

# A Cross-Sectional Study to Assess the Association between ABO Blood Group with Hypertension among 1st year Medical Students

Singh S<sup>1</sup>, Verma SK<sup>2</sup>, Gupta N<sup>3</sup>, Saurabh K<sup>4</sup>

## ABSTRACT

**Introduction:** It has been found in various studies that ABO blood groups are associated with various diseases such as duodenal ulcer, gastric cancer, diabetes mellitus, urinary tract infection, Hypertension and venous thrombosis. Since hypertension is multifactorial, the ABO antigens may indirectly influence arterial pressure. Objectives were to know the distribution of blood groups among the subjects and to assess the association between ABO blood groups and Hypertension

**Material and Methods:** A cross sectional study was conducted among the 1st year medical students in the department of Physiology of Rohilkhand Medical College And Hospital, Bareilly for the period of November 2016 to January 2017. A total of 150 undergraduate students were included in the study by using convenient sampling technique and after taking informed consent. Blood grouping was carried out with the standard antisera. The blood pressure was recorded using mercury sphygmo-manometer both by palpatory and auscultatory methods.

**Results:** The frequency of various blood groups are O-39%, B-37%, A-17%, AB-7%. There was no significant difference between systolic and diastolic blood pressure of different blood groups.

**Conclusion:** Blood group O is the most common blood group in our study. There was no statistically significant association between ABO Blood groups and Hypertension.

**Keywords:** ABO Blood Group, Hypertension among Medical Students

## INTRODUCTION

Hypertension is a chronic medical condition and one of the most common life threatening non-communicable disease. It contributes to 7.6 million premature deaths, 54% of stroke, 47% of ischemic heart disease and 13% of attributable deaths, worldwide.<sup>1</sup> The prevalence rate of hypertension is probably on the rise in developing countries the reason of which is probably adoption of western lifestyles and urbanization.<sup>2</sup> Since, Hypertension remains to be asymptomatic, most of the people only get aware of being hypertensive after the development of complications related to it. Diagnosis of hypertension is of great importance, so that it could be easily prevented by identifying its probable risk factors.<sup>3</sup> Hypertension is dependent on modifiable and non-modifiable factors. Factors like Obesity, high cholesterol, sedentary life style, high fat and low dietary fibers intake are the major causes of hypertension.<sup>4</sup> Familial patterns of hypertension suggests genetic factor as another important non-modifiable predisposing factor, and ABO blood group is one of the such

factor which needs to be studied in more details.

In the year 1900 scientist Karl Landsteiner identified the ABO system of blood group which was the starting of Blood banking and Transfusion medicine.<sup>5</sup> ABO blood grouping is based on antigenic property of red blood cells. Type A individuals have the antigen A, type B have antigen B, and type AB have both; type O have neither of these antigens. These A and B antigens are complex oligosaccharides present on the surface of red blood cells that differ in their terminal sugar. However, along with their expression on red blood cells, ABO antigens are also highly expressed on the surface of a variety of human cells and tissues, including the epithelium, sensory neurons, platelets and the vascular endothelium.<sup>6</sup>

The clinical significance of the ABO blood group system extends beyond transfusion medicine and several reports have suggested an important correlation of ABO blood groups in the development of cardiovascular, oncological and other diseases associated with hypercoagulability.<sup>7,8</sup>

Blood groups are genetically determined and hypertension is also a genetic disorder and genetic factor is an important non- modifiable predisposing factor for the development of hypertension. Thus, the present study was done to assess the association of ABO blood group with hypertension.

Objectives of the study were to know the distribution of blood groups among the subjects and to assess the association between ABO blood groups and Hypertension.

## MATERIAL AND METHODS

A cross sectional study was conducted among the 1st year medical students in the department of Physiology of Rohilkhand Medical College And Hospital, Bareilly for the period of November 2016 to January 2017. After taking informed consent, 150 undergraduate students were included in the study by using convenient sampling technique.

<sup>1</sup>Post-graduate Student, <sup>2</sup>Professor and Head, <sup>3</sup>Associate Professor, Department of Physiology, <sup>4</sup>Post-graduate Student, Department of Community Medicine, Rohilkhand Medical College and Hospital, Bareilly, U.P., India

**Corresponding author:** Gupta N, Associate Professor, Department of Physiology, Rohilkhand Medical College and Hospital, Bareilly, U.P., India

**How to cite this article:** Singh S, Verma SK, Gupta N, Saurabh K. A cross-sectional study to assess the association between ABO blood group with hypertension among 1st year medical students. International Journal of Contemporary Medical Research 2018;5(7):G1-G4.

**DOI:** <http://dx.doi.org/10.21276/ijcmr.2018.5.7.21>

### Data Collection

Blood group was determined during practical hours in haematology laboratory. The experiment was part of the practical curriculum of the first year students and therefore, no separate pricks was inflicted upon the students.

Blood group was determined by standard anti-sera. Blood samples was collected by finger-prick with sterile disposable needle after cleaning the puncture site with spirit and a red cell suspension was prepared. Then, on separate glass slides, on one half, one drop of the three anti-sera was added and on the other side a drop of normal saline was added. Then a drop of the red cell suspension was added on both sides. Blood groups was determined on the basis of presence or absence of agglutination. Agglutination was confirmed by observing under low-power objective of a compound microscope.

Measurement of blood pressure was taken with a mercury sphygmomanometer. The mercury sphygmomanometer is considered as the gold standard for recording of blood pressure. Blood pressure was recorded as per the guidelines of American Heart Association (AHA) scientific statement (2005). Subjects was seated quietly for at least 5 minutes in a chair with their backs supported and their arms bared and supported at heart level. The average value of two readings separated by 1 minute was taken as the blood pressure. For hypertension JNC VII classification was used according to which subjects having a blood pressure of  $\geq 140/90$  mm Hg is labelled as hypertension. Approval for the study was sought from the Institutional Ethics Committee. Informed Consent was taken from every subject and information thus collected was dealt with strict confidentiality and was used for research purpose only.

### Data Analysis

Data was analyzed by ANOVA-one way using spss version-17.

## RESULTS

As shown in table 1 and graph 1, there were 25(16.67%) participants having Blood group A, 55(36.67%) having Blood group B, minimum 11(7.33%) having Blood group AB and maximum 59(39.33%) having Blood group O.

As shown in table 2 and graph 2, Mean Systolic blood

Blood Group	No	Percentage (%)
A	25	16.67%
B	55	36.67%
AB	11	7.33%
O	59	39.33%
Total	150	100%

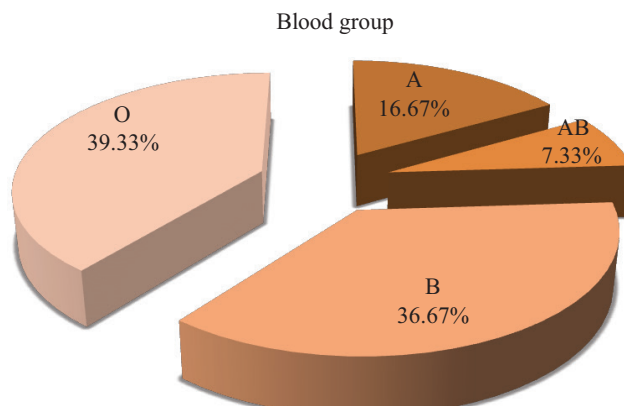
**Table-1:** Blood Group Distribution.

Blood Group	SBP(Mean $\pm$ S.D)	F-Value	P-value
A	110.56 $\pm$ 14.94	1.808	0.148
B	117.71 $\pm$ 14.72		
AB	109.82 $\pm$ 13.01		
O	115.32 $\pm$ 15.25		

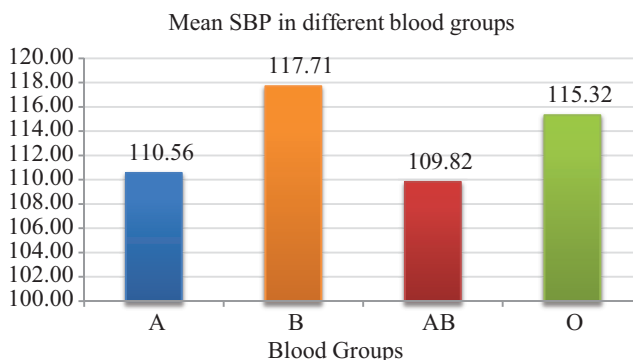
**Table-2:** Comparison of mean Systolic blood pressure (SBP) in different blood group.

Blood Group	DBP(Mean $\pm$ S.D)	F-Value	P-value
A	74.08 $\pm$ 8.73	1.002	0.394
B	77.27 $\pm$ 10.79		
AB	72.36 $\pm$ 9.87		
O	75.83 $\pm$ 10.67		

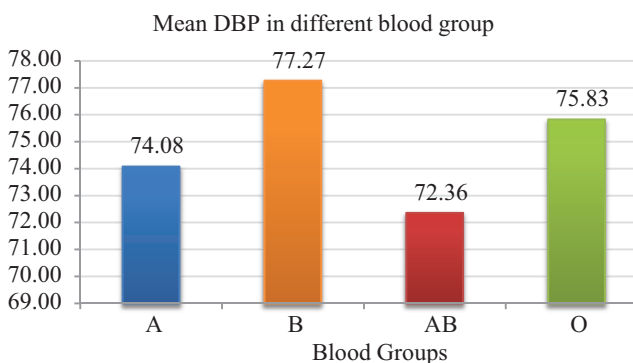
**Table-3:** Comparison of mean Diastolic blood pressure (DBP) in different blood group



**Graph-1:** Blood Group Distribution



**Graph-2:** Comparison of mean SBP in different blood group



**Graph-3:** Comparison of mean DBP in different blood group

pressure in blood group A was  $110.56 \pm 14.94$ , Mean Systolic blood pressure in blood group B was  $117.71 \pm 14.72$ , Mean Systolic blood pressure in blood group AB was  $109.82 \pm 13.01$  and Mean Systolic blood pressure in blood group O was  $115.32 \pm 15.25$ . There was no significant difference in mean Systolic blood pressure in between different blood groups ( $p=0.148$ ).

As shown in table 3 and graph 3, Mean Diastolic blood pressure in group A was  $74.08 \pm 8.73$ , Mean Diastolic blood pressure in blood group B was  $77.27 \pm 10.79$ , Mean Diastolic

blood pressure in blood group AB was  $72.36 \pm 9.87$  and Mean Diastolic blood pressure in blood group O was  $75.83 \pm 10.67$ . There was no significant difference in mean Diastolic blood pressure in between different blood groups ( $p=0.394$ ).

## DISCUSSION

The present study was carried out with 150 students of age group 19-27 years as all of them belonged to the first year of MBBS curriculum. Of 150 students, 72 were males and 78 were females. In our result it was revealed that blood groups O was more predominant, followed by blood groups B, A and AB. The distribution of ABO blood groups was in order of O 59 (39.33%) > B 55 (36.67%) > A 25(16.67%) > AB 11(11.3%). The same trend of Prevalence of blood groups O>B>A>AB were obtained from a study conducted by Baishya R et al.<sup>9</sup> and various other researcher Mirdha M et al.<sup>10</sup>, Thenmozhi S et al.<sup>11</sup>, Mahapatra B et al.<sup>12</sup>, Kohli PG et al.<sup>13</sup>, Sasekala M et al.<sup>14</sup>, Bhatti R et al.<sup>15</sup> In contrast to our study, a study conducted by Patil SV et al.<sup>16</sup>, Roy B et al.<sup>17</sup> and Nazeer M et al.<sup>18</sup> revealed that commonest type of blood group was B followed by O, A and AB.

Hypertension is a chronic medical condition and one of the most common life threatening non-communicable disease. According to the survey done by Indian Council of Medical Research in 2007-8 to identify the risk factors for non communicable diseases under state based Integrated Disease Surveillance Project Phase 1, the prevalence of hypertension was varying from 17 to 21% in all the states of India with marginal rural-urban differences.<sup>19</sup>

Hypertension is divided into Primary (essential) and Secondary. Essential, or primary hypertension is a persistent elevation of blood pressure which is not caused by underlying cardiac, endocrine, or renal disease.<sup>20</sup> Essential hypertension is the most prevalent form of hypertension accounting for 90% of all cases of hypertension. Hypertension is classified as "Secondary" when some other disease process or abnormality is involved in its causation like disease of kidney, (chronic glomerulo-nephritis and chronic pyelonephritis), tumours of adrenal glands, congenital narrowing of aorta and toxemias of pregnancy. These are estimated to account for about 10% or less of the cases of hypertension.<sup>21</sup>

Many other study findings have suggested the genetic basis of essential hypertension in population of different ethnicity.<sup>19,22</sup>

ABO blood group is one the non modifiable risk factor for the development of hypertension, so in the present study we tried to find out the association between ABO blood group and hypertension. In our study it was found that there was no significant difference in mean Systolic blood pressure in between different blood groups ( $p=0.148$ ). A Study done by kondam A. et al.<sup>22</sup> and kaur M. et al.<sup>23</sup> also found similar result.

The current study outcome showed that there was no significant difference in mean Diastolic blood pressure in between different blood groups ( $p=0.394$ ). A significant association was found between the blood group B and O, and diastolic blood pressure.<sup>24-26</sup>

Many other previous studies have shown significant association of Hypertension with blood group B<sup>27-29</sup>, and blood group O.<sup>30,31</sup>

## CONCLUSION

Blood group O is the most common blood group in our study. There was no statistically significant association between ABO Blood groups and Hypertension in present study.

## Recommendations

More further studies in other settings with large number of study participants should be done to elucidate these results.

## REFERENCES

1. Lawes CM, Hoorn SV, Rodgers A. Global burden of blood pressure related disease. *Lancet*. 2008;371:1513-8.
2. Castelli WP. Epidemiology of coronary heart disease. The Framingham Study. *Am J Med* 1984;76:4-12.
3. Eric HA, Joseph L. Vascular disease and hypertension. In: Andreoli TE, Carpenter CC, Griggs RC, Loscalzo J, (Eds). *Cecil Essentials of Medicine*. 6th ed. Michigan: WB Saunders; 2004. p. 155-73.
4. T. Kamran, A. Muhammad, S. Abdus, L. Muhammad et. al. Hypertension in Relation to Obesity, Smoking Stress, Family History, Age and Material status among human population of Multan, Pakistan. *J.Med.Sci.*, 2004;4:30-35.
5. Storry JR and Olsson ML. The ABO blood group system revisited: a review and update. *Immunohematology* 2009;25:48-59.
6. Eastlund T. The histo-blood group ABO system and tissue transplantation. *Transfusion* 1998;38:975-88.
7. Franchini M, Capra F, Targher G, Montagnana M and Lippi G. Relationship between ABO blood group and von Willebrand factor levels: from biology to clinical implications. *Thromb J* 2007;5:1-5.
8. Franchini M, Favaloro EJ, Targher G, Lippi G. ABO blood group, hypercoagulability, and cardiovascular and cancer risk. *Crit Rev Clin Lab Sci* 2012;49:137-49.
9. Baishya R, Sarkar R, Barman B. Blood group and its relationship with bleeding time and clotting time- an observational study among the 1st MBBS students of Gauhati medical college, Guwahati. *Int J Res Med Sci* 2017;5:4147-50.
10. Mirdha M, Jena SK. Distribution of blood group and its relation to bleeding time and clotting time. *Int J Med Sci Public Health* 2016;5:2566-2569.
11. Thenmozhi S, Neelambikai N, Aruna P. Comparison of bleedingtime and clotting time in different ABO blood groups. *National Journal of Physiology*. 2013;1:19-24.
12. Mahapatra B, Mishra N. Comparison of bleeding time and clotting time in different blood groups. *American Journal of Infectious Diseases*. 2009;5:106-108.
13. Kohli PG, Kaur H, Maini S. Relationship of bleeding time and clotting time with blood groups. *Res J Pharm Biol Chem Sci*. 2014;5:1780-3.
14. Sasekala M, Saikumar P. Relationship between bleeding time and clotting time among gender difference and varying blood groups in UG medical students. *IOSR J Dent Med Sci* 2013;10:40-3.
15. Bhatti R, Shiekh DM. Variations of ABO Blood groups.

- Gene Frequencies in Population of Sindh, (Pakistan) Ann King Edward Med Coll. 1999; 5:328–331.
16. Patil SV, Gaikwad PB, Vaidya SR, Patil US, Kittad SD. To study the blood group distribution and its relationship with bleeding and clotting time in dental students. Asian J Medical Pharmaceutical Sci. 2013;1:1–4.
  17. Roy B Banerjee, Sathian B, Mondal M, Saha CG. Blood group distribution and its relationship with bleeding time and clotting time: a medical school based observational study among Nepali. Indian and Sri Lankan students. Nepal J Epidemiol. 2011;1:135–40.
  18. Nazeer M, Aara S, Rafiq N. Blood Groups, BT and CT in Medical and Para Medical Students-Gender Based Distribution and Their Relation. An Observational Study. International Journal of Medical Science and Clinical Invention 2018;5:3553-3556.
  19. Mohan V, Deepa M, Farooq S, Datta M, Deepa R. Prevalence, awareness and control of hypertension in Chennai-the Chennai urban rural epidemiology study (CURES–52). Journal of Association of Physicians of India. 2007;55:326-32.
  20. Bartosh SM, Aronson AJ. Childhood hypertension: an update on etiology, diagnosis, and treatment. *Pediatr Clin North Am* 1999;46:235-252.
  21. Park K. Park's Textbook of Preventive and Social Medicine. 24th edition, Bhanot Publishers: Jabalpur 2017;p.392.
  22. Kondam A. et al. A study of incidence of hypertension in ABO and rhesus blood group system. *Int J Biol Med Res.* 2012;3:1426-1429.
  23. Kaur M, Gill K, Bassi R, Kaur D. Association of ABO and Rh blood groups with Hypertension. *Pak J Physiol* 2016;12:11-14.
  24. Bhasin MK, Walter H, Danker-Hopfe H, (Eds). The distribution of genetical, morphological and behavioral traits among the people of Indian region. New Delhi: Kamla-Raj Enterprises; 1992.
  25. Nemesure B, Wu SY, Hennis A, Leske MC; Barbados Eye Study Group. Hypertension, type 2 diabetes, and blood groups in a population of African ancestry. *Ethn Dis* 2006;16:822–9.
  26. Gogoi HS, Bora B. Prevalence of ABO and Rh positive blood groups among the hypertensive male and female population in greater Guwahati. *Asian J Sci Tech* 2016;7:2635 41.
  27. Sachdev B. Prevalence of hypertension and associated risk factors among nomad tribe groups. *Antrocom* 2011;7:181–9.
  28. Chandra T, Gupta A. Association and distribution of hypertension, obesity and ABO blood groups in blood donors. *Iranian J Ped Hematol Oncol* 2012;2:140–5.
  29. Bhattacharyya S, Ganaraja B, Ramesh BM. Correlation between the blood groups, BMI and prehypertension among medical students. *J Chin Clin Med* 2010;51:78–82.
  30. Nasreen AR. Blood groups and hypertension. *J Baghdad Coll Dent* 2006;18:68–70.
  31. Kaur M. Association between ABO blood group and hypertension among post-menopausal females of North India. *Anthropologist* 2014;17:677–80.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 01-07-2018; **Accepted:** 01-08-2018; **Published:** 08-08-2018