ORIGINAL RESEARCH

Frequency of ABO Blood Groups and its Association with BMI in the First Year Medical Students

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ABSTRACT
Background: Familial patterns of hypertension suggests genetic factor as another important non-modifiable predisposing factor, and accumulated benefit obligation (ABO) blood group is one of such factor. Blood group frequency varies across continents. Blood category O is the most prevalent in general, while AB is rare.ABO is essential as well as practical for transplantation and transfusion among 33 blood group systems. BMI does not specifically quantify body fat, but with more precise body fat measurements, BMI is moderately correlated. The presented study was aimed to determine the frequency of various blood groups and their correlation with BMI. **Methods:** 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. **Results:** The difference between BMI and blood group was found to be statistically significant (p 0.000). There were 42 patients whose blood group was O+ in which 11 were overweight, 26 were normal weighted while 5 were underweight. Of the 40 patients with B+ blood group, 6 were overweight, 30 were normal weighed while 4 were underweight. Overweight subjects were 3 in number, 19 were normal weight while 4 were underweight constituted the 26 A+ patients. **Conclusion:** The most prevalent blood group amongst the students was found to be O positive. Normal BMI was observed in a majority percentage of the total population.
Keywords: ABO, puncture site, Agglutination, Overweight.

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.[1]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.[2]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.[3]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.[4]Familial patterns of hypertension suggests genetic factor as another important non-modifiable predisposing factor, and accumulated benefit obligation (ABO) blood group is one of the suchfactor.

Blood is responsible for the delivery of hormones, oxygen and nutrition to each and every cell of body.[5] The term "blood group" refers to the complete blood group system comprising (the presence or absence of) antigens on the surface of the red blood cells whose specificity is controlled by a series of allelic genes or linked genes. Blood group type refers to the precise pattern of reactions to testing antisera in that specific system.[6]Many types of blood groups were established in the 20th century, but ABO, as well as Rhesus (Rh),

are the most significant blood groups. Human blood groups were discovered for the first time by Karl Landsteiner at the University of Vienna in 1901.[7] The Rh blood group was founded in 1941 by Weiner and Landsteiner. ABO blood groups, as well as Rhesus, are significant for blood transfusions. With respect to organ transplantation and blood transfusions, blood grouping is of extraordinary genetic and therapeutic significance. The basic constituents of blood, antigens, can be used in forensics, genetics, and anthropological studies.[8]

Blood group frequency varies across continents. Blood category O is the most prevalent in general, while AB is rare.[9]ABO is essential as well as practical for transplantation and transfusion among 33 blood group systems. Any human being whose age is above six months possess specific antibodies (anti-B as well as anti-A) in their serum which are of clinical significance. Group B blood contains antibodies against group A blood, while group A blood contains antibodies against group B blood. Although there are no antigens present in blood group O, it contains antibodies from blood groups A and B.[10]Body Mass Index (BMI) is an affordable and simple screening technique which categorizes weight: underweight, healthy weight, overweight, and obesity. BMI does not specifically quantify body fat, but with more precise body fat measurements, BMI is moderately correlated. In addition, BMI seems to be as closely associated with different metabolic and disease outcomes as these more direct body fat measurements are. BMI is the weight of a person in kilograms divided by the square of the height in meters.[11] ABO blood group and BMI have been individually appraised as risk factors for certain diseases. Many studies have shown ABO blood groups to be a risk factor for the prevalence of several diseases including rheumatic diseases[12], thyroid diseases[13], and even malaria.[14] Likewise, imbalanced BMI can contribute to cardiovascular disorders[15], Alzheimer's disease[16], diabetes mellitus[17], and so on. Studies have been conducted to examine whether carrying a specific blood group antigen influences one's BMI. There were different conclusions from these studies with some of them clearly showing that blood groups do influence one's BMI[18-19]. Imbalanced BMI itself can further influence one's overall physical and mental health; hence, from a statistical perspective, it may be important to examine the relationship between the ABO blood antigen and BMI[19].

AIMS AND OBJECTIVES
Aims
- To determine the frequency of various blood groups and their correlation with BMI and BP among medical students.

Objectives
- To study the association of ABO blood types on BMI and blood pressure.
- To compare it with the data present in the other states of India.

MATERIAL AND METHODS
After getting clearance from the ethical committee, recruitment of subjects was done in the Department of Physiology, GMC Srinagar. Blood samples wascollected from first-year MBBS students for blood group, weight for height and BP were collected. The blood was collected for ABO blood grouping via the finger prick method which is a part of their curriculum in physiology practicals. Then the blood pressure of each student was measured through a digital Sphygmomanometer.The participant weremade fully aware of the research. Informed consent both in vernacular as well as in the English language were taken from the participants.

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.

Data obtained was analyzed using SPSS Ver. 23 and one way ANOVA. A p value of < 0.05 was considered as statistically significant.

RESULTS
The present study was conducted on 118 first year MBBS students. The blood was collected for ABO blood grouping via the finger prick method which is a part of their curriculum in physiology practicals.

Table 1: Distribution of patients as per different variables (N=118)			
Variables	**Opts**	**Percentage(%)**	**Frequency(f)**
Age	17 Years	2%	2
	18 Years	16%	19
	19 Years	36%	42
	20 Years	35%	41
	21 Years or above	12%	14
Sex	Male	58%	68
	Female	42%	50
Blood Group	A+	22%	26

	O+	36%	42
	B+	34%	40
	AB+	2%	2
	A-	1%	1
	O-	2%	2
	B-	3%	3
	AB-	2%	2
BMI	Underweight	12%	14
	Normal Weight	70%	83
	Over Weight	17%	20
	Obesity	1%	1

The majority of our subjects 42 (36%) aged 19 years followed by 41 (35%) 20 years. 68 (58%) were males and 50 (42%) females. There were 42 (36%) O+ subjects, 40 (34%) were B+, 26 (22%) were A+. 3 (3%) had B- blood group, 2 (2%) patients each had AB+, O- and AB- while as 1 (1%) had A- blood group. 83 (70%) subjects were normal weight, 20 (17%) were overweight, 14 (12%) were underweight while 1 (1%) were obese.
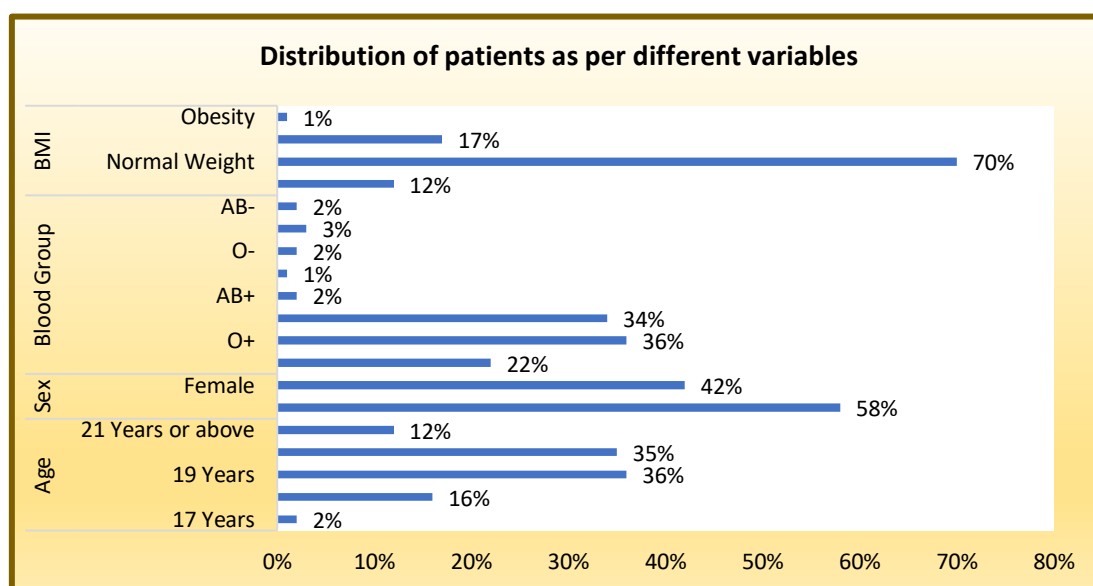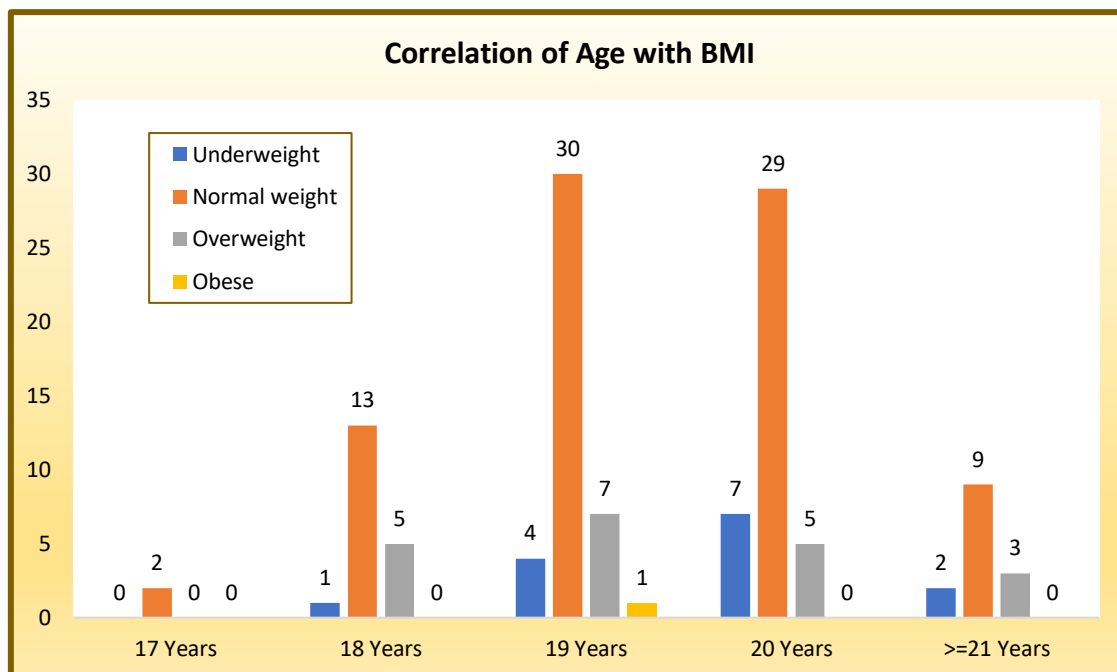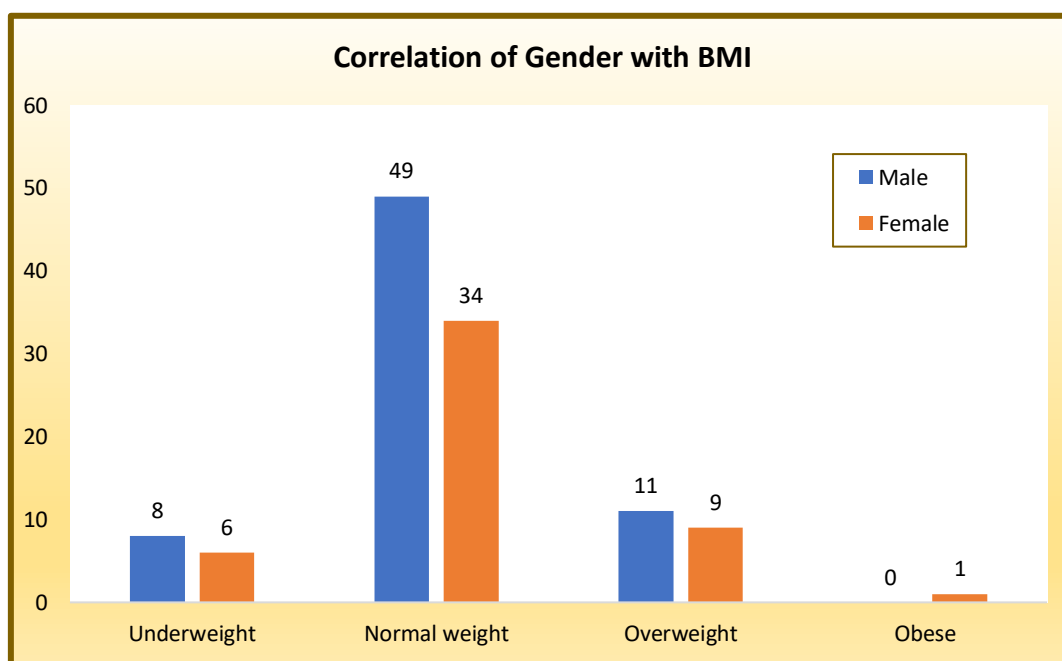

Distribution of patients as per different variables

Table 2: Association of BMI score in different variables									
Demographic Data		**Association with BMI Score**							
Variables	**Opts**	**Underweight**	**Normal weight**	**Over weight**	**Obesity**	**Chi Test**	**P Value**	**df**	**Table Value**	**Result**
Age in years	17	0	2	0	0	6.323	0.899	12	21.026	Not Significant
	18	1	13	5	0					
	19	4	30	7	1					
	20	7	29	5	0					
	>=21	2	9	3	0					
Sex	Male	8	49	11	0	1.485	0.686	3	7.815	Not Significant
	Female	6	34	9	1					
Blood Group	A+	4	19	3	0	66.059	0.000	21	32.671	Significant
	O+	5	26	11	0					
	B+	4	30	6	0					
	AB+	0	2	0	0					
	A-	0	1	0	0					
	O-	0	1	0	1					

| B- | 1 | 2 | 0 | 0 | | | | |
| AB- | 0 | 2 | 0 | 0 | | | | |

Correlation of Age with BMI
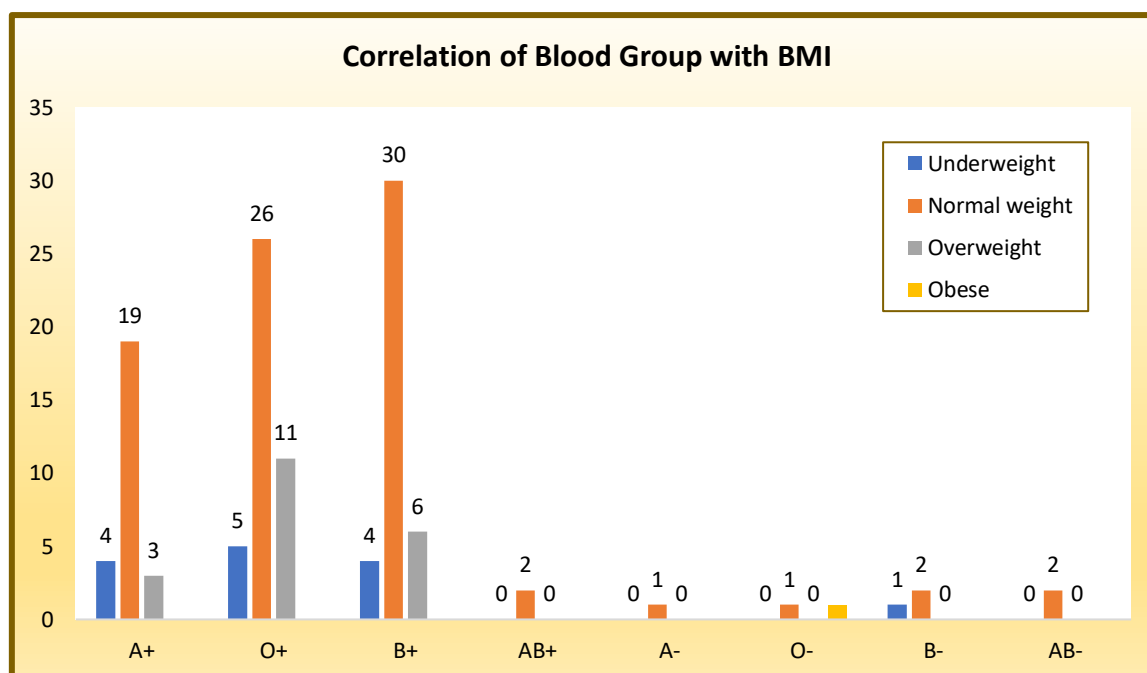
There was statistically insignificant difference when age was correlated with overweight with a p value of 0.899. Majority of subjects 42 aged 19 years in which 30 were normal weight, 7 were overweight, 4 underweight and only 1 obese. Among 41 patients aged 20 years, 29 were normal weight, 7 underweight and 5 overweight.

Of the 68 males in this study, 49 were normal weight, 11 were overweight and 8 underweight. In 50 females, 34 were normal weight, 9 overweight, 6 underwent and 1 obese. There is insignificant statistical correlation between gender and BMI.

Correlation of Gender with BMI

The difference between BMI and blood group was found to be statistically significant (p 0.000). There were 42 patients whose blood group was O+ in which 11 were overweight, 26 were normal weighted while 5 were underweight. Of the 40 patients with B+ blood group, 6 were overweight, 30 were normal weighed while 4 were underweight. Overweight subjects were 3 in number, 19 were normal weight while 4 were underweight constituted the 26 A+ patients.

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Correlation of Blood Group with BMI

DISCUSSION

The present study was carried out with 118 students of first year of MBBS. Of these 118 students, 42 (36%) were 19 years of age followed by 41 (35%) 20 years, 19 (16%) were aged 18 years while as 14 (12%) were 21 years of age. There were 68 (58%) males and 50 (42%) females. 70% of the students were normal weight, 17% overweight, 12% underweight and only 1% overweight. In our result it was revealed that blood groups O+ was more predominant, followed by blood groups B+ and A+.The same trend of Prevalence of blood groups O>B>A>AB were obtained from a study conducted by Baishya R et al.[20]and various other researcher Mirdha M et al.[21], Thenmozhi S et al.[22], Mahapatra B et al.[23], Kohli PG et al.[24], SasekalaM et al[25], Bhatti R et al.[26]

There was statistically insignificant difference when age was correlated with overweight with a p value of 0.899. Majority of subjects 42 aged 19 years in which 30 were normal weight, 7 were overweight, 4 underweight and only 1 obese. Among 41 patients aged 20 years, 29 were normal weight, 7 underweight and 5 overweight. Of the 68 males in this study, 49 were normal weight, 11 were overweight and 8 underweight. In 50 females, 34 were normal weight, 9 overweight, 6 underwent and 1 obese. There is insignificant statistical correlation between gender and BMI. The difference between BMI and blood group was found to be statistically significant (p 0.000) with 42 O+ subjects in which 11 were overweight, 26 were normal weighted while 5 were underweight. Of the 40 patients with B+ blood group, 6 were overweight, 30 were normal weighed while 4 were underweight. Overweight subjects were 3 in number, 19 were normal weight while 4 were underweight constituted the 26 A+ patients.

The BMI of an individual depends upon a number of factors including metabolic rate, eating habits, physical activity, genetic variants, family, ethnicity and even the socioeconomic and marital status of the individual. Individuals having a BMI of less than 18.5 kg/m^2 are considered to be underweight and are at greater risk of acquiring nutritional deficiencies[27], osteoporosis[28], and atrial flutter[29], while those with a BMI of 18.5 – 23 kg/m^2 are normal. Individuals with a BMI of 23 kg/m^2 or greater are considered overweight and obese hence are more susceptible to cardiovascular disorders[30] and diabetes mellitus[31].

Among the many factors that influence BMI as mentioned above, blood groups are one them. Many experiments have been done recently that prove so. In 2017, Ghosh AK et al studied third-year MBBS students of RG Kar Medical College, Kolkata, and found 68.4% to be of normal weight, 25.6% students to be overweight and 6% to be students to be underwent[32]. JadhavLR et al studied first-year MBBS students of Mysore Medical College and found 23.8% overweight students[33]. These studies indicated a relationship between being overweight or obese and the O or B blood group, although Kelso et al showed no betting relationship[34].

CONCLUSION

The most prevalent blood group amongst the students was found to be O positive. Normal BMI was observed in a majority percentage of the total population. Statistically significant association was observed between BMI and ABO. Major junk of our study population weighed normal.

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