

Original Research Article

Correlation between ABO blood groups and body mass index among medical students

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Received: 24 July 2019

Accepted: 31 August 2019

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ABSTRACT

Background: ABO blood groups are associated with certain diseases. The present study seeks to find out if there is any association between ABO blood groups and body mass index.

Methods: The present study involves 150 medical students, 105 boys and 45 girls in the age group of 18-23 years in the Veer Surendra Sai Institute of Medical Sciences and Research, Burla, Sambalpur. Height in meters and weight in kg were taken by stadiometer and weighing machine. BMI was calculated using formula $BMI = \text{weight in kg} / \text{height in m}^2$. Blood groups were determined by slide agglutination method. The data was analyzed through SPSS 20.

Results: Overweight and obesity was found more prevalent in boys than girls. In total, 20.7% students were overweight (21% boys and 20% girls). The same trend was found in obesity. 15.3% of total students were obese (16.2% boys and 13.3% girls). Blood group B was reported the most common blood groups (42%) followed by blood group O (28%), while blood groups A and AB were found 18.7% and 11.3% of participants, respectively. The prevalence of overweight (BMI 25-29.9) among participants based on blood group O, A, AB and B was 23.8%, 22.2%, 21.4% and 5.9%, respectively. The prevalence of obesity (BMI >30) among participants based on blood groups AB, B, A and O was 23.5%, 17.5%, 14.3% and 9.5%, respectively.

Conclusions: Prevalence of overweight and obesity was more in blood group O and AB respectively and was more in males than females.

Keywords: ABO blood groups, Body mass index, Obesity, Overweight

INTRODUCTION

Obesity is defined by World Health Organisation (WHO) as abnormal and excessive fat accumulation.¹ According to WHO global estimates, 39% adults (18 years and older) were overweight and 13% adults were obese in 2016.² This shows that obesity and overweight has become a big problem in the world.

The decrease of quality of life is one of the psychosocial consequences of obesity.³ Obesity is a major risk factor

for diseases, such as metabolic syndrome, type 2 diabetes, cardiovascular diseases and cancer.⁴ Obesity is classified based on Body Mass Index (BMI). BMI is defined as weight in kilograms divided by square of height in metres. Based on the WHO classification for obesity in adults, a BMI between 25 and 29.9 is overweight and BMI >30 is obese. Visceral fat is more problematic than subcutaneous fat.

Several studies on relationship between ABO blood group and obesity has been done on different

communities and subjects. Behera et al. found that the blood group AB and Rh (-) was associated with the highest number of obese subjects.⁵ Sukalingam and Ganesan revealed that the patients with blood group B were more susceptible to be obese compared to those with the other blood groups.⁶ On the other hand, Mascie-Taylor and Lasker revealed that there was no relationship between blood groups and BMI.⁷

The goal of present study is to find any potential relation between the ABO blood groups and BMI (body mass index) or obesity among medical students. This may contribute to underlying genetic or environmental factors.

METHODS

Present study was conducted on 150 medical students (105 boys and 45 girls) in the age group of 18-23 years (mean age 20.43±8.9 years) in the Physiology Department, Veer Surendra Sai Institute of Medical Sciences and Research, Burla, Sambalpur, on MBBS batch 2018-19 from October 2018 to December 2018. Students were described about the study and written consent taken. Students with cardiovascular and respiratory, neurological or gastrointestinal diseases or receiving active treatment for any disease, having history of any hospitalization in last six months were excluded from the study. Students between age group of 18 to 23 without any obvious disease were included.

Stadiometer was employed to check height in centimetres, with subjects not wearing shoes. Value of height to nearest 0.5 cm was taken. Afterwards, height was converted to metres for calculating BMI. The weight was measured on analog weighing machine with light clothes without wearing shoes. Value of weight to nearest 0.5 kg was taken. To prevent inter-observer bias, height and weight were measured by a single person. Body mass index (BMI) was calculated as weight in kilogram divided by square of height in m². The BMI classification was based on World Health Organisation as follows.

Table 1: Classification of body mass according to body mass index (BMI).

Classification	BMI (Kg/m ²)
Underweight	BMI <18.5
Normal	BMI 18.5-24.99
Overweight	BMI 25.0-29.99
Obese	BMI >30

According to the Table 1, BMI >30 was taken as obese, BMI between 25 and 29.99 was taken as overweight, BMI between 18.5 and 24.99 was taken as normal and BMI <18.5 was taken as underweight.

ABO typing was done by classic (antigen antibody agglutination test) method of making slides using antisera (Eryclone Monoclonal ABO/Rh, Tulip Diagnostic Ltd.

Delhi, India). Under aseptic precautions, left middle finger was pricked with a sterile needle. A large drop of blood is collected into a small vial containing isotonic saline (0.9% NaCl) to obtain red cell suspension. Three clean slides were labeled as “A”, “B” and “D” followed by placing anti-serum A, anti-serum B and anti-serum D drops over them. A drop of red cell suspension was added on each slide and mixed with blood properly by separate ends of glass rods. The agglutination reaction was used to check blood groups.⁸

The data was analysed using statistical software SPSS (Statistical Package for the Social Sciences, IBM Corporation, Armonk, Network) version 20 to determine any association between obesity and different blood groups.

RESULTS

Table 2: BMI showing overweight and obesity of students.

Weight	Number	Percentage
Underweight (<18.5)	5	3.3
Normal (18.5-24.9)	91	60.7
Overweight (25.0-29.9)	31	20.7
Obese (>30)	23	15.3
Total	150	100

Table 2 shows the distribution of participants according to BMI.

As seen in the Table 2, highest percentage (60.7%) of students is normal and lowest percentage (3.3%) of students is underweight. Obese and overweight students comprise 15.3% and 20.7% of students respectively.

Table 3: BMI in boys and girls.

BMI	Sex				Total	
	Boys(n=105)		Girls(n=45)		No.	%
	No.	%	No.	%		
Underweight (<18.5)	3	2.9	2	4.4	5	3.3
Normal (18.5-24.9)	63	60	28	62.2	91	60.7
Overweight (25.0-29.9)	22	21	9	20	31	20.7
Obese (>30)	17	16.2	6	13.3	23	15.3
Total	105	100	45	100	150	100

Table 3 shows overweight and obesity is more prevalent in boys than girls. Out of 150 students participated in the study, 105 were boys and 45 were girls. As shown in the Table 3, 2.9% of boys were underweight, 21% were overweight and 16.2% were obese. Among girls, 4.4% were underweight, 20% were overweight and 13.3% were obese. The incidence of girls being underweight is more than boys, while boys were more overweight and obese than girls.

Table 4: Relation of different blood groups with BMI.

Body Mass Index (BMI)	Blood Group							
	A		B		AB		O	
	No.	%	No.	%	No.	%	No.	%
Underweight (<18.5)	1	3.6	3	4.8	1	5.9	0	0.00
Normal (18.5-24.9)	17	60.7	35	55.6	11	64.7	28	66.7
Overweight (25.0-29.9)	6	21.4	14	22.2	1	5.9	10	23.8
Obese (>30)	4	14.3	11	17.5	4	23.5	4	9.5
Total	28	100	63	100	17	100	42	100

Table 4 shows the prevalence of overweight (BMI 25-29.9) among all participants based on ABO blood group O, B, A and AB was 23.8%, 22.2%, 21.4% and 5.9% respectively. The prevalence of obesity (BMI >30) on blood group AB, B, A and O was 23.5%, 17.5%, 14.3% and 9.5% respectively. The prevalence of overweight was more in O blood group, while obesity was more in AB blood group. The prevalence of underweight (BMI<18.5) on blood group AB, B, A and O was 5.9%, 4.8%, 3.6% and 0% respectively. The prevalence of underweight was more in AB blood group and less in O blood group.

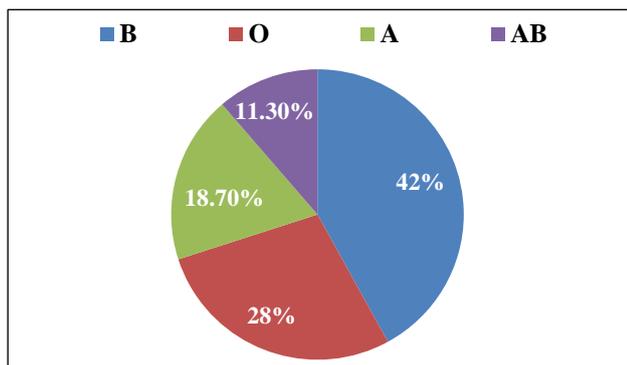


Figure 1: Distribution of blood groups.

Figure 1 shows the frequency of ABO blood groups among the participants.

Figure 1 shows the frequency of ABO blood groups among all participants were- B group, 42%; O group, 28%; A group, 18.70%; and AB group, 11.30%, 94.7% were Rh+ve, while 5.3% were Rh-ve.

DISCUSSION

In present study we found that prevalence of overweight and obesity was 20.7% and 15.3%, respectively. When data for boys and girls was separately analyzed, we found that overweight and obesity was more prevalent in boys (21% and 16.2%) than girls (20% and 13.3%).

Singh S et al, studied medical students of Government Medical College, Amritsar, in 2017 and found 22.5% overweight and 15.5% obesity, this study matches our

study.⁹ This result is higher in comparison to the study on Punjabi population by Sukalingam K et al in Malaysia, where the overall prevalence of overweight and obesity was 19% and 14%, respectively.⁶ Also obesity was more in O blood group followed by B blood group, but in our study, obesity was more common in AB blood group followed by B blood group. Qung YA et al studied students of Advanced Medical and Dental Institute of Malaysia and found 21.5% overweight and 26.8% obese, and high incidence of obesity in B blood group followed by A blood group, while in our study, authors found high prevalence of overweight in O blood group and high prevalence of obesity in AB blood group.¹⁰

Gosh AK et al studied third year MBBS students of RG Kar Medical College, Kolkata, in 2017 and found 25.6% overweight and 6% obesity.¹¹ Jadhav et al studied first year MBBS students of Mysore Medical College and found 23.8% students were overweight.¹² These studies have shown relation of O or B blood group with overweight or obesity, while Kelso et al showed no relation between ABO blood group types and body weight among four samples for different culturally distinct populations.¹³

The distribution of ABO blood groups varies worldwide depending on different factors such as genetics, race and ethnicity. Our results regarding the prevalence of ABO blood group types showed overweight and obesity in O group and AB blood group, respectively.

Health awareness programs should be arranged in medical colleges to educate students about the adverse effects of obesity. They should also be taught about contributing factors of obesity such as lack of balance diet, consumption of fast food, TV viewing and lack of exercise. Health awareness through media and use of posters at public places may be helpful. Young adults should be encouraged for balanced nutrition and physical activity to avoid weight gain.

ACKNOWLEDGEMENTS

The authors are thankful to medical students for taking part in present study and Physiology Department for providing help in research.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Shehin M, Basila V. Correlation between ABO blood groups and body mass index among medical students. Int J Res Med Sci 2019;7:3878-81.