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FREQUENCY DISTRIBUTION OF ABO AND RH BLOOD GROUP AMONG THE STUDENT POPULATION OF GPGC MARDAN, KHYBER PAKHTUNKHWA.

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ABSTRACT

Currently 36 blood groups in addition to ABO and Rh blood group systems have been recognized. There are a total of 38 human blood group systems. ABO and Rh are the two most significant blood group system. Objective of this study is to determine the frequency distribution of ABO and Rh blood groups among student population of GPGC Mardan, Kpk Pakistan. And look into the possibility of a link between blood types and certain diseases and physiological characteristics A sample size of 220 participants with both genders (143 males and 77 females) were chosen at random from the students of GPGC Mardan. The finger prick method was used to obtain blood samples, which includes extracting a very tiny quantity of blood from the tip of a finger. A drop of blood from each participant was put on three separate clean slides for the ABO and Rh tests. A drop of each antisera, anti A, anti B, and anti D obtained from the Hi-tech Medical Laboratory, shewa adda, swabi, was introduced to and stirred with each blood sample with the help of glass rods and left gently up to 60 secs to observe agglutination. Blood group were identified on the basis of agglutination. Total 220 samples were analyzed in which 65% was males and 35% was females. In our population the most prominent blood group was blood group B with percentage frequency of 41% consists of 31.36% Rh positive and 10% was Rh negative. The percentage frequency of blood group A in our population was 31.36% consist of 23.36% Rh positive and 7.72% Rh negative. Followed by blood group O with percentage frequency of 17.72% consist of 11.36% Rh positive and 6.36% Rh negative. Followed by the most least occurring blood group AB with percentage frequency of 9.54% consist of 7.27% Rh positive and 2.27% Rh negative. Out of 220 sample 73.63% was Rh positive and 26.36% was Rh negative. With respect to age the students age ranges from 16-20 (years) were 65.45% and age ranges from 21-25 (years) were 34.54%, Similarly group age 16-20 were 68.36% Rh positive and group age 21-25 were 31-36% Rh negative. Blood group B was the most prominent blood group while blood group AB was the least existing blood group. Similarly Rh positive was more prominent than Rh negative. Finally it is concluded that among the students population of GPGC mardan the most frequently occurring blood group was blood group B and the most least occurring blood group was AB. Rh positivity was more than Rh negativity.

INTRODUCTION

There are about 100 minor blood group system and about 36 major blood group systems known today (owaidah et all, 2020). In 1901, Landsteiner demonstrated that human beings could be classified into 4 groups depending on whether their red cells contain one ‘A’ or another ‘B agglutinogenes or both ‘AB’ or neither ‘O’. It was demonstrated that there are antibodies to A and B. It was also shown that a person’ s serum does not contain the antibodies for the antigen present in his own red cells but carries antibodies against the antigen which he does not possess (Gupte, 2000). The term "blood group" refers to a hereditary allogeneic variation seen on the surface of erythrocytes (Daniels, 2002). The MN, Duffy, Kell, Kidd, and Lewis blood groups are among the 29 recognized blood groups with a total of more than 240 antigens (Storry and Olsson, 2004). The ABO and Rhesus (Rh) blood types are the most well-known. The ABO blood group are the first red cell antigens while the Rhesus blood group are the most immunogenic red cell antigens revealed. In every blood bank or blood transfusion service, both are routinely analyzed Antigens for blood groups can be carbohydrate structures on red cell surface glycoproteins or glycolipids (Akinnuga, 2011). ABO antigens are strongly expressed on the surface of epithelial cells, in addition to their expression on red blood cell. They're primarily glycosphingolipids on RBCs. Agglutinins are antibodies that bind to erythrocytes antigens, and people are classified into four primary blood types depending on the existence of such antigens and agglutinins (Jeremiah, 2006). There are four principle blood group: 'A', 'B', 'AB', and 'O'. The declaration of 'ABO' antigens is constrained by three separate hereditary loci: 'ABO' situated on chromosome 9 and 'H' and 'Se', the two of which are situated on chromosome 19. Height, weight, and BMI were not linked to ABO blood types in a research by Jafari et al. (2012). Body composition measurements and ABO blood types were shown to have no correlation in numerous investigations. However, anthropometric measurements and ABO blood types have been linked in a few studies. Blood type B (B, AB) patients were taller than non-B (A, O) subjects in a study of 898 young males. In a separate research of Brazilian babies, girls with blood group A had considerably higher weights than those with other blood types. Group B (B, AB) subjects were taller than non-B (A, O) subjects, although this variation was not observed in male babies (Ainee et al., 2014). There are several studies that link illnesses to antigens of the abo blood group system, which aid in the accumulation of cholesterol and blood pressure, and therefore the presence of A1 raises the risk of coronary heart disease (ghobadian et al., 2014). Individuals with blood group O are more likely to contract malaria and cholera than those with blood groups A, B, and AB. Blood group O has been shown to have higher blood pressure, glucose, and cholesterol levels in the blood than blood groups A, B, and AB in the Iraqi population (onah et all, 2019) ABO blood groups are associated with GDM, and group AB was a risk factor for GDM in Japanese population. Women with the AB blood group had the highest risk of prenatal hypertension disorders, pre-eclampsia, and severe pre-eclampsia, according to the largest study on the issue to date Coronavirus disease 2019 (COVID-19). The Pneumonia pandemic has turned into a major public health crisis. COVID-19 is caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), a novel coronavirus family member. (Qian fat et al, 2020). Antigens of the ABO family are also abundant on the surface of epithelial cells. Research has suggested a link between the ABO blood type and the risk of some epithelial cancers, such as pancreatic cancer (wolpin BM et all, 2009) and gastric cancer (Aird I et all, 1953). The expression of ABO blood type antigens in secretors' mucus is determined by their secretor status (80 percent of Western population).. The findings of some study back up the idea that there is a link between mental illnesses and ABO blood groups: individuals with the AB blood type have a higher risk of developing psychiatric problems. Individuals with the AB blood group have a nearly three-fold greater risk of having a mental disease than those with other blood groups. In a study on Blood Groups and their Relationship with Intellectual ability across a Survey of Jordanian

University Students, students with blood group (AB) received the highest overall percentage and best grade, while pupils with blood group (B) received the lowest cumulative average and minimum grade.

The Rh blood type is the second most significant blood group, and it was originally explained 60 years ago. When a lady received incompatible Rh blood from her spouse, her blood reacted. Her serum coagulated RBCs from her husband's blood. Landsteiner and Weiner recognized it after a year, in 1939. Initially, it was thought that human and animal bodies recognized a common component, Rh on the surface of human and Rhesus RBCs, but this was quickly proven to be incorrect.
The Rh blood type is determined by a single gene on chromosome 1 that has two alleles, R and r. R has the dominance over r. (anees and mirza, 2005). Rh blood group was called after a similar antigen found in a rhesus monkey in 1930. (Egesie et all, 2008). African blacks are 95% Rh positive and 7% Rh negative, Asians are 98% Rh positive and 2% Rh negative. Native Africans have also been found to be Rh positive, according to reports (pramanik and pramanik, 2000). The Rhesus factor, commonly known as Rh factor, is an antigen that most people have on the outside of their red blood cells. People with the rhesus factor have a positive (+) blood type, such as A+ or B+, whereas those without it have a negative (-) blood type, such as O- or AB-

OBJECTIVES

Objective of this study is;

- To determine the frequency distribution of ABO and Rh blood groups among student population of GPGC Mardan, Kpk Pakistan.
- Which blood group is more prominent and which one is least occurring.
- And look into the possibility of a link between blood types and certain diseases and physiological characteristics.

MATERIALS AND METHODS

A total of 220 participants were chosen among the GPGC mardan students. A finger prick technique was used to get a blood sample. Also known as a finger stick. The middle or ring finger is recommended by the WHO. Fingers are chosen to take blood samples because they have the most tissue depth beneath the skin and so pose the least risk of damage. The thumb or index finger is more likely to be scored and is also more sensitive, making the operation more traumatic. A technique that involves pricking a finger with a lancet to extract a tiny amount of capillary blood for examination. The blood collection location, which is clear of surface artery flow, is disinfected with a tropical germicide and the skin punctured with a sterile lancet. Capillary is collected in a capillary tube after a drop has formed. blood Antisera, especially Anti- A, Anti- B, and Anti- D, are used to identify the presence or absence of the A, B, and D antigens on human red blood cells. The method is based on the agglutination concept. For the ABO and RH blood tests, a drop of blood from each person was put on three separate places on a clean white tile. A drop of each antisera, anti A, anti B, and anti D, acquired from Hi-tech medical laboratory shewa adda, swabi, was added to each blood sample and mixed with a tooth pick. antisera A binds blood cells together, the mean blood contains antigen A, indicating blood type A. Blood is B type if antisera B binds blood cells together To determine Rh status, we examine the drop with which antisera-D is added; blood agglutinates, the blood is Rh positive; if blood does not agglutinated with antisera-D, the blood is Rh negative.

RESULT

Two hundred and twenty (220) were randomly selected from among the student's population of GPGC mardan. This consisted of 77 females and 143 males between the ages of 16 to 25. The frequency distribution of the ABO and Rh blood groups are noticed. There are significant difference in the frequency distribution of blood groups between the male and female population of the college**.**

Table 4.1: ABO Blood group distribution among the 220 male and female of GPGC mardan

Sex	A	B	AB	O	Total
Male	45(20.45%)	59(26.81%)	14(6.36%)	25(11.36%)	143(65%)
Female	24(10.90%)	32(14.54%)	7(3.18%)	14(6.36%)	77(35%)
Total	69(31.36%)	91(41.36%)	21(9.54%)	39(17.72%)	220(100%)

About of 220 samples were collected from among the student population of GPGC mardan. This is composed of 143(65%) male population and 77(35%) female population. Among male population out of 143 samples 45 are A having 20.45%, 59 are B having 26.81%, 14 are AB having 6.36% and 25 are O having 11.36%. Among female population out of 77 samples 24 are A having 10.90%, 32 are B having 14.54%, 7 are AB having 3.18% and 14 are O having 8.66%.

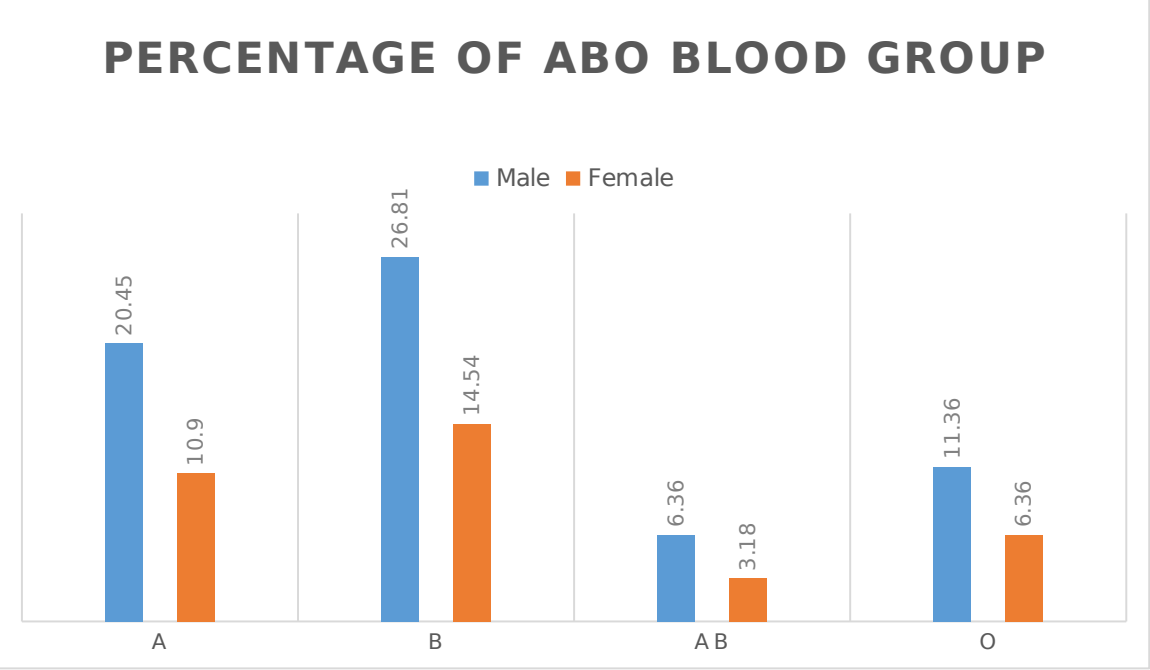

Figure 4.1: percentage of ABO blood group among male and female

Table 4.2: Rh D distribution among the student of GPGC mardan based on ABO blood group (n=220)

ABO blood group	*Rh D positive*	*Rh D negative*
A	52(23.63%)	*17(7.72%)*
B	69(31.36%)	*22(10%)*
AB	16(7.27%)	*5(2.27%)*
O	25(11.36%)	*14(6.366%)*
Total	*162(73.63%)*	*58(26.36%)*

Table 4.2 shows that out of total 220 samples 162(73.63%) are Rh-positive and 58(26.36%) are Rh-negative. Out of total 162 Rh-positive 52 with 23.63% are A, 69 with 31.36% are B, 16 with 7.27% are AB and 25 with 20.33% are O. Among 58 Rh-negative 17 with 7.72% are A, 22 with 10% are B, 5 with 2.27% are AB and 14 with 6.36% are O.

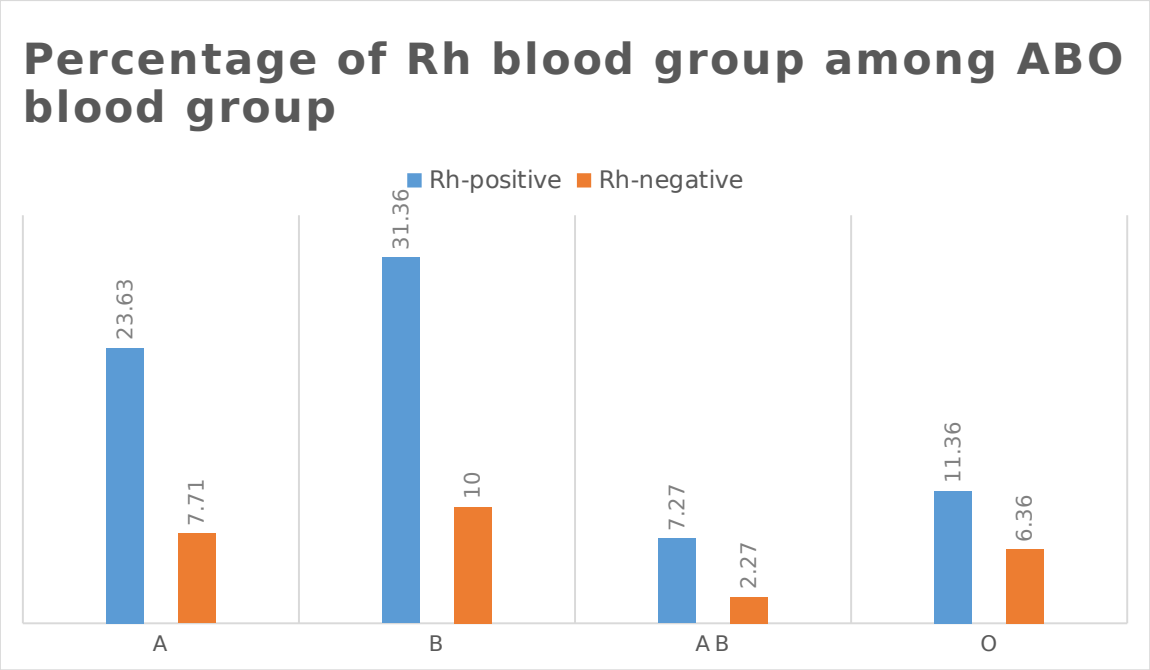

Figure .4.2: percentage of Rh-positive and Rh-negative among ABO blood group.

Table 4.3: Combined distribution of ABO and Rh Blood Groups.

Blood group	Total n=220	Total %	Male n=143	Male %	Female n=77	Female %
A Rh-positive	52	23.63	35	15.90	17	7.72
A Rh-negative	17	7.72	10	4.54	7	3.18
B Rh-positive	69	31.36	47	21.36	22	10
B Rh-negative	22	10	12	5.45	10	4.54
AB Rh-positive	16	7.72	12	5.45	4	1.81
AB Rh-negative	5	2.27	2	0.90	3	1.36
O Rh-positive	25	11.36	17	7.72	8	3.36
O Rh negative	14	6.36	8	3.63	6	2.72

Table 4.3 shows combine frequency distribution of ABO and Rh blood groups.

In about 220 samples:

52 are A Rh-positive having 23.63% (35 with 15.90% are males and 17 with 7.72% are females),

17 are A Rh-negative having 7.72% (10 with 4.54% are males and 7 with 3.18% are females),

69 are B Rh-positive having 31.36 % (47 with 21.36% are males and 22 with 10% are females),

22 are B Rh-negative having 10% (12 with 5.45% are males and 10 with 4.54% are females),

16 are AB Rh-positive having 7.72% (12 with 5.45% are males and 4 with 1.81% are females),

5 are AB Rh-negative having 2.27% (2 with 0.90% are males and 3 with 1.36% are females),

25 are O Rh-positive having 11.36% (17 with 7.72% are males and 8 with 3.36% are females),

14 are O Rh-negative having 6.36% (8 with 3.63% are males and 6 with 2.72% are females).

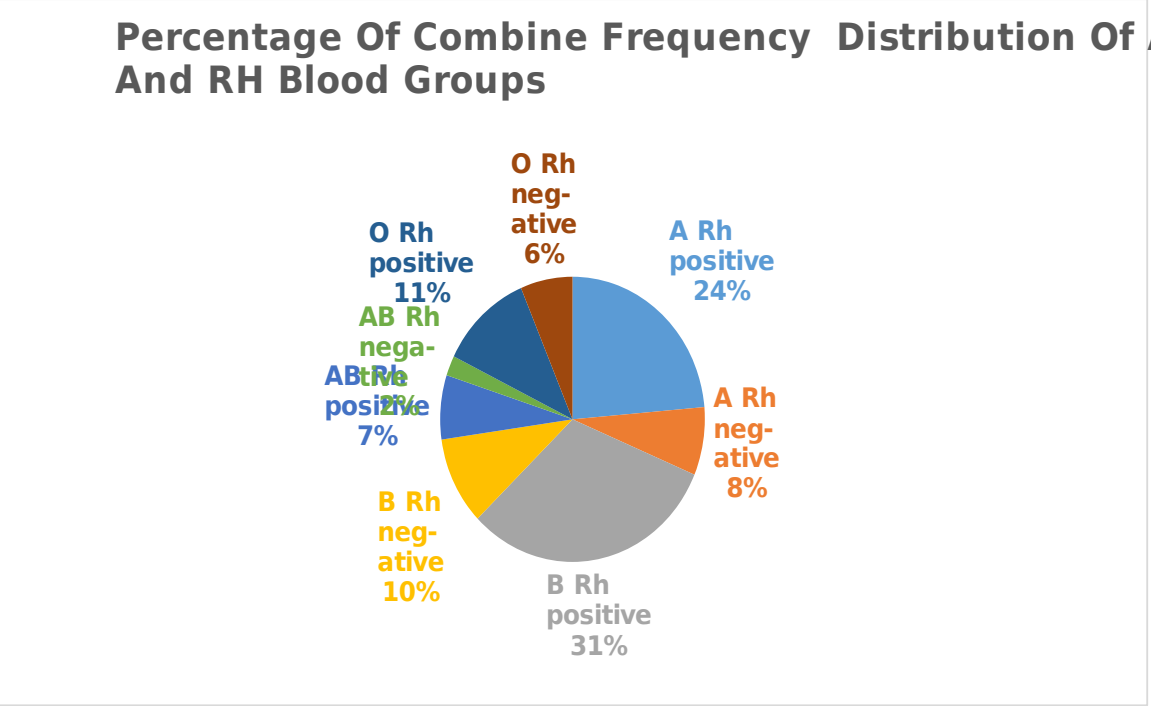

Figure 4.3: percentage of combined frequency distribution of ABO and Rh blood group

Table 4.4: frequency distribution of ABO and Rh blood groups among the female population of GPGC MARDAN.

Female	ABO	Rh-positive	Rh-negative
A	24 (31.16%)	17 (22.07%)	7 (9.09%)
B	32 (41.55%)	22 (28.57%)	10 (12.98%)
A	7 (9.09%)	4(5.19%)	3 (3.89%)
B	14 (18.18%)	8 (10.38%)	6 (7.79%)
O			
Total	77 (100%)	51(66.21%)	26(33.73%)

Table 4.4 shows that out of 24(31.16%) are A, 17(22.07%) are Rh-positive and 7 (9.09%) are Rh-negative. Among 32(41.55%) B, 22(28.57%) are Rh-positive and 10(12.98%) are Rh-negative. About 7(9.09%) AB females, 4(5.19%) are Rh-positive and 3(3.89%) are Rh-negative. 14(18.18%) are O which contains 8(10.38%) Rh-positive females and 6(7.79%) Rh-negative females.

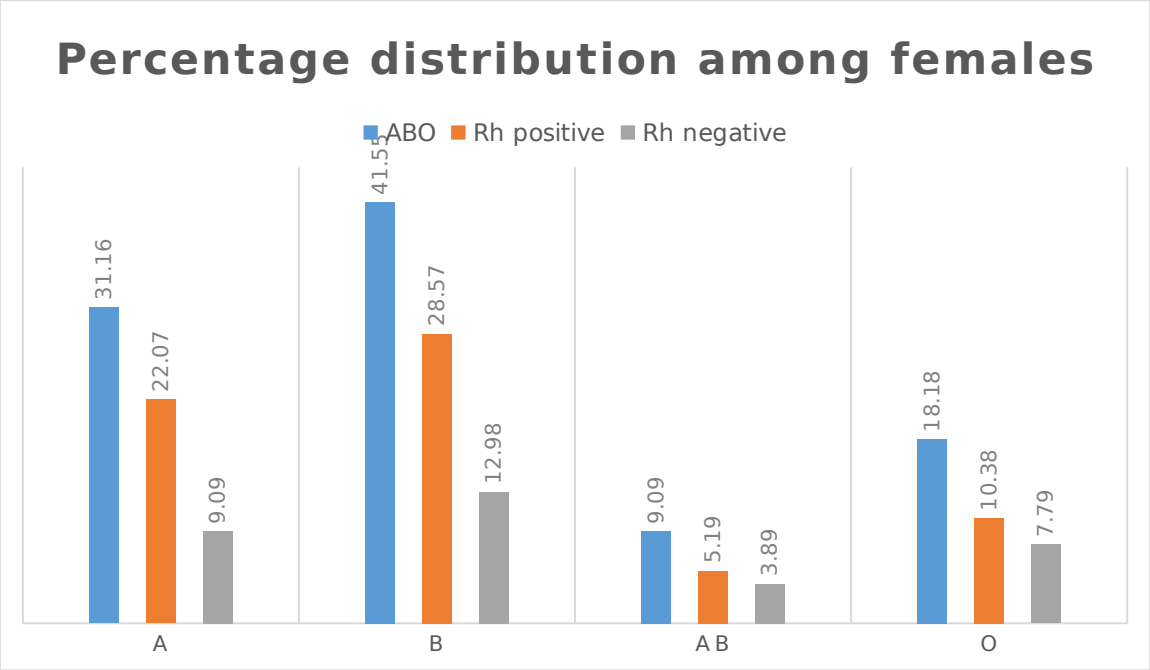

Figure 4.4: percentage distribution of ABO and Rh blood groups among female population of GPGC MARDAN.

Table 4.5: frequency distribution of ABO and Rh blood groups among the male population of GPGC mardan.

Male	ABO	Rh-positive	Rh-negative
A	45(31.46%)	35 (24.47%)	10 (6.99%)
B	59 (41.25%)	47 (32.86%)	12 (8.45%)
A B	14 (9.79%)	12 (8.39%)	2 (1.39%)
O	25 (17.48%)	17 (11.88%)	8 (5.59%)
Total	143 (100%)	111 (77.62%)	32 (22.37%)

Table 4.5 shows frequency distribution of ABO and Rh blood groups among male only. Out of 45(31.46%) A males 35(24.47%) are Rh-positive and 10(6.99%) are Rh-negative. 59(41.25%) are males with blood group B having 47(32.86%) Rh-positive and 12(8.45%) Rh-negative. About 14(9.79%) are AB which is composed of 12(8.39%) Rh-positive and 2(1.39%) Rh-negative. Males with O blood group are 25(17.48%) out of which 17(11.88%) are Rh-positive and 8(5.59%) are Rh-negative.

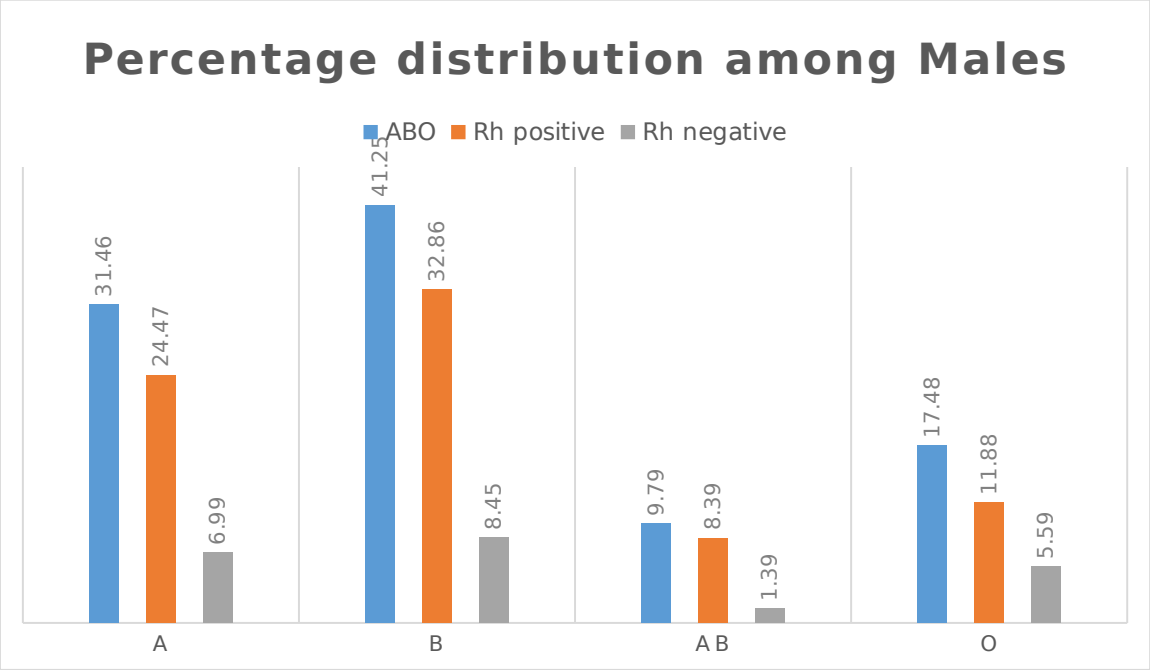

Figure: 4.5 percentage distribution of ABO and Rh blood groups among male's students of GPGC MARDAN

Table 4.6: frequency distribution of ABO blood groups among participants with respect to age

AGE (YEARS)	A	B	AB	O	TOTAL
16-20	48 (21.81%)	61 (27.72%)	12 (5.45%)	23(10.45%)	144 (65.45%)
21-25	21 (9.54%)	30 (13.63%)	9 (4.09%)	16 (7.27%)	76 (34.54%)
TOTAL	69 (31.36%)	91 (41.36%)	21 (9.54%)	39 (17.72%)	220 (100%)

Table 4.6 shows frequency distribution of ABO blood groups on the basis of age. Individuals from 16 to 20 years old are 48(21.81%) A, 61(27.72%) B, 12(5.45%) AB and 23(10.45%) whereas participants from 21 to 25 years are 21(9.54%) A, 30(13.63%) B, 9(4.09%) AB and 16(7.27%) O

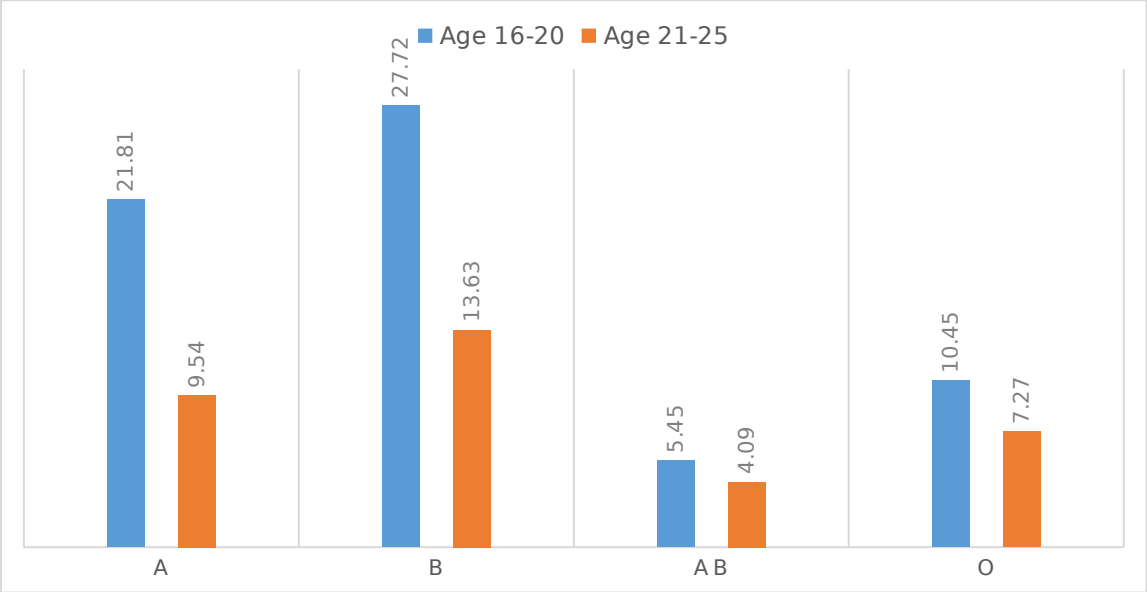

Figure 4.6: frequency distribution of ABO blood group with respect to age

Table 4.7: frequency distribution of Rh blood groups among participants with respect to age.

Age (years)	Rh-positive	Rh-negative	Total
16-20	114 (51.81%)	37 (16.81%)	151(68.36%)
21-25	48 (21.81%)	21(9.54%)	69(31.36%)
Total	162(73.63%)	58(26.36%)	220(100%)

TABLE 4.7 shows frequency distribution of Rh blood group on the basis of age. 151(68.36%) are total participants between the age of 16 to 20 years out of which 114(51.81%) are Rh-positive and 37(16.81%) are Rh-negative. Whereas individuals from age 21 to 25 years are 69 (31.36%) among which 48(21.81%) are Rh-positive and 21(9.54%) are Rh-negative.

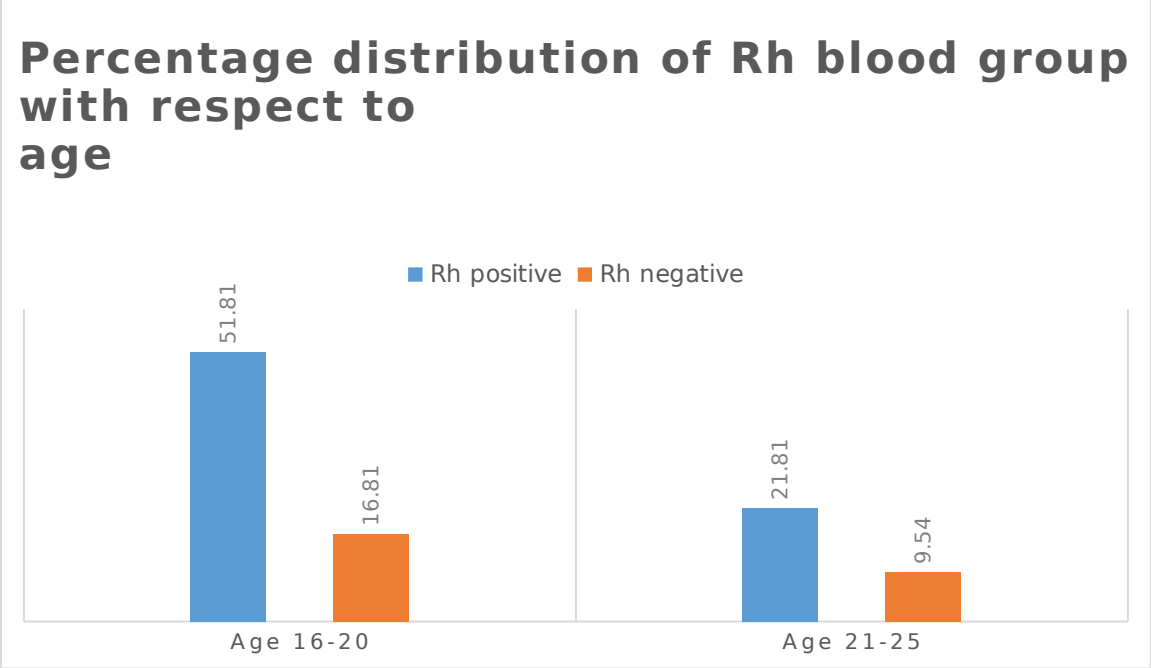

Figure 4.7: percentage distribution of RH blood group with respect to age among students of GPGC mardan.

DISCUSSION

The frequency distribution of ABO blood groups and Rh phenotypes in GPGC MARDAN was examined in this study. These frequencies are for local blood donations and are used to calculate the ABO and Rh levels phenotypes in the population of GPGC mardan. The study explored that B blood type has greatest prevalence in the population that is 41.36 percent Followed by blood group A with the percentage frequency of 31.36 percent, blood group O with the percentage frequency 17.72percent and blood group AB with least percentage frequency that is 9.54 percent. The ABO blood type frequency distribution varies from community to community. Blood type O shows a high frequency distribution in several additional investigations. According to an Indian research, the distribution of blood groups in India is O (34.56 percent) > B (34.10 percent) > A (23.16 percent) > AB (8.18 percent). Their findings are consistent with the rest of the world, such as Australia, the United Kingdom, the United States, and Saudi Arabia, where blood group 'O' is the most common blood group, but not with European and African populations, where blood groups A and B are predominant, respectively, as in our study. They discovered that blood type O is more frequent in southern (38.95 percent), eastern (36.90 percent), and western (34.66 percent). In India, blood group B is prevalent in the central (36.18 percent) and western (34.66 percent) areas, whereas blood group B is prevalent in the central (36.18 percent) and northern (35.62 percent) regions, which is consistent with our findings. Environmental influences and natural selection can explain the uneven distribution of blood types in different parts of India; (GK Patidar, and Y DhimaN, 2021) Blood group O has a frequency distribution of 46.92 percent in the United States, blood group A has a frequency distribution of 40.72 percent, blood group B has a frequency distribution of 8.63 percent, and blood group AB has a frequency distribution of 10 percent. and for black people in U.S Blood group O has a frequency distribution of 45.89 percent in the, blood group A has a frequency distribution of 27.34 percent, blood group B has a frequency distribution of 19.90 percent, and blood group AB has a frequency distribution of 7 percent (Adeyemo et all, 2006). The most prevalent blood group among eastern Turkish is A, which accounts for 42.7 percent of the population, followed by blood group O (32.7 percent), blood group B (16.5 percent), and blood group AB (8 percent) (Dilek at all 2006). Likewise, in Azad Jammu and Kashmir, blood group B is the most popular, with a frequency distribution of 36.6 percent, preceded by blood group O with a frequency distribution of 35 percent, Blood group A with a frequency distribution of 21.4 percent, and blood group AB with a frequency distribution of 7%. Blood group O has the largest percentage frequency (41.5%) among Davangereu's inhabitants, following by blood group B (32.2%), blood group A (19%), and blood group AB (7.2%). Blood group A is represented by 29.30 percent of University of Nigeria Nsukka students, blood group B by 11.10 percent, blood group AB by 4.50 percent, and blood group O by 54.80 percent. Blood group O has the highest incidence at 54.80%, while blood group AB has the least influence at 4.50 percent (onah et all, 2019). In our study blood group B has highest frequency distribution among females that is 41.55% followed by A which is 31.16%, O which is 18.18% and the least one is AB with 9.09%. Whereas in males blood group B is 41.25%, blood group A is 31.46%, blood group O is 17.48% and AB is 9.79%. This is also show that B blood group has highest frequency distribution and AB has smallest frequency distribution. Males with blood group O make up 37.26 percent of the Kurdish population, whereas males with blood group A make up 31.52 percent, men with blood group B make up 23.94 percent, and men with blood group AB make up 7.28 percent.

Males with blood group O have the highest prevalence, followed by men with blood groups A, B, and AB. In female Kurdish, blood type O is the most common, accounting for 37.06 percent of the population, followed by A (33.54 percent), B (23.74 percent), and AB (5.66%). (Mohammad s jaff, 2010). The distribution of Rh D differs from one population to the next. In this study, 73.63 percent of participants were Rh D positive, whereas 26.36 percent were Rh D negative. In Nigeria, 97 percent of people are Rh positive, whereas only 2% are Rh negative (Egesie at all, 2008) Rh positivity is around 94.76 percent among African-Americans, compared to nearly 99.99 percent in Africans (salih at all 2009). Similarly, 93 percent of Indians are Rh D positive, whereas just 7% are Rh D negative (Rao and Shetty, 2014). Rh-positive students account for 32.95 percent of men and 55.66 percent of females at the University of Nigeria Nsukka, whereas Rh-negative students account for 3.98 percent of males and 7.37 percent of females (onah et all 2019).
This study determined combined frequency distribution of ABO and Rh blood group that;

52 are A Rh-positive having 23.63% (35 with 15.90% are males and 17 with 7.72% are females),

17 are A Rh-negative having 7.72% (10 with 4.54% are males and 7 with 3.18% are females),

69 are B Rh-positive having 31.36 % (47 with 21.36% are males and 22 with 10% are females),

22 are B Rh-negative having 10% (12 with 5.45% are males and 10 with 4.54% are females),

16 are AB Rh-positive having 7.72% (12 with 5.45% are males and 4 with 1.81% are females),

5 are AB Rh-negative having 2.27% (2 with 0.90% are males and 3 with 1.36% are females),

25 are O Rh-positive having 11.36% (17 with 7.72% are males and 8 with 3.36% are females),

14 are O Rh-negative having 6.36% (8 with 3.63% are males and 6 with 2.72% are females).

It shows that B Rh-positive has highest frequency followed by A Rh-positive, O Rh-positive, AB Rh-positive, B Rh-negative, A Rh-negative, O Rh-negative and AB Rh-negative. In another study, 38 people were A Rh-positive having percentage 31.67% (19 with 29.69 percent males and 19 were 33.93 percent females), 3 were A Rh-negative having percentage 2.50 (3 with 4.69 percent males and 0 were females), 34 were B Rh-positive having percentage 28.33 % (19 with 29.69 percent males and 15 with 26.78 percent females), And 1 was B Rh-negative having percentage 0.83% (1 with 1.56 percent males and 0 Percent females). 5 are AB Rh-positive having 4.17 %(2 with 3.12% males and 3 with 5.35% females), 0 are AB Rh-negative, 38 are O Rh-positive, accounting for 31.67 percent of the total (20 with 31.25 percent men and 18 with 32.14 percent females). And 1 is O Rh-negative, accounting for 0.83 percent of the total (0 males and 1 female with 1.78 percent) (pramanik and pramanik, 2000). The highest frequency distribution is for A and O Rh-positives, followed by B Rh-positives, AB Rh-positives, A Rh-negatives, B and O Rh-negatives, and AB Rh-negatives.

CONCLUSION

According to the findings, blood type B is the most frequent ABO blood group among GPGC mardan students, while blood group AB is the least common. Rh-positive blood groups are the most frequent, whereas Rh-negative blood groups are the least common. B Rh- positive has the highest frequency distribution among mixed blood types, whereas AB Rh-negative has the lowest frequency distribution among the population under investigation.

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