

# FREQUENCY OF PRE-HYPERTENSION AMONG VARIOUS BLOOD GROUPS

Muhammad Moiez<sup>1</sup>, Hira Zahid<sup>2</sup>, Rida Ashfaq<sup>1</sup>, Saima Zareen<sup>3</sup>, Benash Altaf<sup>2</sup>, Zakriya Rasheed<sup>1</sup>

<sup>1</sup>Aziz Fatimah Hospital, Faisalabad - Pakistan

<sup>2</sup>Aziz Fatimah Medical and Dental College, Faisalabad - Pakistan

<sup>3</sup>Azra Naheed Medical and Dental College, Lahore - Pakistan

## ABSTRACT

**Objectives:** To determine the frequency of pre-hypertension among various blood groups of medical students.

**Material and Methods:** This cross-sectional study was conducted at Aziz Fatima Medical and Dental College Faisalabad, Pakistan. A hundred medical students aged 18 to 25 were enrolled from first year to final year MBBS by convenience sampling technique. Blood pressure was measured by auscultatory method and blood groups were determined by conventional slide method. Data was analyzed by SPSS version 25. Basic characteristics of the studied population are presented as mean and standard deviation (age, height, weight, and blood pressure). Categorical variables like prehypertension are analyzed as dichotomous variables and are expressed as frequencies and percentages. Proportions were compared using the Chi-square test.  $p \leq 0.05$  was taken as statistically significant.

**Results:** The study revealed that blood group B was the most common blood group followed by O blood group. While AB blood group is the least common blood group in our study.

Of the total population pre-hypertension was found in 56(55.4%). Prehypertension was most frequently found in subjects with blood group A (71.4%) whereas least commonly found in subjects having blood group B.

**Conclusion:** Blood group B was the most common blood group of our studied population. Prehypertension is commonly found in subjects with blood group A.

**Keywords:** Blood group antigens, Pre-Hypertension

**This article may be cited as:** Moiez M, Zahid H, Ashfaq R, Zareen S, Altaf B, Rasheed Z. Frequency of pre-hypertension among various blood groups. *J Med Sci* 2023 October;31(4):266-269

## INTRODUCTION

Hypertension, which is also known as the “silent killer”, is a modifiable risk factor and a challenging health problem globally. <sup>1</sup> Prevalence of pre-hypertension is an emerging disease that is increasing at an alarming rate among youngsters. <sup>2</sup> It is estimated that the number of mortalities due to prehypertension in developing countries is rising to 15% i.e. 44 million people by the year 2020. <sup>3</sup> Prehypertension accounts for 45 to 55% of the morbidity in youngsters of the Indo sub-continent. <sup>4</sup> Association of blood groups regarding paternity issues and medicolegal issues is already been well documented. These days the interest of medical researchers is increasing to explore its association with different diseases. The association of

various diseases with blood group antigens is well documented including certain infections and carcinomas while certain diseases are still questionable regarding blood groups. <sup>5</sup>

Essential hypertension is more prevalent in adults than in children. Diagnosis of raised blood pressure in the early years of life can be a forecast of hypertension in adults. <sup>6</sup> Various studies in the past have been conducted to find the correlation of “ABO” and “Rhesus” blood groups with hypertension showing conflicting results. <sup>6</sup>

Future research is required concerning the linkage between these parameters, which might help screen the young population at risk of pre-hypertension and take primary preventive actions to reduce the burden of diabetes and its complications in the community.

Hence current study is designed and planned to find out the frequency of pre-hypertension and ABO blood groups among medical students and to find out the association between both study parameters.

Prehypertension is usually asymptomatic and remains undiagnosed in young adults. Although some

Correspondence

**Dr. Hira Zahid**

Senior Demonstrator

Aziz Fatimah Medical and Dental College, Faisalabad - Pakistan

**Cell:** +92-323-7624565

**Email:** drhirazahid@yahoo.com

**Date Received:** 19/03/2023

**Date Revised:** 02/06/2023

**Date Accepted:** 06/08/2023

of them sometimes experience excruciating headaches and visual blurriness they do not take it enough seriously to seek medical assistance, considering themselves as healthy individuals. Ultimately when they get medical advice due to the gradual deterioration of their symptoms it gets very late and the subject gets full-blown disease. Thereby warning us to be alert and follow proper precautions to curb outcomes such as CVD. <sup>3</sup> According to JNC 8 guidelines starting antihypertensive drugs at specific Blood Pressure values helps to obtain better health results. <sup>8</sup> High-risk younger populations should be screened earlier for pre-hypertension than other populations and should be advised to adopt preventive measures to reduce the incidence of hypertension and its serious sequences and outcomes. We designed this study to determine the frequency of pre-hypertension among various blood groups of medical students.

## MATERIALS AND METHODS

This study was conducted at Aziz Fatima Medical and Dental College Faisalabad, Punjab, Pakistan from July to December 2020. It was a cross-sectional study. The sample size was calculated by keeping a confidence interval of 95 while the margin of error was 0.05, power was 0.8. While using the mean difference of systolic blood pressure among normotensive and hypertensive and standard deviation. It comes out to be 88 while keeping 20% dropouts (18 students). Out of a total of 106 subjects, 6 were not willing to participate. A hundred medical students aged 18 to 25 years were enrolled from 1<sup>st</sup> year to the final year of MBBS by convenience sampling technique. Ethical approval was taken from the institutional ethical committee (Ref. No: IEC/918-20). Hundred male and female students of 18 to 25 years of age were enrolled from 1<sup>st</sup> year to the final year of MBBS by convenience sampling technique. Students of first-year to second-year MBBS were approached during their physiology practical classes, whereas students of third-year to final year were approached during ward rotation at Aziz Fatimah Hospital Faisalabad. All relevant information including age, race, medical history, and family history of hypertension was recorded on structured proforma. Medical students with a history of cardiovascular diseases, and diabetes mellitus were excluded. Before enrolling, informed consent was taken from subjects, and were assured of confidentiality.

The conventional slide method was used to determine blood groups. Three glass slides were labelled as 'A', 'B', and 'D'. Blood drops were obtained by figure pricking following aseptic measures, and were placed on each slide. Drops of anti-A, anti-B, and anti-D sera were added to respective slides and mixed with blood using toothpicks. Blood groups were determined by observing agglutination reactions.

A Mercury sphygmomanometer was used to estimate blood pressure by auscultatory method making the

subject sit and relax for 5 minutes.<sup>9</sup> Three readings were recorded and their average value was used for data analysis. According to JNC 7 criteria, blood pressure <120/80 mmHg and 121-139/81-90 mmHg was taken as normal and prehypertension respectively.<sup>10</sup>

## STATISTICAL ANALYSIS

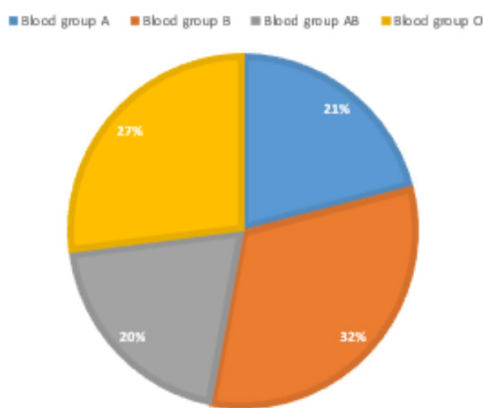
SPSS 25 was used to analyse the data. Descriptive of the studied population was presented as mean and standard deviation (age, height, weight, and blood pressure). Categorical variables like prehypertension are analyzed as dichotomous variables (yes/no) and are expressed as frequencies and percentages. Proportions were compared using the Chi-square test.  $p \leq 0.05$  was taken as statistically significant. Means of blood pressure were compared among prehypertensive and normotensives were compared by independent T-test.

## RESULTS

The study is comprised of 100 male and female medical students (50 in each group). Description of the study population is described in Table 1. The mean  $\pm$  SD of study participants was  $21.6 \pm 1.82$ . The current study reveals that the commonest blood group was B followed by blood group O in the current study population while the least frequent blood group was AB in our study (Figure 1). Eighty-three (83.2%) of the population was Rh positive and only 17(15.8%) were Rh negative. Of the total population pre-hypertension was found in 56(55.4%). On the other hand, 44(43.6%) of the population were normotensive. Prehypertension was significantly found in subjects with blood groups A (71.4%) followed by subjects having blood groups AB and O (Table 2). Subjects with prehypertension have the highest systolic (122.2 vs. 112.9) and diastolic blood pressure (88.89 vs. 74.0) compared to normotensives. However, a statistically significant difference was found in terms of diastolic pressure ( $p$ -value 0.006) (table 3).

## DISCUSSION

Prehypertension is an alarming sign if detected early in life, which depicts the risk of hypertension later on in life. The seventh report of the Joint National Committee (JNC-7) proposed separate cataloging for prehypertension, separating it from established hypertension. <sup>10</sup> ABO blood group system is based on the inheritance of the presence and absence of antibodies and antigenic substances. ABO Blood group system is gaining attention these days for researchers as it is found to be associated with various diseases. <sup>11</sup> Active research has now been carried out to explore the association of various diseases with different blood groups showing that certain diseases are found to be associated with particular blood groups. <sup>12</sup> It is found that there is diverse distribution of blood groups globally reflecting the particular ethnicity and genetic



**Fig 1: Blood group distribution among the study population (n= 100)**

**Table 1: Descriptive Statistics of study population (n= 100)**

Age	Mean	Std. Deviation
	21.61	1.82
Weight	67.33	12.92
Height	2.74	0.32
BMI	24.66	4.48
BPS	118.51	10.48
BPD	82.34	11.56

**Table 2: Frequencies and percentages of normotensive and prehypertensive among ABO blood groups.**

ABO blood groups	Frequency of blood groups (n= 100)	Normotensive 100-120 / 60-80 mmHg (n=44) N (%)	Pre-hypertensive 121-140 / 81-90 mmHg (n=56) N (%)
A	21	6(28.6)	15(71.4)
B	32	17(53.1)	15(46.9)
AB	20	9(45.0)	11(55.0)
O	27	12(44.4)	15(55.6)
p-value		0.037	

p-value is determined by the Chi-Square test  
 p-value ≤ 0.05 = significant

**Table 3: Comparison of Blood Pressure among Prehypertension and Normotensive subjects**

	Systolic blood pressure Mean ± SD	Diastolic blood pressure Mean ± SD
Pre hypertension (n=56)	122.91 ± 10.79	88.87 ± 10.51
Normotensive (n=44)	112.90 ± 6.82	74.02 ± 6.33
p-value	0.39	0.006

p-value is determined by T-test, p-value ≤ 0.05 is taken as significant

makeup of particular populations. Knowledge and awareness regarding the blood groups and their association with different diseases might help to explore the emerging diseases which might aid help forecasting the evolving health challenges. Blood group B was the most common blood group in our study, which was in accordance with a study done by Jawed S.<sup>13</sup> These results are also in agreement with other studies conducted in Punjab carried out on the broader scale<sup>14</sup> suggesting that blood group B is more common in Punjab. However, the study conducted by Altaf B<sup>4</sup> suggests that blood group O was more common in their sample.<sup>4</sup> This result may be due to their small sample size. In contrast, Sindh and Baluchistan populations are common in blood group O.<sup>15</sup> The least common blood group that is found in our study is blood group AB and this is also supported by the studies showing similar results as ours.<sup>15, 16, 17</sup>

In the current study, prehypertension was most frequently found in individuals having blood group A. Our results are justified by the Sushil et al study conducted in Nepal, which also reported the occurrence of hypertension in individuals with blood group A.<sup>18</sup> Another Study conducted in Ghana reported hypertension in blood group AB followed by blood group A.<sup>19</sup> A study conducted in Saudia by Alanazi TS shows no significant association between different blood groups and susceptibility to develop hypertension while they didn't mention prehypertension in their study.<sup>17</sup>

We have found a significant difference in diastolic blood pressure in the pre-hypertensive and normotensive groups. These results are similar to a study conducted in Faisalabad by Altaf B.<sup>4</sup>

The strength of the study was its standardized protocol like the questionnaire and estimation of blood pressure and blood group.

This is a single-centred study is a limitation as results cannot be generalized to the whole population.

**CONCLUSION**

Blood group B was the most common blood group of our studied population. Prehypertension is commonly found in subjects with blood group A.

**REFERENCES**

- Varghese A, Abraham ML, Ramachandran R, Thomas SA. Prospective study of the relationship between blood pressure and blood group among adult male blood donors in a Tertiary care center. *Inter J Clin Exp Phys.* 2015; 2: 51-5.
- Kaur M. Correlation between body mass index and blood pressure in adolescents. *Pak J Physiol.* 2016; 12: 47-50.
- Kande V. Mallikarjuna Rao, G. Pavan Kumar Reddy. Prevalence of prehypertension in young adults in a semi-urban district in Telangana. *Int J Adv Med.* 2016

- ;3(1):63-67 DOI: <http://dx.doi.org/10.18203/2349-3933.ijam20160190>
4. Altaf B, Jawed S, Behram F, Khan ZA, Naz S. Association of Pre- hypertension with blood groups in young population. *Professional Med J.* 2019; 26(11):1820-1824. DOI: 10.29309/TPMJ/2019.26.11.469
  5. Amjadi O, Rafiei A, Ajami A, Valadan R, Hosseini-khah Z, Hajilooi M, Janbabaeei G. Blood groups: in Health and Diseases. *Res Mol Med.* 2015; 3 (4): 1-9
  6. Ezeudu CE, Chukwuka JO, Ebenebe JC, Igwe WC, Egbuonu IHypertension and prehypertension among adolescents attending secondary schools in the urban area of South-East, Nigeria..*Pan Afr Med J.* 2018;31:145. doi: 10.11604/pamj.2018.31.145.15994.
  7. Mishra SK, Naresh B, Prabhakar S, Keshav S, Pallavi I. Frequency& distribution of ABO and Rh (factor) blood groups among medical students of central India, Rewa, Madhyapradesh. *Inter J Pharma, Chem Biol Sci.* 2014; 4: 980-4
  8. Halboup AM, Othman GQ, Battah MM, Alzoubi KH, Sal-lom H. Awareness of Physicians in Yemen Toward High Blood Pressure Management According to the Eighth Joint National Committee (JNC 8) Guideline.*Int J Gen Med.* 2020;13:529-537. doi: 10.2147/IJGM.S265118.
  9. National institute for health and clinical excellence, hypertension in adults: diagnosis and management NICE Guideline [NG136] Published Date: August 2019
  10. Huang Y, Guo P, Karmacharya BM, Seeruttun SR, Xu DR, Hao Y. Prevalence of hypertension and prehypertension in Nepal: a systematic review and meta-analysis. *Global health research and policy.* 2019 Dec;4(1):1-0.
  11. Ewald DR, Sumner SC. Blood type biochemistry and human disease. *Wiley Interdiscip Rev Syst Biol Med.* 2016 Nov;8(6):517-535. doi: 10.1002/wsbm.1355. Epub 2016 Sep 7
  12. Etemadi A, Kamangar F, Islami F, Poustchi H, Pourshams A, Brennan P et al Mortality and cancer in relation to ABO blood group phenotypes in the Golestan Cohort Study. *BMC medicine.* 2015 Dec;13(1):8.
  13. Jawed S, Zia S, Tariq S. Frequency of different blood groups and its association with BMI and blood pressure among the female medical students of Faisalabad. *J Pak Med Assoc.* 2017 Aug;67(8):1132-1137
  14. Khan MU, Bashir MW, Rehman R, Kiani RA. Frequency of ABO and Rh (D) Blood Groups Among Blood Donors in Lahore, Pakistan.*Inter J Adv Biol Biomed Res.* 2014; 29: 597-600
  15. Kanwal S, Qureshi HJ, Aslam MS, Masood S. Frequency of ABO and Rh blood groups in students of Akhtar Saeed Medical and Dental College, Lahore. *Pak J Physiol.* 2016; 12: 29-30
  16. Sana Ullah, Ahmad T. Distribution of ABO and Rh (D) Blood Groups in the Population of District Dir Lower, Khyber Pakhtunkhwa Pakistan. *World Applied Sci J.* 2015; 33: 123-35)( Tesfaye K, Petros Y, Andargie M.Frequency distribution of ABO and Rh (D) blood group alleles in Silte Zone, Ethiopia. *Egypt J Med Human Gen.* 2015; 16: 71-6.)
  17. Alanazi TS, Alanazi KN, Alruwaili WA, Alanazi MA, Alshammari AN, Alanazi AS, Alazmi ZN, Alanazi AA, Almi-jlad RM, Almutairi AS, Alenzi AM. Blood groups as a risk factor of hypertension in the Arar population, Northern Saudi Arabia. *The Egyptian Journal of Hospital Medicine.* 2018 Oct 1;73(6):6854-8
  18. Sushil K, Binod R, Rani G. Association of ABO blood groups with blood pressure in young male adults of Bhaktapur: A cross-sectional study. *Middle East Journal of Family Medicine.* 2018 Aug 1;7(10):0.
  19. Acheampong K, Boateng C A . Prevalence of Hyper-tension and Its Association with Blood Groups among Sandwich Students in Valley View University Community. Available from: [https://www.researchgate.net/publication/322909762\\_Prevalence\\_of\\_Hypertension\\_and\\_Its\\_Association\\_with\\_Blood\\_Groups\\_among\\_Sandwich\\_Students\\_in\\_Valley\\_View\\_University\\_Community](https://www.researchgate.net/publication/322909762_Prevalence_of_Hypertension_and_Its_Association_with_Blood_Groups_among_Sandwich_Students_in_Valley_View_University_Community) [cited on: Nov 17, 2020].

**CONFLICT OF INTEREST:** Authors declare no conflict of interest

**GRANT SUPPORT AND FINANCIAL DISCLOSURE:** NIL

**AUTHOR'S CONTRIBUTION**

Following authors have made substantial contributions to the manuscript as under

- Moiez M:** Conception, write up and over all supervision
- Zahid H:** Data collection, literature search
- Ashfaq R:** Statistical analysis and bibliography
- Zareen S:** Literature search
- Altaf B:** Data collection
- Rasheed Z:** Data collection

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)