

Distribution of blood groups and Rh factor in population of Tarhuna city

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الملخص:

يعتبر نظام فصيلة الدم ABO أحد أهم الانظمة ذات الأهمية السريرية في نقل الدم، وزرع الأعضاء، بالإضافة إلى فقر الدم الانحلالي لحديثي الولادة. **الهدف:** تم إجراء هذا البحث بهدف تحديد مدى انتشار وتوزيع فصائل الدم في مدينة ترهونة. **المواد والطرق:** تضمنت هذه الدراسة 700 عينة تم جمعها من مستشفى ترهونة التعليمي والعيادة المجمععة ومستوصف الخضراء ومستشفى الداوون. تعتمد بيانات هذه الدراسة على السجلات (المحفوظات) المتوفرة في بنك الدم والمختبرات الطبية في الفترة من أكتوبر 2022 إلى مارس 2023. تم تسجيل هذه المعلومات عن طريق إستبيان تضمن نوع الفصائل الدموية، العامل الريزوسي والجنسي. **النتائج:** تبين أن فصيلة الدم O+ هي الأكثر انتشاراً بنسبة (42.43%)، تليها فصيلة الدم A+ بنسبة (27.14%)، بينما أقل فصيلة انتشاراً كانت ثم فصيلة الدم AB- (0.71%)، أما بالنسبة للعامل الريزوسي فقد كانت نسبة الحالات الموجبة (86.71%) أما الحالات السالبة فقد كانت بنسبة (13.29%). **الخلاصة:** نسبة انتشار الفصائل الدموية في مدينة ترهونة تقع ضمن المعدل المحلي والإقليمي والعالمي لإنتشار الفصائل الدموية.

Abstract:

Background: The ABO blood group system is one of the most important blood group systems for clinical use in organ transplantation, blood transfusion, as well as in newborn hemolytic anaemia. **Aim:** This study was conducted with the aim of determining prevalence and distribution of ABO and Rh blood groups in Tarhuna city. **Materials and methods:** This study included 700 samples collected from Tarhuna Teaching Hospital and polyclinic, Al-Khadra clinics and Al-Dawun Hospital in the period from October 2022 to march 2023. The information of this study depends on the records (archives) available in the blood bank and laboratories. This information was recorder by a questionnaire included gender, type of ABO, Rh factor, and living place. **Results:** it was found that blood type O+ is the most prevalent with a percentage of (42.42%), followed by blood type A+ (27.14%), while the least prevalent blood group was AB- by (0.71%). As for the Rh system, Rh+ (86.71%) was more frequent than Rh- (13.29%). **Conclusion:** frequencies of ABO and Rh phenotypes in the Tarhuna city are similar to those reported in the most areas of the world.

KEY WORDS: *Blood groups, ABO phenotypes, Rh factor.*

INTRODUCTION:

Before the discovery of ABO blood groups, blood transfusions caused a high death rate since it was unknown how individuals in the human population differed in their blood composition. Based on a later study conducted in 1900 by Landsteiner, it is now possible to type or classify blood according to the ABO classes (A, B, and O) according on whether red blood cells (RBCs) have surface antigens or not. Des Casterllo and Sturli discovered the final type (AB) in 1902 [Anifowoshe et al, 2017].

The phrase "blood group" refers to the overall blood group system, which includes red blood corpuscles (RBCs) antigens, whose specificity is regulated by a number of genes that can be allelic or extremely tightly related on the same chromosome [Mitra et al, 2014]. ABO glycosyltransferase is the name of the gene on chromosome that defines the human ABO blood type. The three primary allelic variants of the ABO locus are A, B, and O [Farhud and Yeganeh, 2013]. The presence of A and B

antigen on the surface of red blood corpuscles determines the ABO blood group [**Hosoi, 2008**].

Blood of type A contains type A antigens, blood of type B has type B antigens, blood of type AB has both types of antigens, and blood of type O has neither type A nor type B antigens. Additionally, type A plasma has type B antibodies that work against type B antigens, whereas type B plasma has type A antibodies that work against type A antigens. Type O blood has both A and B antibodies, but type AB blood lacks neither type of antibody [**Adeyemo and Soboyejo, 2006**].

The importance of Rh blood type (Rhesus) in blood transfusion biology is second only to that of ABO blood group. The presence or lack of the Rh (D) antigen on the red blood corpuscles is the most clinically relevant polymorphism in this highly polymorphic substance, which comprises more than forty-four distinct antigens [**Anifowoshe et al, 2017**]. Landsteiner and Alexander S. Weiner made the Rhesus system their own in 1937 [**Gauthaman, 2017**]. On chromosome 1 there is a gene called Rh, only five of the 50 known blood group antigens in the Rh system are important [**Mitra et al, 2014; Patil et al, 2017**].

However, the presence or lack of the Rh (D) antigen on the red blood corpuscles is the most clinically relevant polymorphism which encompasses the positive and negative Rh phenotypes [Chandra and Gupta, 2012; Anifowoshe et al, 2017]. Studying blood group is very important because it plays an important role in genetics, transfusion and forensic medicine pathology and may have some association with disease, Rh incompatibility and ABO incompatibility in new babies [Rehman et al, 2005].

Aim of the study:

This study aimed to determine distribution of ABO and Rh blood groups among the population in Tarhuna region, and to determine the most and least common blood groups, as well as the relationship between blood types and gender.

Materials and methods:

This study was conducted in Tarhuna District – Libya on 700 cases (443 males and 257 females), the data was collected from records (archives) available in the blood bank and medical laboratories of Tarhuna Teaching Hospital, Tarhuna polyclinica, Al-Khadra clinica and Al-Dawun Hospital during the period from

December 2022 to March 2023. The study information was recorder by a questionnaire include type of ABO, Rh factor and gender. The obtained results were included in tables and figures then discussed, results were expressed as numbers and percentages.

Results:

Total of 700 randomly selected samples from the city center of Tarhuna, Al-Dun and Al-Khadra was as follows: 257 women (36.71%) and 443 men (63.29%) as figure 1 elucidate.

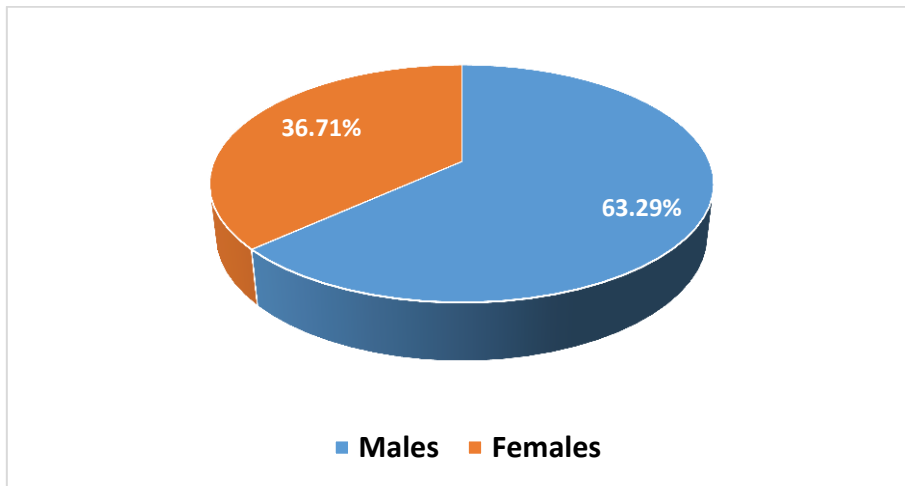


Figure 1: distribution of study samples according to gender.

Distribution of ABO blood groups: Table 1 and figure 2 shows that, the distribution of A, B, O and AB blood groups were

219(31.28%), 104(14.86%), 346(49.43%), and 31(4.43%) out of total cases respectively.

Table 1: The numbers and percentages of samples taken from each ABO blood group.

Blood group	Number	Percent
A	219	31.28%
B	104	14.86%
O	346	49.43%
AB	31	4.43%
Total	700	100%

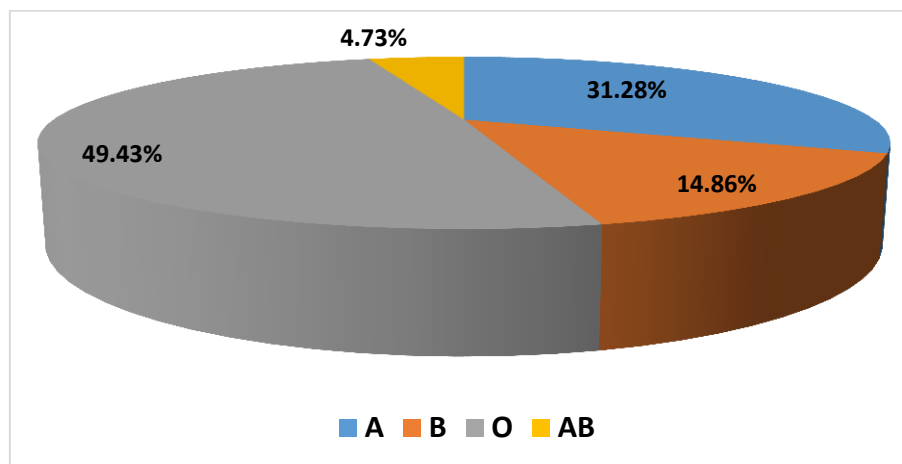


Figure 2: shows the distribution of ABO Blood groups in the study sample.

Figure 3 reveals that the distribution of ABO blood groups was as follows for gender: in males (blood group A 137, B 71, O 219, AB 16), while in females (82, 33, 127, 15) respectively.

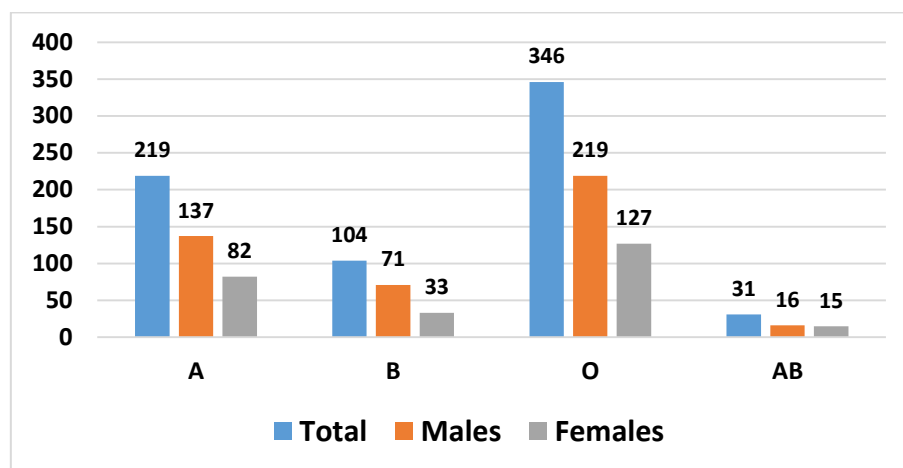


Figure 3: shows the distribution of ABO blood groups among both of male and female.

Distribution of ABO blood groups according to gender:

Among 443 male samples, the distribution of blood groups was as follows: blood group A 137 (31%), B 71 (16.03%), O 219 (49.44%) and AB 16 (3.61) of cases, while among 257 female sample, the distribution of blood groups was as follows: blood

group A 82 (31.91%), B 33 (12.84%), O 127 (49.41%), AB 15 (5.84) of cases. The findings showed that blood group O was more frequency in study sample (219 out of 443 males and 127 out of 257 females) while blood group AB was less frequency in study sample (16 out of 443 males and 15 out of 257 females). As elucidate in figure 4.

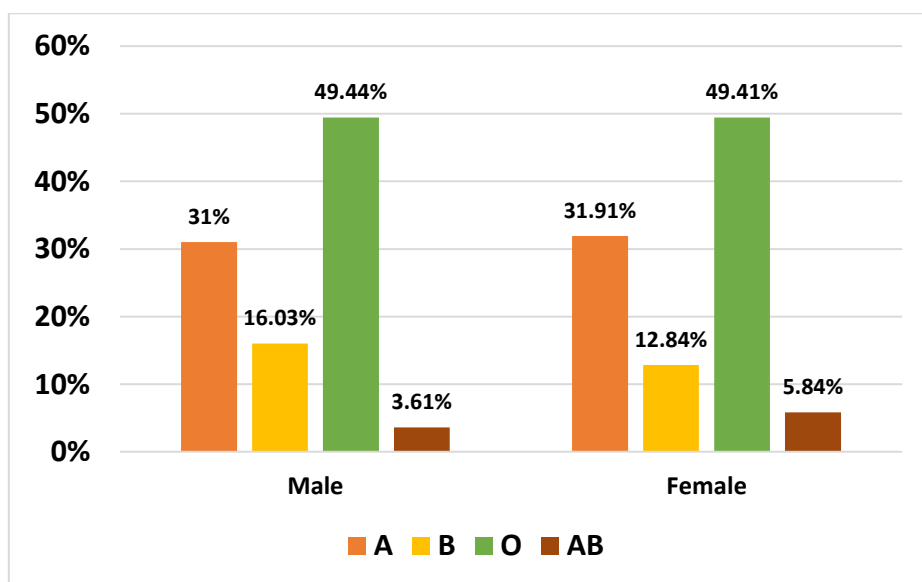


Figure 4: Distribution of ABO blood groups in male and female

ABO blood groups and Rhesus factor distribution in the study sample: The survey findings demonstrated that the distribution based on ABO and Rh typing in study sample distribution was: 190(27.14%), 29(4.14%), 94(13.44%), 10(1.43%), 297(42.43%), 49(7%), 26(3.71%), and 5(0.71%)

for A+, A-, B+, B-, O+, O-, AB+, and AB- respectively. The study concluded that the O+ type is the most prevalent compare with other types, and the AB- type having the lowest proportion, as shown in figure 5.

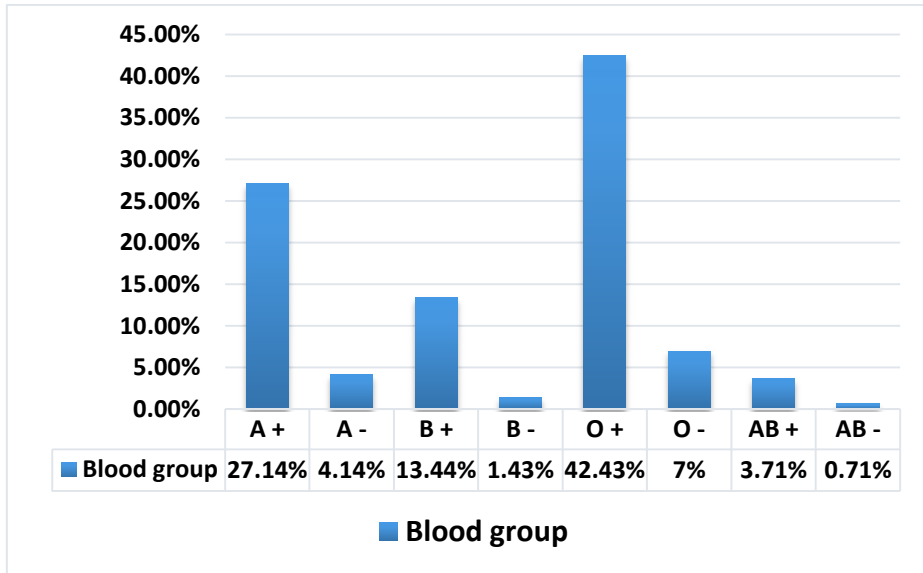


Figure 5: shows the distribution of ABO blood group and Rh factor in study sample

Distribution of ABO blood groups and Rh factor according to gender: distribution of positive and negative Rh blood groups in males and females was depicted in figure 6; where the highest frequency in males was for blood group O+ (43.11%), followed by group A+(27.10%), then B+ (14.67%), O- (6.32%),

A- (3.84%), AB+ (2.71%), B- (1.35%), and AB- (0.90%), while the distribution in females was as follows: blood group O+ having the highest frequency (41.24%), followed by group A+ (27.24%), B+ (11.28%), O- (8.17%), AB+ (5.45%), A- (4.67%), B-(1.56%) and AB-(0.39%).

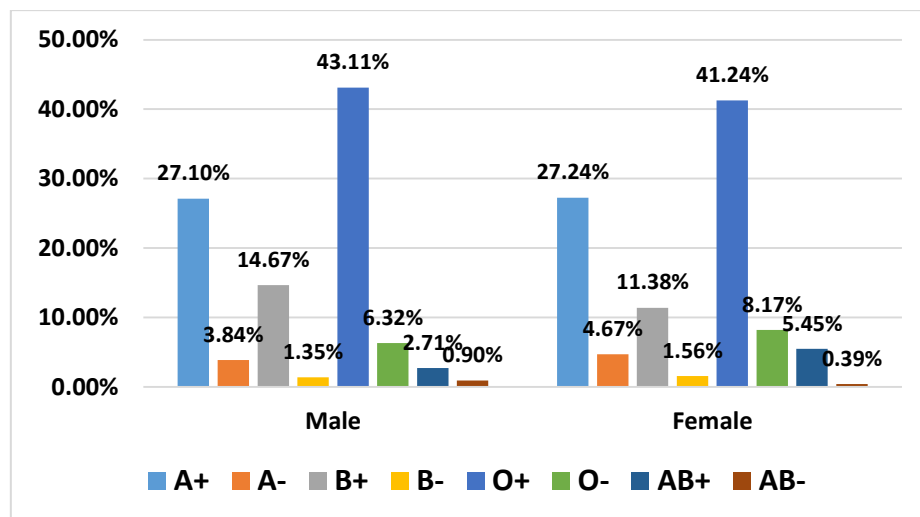


Figure 6: shows the distribution of ABO blood groups and Rh factor according to gender

Overall, number of samples with positive Rh factor was 607 out of 700 cases, with a rate of 86.71%, (388 (87.58%) of 443 males were Rh+, and 219 (85.21%) of 257 females were Rh+).

while The number of Rh negative cases was 93 out of 700 cases, with a rate of 13.29% (55 (12.42% among 443 males and 38 (14.79%) among 257 females), as elucidate in figures 7 & 8.

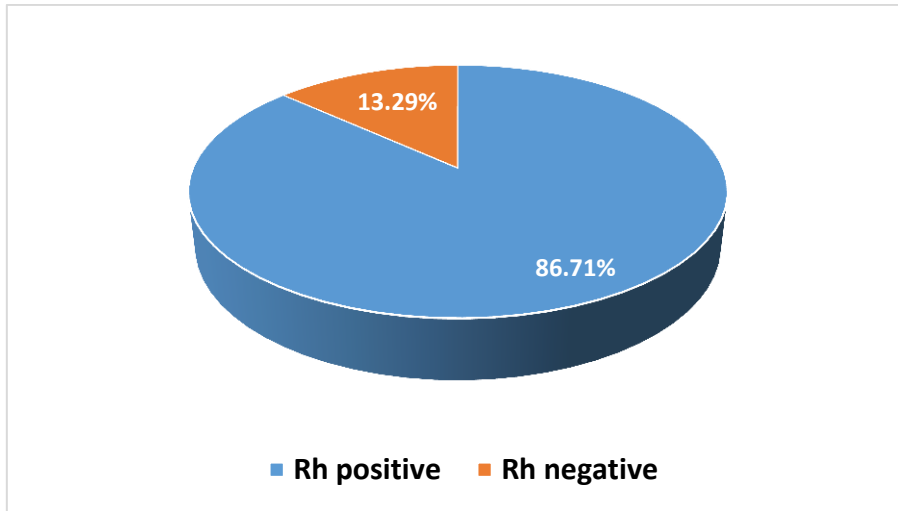


Figure 7: Distribution of Rh positive and negative samples

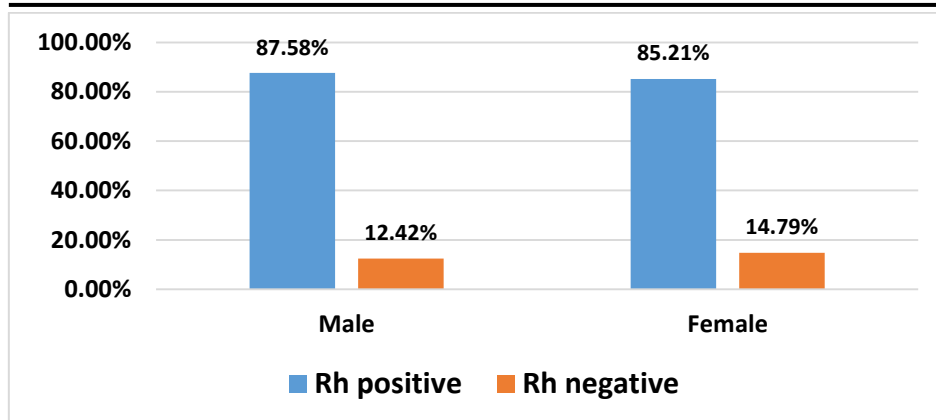


Figure 8: Distribution of Rh-positive and Rh-negative cases according to gender

DISCUSSION:

In the current study seven hundred samples from three of largest residential communities in Tarhuna district were randomly investigated to identify blood groups, the information was taken from the records of health centers laboratories and the blood bank, where the data included type of blood group and gender. Males were more involved in this study than females, the number of male samples where reached 443 while the number of female samples were 257, this variation in the numbers of females and males in the study sample may be due to the causes related to blood group requests, which are more in males such as blood donate.

According to the study's findings, percentages for distribution of blood groups in Tarhuna area were as follows, (49.43%), (31.28%), (14.86%), and (4.43%) for blood group O, A, B, AB respectively. These ratios also maintain their order in relation to the distribution of the Rhesus factor, with slight differences numbers for the negative and positive Rh. As for the distribution of positive and negative blood groups, the highest frequency was for group O+ (42.43%), followed with group A+ (27.14%), then B+ (13.44%), then O- (7%), then A- (4.14%), then AB+ (3.71%), then B- (1.43%) and finally group AB- (0.71%) which had the lowest frequency.

Moreover, despite the difference in sample size between males and females, the study did not show significant differences in the distribution of blood groups between both genders.

The study noted that there is no significant discrepancy between the prevalence of blood groups in Tarhuna district compared to some studies in African and Asian countries, as this study rates in general did not exceed the rates published in these countries, for example rate of O group (56.85), (55.3%), (44.7%), (31.44%) Saudi Arabia, Nigeria, Turkey, and Egypt

respectively [Adeyemo, and Soboyejo, 2006; Sarhan et al, 2009; Abdelmonem et al, 2019].

When comparing the current study finding with previous local studies, it was noted that the prevalence of blood group O+ in Tarhuna region was higher than its prevalence in Al-Bayda (30.24%), Bani Walid (33.4%), Ajdabiya (26.39%) and Sabratha (33.96), while the blood group O- was similar to its prevalence in Al-Bayda city (7.19%), and less than the rest of the cities under comparison, while it was observed that the percentages were closer in prevalence of type A+ and A-. As for group B+, its prevalence in the Tarhuna area is very close to its prevalence in the city of Ajdabiya (13.89%), while it was less than Bani Walid, Sabratha cities and Al-Bayda. It was also noted that the prevalence of group B- in Tarhuna district was similar to distribution in Sabratha (1.92%) compared to the local studies under comparison. As for the prevalence of species AB+, it is very similar to its prevalence in the Sabratha city and less than its prevalence in the rest of the cities, while prevalence of AB- was similar to prevalence it in Al-Bayda and Sabratha cities, and less than other cities [Saad, 2016; El-

Moghrabi et al, 2019; Ameigal and Ageel, 2019; Sakal et al, 2019].

The distribution of blood groups worldwide often varies slightly from established percentages, the ratio of the distribution of positive blood groups (Rh+) in Tarhuna district was (86.71%), and negative blood groups (Rh-) was (13.29%), the ratios deduced from this study are within the range of global, regional, and local. Rh positive blood groups are the majority in Tarhuna

CONCLUSION:

This study concluded that the frequencies of ABO and Rh phenotypes in the Tarhuna region are similar to those reported whether in Libya or abroad.

There is no difference in blood groups for gender.

Blood group O, especially O+ is the most common type among the population of Tarhuna area, while blood group AB particularly AB- is the least common.

Rh positive blood groups are the majority in Tarhuna.

Recommendations:

It is recommended that:

- 1- Given the importance of accurate identification of blood types, their prevalence, and their relationship to public health, more research is recommended in this regard to develop blood transfusion services and the proper operation of blood banks.
2. Encouraging public awareness about health issues and the need for blood donation, especially rare species.

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