

Association of ABO blood groups with blood pressure in young male adults of Bhaktapur: A cross-sectional study

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Abstract

Background: The association between ABO blood groups and blood pressure has remained unclear. The present study aimed to assess the association between ABO blood groups and the blood pressure among the young male adult population of Bhaktapur, Nepal.

Methods and Materials: This was a cross-sectional study performed on 584 young male adults aged between 17 and 22 years. Two variables were noted from each individual: Arterial blood pressure and blood group. Chi-square test was used to find the relation between these two variables. P value < 0.05 is considered as statistically significant.

Results: The mean systolic blood pressure was significantly high in A blood group when compared to other blood groups (P value 0.04). The correlation between diastolic blood pressure and blood groups A, B, AB and O was not found. Moreover, association between blood pressure and Rhesus (Rh) blood group was not revealed.

Conclusion: Results of this study suggested that A blood group individuals have more susceptibility for high blood pressure indicating a potential risk of cardiovascular diseases with genetic relation between ABO blood group and hypertension. More and more studies in larger populations and different geographical areas are required to prove the correlation between ABO blood group and the blood pressure.

Key words: Blood group, Blood pressure, Hypertension

Introduction

Among numerous blood grouping systems, the ABO and Rhesus (Rh) blood grouping remain the most popular and clinically vital. Austrian scientist, Karl Landsteiner in 1901 named the first blood group in humans, which was the ABO blood group(1). Later, Rh blood group was introduced by Landsteiner and Wiener in 1941(2). The principle is that two antigens and two antibodies are responsible for the ABO types and a particular combination of these four types reveals an individual's ABO blood group. However, along with their expression on RBCs (Red Blood Cells), ABO antigens are also significantly presented on the surface of a variety of human cells and tissues, including neurons, platelets, and the different endotheliums(3). Thus, the medical importance of the ABO blood group system plays a vital role in modern medicine and numerous reports have suggested an important correlation between ABO blood groups and the development of various diseases such as cancers, diabetes, peptic ulcer and CVS diseases. Blood pressure is one of the vital signs routinely monitored by medical professionals and healthcare providers. Recent studies have revealed that cardiac disease is more commonly associated with people of blood type other than O (5). Most of the blood group studies on blood pressure have been on populations with preexisting hypertension(6). This study assessed the effect of ABO blood group on blood pressure and its prevalence among healthy young male adults of Bhaktapur, Nepal.

Methodology

The present study was conducted in the Department of Physiology of Kathmandu Medical College and Hospital after obtaining ethical clearance. It was a Cross-sectional study conducted in Bhaktapur from December 2016 to December 2017. The participation was totally voluntary. Informed written consent was taken from each participant before collecting any form of data. Demographic data and family history of any kind of disease was taken. After 10

minutes of resting, Blood Pressure (BP) was recorded twice in the left arm of each individual in sitting position; with 10 minutes interval between two recordings and mean value was taken. Blood pressure was recorded using a mercury Sphygmomanometer. The appearance (phase I) and disappearance (phase V) of Korotkoff sounds were considered for systolic and diastolic BP, respectively(7). Measurement of BP was done by the principal investigator to avoid bias. Individuals were divided into Normal, Prehypertensive and Hypertensive according to the guidelines by The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-VII)(8). For blood group determination, blood was collected from left ring-finger under aseptic precautions. ABO and Rh blood grouping were done by agglutination test using monoclonal anti-A, anti-B and anti-D (IgM) sera. Statistical analysis was done by using SPSS version 17. Chi-square test was used to know the association of ABO blood groups to blood pressure. 'P' value < 0.05 is taken as significant.

Results

The mean age of the study population was 19.56 ± 2.32 yrs (Mean \pm SD). It was found that blood group O (44.52%) was most prevalent in Bhaktapur, followed by blood group B (29.96 %), then group A (20.89 %), and least prevalent was group AB (4.63 %), shown in Table 1. In the Rhesus system, 95% of individuals were Rh(D) positive and only 5% were Rh(D) negative (Figure 3). The mean Systolic Blood Pressure (SBP) in A group is statistically significant with 'p' value of 0.04, and no significant difference in the mean Diastolic Blood Pressure (DBP) of ABO group (Table 1). In this present study the prevalence of prehypertension and hypertension was 32.78% and 14.67 % respectively. The prehypertensive and hypertensive individuals were counseled for further monitoring and evaluation. Table 2 indicates there is no significant association of increased blood pressure with AB, B and O blood groups, whereas A group shows a significant association (p value, 0.04) with elevated blood pressure.

Table 1: Distribution of ABO blood groups and mean blood pressure in the study population

Blood Type	Number of Subjects (N) (Total =584)	Percentage	Mean SBP in mmHg (Mean \pm SD)	Mean DBP in mmHg (Mean \pm SD)
A	N= 122	20.89 %	129.4 \pm 14.4	78.4 \pm 10.2
B	N= 175	29.96 %	122.3 \pm 11.6	74.24 \pm 9.3
AB	N= 27	04.63 %	121.4 \pm 10.5	76 \pm 10.40
O	N= 260	44.52 %	121.1 \pm 14.8	75.6 \pm 11.3

Table 2: Frequencies of ABO blood group in the study population (normal and elevated blood pressure)

Blood Type	Subjects with normal BP (N=280)	Subjects with elevated BP (N=304)	P value
A	35	87	0.04*
B	90	85	0.9
AB	15	12	0.1
O	140	120	0.9

(*P value < 0.05)

Figure 1: Distribution of ABO blood groups in the study subjects

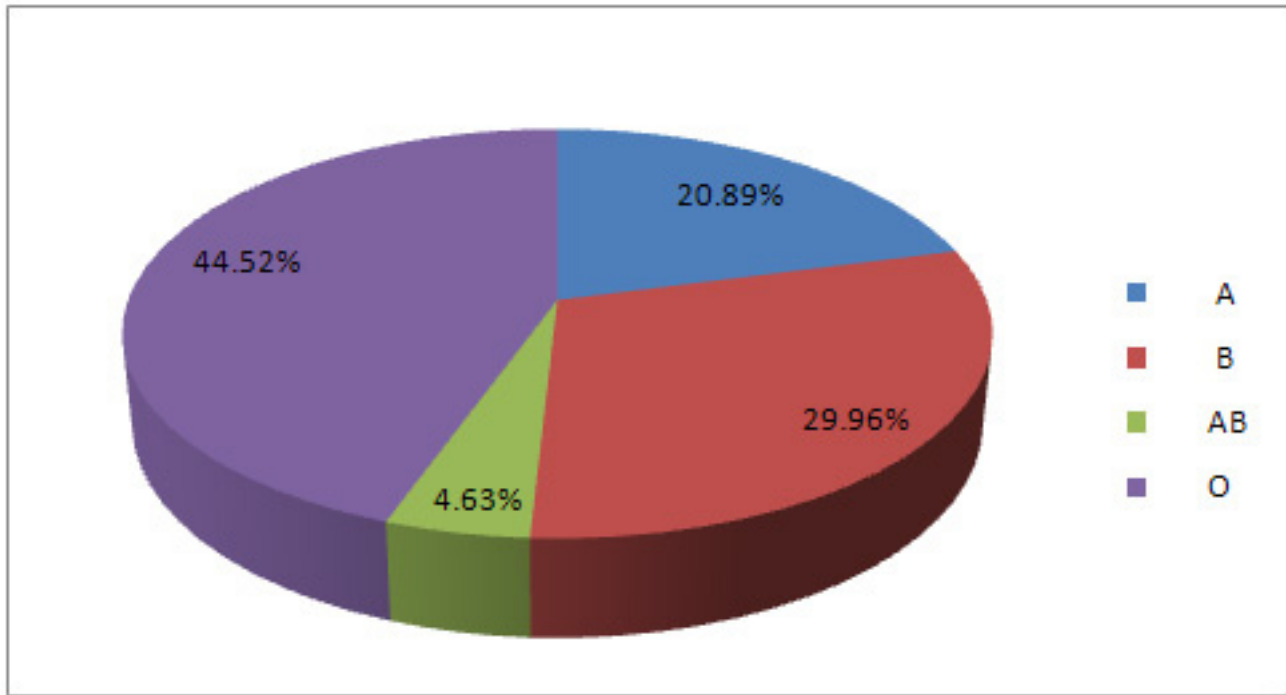


Figure 2: Systolic BP mmHg (Mean \pm SD) in the study subjects

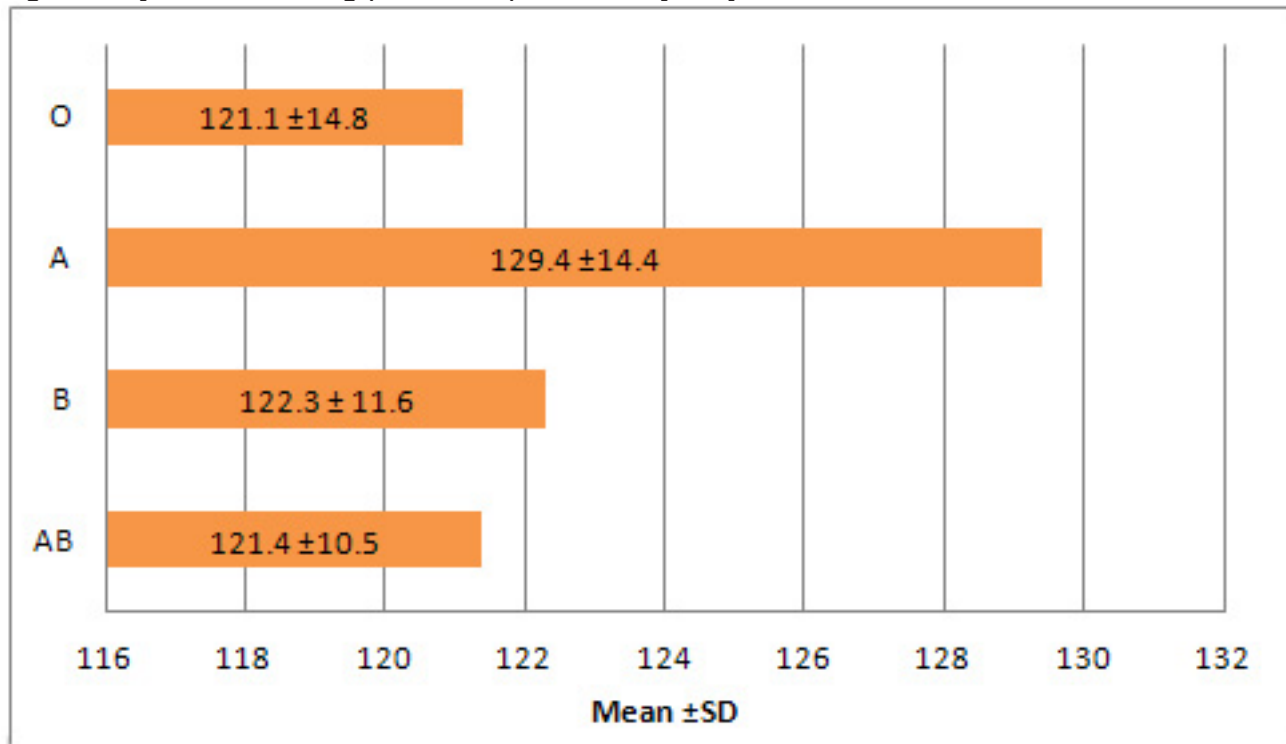
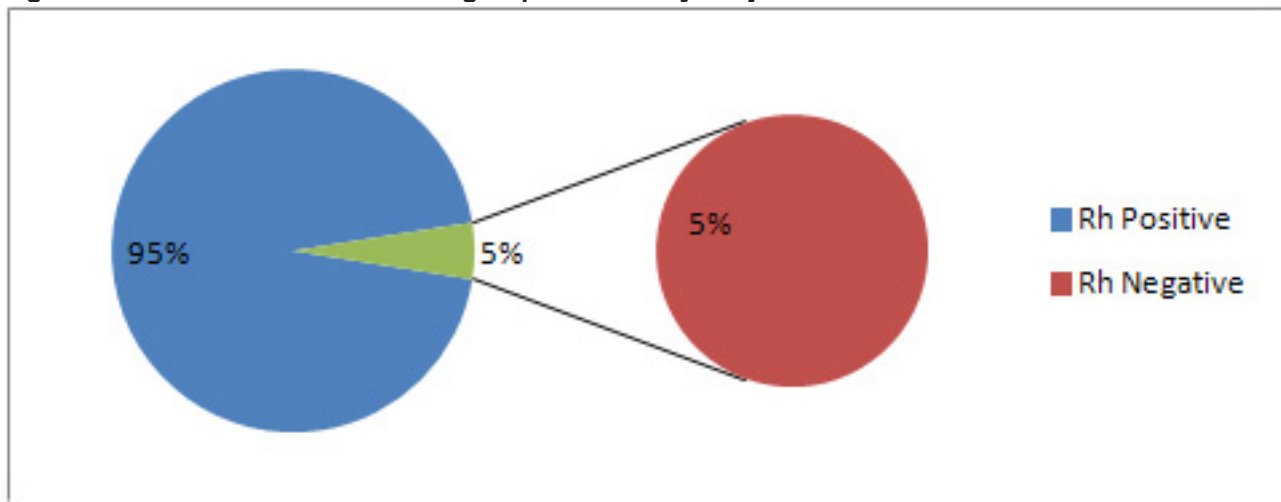


Figure 3: Distribution of Rh D blood group in the study subjects

Discussion

The present study was comprised of 584 young male adults. Our study revealed that the individuals having blood group A (71.3%) have higher BP at baseline. Similar kind of association between A blood type and blood pressure was found in other studies; individuals with blood type A had a significantly greater risk of coronary artery disease and myocardial infarction, as compared to individuals who do not have type A blood group(9). In similar studies conducted by Maxwell it was found that the chances of hypertension in Glasgow were highest in blood group O patients (53.04%), followed by A (33.62%), then B (11.02%) and lowest was seen in blood group AB (2.32%)¹⁰. In a study done by Alam, no significant difference in systolic and diastolic blood pressure among all blood groups was seen(11). Our study clearly showed that A blood group is more susceptible to hypertension in comparison to other blood groups.

Conclusion

This study showed that blood group O (44.52%) is the most prevalent blood group in Bhaktapur. Frequency of occurrence of hypertension was found to be highest in blood group A. Previous studies have shown that relation between ABO and hypertension exists. Thus, from the present study also we can assume that the ABO antigens play an indirect role in influencing arterial blood pressure. However, further detailed studies with a wider geographical area and big study population is needed to justify the relation between blood group and blood pressure.

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