

Analysis and Knowledge of Blood Groups and Attitudes Toward Blood Donation in Jordan

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Abstract

Background: This study aimed to determine the distribution of blood groups among Jordanian university students, investigate the Knowledge and attitudes toward blood donation among the study population. Also, it aimed at assessing any correlation between blood groups and achievement, geographical distribution, and gender. As well as, it aimed to investigate the personal Knowledge of blood group, the blood donations throughout life, matching of blood group compared to those registered in the governmental departments, ability to form a database of people who can donate blood.

Methods: To attain the study's objective, a random sample of 830 Jordanian university students from different regions were selected. The researcher adopted an analytical and descriptive study.

Results: The study revealed that the most prominent blood group among Jordanian university students is A group according to the ABO system and group O+ according to ABO and RH system. Also, it revealed that 93.6% had not donated blood.

Conclusions: Blood group A was found to be the highest among the study population. 81.2% of the students were found to be RH+. Recording blood groups correctly and encouraging blood donation in the Jordanian community is critical for life-saving.

Keywords: ABO, Rh, Blood Groups, Blood Donation, Jordanian university students.

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Introduction

The blood is an essential element for living where it forms 7 percent of overall body weight. Blood also plays an immense role in nutrients circulation, respiration, waste elimination, immune defense, water, and acid-base equilibrium [1]. Red blood cells (RBCs) mainly function to pick up oxygen from the lungs, deliver it to tissues, and pick up carbon dioxide from cells to the lungs [2]. Human blood differences are due to the presence or absence of specific protein molecules called antigens and antibodies [3].

The antigens are located on the red blood cells' surface, and the antibodies are in the blood plasma. These molecules have differing

types and combinations [4]. Since 1901, over 20 different blood group systems have been known, but the ABO and Rhesus (Rh) blood groups remain the most important. Both these systems are useful in blood transfusion and organ transplantation, and those systems are most studied by the researchers in light of their clinical, genetic, and anthropological importance [5].

The A and B antigens are expressed on the RBCs, and these antigens are inherited co-dominantly over O [6]. To avoid the risk of mismatched blood transfusion, it is essential to see the blood groups of those involved before transfusion [7]. In blood typing, the antigens on RBC surfaces are called agglutinogens because

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they are partially liable for RBC agglutination in mismatched transfusions. The plasma antibodies that react toward them are called agglutinins [8].

The Rh blood group is decided by genes called D, which has two alleles: D, d. If the persons are classified as Rh-positive (Rh+), the genotype is DD or Dd and have D antigens on RBCs. In Rh-negative (Rh-), people do not have the D antigen [9]. The Rh blood group is determined using an anti-D reagent. Anti-D antibodies are generally not present within the blood. They form in Rh- individuals who are exposed to Rh+ blood as in transfusion, the recipient produces anti-D. A related condition may occur when an Rh- woman carries a Rh+ fetus. The first pregnancy may be uneventful because the placenta naturally prevents maternal and fetal blood from mixing. However, at the time of birth, or if a miscarriage happens, placental tearing exposes the mother to Rh+ fetal blood. She then begins to produce anti-D antibodies. If she becomes pregnant again with a Rh+ fetus, her anti-D antibodies may pass through the placenta and agglutinate the fetal erythrocytes [10]. Agglutinated RBCs hemolyze, and therefore the baby will be born with hemolytic disease of the fetus and newborn (HDFN) [11].

Furthermore, the invention of ABO and Rh blood groups has contributed immensely to blood banking services as blood banks require timely information concerning the distribution and frequency of blood groups to ensure an adequate supply of the most medically useful blood types [12]. Moreover, it is also crucial for transfusion medicine in preventing transfusion problems; so, the routine practice of blood typing and cross-matching blood products should prevent the adverse transfusion reactions caused by ABO antibodies [13] as Acute hemolytic transfusion reaction (AHTR), which typically develops within an hour after the transfusion is started [14] and is considered one of the most severe acute hemolysis reactions [15], where donor erythrocytes are rapidly destroyed by preformed recipient antibodies [16]. Typically, this is due to ABO mismatching from a clinical error or blood mistyping, which can be fatal. Blood transfusion

reactions are relatively common [17].

ABO grouping determination is vital in pre-transfusion studies of patients and donors also as in cases of patients. Aside from their importance in transfusion practice, the ABO and Rh blood groups are useful in population genetic studies and in resolving specific medical issues, particularly in disputed paternity cases. In modern medicine, besides their importance in evolution, their relation to disease and environment is increasingly important, so the Knowledge of the distribution of ABO blood group is essential as specific diseases and malignancies have a predilection for certain blood groups [18] like it was found that carcinoma of the cervix had a higher frequency in blood group A [19]. A significant association was identified for cholera in which cholera patients were twice as likely to have blood group O and tend to have more severe cholera infections comparable to other blood groups [20] [21]. Also, people with blood group O had a higher prevalence of malaria but a lower prevalence of severe malaria than other blood groups [22]. Older women with blood type O had a higher risk of developing gastroduodenal ulcers than those with other blood groups [23]. An exciting association has been found between fingerprint distribution (dermatographic) patterns and blood groups [24]. This present study investigated ABO and Rh blood groups' distribution among Jordanian university students representing the Jordanian population.

Purpose and questions of the study

Blood groups distribution varies from one population to another [25]. This study aimed to determine blood groups' distribution among Jordanian university students, investigating and analyzing the Knowledge and attitudes toward blood donation among the study population. To achieve the purpose of the study, the following questions were formulated: What is the distribution and distinct blood groups among Jordanian university students?

Is there any correlation between blood groups and achievement, geographical distribution, and gender?

What is the personal Knowledge of blood group among the study population in light of the

following variables; the number of blood donations throughout life, matching of blood group compared to that registered in the governmental departments, and ability to make a database of people who can donate blood in any time?

Materials and Methods

This study is a quantitative, descriptive, and cross-sectional study conducted after the accrual of ethical approval from Jordanian governmental universities.

The questionnaire developed by the researcher based on previous studies, then used for data collection from participants. The study was conducted within the Jordanian governmental universities. Informed consent was obtained from participants.

ABO blood group was decided by the conventional glass slide method. The puncture site was cleaned with ethyl alcohol, and then blood samples were collected by finger prick with a sterile lancet. A drop of anti-Rh serum, anti-A and anti-B was placed on glass slides. A drop of blood from each subject was mixed with each anti-serum individually. Blood groups were determined based on agglutination [26]. After analyzing the taken sample from the student and recorded blood group, the student was asked about:

Name, gender, national number, student university number, the college in which student study, phone number, residency place, student GPA during secondary school, student GPA at the university, frequency of blood donation throughout life, Knowledge of father's blood group, Knowledge of mother's blood group, blood group according to the driving license, and Knowledge of his/her blood group.

The sample size was calculated after

determining the level of significance (α), power, and effect size. The researcher assumed that the level of significance (α) of 0.05; which represented the probability that an observed relationship could result from chance. Power ($1-\beta$) 90%, which indicated the probability to detect real relationships among variables. The required sample size calculated, and the results showed that the required sample size was 830 participants.

The study sample consisted of 830 students; 471 "56.7%" of the study sample was males, and 471 "43.3%" of the study sample was females.

Different correlations and data analysis was evaluated using the Statistical Package for Social Sciences (SPSS®) version 24.

Results

The results of the study are discussed according to the questions of the study, respectively.

- The predominant blood group according to the ABO system was group A regardless of the RH system and constitute 38.3%, while the dominant blood group of ABO and RH was group O+ and forms 32%. This distribution's importance is to know the rare blood groups in Jordan and form awareness among these blood groups' owners due to the lack of these groups in Jordan.

Through the results, it was seen that the blood group O- which is considered as a universal donation constitutes 6%, O- owners are encouraged to donate blood repetitively, and the researcher was keen to restrict their information carefully and adequately, permanent follow up and update their data to communicate with them to donate blood. The distribution of ABO blood groups is illustrated in Table (1).

Table (1): distribution of blood groups in Jordan

Blood groups		Frequency		Percent	
A	A-	318	61	38.3	7.3
	A+		257		31.0
B	B-	135	30	16.3	3.6
	B+		105		12.7
O	O-	316	50	38	6.0
	O+		266		32.0

Blood groups		Frequency		Percent	
AB	AB-	61	15	7.3	1.8
	AB+		46		5.5
Total		830		100.0	

- The percentage of those who had RH+ blood groups within the study sample was 81.2%.
- The percentage of those who had RH- blood groups within the study sample was 18.8%.

- The percentage of females who had RH- blood groups within the study sample was 17.4%

Geographical distribution of blood groups in Jordan shown in chart (1).

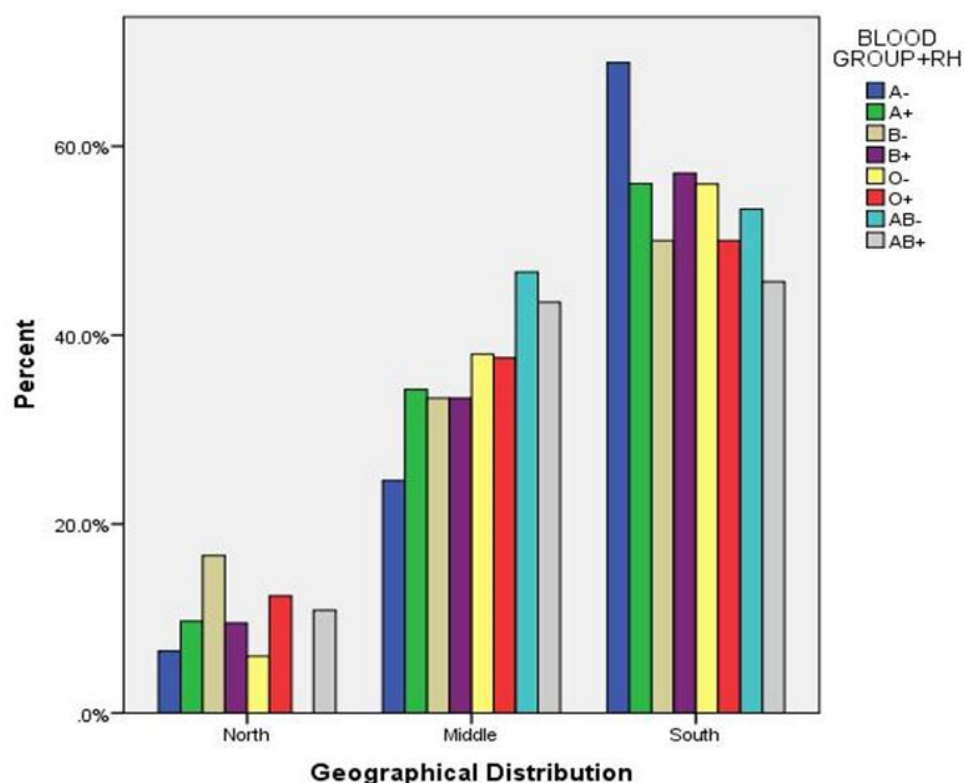


Chart (1): Geographical distribution of blood groups in Jordan

- There were no differences or correlations between the different blood groups and gender as a specific blood group distinguished no particular gender through

statistical analyses. Neither were any blood group present to a specific gender more than the other, and the slight difference is because the male sample is slightly more than the female, As shown in chart (2).

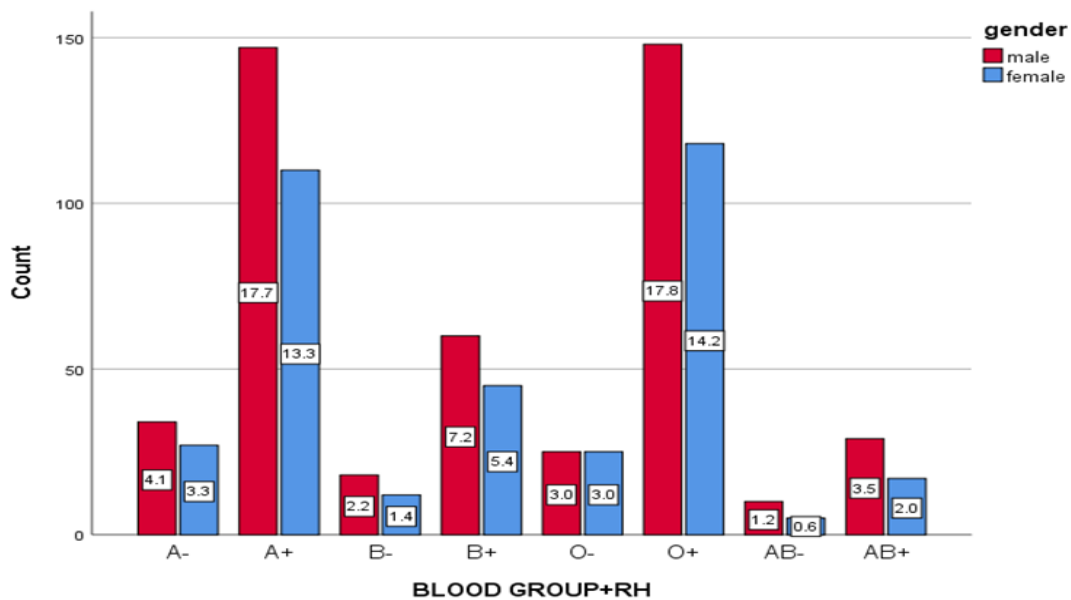


Chart (2): Blood groups and gender

- The students with blood group A + had the highest level of achievement, based on their achievement in high school and university.
- Personal Knowledge about the blood group is explained in Table (2), and this shows an

initial impression that 75% of the study sample at least have never donated blood as they do not know their blood group, and this also indicates a lack of awareness program toward knowing their blood group and donating blood.

Table (2): personal knowledge of blood group

Knowledge of blood group	Frequency	percentage
Do not Know	615	74.1
Know (identical to the result)	208	25.1
Know (not identical to the result)	7	0.8
Total	830	100.0

Table (3) shows the extent to which the actual blood group corresponds to the one on the driver's license, through which we may conclude that a large percentage of the blood groups bound to the drivers' licenses are incorrect and constitutes 28% of the driving licenses. In this case, the concerned governmental institutions form a wrong database when they can create an accurate

database that they can rely on in an emergency, disaster situations, and in the event of a need for rare blood groups. Table (3) shows that the relevant authorities should not randomly register the blood group on the drivers' license and national ID. The process must be disciplined, and each person is required to bring a document proving the type of his blood group from accredited health institutions.

Table (3): The extent to which the actual blood group corresponds to the one on the driver's license

The extent to which the actual blood group corresponds to the one on the driver's license	Frequency	percentage
Do not have a driving license	686	82.7
The actual blood group corresponds to the driver's license	103	12.4
The actual blood group do not correspond to the driver's license	41	4.9
Total	830	100.0

• After explaining to every one of the study samples the benefits of donating blood and how the blood donation process may contribute to saving the lives of many people worldwide, 96% of the study sample expressed their willingness to donate blood at any time. From this ratio, it might be asserted that building a database of people who can donate blood is easy and smooth as long as the donors are present and able to donate blood.

- The number of blood donations throughout

life for the study sample is shown in Table (4). 93.6% of study sample have never donated blood, and this indicates that awareness of blood donation in Jordan is not well encouraged and not highly motivated, and the Jordanian people may not realize the importance of blood donation; therefore, concerned governmental institutions should start a national program to encourage blood donation.

Table (4): frequency of blood donation.

Number of blood donations	frequency	percentage
0	777	93.6
1	28	3.4
2	13	1.6
3	7	.8
4	1	.1
5	3	.4
7	1	.1
Total	830	100.0

• Tables (5) shows the extent of the study sample knowledge to their fathers' and mothers'

blood groups, and if it matches their blood group.

Table (5): the extent of the study sample knowledge to their fathers' and mothers' blood groups

		Frequency	percentage
The Knowledge of the study sample to their fathers' blood groups	Do not Know	748	90.1
	Knows and identical to blood group	50	6.0
	Knows and not identical to blood group	32	3.9
	Total	830	100.0
The Knowledge of the study sample to their Mothers' blood groups	Do not Know	756	91.1
	Knows and identical to blood group	48	5.8
	Knows and not identical to blood group	26	3.1
	Total	830	100.0

Discussion and recommendations

The results obtained are considered useful for genetic information, medical diagnosis, and the community's individuals' general health. Also, this information revealed through the results is deemed to be critical in emergencies and occasional health disorders, especially when there is a shortage of blood due to less donating blood. The researcher has connected the database that he collected to the blood bank accompanied by phone numbers and addresses of people who can donate blood at any time. This method has been used several times to save the lives of people who were in fatal need of blood. In light of the study results, the researcher hopes that this project will be applied in all parts of the world by using technological methods as phone applications and websites to communicate with people to donate blood, making blood donation easier.

In light of the results of the study, the researcher recommends a set of recommendations for the relevant and specialized concerned institutions, the most important of which are the following:

- Everyone should be aware of his blood group, which saves patients' lives when there is an emergent need for a blood transfusion and predicts who is susceptible to diseases related to a specific blood group. However, more research is needed in this aspect.
- The data recorded in the governmental institutions need to be reviewed To be more accurate due to the possibility of returning to it and using it in emergencies and disasters, making it easier to obtain blood and find donors quickly and smoothly.
- Establishing a national awareness program to encourage blood donation among

the population to make it easier and then to be a global project.

- It is recommended that other studies are to be conducted on other environments in other parts of the world on other different variables.

This research was groundbreaking, as it was the first in Jordan. However, The current study has several limitations. Firstly, the sample population includes only university students. Future studies shall include all Jordanian people of different ages to have a representative sample.

The second limitation related to the utilized tool in this study. Although a questionnaire enables the researcher to systematically collect the data and collect a considerable amount of data, it is difficult to understand the context of phenomena, and data may not be strong enough to explain the nature of the problem. Thus, it is suitable for future studies to conduct qualitative methods to have detailed information regarding the studying problem.

Conclusion

The relevance of having Knowledge about the blood group systems among any population is enormous. Blood group A group and group O+ are predominant according to the ABO system, ABO and RH system. 93.6% of the Jordanian university students had not donated blood. The researcher hopes to address further study to include a sample from different ages in the community, making the results more generalizable. The results of the study revealed that the ABO and RH blood group distribution pattern in Jordan is different from other parts of the world. Such studies need to be carried out at all the regional levels of the world. Also, I wish to determine further study about organ donation attitudes in Jordan in the future.

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تحليل ومعرفة فصائل الدم والمواقف تجاه التبرع بالدم في الأردن

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الملخص

الخلفية: هدفت هذه الدراسة إلى تحديد توزيع فصائل الدم بين طلبة الجامعات الأردنية، وتقصي المعرفة والمواقف تجاه التبرع بالدم بين مجتمع الدراسة، وهدفت - أيضاً - إلى تقييم أي ارتباط بين فصائل الدم والإنجاز العلمي والتوزيع الجغرافي والجنس، إضافة إلى تقصي المعرفة الشخصية لفصيلة الدم، وعدد مرات التبرع بالدم طوال الحياة، ومطابقة فصيلة الدم مقارنة بتلك المسجلة في الدوائر الحكومية، والقدرة على تكوين قاعدة بيانات للأشخاص الذين يمكنهم التبرع بالدم. **منهجية البحث:** لتحقيق هدف الدراسة تم اختيار عينة عشوائية قوامها (830) طالباً جامعياً أردنياً من مناطق مختلفة، واعتمد الباحثان طريقة الدراسة التحليلية الوصفية.

النتائج: أوضحت الدراسة أن أبرز فصيلة دم بين طلبة الجامعات الأردنية، هي مجموعة (A) حسب نظام (ABO) والمجموعة (O +) حسب نظام (ABO) و (RH)، وكشفت - أيضاً - أن (93.6%) من عينة الدراسة لم يتبرعوا بالدم مطلقاً. **الخلاصة:** وجد أن فصيلة الدم (A) هي الأعلى بين أفراد مجتمع الدراسة، ووجد - أيضاً - أن (81.2%) من الطلبة هم من فئة (RH+)، ويُعدّ تسجيل فصائل الدم بشكل صحيح، وتشجيع التبرع بالدم في المجتمع الأردني أمراً بالغ الأهمية لإنقاذ الحياة.

الكلمات الدالة: (ABO)، (RH)، فصائل الدم، التبرع بالدم، طلبة الجامعات الأردنية.