

ORIGINAL ARTICLE

Association of ABO And RH Blood Group with Hypertension – An Observational Study

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Abstract:

Objective: The principle aim is to find out the association of ABO and Rh blood group with hypertension.

Methods: This cross-sectional study was conducted at hypertension and research centre, Rangpur. A total of 1128 hypertensive patients were included in this study by purposive sampling method. Staging of hypertension was done according to The JNC 7 Hypertension Guidelines. ABO and Rh blood group are determined by agglutination method.

Result: This study demonstrated that majority (58.1%) patients were within 40 to 60 years of age. 63.7% patients were male and 36.3% were female. 65% patients were from rural area and the rest 35% from urban area. Socio-demographic data demonstrate that 48.6% was service holder, businessman 13.5%, farmer 12.2% and others occupation includes 25.7% like retired person, student etc. Majority (40.7%) patients were poor; middle class 31.7% and 23% were rich. Maximum observed systolic blood pressure was 170 mm of Hg and minimum 110 mm of Hg. Maximum diastolic blood pressure was 120 mm of Hg and minimum 60 mm of Hg. Out of 1128 hypertensive patients 21% patients had normal BMI, 66.7% overweight, 8.8% moderately obese and 3.5% patients were under weight.

ABO blood group of this hypertensive study subjects showed 41.3% ($p < 0.001$) were blood group B, group A 32.2% ($p = 0.25$); group O 14.0% ($p < 0.001$) and 12.5% ($p < 0.001$) were blood group AB. Rh typing of the study patients showed 92.6% ($p < 0.001$) was found Rhesus positive and only 7.4% ($p < 0.001$) was Rhesus negative. Among the Rh positive group 32.1% ($p = 0.25$) was A positive, 35.5% ($p < 0.001$) B positive, 12.5% ($p < 0.001$) AB positive and 12.4% ($p < 0.001$) was found O positive respectively. Among Rh negative group 0.1% ($p = 0.44$) was A negative, 5.8% ($p < 0.001$) B negative, 00% ($p > 0.05$) AB negative and 1.6% ($p = 0.001$) was found O negative respectively in comparison with another study where Rh positive blood group were A-21.58%, B-34.58%, AB-8.85%, O- 30.70% and Rh negative group were A- 0.82%, B-0.96%, AB-0.64%, O-1.87% respectively.

The prevalence of hypertension was more in Rh positive blood group 92.6% ($p < 0.001$), particularly in Rh B positive 35.5% ($p < 0.001$) and significantly less in A, AB and O blood group which were found statistically significant.

Conclusion: The prevalence of hypertension is more in Rh B positive and significantly less in other ABO blood group.

Key Word: Hypertension, ABO blood group, Rh blood group.

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Introduction:

Hypertension has proven to be a silent killer contributing to many deaths and considerably increasing morbidity worldwide.¹ Hypertension is rapidly emerging as a major public health problem in developing countries.² 25% of world adult population is already hypertensive. Almost three quarters of the hypertensive population are in developing countries.³ Nationwide survey on NCD conducted in Bangladesh in 2010 indicated that the prevalence of hypertension is 17.9%.⁴ Twelve million people suffers from hypertension in Bangladesh.⁵ Essential hypertension generally is regarded as a polygenic disorder.⁶

The ABO blood group system was discovered by Austrian scientist, Karl Landsteiner, who found three different blood types (A, B and O) in 1900 from serological differences in blood called the Landsteiner Law.⁷ In 1902, DesCasterllo and Sturli discovered the fourth type, AB.⁸ The genes of ABO blood group have been determined at chromosome locus.⁹⁻¹²

The blood group of a person depends upon the presence or absence of two genes, A and B. In some study of different parts of the world it has been shown that there are some correlation between ABO and Rh blood group with hypertension. But population based study on association of hypertension with ABO blood group and Rh typing lacking in our country.

In most cases the cause of hypertension is unknown, there may be some genetic influence though yet not established. ABO blood group and Rh typing in each individual is also genetically determined.

So this association might helps in the identification of hypertension, its early prevention, treatment and prevention of target organ damage.

Materials & Methods:

This cross-sectional study was conducted at Hypertension Research Centre, Rangpur - A Hypertension care and Research centre from July, 2012 to December, 2012. A total of 1128 patients were included in this study by purposive sampling method. All the patients were diagnosed cases of hypertension (BP >140/90 mm

of Hg). This study included adult patient aged e"18 years. All cases of secondary hypertension were excluded by history, physical examination and relevant investigations. Blood pressure was measured with a well-calibrated sphygmomanometer. Staging of hypertension was done according to The Seventh Report of the Joint National Committee on Prevention, detection, Evaluation and treatment of High Blood Pressure. ABO and Rh blood group of all hypertensive patients are determined by agglutination method.

Results:

This study intended to find the association between hypertension and ABO blood group. The findings derived from data analyses were presented below.

Table-I
Distribution of age and sex of the study subjects (n = 1128)

| Age (years) | Sex | | Total |
|-------------|--------------|--------------|-------------|
| | Male | Female | |
| 18-40 | 315 (27.92%) | 140 (12.41%) | 455 (40.3%) |
| 40-60 | 385 (34.13%) | 270 (23.93%) | 655 (58.1%) |
| > 60 | 18 (1.6%) | 00 (00%) | 18 (1.6%) |
| Total | 718 (63.7%) | 410 (36.3%) | 1128 (100%) |

In this study, out of 1128 hypertensive patients majority 655 (58.1%) were between 40-60 year of age and about 718 (63.7%) were male and 410 (36.3%) were female. (Table-I).

Socio-demographic data demonstrated that educational status of the study subjects included majority 314 (27.8%) were graduate and Occupation comprised majority were Service holder 548 (48.6%). Most 733 (65%) patients were from rural areas and the rest (35%) was from urban areas. Among 1128 hypertensive patients most of the 751 (66.7%) patients were overweight.

Majority of the study patients 851(75.4%) had no family history of hypertension. (Table-II).

Association of ABO and Rh blood group with hypertension:

In this study among the 1128 subjects 466(41.3%) belongs to ABO blood group B, 363(32.2%) blood

Table-II
Socio-demographic characteristics of the study subjects (n = 1128)

| Variables | | Sex | | Total |
|---------------------------|------------------|------|--------|--------------|
| | | Male | Female | |
| Educational Qualification | Primary | 207 | 63 | 270 (23.9%) |
| | Secondary | 87 | 175 | 262 (23.2%) |
| | Higher Secondary | 81 | 24 | 105 (9.3%) |
| | Graduate | 286 | 28 | 314 (27.8%) |
| | Postgraduate | 57 | 120 | 177 (15.7%) |
| Total | | 718 | 410 | 1128 (100%) |
| Occupation | Farmer | 138 | 00 | 138 (12.2%) |
| | Service | 428 | 120 | 548 (48.6%) |
| | Businessman | 152 | 00 | 152 (13.5%) |
| | Others | 00 | 290 | 290 (25.7%) |
| Total | | 718 | 410 | 1128(100%) |
| Residence | Rural | 195 | 200 | 395 (35%) |
| | Urban | 523 | 210 | 733 (65%) |
| Total | | 718 | 410 | 1128 (100%) |
| BMI | Normal | 163 | 73 | 236 (20%) |
| | Overweight | 466 | 249 | 715 (66.7%) |
| | Obese | 48 | 80 | 128 (10.3%) |
| | Under weight | 41 | 08 | 49 (3.5%) |
| Total | | 718 | 410 | 1128 (100%) |
| Family history HTN | Yes | 100 | 53 | 153 (13.56%) |
| | No | 618 | 357 | 975 (86.44%) |
| Total | | 718 | 410 | 1128 (100%) |

group A, 158(14.0%) blood group O and 141(12.5%) subjects belongs to blood group AB respectively.

Majority 1045 (92.6%) belongs to Rh blood group positive and only 83 (7.4%) are Rh blood group negative (Table-III).

Among the Rh positive blood group 362 (32.1%) was A positive, 401 (35.5%) B positive, 141 (12.5%) AB positive and 140 (12.4%) was found O positive respectively. Among Rh negative group 1 (0.1%) was A negative, 65 (5.8%) B negative, 0 (00%) AB negative and 18 (1.6%) was found O negative respectively (Table IV).

Table-III
ABO & Rh blood group distribution of the study subjects (n=1128)

| Variables | | Sex | | Total No. (%) | p value |
|-------------|----------|------|------------|----------------|---------------------|
| | | Male | Female | | |
| Blood Group | A | 240 | 123 | 363 (32.2) | 0.25 ^{ns} |
| | B | 267 | 199 | 466 (41.3) | <0.001 ^s |
| | AB | 141 | 00 | 141 (12.5) | <0.001 ^s |
| | O | 70 | 88 | 158 (14.0) | <0.001 ^s |
| Total | 718 | 410 | 1128 (100) | | |
| Rh type | Positive | 635 | 410 | 1045 (92.6) | <0.001 ^s |
| | Negative | 83 | 00 | 83 (7.4) | <0.001 ^s |
| Total | | 718 | 410 | 1128 (100) | |

Table-IV
ABO & Rh blood group distribution of the study subjects (n=1128)

| Blood group with Rh type | Sex | | Total No. (%) | p value |
|--------------------------|------|--------|----------------|---------------------|
| | Male | Female | | |
| A (+ve) | 239 | 123 | 362 (32.1) | 0.25 ^{ns} |
| A (-ve) | 1 | 0 | 1 (0.1) | 0.44 ^{ns} |
| B (+ve) | 202 | 199 | 401 (35.5) | <0.001 ^s |
| B (-ve) | 65 | 0 | 65 (5.8) | <0.001 ^s |
| AB(+ve) | 141 | 0 | 141 (12.5) | <0.001 ^s |
| O (+ve) | 52 | 88 | 140 (12.4) | <0.001 ^s |
| O (-ve) | 18 | 0 | 18 (1.6) | 0.001 ^s |
| Total | 718 | 410 | 1128 (100) | |

Discussion

In this study among 1128 hypertensive patients majority (58.1%) were 40 to 60 years of age and 63.7% were male and 36.3% female with Male female ratio 1.75:1. Hypertension is more common in men than in women of same age. Sex difference in the prevalence of hypertension may be mainly attributed to the differences in dietary habit, life style choice, salt intake, Physical activity level and some genetic polymorphism.¹³

Among 1128 hypertensive patients only 13.56% patients had positive family history and majority (75.4%) patients had no family history of hypertension. Majority of the study subjects 66.7% were overweight.

Positive family history is associated with hypertension prevalence double that found in patients with negative history and is independent with weight. When over weight is also present, however hypertension prevalence is three to four times as high.¹⁴

In this study among the 1128 subjects blood group B was found in 41.3% (p<0.001), group A in 32.2% (p=0.25), group O in 14.0% (p<0.001) and blood group AB in 12.5% (p<0.001) respectively (Table III).

The relative frequency of O, A, B and AB blood group in Western Europe are 46%, 42%, 9% and 3% respectively.¹⁵

In the United States, the frequency of O, A, B and AB blood group is 45%, 41%, 10% and 4%.¹⁶

In a study of our country showed prevalence of ABO blood group are A - 22.40%. B - 35.54%, AB - 9.49%, O - 32.57%.¹⁷

This study shows prevalence of hypertension is high in group B and significantly low in blood group O. So there was significant association found between hypertension with blood group B and O (p value is <0.05 which is statistically significant).

In this study majority 92.6% (p<0.001) was found Rhesus positive and only 7.4% (p<0.001) was Rhesus negative. Among the Rh positive group 32.1% (p=0.25) was A positive, 35.5% (p<0.001) B positive, 12.5% (p<0.001) AB positive and 12.4% (p<0.001) was found O positive respectively. Among Rh negative group 0.1% (p=0.44) was A negative, 5.8% (p<0.001) B negative, 00% (p>0.05) AB negative and 1.6% (p=0.001) was found O negative respectively.

Significant association was found in B and O positive blood group (p value is <0.001).

In a study of Belgium reported an association between the ABO blood group and blood pressure among 42, 000 Belgian men.¹⁸ They found that those with ABO blood type AB had the highest values of SBP and DBP.

Conclusion & Recommendation:

The prevalence of hypertension is more in Rh B positive and significantly less in other ABO & Rh blood group.

The limitation of the present study is data were collected from single center. Further multi-

center study was recommended to validate the finding of the present study.

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