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Association of ABO blood group with Hypertension and BMI in a tertiary health care hospital

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ABSTRACT

Introduction: Hypertension is a chronic medical condition and one of the most common life threatening non-communicable disease. 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 detail.

Objectives:

1. To know the distribution of different blood groups among hypertensive patients.

2. To assess the association between blood groups with Hypertension and BMI

Material & Methods: This is a Prospective study done in ESIC medical college and hospital over a period of 3 months (Jan 2023 to Mar 2023). All adults of ≥ 18yrs of age and who were hypertensive (primary) were included in the study, wherein we had 300 cases. Along with blood pressure their height, weight and BMI was recorded. Blood grouping and Rh typing was done simultaneously. Pregnant women and patients with secondary hypertension were excluded from the study.

Results: Blood group 'O'was the most prevalent (n= 102; 34.0%) blood group in our study.This was followed by 'A' (n=93; 31.0%), 'B' (n=78; 26.0%) and 'AB' (n=27; 9.0%). The highest average values of systolic blood pressure (SBP) and diastolic blood pressure (DBP) were recorded in blood group 'B'. The observed differences in the mean values of blood pressure (BP) indices across ABO blood groups were statistically significant. Maximum subjects with elevated blood pressure were found in blood group 'B' (n=78; 26.0%) and significant association was observed between ABO blood groups and Hypertension ($p < 0.001$). However, we did not find any significant association with BMI and gender among different blood groups.

Conclusion: In conclusion, our results suggest that hypertensive patients were found to be highest in blood group 'B' and lowest in blood group 'AB'. No correlation exists between the gender and BMI.

Keywords: *Blood group, Hypertension, Body mass index (BMI).*

1. INTRODUCTION

Hypertension is one of the major health problem in the world without early specific sign and symptoms. According to JNC, systolic 90-119 mm of Hg and diastolic 60-79 mm of Hg is normal blood pressure. Hypertension is a condition where systolic pressure is >120 mm of Hg and diastolic is >80 mm of Hg. Prehypertension (high normal), systolic blood pressure is 120-139 mm of Hg and diastolic is 80-89 mm of Hg.[1]

In India, total prevalence for hypertension was 29.8% (95% CI: 26.7–33).3 Age, gender, genetic factors and ethnicity were non-modifiable risk factors of hypertension. [2]

Hypertension is one of the major risk factors for cardiovascular mortality, which responsible for 20% - 50% of total deaths. [3] Factors like obesity, high cholesterol level, sedentary lifestyle, high fat and low fibers diet are major cause of hypertension.[4]

Genetic factors responsible for hypertension were non-modifiable factor risk factors, as found by the family history of hypertension among hypertensive patients. ABO blood group was one of them that requires to be investigated in detail. Since hypertension is multifactorial, the ABO antigens might indirectly affect the arterial pressure. [5]

The ABO blood group system was the first human blood group system discovered by Landsteiner in 1900. ABO group was distributed into four major blood groups A, B, AB and O depending upon detection of these antigens and agglutinins in individuals.[6]

Determination of ABO blood groups is done by detecting A and B antigens. In addition, known red cells are used to detect anti-A and anti-B in the serum, by a process called 'reverse' grouping. The ABO blood group is entirely and inherently heritable, genetically detected at time of conception and became permanent for whole life. [7]

The ABO blood-group pattern was one of the genetic pattern that gives the most valuable information regarding the early detection of vulnerable groups. Various studies had found that different antigens of ABO blood group such as group A, group B and group O had a higher risk of development of hypertension.[8] Though, controversial findings recorded by other study, which did not find any relevant information that suggest the ABO blood group relationship with hypertension.[9]

In this current study we tried to find out the relationship between ABO blood group and hypertension along with BMI.

Objectives:

1. To know the distribution of different blood groups among hypertensive patients.

2. To assess the association between blood groups with Hypertension and BMI

2. MATERIAL & METHODS

This is a Prospective study done in ESIC medical college and hospital over a period of 3 months (Jan 2023 to Mar 2023). All adults of ≥ 18yrs of age and who were hypertensive (primary) were included in the study, wherein we had 300 cases. Along with blood pressure their height, weight and BMI was recorded. Blood grouping and Rh typing was done simultaneously. Pregnant women and patients with secondary hypertension were excluded from the study.

3. RESULTS

Table 1: Gender distribution according to blood group of patients

Sex	Blood group				Total
	A	AB	B	O	
Female	41	17	44	52	154
	26.6%	11.0%	28.6%	33.8%	100.0%
Male	52	10	34	50	146
	35.6%	6.8%	23.3%	34.2%	100.0%
Total	93	27	78	102	300
	31.0%	9.0%	26.0%	34.0%	100.0%

*chi-square test= 4.277, p-value = 0.238 (NS)

The data of 300 patients were analyzed. In total, 154 were female and 146 were female. Blood group 'O' was the most prevalent (n= 102; 34.0%) blood group in our study. This was followed by 'A' (n=93; 31.0%), 'B' (n=78; 26.0%) and 'AB' (n=27; 9.0%).

Table 2: Relationship between Hypertension and age

Age Interval	Blood group				Total
	A	AB	B	O	
20-29	1	0	1	3	5
	20.0%	0.0%	20.0%	60.0%	100.0%

30-39	6	2	7	7	22
	27.3%	9.1%	31.8%	31.8%	100.0%
40-49	22	3	23	14	62
	35.5%	4.8%	37.1%	22.6%	100.0%
50-59	28	9	30	38	105
	26.7%	8.6%	28.6%	36.2%	100.0%
60-69	31	9	13	34	87
	35.6%	10.3%	14.9%	39.1%	100.0%
>70	5	4	4	6	19
	26.3%	21.1%	21.1%	31.6%	100.0%
Total	93	27	78	102	300
	31.0%	9.0%	26.0%	34.0%	100.0%

*chi-square test = 19,048, p-value = 0.212 (NS)

Majority of the study participants with hypertension 105 (35%) were observed in 50-59 yrs and least in 20-29 yrs (1%) respectively. In age interval of 20-29 yrs majority of patients with hypertension belong to O blood group and least was found in AB blood group. In age interval of 40-49 yrs majority of patients with hypertension belong to B blood group and least was found in AB blood group. From the age group of 50-70 yrs and above majority of patients with hypertension belong to O blood group and least was found in AB blood group. The relationship between hypertension and age is not statistically significant (i.e p-value = 0.212)

Table 3: Summary of study parameters

	N	Minimum	Maximum	Mean	Std. Deviation
Age	300	26	79	54.15	10.841
Ht	300	1.34	1.82	1.5775	0.09033
Wt	300	36.0	112.0	64.015	12.5667
BMI	300	15.8	47.2	25.744	4.7441
Systolic BP	300	108	200	142.59	17.130
Diastolic BP	300	60	120	87.70	10.597
PP	300	20	110	54.94	13.225
MAP	300	37	140	105.21	13.376

This table presents the mean values of anthropometric and BP indices of the entire study sample (n=300). The average age, height weight and BMI was found to be 54.15±10.8, 1.5± 0.09, 64 ± 12.5, 25.7±4.7 respectively. The average mean systolic and diastolic BP was found to be 142±17.1& 87.7±10.5 respectively.

Table 4: Comparison between mean systolic and diastolic BP with different blood groups

		N	**Mean**	**Std. Deviation**
Systolic BP	A	93	133.9032	1.40701
	AB	27	128.3333	2.09395

	B	78	142.8354	1.51429
	O	102	138.2574	1.36860
	Total	300	137.2200	4.63283
Diastolic BP	A	93	87.7097	1.67838
	AB	27	81.8519	1.91560
	B	78	97.8608	2.01109
	O	102	92.4356	1.17827
	Total	300	91.4467	5.15387

Between groups, significant p value <0.001

The mean values of BP indices were higher in B blood group as compared to other blood group. i.e 142.835±1.51 and 97.8±2.01 respectively. And lowest level of systolic and diastolic BP was found in AB blood group i.e 128.3±2.09 and 81.85±1.91 respectively.

Table 5: Distribution and prevalence of hypertension, obesity and overweight in different blood groups

BMI	**Blood group**				**Total**
	A	**AB**	**B**	**O**	
Normal 22.9	36	5	17	23	81
	44.4%	6.2%	21.0%	28.4%	100.0%
Obese 25 or >	41	14	41	62	158
	25.9%	8.9%	25.9%	39.2%	100.0%
Over-weight 23-25	14	6	17	15	52
	26.9%	11.5%	32.7%	28.8%	100.0%
Under-weight < 18	2	2	3	2	9
	22.2%	22.2%	33.3%	22.2%	100.0%
Total	93	27	78	102	300
	31.0%	9.0%	26.0%	34.0%	100.0%

chi-square statistic = 14.032, p-value = 0.121 (NS)

Maximum 62(39.2%) had obesity in O blood group and least was found in AB blood group 14(8.9%). Patients with B blood group were found to be maximum being overweight 17 (32.7%) and underweight 3(33.3%) respectively. The relationship between hypertension, obesity and overweight in different blood groups was found to be statistically insignificant, p-value = 0.121.

4. DISCUSSION

This current study showed that blood group O was the most common type, and AB the least common. A Saudi Arabian study also showed similar result. Reports of increased cardiovascular (CV) risks was found in different blood groups and hypertension was considered as a commonest cardio-vascular risk. [10]

In our study, average age of the participants was 54.15 ± 10.8 years. This was similar to Tabatabaie et al where mean age of participants was 52.3±10.1 years. [11] Majority of the participants in our study were females (51.34%) with male to female ratio of 0.95:1. This is similar to study conducted by Teli et al in Puducherry. This relation of gender with ABO blood group was statistically in-significant (p>0.05).[12]

In our study a positive association of hypertension with the ABO blood group is seen. In Tamil Nadu, Kondam et al determined ABO blood groups had no relation with essential HTN. [13] Kaur et al had found that in hypertensive group, commonest blood group was B (39.6%), followed by O group (34.6%), A group (20%), and AB group (5.8%).[14]

In Iran a cross sectional study was conducted among 510 subjects, from them 208 (40.8%) were hypertensive, and the results showed no association between the ABO blood groups and hypertension (p=0.815). Therefore, there was no evidence in favor of the hypothesis that ABO blood groups might be risk factor for hypertension. [11]

Kesteloot and Van Houte reported an association between the ABO blood group and blood pressure among .42,000 Belgian men. They displayed that those with blood type AB had the highest values of SBP and DBP. [15]

In earlier studies, from northern part of India observed that AB blood group individuals had least chance of developing hypertension compared to other groups [16,17]. Maxwell and Maxwell 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 were in AB (2.32%)[18]. ***Alam et al.*** observed no significant difference in systolic and diastolic blood pressure among all blood groups.[19]

Reports in literature on the relationship between ABO blood group and BMI are inconsistent [20], with various authors associating increased BMI with the presence of particular ABO antigens, while others have shown no association between these two factors. [21]

ABO blood type and body weight may be biologically related probably through a pathway that involves thrombotic factors like FVIII because it is known that non-blood group O individuals have higher FVIII. For instance, increased BMI was associated with a higher level of FVIII. Also, obesity is considered to be an inflammatory disease, and this phenomenon may be linked to a hypothesized ABO blood antigen regulatory effect on inflammation.[22] Nevertheless, such a molecular pathway or any others have not been found, suggesting that association between ABO and BMI may be arbitrary.

Even large cohort studies by Jafari et al. [23] and Mascie-Taylor and Lasker[24]failed to link BMI with either ABO or Rh phenotype.

There is no significant association between BMI and ABO blood group which is in concordance with other studies.

5. CONCLUSION

In conclusion, our results suggest that blood group ‘B’ patients were found to be having higher mean systolic and diastolic pressures and lowest in blood group ‘AB’. No correlation exists between the age, gender and BMI.

REFERENCES

[1] JNC 8 Guidelines for the Management of Hypertension in Adults. Am Fam Physician.1; 90(7):503-504, 2014 Oct.

[2] Anchala R, Kannuri NK, Pant H, Khan H, Franco OH, Di Angelantonio E, et al. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. *J Hypertens*. 2014;32(6):1170–1177.

[3] K. Park. Hypertension. In: Preventive and Social Medicine. 24th ed. jabalpur: M/s Banarasi Bhanot; 2017. p. 391–4.

[4] T. Kamran, A. Muhammad, S. Abdus, L. Muhamma et.al. Hypertension in Relation to Obesity, Smoking Stress,Family History, Age and Material status among human population of Multan, Pakistan. J.Med.Sci.,4(1):30-35,2004.

[5] Srivastava R, Upadhyay A. Relation of ABO blood group with blood pressure in 25 – 35 years of age group in normal population of Agra. *Indian J Clin Anat Physiol* 2019;6(1):5-9.

[6] Mourant AE, Kopec AC, Domaniewska-Sobczak K. Blood groups and diseases. A study of associations of diseases with blood groups and other polymorphisms. Oxford University Press; 1978.

[7] Abdollahi A, QorbaniM, SalehiA, MansourianM. ABO blood groups distribution and cardiovascular major risk factors in healthy population. Iranian J Publ Health.2009; 38:123–26.

[8] Chandra T, Gupta A. Association and distribution of hypertension, obesity and ABO blood groups in blood donors. *Iran J Pediatr Hematol Oncol* 2012;2(4):140.

[9] 19. Platt D, Mühlberg W, Kiehl L, Schmitt-Rüth R. ABO blood group system, age, sex, risk factors and cardiac infarction. *Arch Gerontol Geriatr* 1985;4(3):241–249.

[10] TurkiA, AlrasheedK, OmarB, AlfraidyMA. Relation between ABO blood groups and obesity in a Saudi Arabian population. Journal of Taibah University Medical Sciences. October 2017;12(5): 407-41.

[11] Tabatabaie A-H, Ali-Madadi M. Possible association between ABO and Rh (D) blood groups and hypertension.

Pak J Med Res 2012;28(1):235–237.

[12] Teli SS, R D, L P, M SV. Original article Association of ABO and Rh blood groups with blood pressure : A cross sectional study in South Indian population. *Indian J Basic Appl Med Res* 2016;5(3):8–13.

[13] Kaur M, Gill K, Bassi R, Kaur D. association of ABO and RH blood groups. *Pak J Physiol 2016;12(2):11–14.*

[14] Kondam A, Chandrashekar M, Suresh M, Madhuri BA. A study of incidence of hypertension in ABO and rhesus blood group system. Int J Biol Med Res 2012;3(1):1426–1429.

[15] Kesteloot H and Van Houte O (1974): An epidemiologic survey of arterial blood pressure in a large male population group. Am J Epidemiol.,99:14–29.

[16] 16. Nishi K, Gupta NK and Sharma S (2012): Study on the Incidence of Hypertension and Migraine in ABO Blood Groups. ISCA J. Biological Sci ., 1(2): 12-16.

[17] Sachdev B (2016): Prevalence of hypertension and associated risk factors among Nomad Tribe groups. Antrocom Online Journal of Anthropology ,7(2):181-189.

[18] Maxwell R and Maxwell K (1955): ABO blood groups and hypertension. BMJ., 16: 179-180.

[19] Alam M, Wardell J and Anderson E (2000): Effects of first myocardial infarction on left ventricular systolic and diastolic function with the use of mitral annular velocity determined by pulsed wave Doppler tissue imaging, J Am Soc Echocardiogr., 13, 343-352.

[20] T. Chandra and A. Gupta. Association and distribution of hypertension, obesity and ABO blood groups in blood donors. *Iranian Journal of Pediatric Hematology and Oncology*, vol. 2, no. 4, pp. 140–145, 2012.

[21] D. R. Faber, P. G. de Groot, and F. L. Visseren, "Role of adipose tissue in haemostasis, coagulation and fibrinolysis," *Obesity Reviews*, vol. 10, no. 5, pp. 554–563, 2009.

[22] E. Jafari, V. Sebghatollahi, S. Kolahdoozan, E. Elahi, and A. Pourshams, "Body mass index and ABO blood groups among different ethnicities of the Golestan cohort study subjects," *Govaresh*, vol. 17, no. 1, pp. 50–54, 2012.

[23] C. Mascie-Taylor and G. Lasker, "Lack of an association between ABO and Rh blood group polymorphisms and stature, body weight, and BMI in a cohort of British women," *Human Biology*, vol. 62, no. 4, pp. 573–576, 1990.