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DIFFERENT BLOOD GROUPS;

ASSOCIATION WITH BODY MASS INDEX IN MEDICAL STUDENTS OF KARACHI

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ABSTRACT… Objectives: To find out the association of body mass index with different blood groups in medical students. Background: Increased body mass index leads to obesity and is a prominent risk factor for hypertension and diabetes. Blood groups are known to be associated with various diseases and recent studies have shown that a particular blood group with the highest body mass index appeared to be more susceptible to predisposition to hypertension. **Study Design:** Cross-sectional study. **Setting:** Liaquat National Medical College, Karachi. **Period:** June 2015 to September 2015. **Methodology:** 181 medical students with 85 males and 96 females and age ranging from 18-22 years. Weight and height of each student was measured using the standard stadiometer and blood groups were determined using the anti-sera. **Results:** Mean age of the participants was 19.92 ± 1.10 years. Blood group "O" was found to be most prevalent (39.2%) while blood group "AB" was found to be the least (8.3%). Mean BMI of subjects with blood group A, B, AB and O were found to be 24.3 ± 5.04, 22.6 ± 3.59, 23.0 ± 2.91 and 23.7 ± 4.20 kg/m^2 respectively. The highest BMI was found in subjects with blood group "A" 24.3 ± 5.04 kg/m^2 and lowest in blood group "AB" 23.0 ± 2.91kg/m^2. The Rhesus-D positive and male students had greater body mass index 23.6 ± 3.56 than females 23.2 ± 3.44. Comparison of overall mean BMI values among different blood groups showed significant difference with p-value < 0.001. **Conclusion:** Blood group "A" and Rhesus-D positive subjects especially males were found to be the high risk blood type with predisposition to morbidity associated with increased body mass index.

Key words: Blood groups, body mass index, medical students.

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INTRODUCTION

Analysis of blood group distribution in the world reveals that the frequency of different blood groups in Pakistani population is "O" 33%, "A" 21%, "B" 36% and "AB"9%.[1]

Among the various blood groups, ABO system was the first to be recognized and has been identified as a genetic marker for obesity. Moreover, different blood groups are associated with different types of diseases.

According to World health organization, body mass index (BMI) is defined as a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It offers a reasonable measure to assess distribution of fat in children and adults. The precision of measurements of height and weight suggests that a variant of weight-for-height provides a more reliable measure of adiposity within populations.[2,3]

Body mass index being a modifiable risk factor can be assessed in time, and blood groups being non modifiable risk factor, should be identified as being prone to developing obesity, so that young adults can be accordingly counseled for the life style modifications and thus be prevented from major diseases associated with increased BMI.[4] Various studies have been performed regarding the distribution of frequency of different blood groups in different regions of Pakistan. Hence, the objective of this research is to target high risk blood type with the greatest mean body mass index and emphasize them on the importance of primordial prevention from the morbidity associated with obesity in our local population.

MATERIALS AND METHODS

This cross sectional study was conducted at Liaquat National Medical College after approval from ethical review committee recruiting a total of 181 medical students from June 2015 to August 2015. The participants included 85 males and 96 females with the age ranging from 18-22 years.

After the informed consent, height and weight of the all the subjects were recorded by using stadiometer with weighing machine and their BMI was calculated by the standard formula.
BMI= Weight in kilograms / Height in meter square

The normal range of BMI is 18.50-24.99 kg/m^2. Cut off value for overweight is 25 kg/m^2 while 30 kg/m^2 is the cut off for obese.[3] The blood group of each subject was determined by agglutination test with conventional slide method using the antisera anti A, anti B and anti D after all aseptic measures.

Statistical analysis was done by using SPSS 21. Descriptive statistics was done to determine the frequency and means with standard deviation. ANOVA was applied to determine the significant difference (P-value < 0.05) between the BMI among different blood groups and gender.

RESULTS

In 181 students, with 85 males and 96 females, mean age was 19.92 ± 1.10 years. The blood group "O" was found to be most prevalent (39.2%) while blood group "AB" was found to be the least (8.3%).

Mean BMI of subjects with blood group A, B, AB and O were found to be 24.3 ± 5.04, 22.6 ± 3.59, 23.0 ± 2.91 and 23.7 ± 4.20 kg/m^2 respectively. Mean BMI of subjects with Rh +ve was found to be 23.4 ± 4.06 while those with Rh –ve blood had mean BMI 20.9 ± 2.82 kg/m^2 .(Table-I)

The highest BMI was found in subjects with blood group "A" i.e 24.3 ± 5.04 kg/m^2 where as the lowest value in blood group "AB" i.e. 23.0 ± 2.91kg/m^2. The Rh +ve subjects were found to have higher BMI as compared to Rh –ve. (Table-I). BMI with respect to gender and individual blood group is shown in Table-II & IIII. Comparison of overall mean BMI values among different blood groups (ABO & Rh) and gender showed significant difference with *p*-value < 0.001. (Table-IV)

Blood group	Frequency (n)	Percentage (%)	Mean BMI ± SD (kg/m^2)
O	71	39.2	23.7 ± 4.20
B	69	38.1	22.6 ± 3.59
A	26	14.4	24.3 ± 5.04
AB	15	8.3	23.0 ± 2.91
Rh +ve	171	94.5	23.4 ± 4.06
Rh -ve	10	5.5	20.9 ± 2.82

Table-I. Distribution of Blood Groups ABO & Rh with their mean BMI

Gender	Mean BMI ± SD (kg/m^2)
Males	23.6 ± 3.56
Females	23.2 ± 3.44

Table-II. Mean with SD deviation of BMI of all the subjects

Blood group	BMI Males (n=85) (kg/m^2)	BMI Females (n=96) (kg/m^2)
A	25.3 ± 3.38	23.6 ± 5.85
B	22.8 ± 3.00	22.4 ± 3.99
AB	23.0 ± 3.05	23.0 ± 2.94
O	23.5 ± 4.07	23.2 ± 4.37
Rh +ve	23.5 ± 3.53	23.3 ± 4.50
Rh -ve	20.8 ± 3.28	21.1 ± 2.66

Table-III. Mean BMI ± SD in relation to ABO blood groups in males and females

Variables	P value (< 0.05)
Gender	0.001
ABO group	0.001
Rh group	0.001

Table-IV. Comparison of mean BMI among ABO, Rh blood groups and gender, by using ANOVA.

DISCUSSION

Blood groups have been of great interest for the researcher because of their association with different types of diseases like hypertension and diabetes. Increased body mass index or

obesity is one of the greatest risk factor for the predisposition of these ailments. Therefore, the main aim of the study is to target high risk blood type with the greatest body mass index and to prevent the co-morbid associated with it.

In a study by Tabatabaie et al, it was found that subjects with blood group A had higher number of hypertensives. This may show relevance with our results according to which higher BMI in blood group A is a risk factor for developing hypertension.[5] Overall in the study population, the most prevalent blood group was blood type O (39.2%; n=71) followed by B blood group (38.1%; n=69).This was consistent with the findings of study conducted by Bhatti R et al who reported the pattern of distribution of ABO blood type as O>B>A>AB in province Sindh.[6] Blood group A was found with a prevalence rate of 14.4% with blood type AB having the least prevalence (8.3%; n=15). These results were in contrast to the study conducted by Mohammad Ilyas in which the most prevalent blood group in all study subjects was B type.[1]

Other contrast studies were reported in Bannu and Peshawar with ABO blood type distribution as B>A>O>AB and in Skardu as A>B>O>AB.[7,8]

Gender differences of mean BMI showed that males had greater mean BMI than females. This was in agreement with the study conducted by Ji et al in which BMI of Chinese boys was found to be higher than BMI of Chinese females.[10] Similar findings were found in a study by Ogden et al who found that US male children and adolescents had greater BMI than females.[11]

Percentage for Rhesus-D positive students was 91.4% as compared to Rhesus- D negative students with 9.6% which was close to the findings of the study conducted by Muhammad Ilyas [1]. Amir Hossein Tabatabaie et al also found greater number of Rh(D^+) subjects as compared to Rh(D—).[5]

Our results showed that highest mean BMI (24.3± 5.04) was found in subjects with blood group A. This was in contrast with study by Ainee et al study which reported highest BMI in AB blood group[2]. Bhattacharyya et al and Haris et al revealed in their study that subjects with blood group B had greater BMI than other blood types.[4,9]

Our results showed significant differences among blood groups regarding BMI ($P<0.05$). This was in contrast with the study conducted by Ainee et al in which comparison of BMI among different blood groups did not show significant difference ($P> 0.05$)[2] as the study population included school going children when compared to the adult population in our research.

CONCLUSION

The most frequent blood group was found to be O+ve. Blood group "A" and Rhesus-D positive subjects were found to have significantly higher levels of body mass index compared to other blood types especially in males thus rendering them to higher risk of developing obesity.

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"It is your decisions,
and not your conditions,
That determine your destiny."

Unknown

AUTHORSHIP AND CONTRIBUTION DECLARATION

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