of medicine and other health colleges, because of the awareness of the these colleges for the importance of ABO-

Rh blood groups, and the performance of routinely ABO-Rh blood group test for all students by the University medical center.

Recommendation

The data obtained in this study showed that the major portion of the girls students do not know their blood groups; thus, an arrangement for free blood grouping program with the permission and help of the administration of the institution is recommended.

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ARABIC SUMMARY

توزيع مجموعات الدم ABO و Rh على عينة عشوائية من الطالبات بجامعة الملك خالد.

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- 2- قسم النساء والولادة - كلية الطب - جامعة الملك خالد - ابها - المملكة العربية السعودية

الأهداف: التعرف على نمط توزيع مجموعات الدم ABO و Rh على عينة عشوائية من الطالبات من مختلف الكليات العلمية، جامعة الملك خالد. كما تهدف هذه الدراسة إلى المساعدة في خدمات نقل الدم للقضاء على خطر fetalis erythroblastosis في حديثي الولادة.

الطريقة: تم إجراء هذه الدراسة من خلال توزيع استبيان صمم بواسطة الباحثين على 3287 طالبة، وقد أجري هذا الاستبيان على مدى فترة 3 أشهر من فبراير إلى إبريل 2011. تم تعبئة الاستبيان من قبل المشاركات اللواتي تطوعن في الدراسة ومن ثم إعادتها. تم إدخال المعلومات السابقة إلى حاسب آلي مزود ببرنامج إحصائي وتم استخدام الاختبارات الإحصائية المناسبة.

النتائج: بلغ عدد الطالبات اللواتي يعرفن مجموعة دمهن 965 طالبة من أصل 3287 طالبة شاركن في هذه الدراسة. كما أظهرت هذه الدراسة أن تكرار مجموعات ABO بينهن كانت: 57.31% للمجموعة O، 32.74% للمجموعة A، 9.22% للمجموعة B، و 0.73% للمجموعة AB. وقد كان ما نسبته 9.7% للمجموعة سالبة Rh.

خاتمة: إن نتائج هذه الدراسة تحتم على وجود برامج تثقيفية للطالبات والمجتمع المحلي للإدارة الفعالة لحالات الطوارئ الطبية.