Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL11, ISSUE 04, 2020

Association between body mass index and blood groups in medical students

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ABSTRACT

Background: With the changing lifestyle and eating patterns of the society, the incidence of obesity is increasing day by day. Obesity has a multifactorial causation consisting of environmental, genetic as well as physiological factors. The present study seeks to determine if there is any association between ABO blood groups and body mass index.

Materials and methods: Our study involves 200 medical students consisting of 102 boys and 98 girls in the age group of 18-23 years in the Government Medical College, Amritsar. Weight, height for BMI and blood groups are used in order to find any association between ABO blood group and BMI.

Results: Overweight and obesity was found more prevalent in boys than girls, 22.5% students were overweight and 15.5% were obese. The prevalence of overweight was (24.52% boys and 20.40% girls) and prevalence of obesity was (25.49% boys and 5.10% girls). Blood group B was reported the most common blood groups (37.5%) followed by blood group O (32.0%), while blood groups A and AB were found 19.5% and 11% of participants, respectively. The prevalence of overweight (BMI 25-29.9) among participants based on blood group O, A, AB and B was 29.69%, 25.64%, 18.18%, 16.00%, while obesity (BMI >30) among participants based on blood groups B, O, A and AB was 24.00%, 10.94%, 10.26% and 9.09%.

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

Keywords: ABO Blood Groups, Body Mass Index, Overweight and Obesity

BACKGROUND

We have lived in the era of communicable diseases in the past, but now we are living in the era of non communicable diseases, where non communicable diseases have surfaced as an epidemic. One of the, obesity is a well-documented condition of increased prevalence in the developing and developed countries and is one of the most important health problems worldwide.[1-2] Obesity doesn't have one causal factor but multiple, some of which are still yet to be fully understood. Along with the lifestyle, eating habits, sedentary lifestyle, metabolic diseases, mental disorders, genetic factors, obesity becomes a multifactorial condition that needs a multidimensional

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approach. Not only obesity effects the physical condition of an individual but also decreases the quality of life, because of it's substantial psychosocial consequences.[3-6] Obesity has been classified according to Body Mass Index (BMI), it is a simple weight for height index. This is calculated as a person's weight in kilograms divided by square of his or her 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. Elevated BMI has made obesity and its underlying factors a high priority for health authorities worldwide. Overweight and obesity are linked to more morbidities and mortalities. One of the major risk factors maybe ABO blood groups and they have been shown to be associated with different diseases.[7-12] Extra weight as body fat can be risky, which is not limited to the extra layer of fat subcutaneously, but also includes visceral fat, which lies deep inside abdomen surrounding internal organs that is one of the most prominent causes of sleep apneoa and other diseases like cardiovascular disease, insulin resistance and type 2 diabetes, colorectal cancer, sleep apnoea, gout, gallbladder diseases and premature death.[9-14] Weight is largely determined by how one balances the calories one eats with the energy one burns. If one is eating more calories that he is burning, then ofcourse that individual is going to put on weight. Ageing does play a role too. As person ages, he/she loses muscle mass, that decreases metabolism, especially if one is not physically active. Loss of muscle mass decreases the rate at which our body uses calories, which can make it more challenging to maintain a healthy weight. According to the 2015-2020, dietary guidelines for Americans, men in their 50s need about 200 fewer calories and more protein daily than they do in their 30s due to this muscle loss. Many women also notice an increase in fat as they get older, even if they are not gaining weight. This is likely to a decreasing level of oestrogen, which appears to influence where fat is distributed in the body. Although, subcutaneous fat poses cosmetic concerns, visceral fat is linked to far more dangerous health problems. Few studies have been carried out to detect the association of ABO blood groups with obesity with uncertain results.[15] 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, which may contribute to underlying genetic or environmental factors and can be considered in future studies.

MATERIALS AND METHODS

Present study was conducted on 200 medical students (102 boys and 98 girls) in the age group of 18-23 years (mean age 20.43 ± 8.9 years) in the Physiology Department, Government Medical College, Amritsar, on MBBS batch 2016-17. Students were described about the study and structured questionnaire pro forma was filled and written consent taken. Students suffering from cardiovascular, respiratory, neurological diseases and congenital abnormalities were excluded. Height and weight of students were recorded and ABO blood groups determined. For measurement of height, measuring tape was mounted accurately on the wall perpendicular to properly levelled floor. The students were asked to stand against wall with its back and head touching wall without shoes. The height was measured in centimetres and later converted to metres for calculation of BMI. The weight was measured on standardised weighing machine with light clothes without footwear. To avoid inter-observer bias height and weight was measured by single investigator. BMI was calculated as weight in kg divided by square of height in meter (kg/M2). The BMI classification was based on WHO (World Health Organisation) as follows

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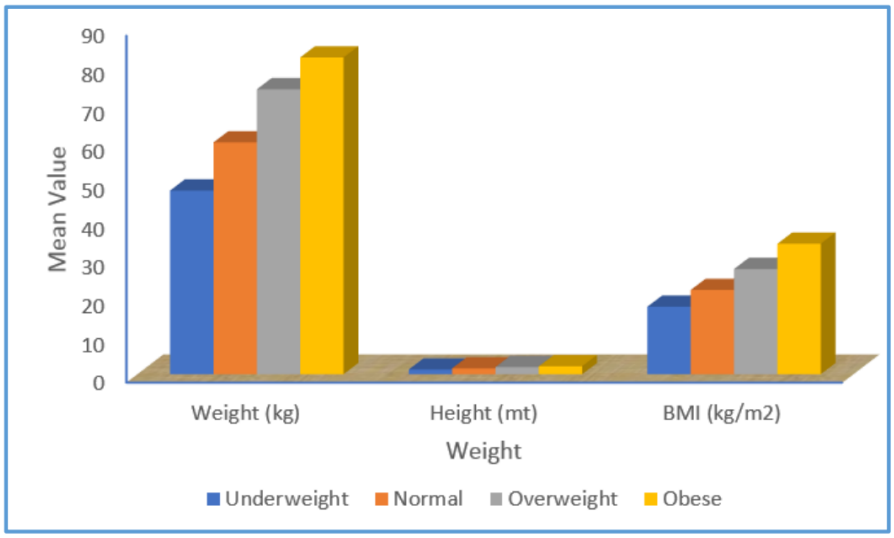
Underweight	BMI <18.5
Normal	18.5-24.99
Overweight	25.0-29.99
Obese	>30

The data was analyzed using SPSS to determine any association between obesity and different blood groups.

RESULTS



Weight	Number	Percentage
Underweight (<18.5)	18	9
Normal (18.5-24.9)	106	53
Overweight (25.0-29.9)	45	22.5
Obese (>30)	31	15.5
Total	**200**	**100**

Table 1. BMI Showing Overweight and Obesity of Students

BMI	Sex				Total	
	Boys (n=102)		Girls (n=98)		No.	%
	No.	%	No.	%		
Underweight (<18.5)	6	5.88	12	12.24	18	9.00
Normal (18.5-24.9)	45	44.12	61	62.24	106	53.00
Overweight (25.0-29.9)	25	24.51	20	20.41	45	22.50
Obese (>30)	26	25.49	5	5.10	31	15.50
Total	**102**	**100**	**98**	**100**	**200**	**100**

Table 2. BMI in Boy and Girls

Table 2 shows the distribution of participants according to BMI was 18 (9%) underweight, 106 (53%) normal weight, 45 (22.5%) overweight and 31 (15.5%) obese.

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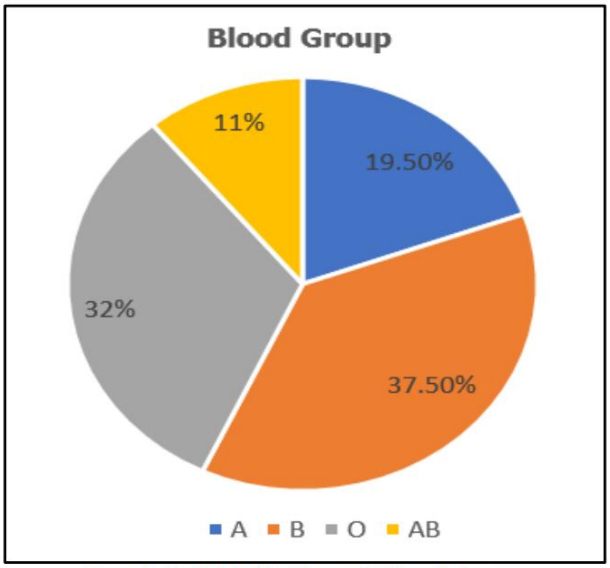

Graph 2. Distribution of Blood Groups

We evaluated the association between BMI and ABO blood groups. Graph 2 shows the frequency of ABO blood groups among all participants were- B group, 37.5%; O group, 32.0%; A group, 19.5%; and AB group, 11%. 93.5% Rh+ve, while 6.5% Rh-ve. Table 3 shows the prevalence of overweight (BMI 25- 29.9) among the participants based on ABO blood group O, A, AB and B was 29.69%, 25.64%, 18% and 16.0%. While the prevalence of obesity (BMI >30) on blood group B, O, A and AB was 24%, 10.9%, 10.26% and 9.09%. The prevalence of overweight was more in O blood group, while obesity was in B blood group.

Body Mass Index (BMI)	**Blood Group**							
	A		**AB**		**B**		**O**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Underweight (<18.5)	3	7.69	0	0.00	9	12.00	6	9.38
Normal (18.5-24.9)	22	56.41	16	72.73	36	48.00	32	50.00
Overweight (25.0-29.9)	10	25.64	4	18.18	12	16.00	19	29.69
Obese (>30)	4	10.26	2	9.09	18	24.00	7	10.94
Total	**39**	**100**	**22**	**100**	**75**	**100**	**64**	**100**

Table 3. Relation of Different Blood Groups with BMI

DISCUSSION

Obesity is an important public health problem worldwide and its prevalence is increasing in developed and developing countries. In our study, the overall prevalence of overweight was 22.5% and obesity 15.5%, when data for boys and girls was separately analysed, the overweight and obesity in boys (24.52% and 25.49%) was more prevalent than girls (20.4% and 5.10%). Gosh AK et al[16] studied third year MBBS students of RG Kar Medical College, Kolkata, in 2017 and found 25.6% overweight and 6% obesity, the study matches our study. Sukalingam K et al[17] found overweight and obesity to be 19% and 14% in girls and boys and obesity was more in O blood group followed by B blood group, which is similar to our study. Qung YA et al[18] studied students of Advanced Medical and Dental Institute of Malaysia and found 21.5% overweight and 26.8% obese and 15.4% severely obese, and high incidence of obesity in B blood group followed by A blood group, while in our study, we found overweight in O blood group and obesity in B blood group. Jadhav et al[19] studied first year MBBS students of Mysore Medical College and found 23.8% students were overweight. Aboel Fetoh et al[20] have shown obesity in O blood group, which corroborates our study. These studies have shown relation of O or B blood group

ISSN: 0975-3583,0976-2833 VOL11, ISSUE 04, 2020

with overweight or obesity, while Kelso[21] and colleagues showed no relation between ABO blood group types and body weight among four samples for different culturally distinct populations. Many studies have shown correlation between ABO blood group system and overweight or obesity even relation with many diseases like gastric cancer and peptic ulcer, thrombosis, hypertension, diabetes mellitus, coronary heart disease and myocardial infarction. [7-14] In 2007-08, National Health and Nutrition Examination Survey (NHANES) of United States using measured heights and weights indicate that an estimated 34.2% of US adults aged 20 years and over are overweight, 33% are obese and 5.7% are extremely obese. [22] The overweight and obesity is increasing rapidly and effective steps are required to be initiated immediately. DeOnis M and Blossmer M. [23] had suggested the need of information on dietary pattern and weight gain in school going children, because these overweight and obese children will become obese adults. The lifestyle of children is based on lifestyle of their parents. The children learn a lot from their parents, so good dietary and healthy lifestyle can help them lead healthy life. Using computer, internet, mobile, Facebook, Whatsapp and watching TV for long hours have affected the younger generation.[24-25] These gadgets have made the life of younger generation non-active and lethargic. Such habits should be discouraged as they cause childhood or teenage obesity. 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 followed by B blood group, which are most common groups (O group- 32% and B group- 37.5%). In schools, teachers should be specially trained to take regular classes on health and weight management. Students should be discouraged from using fast foods filled with high calories and fats. Further research is necessary in future, which should involve different people from different cultures, religion and socioeconomic group as India is too diversified, a multicenter study is required in this regard.

CONCLUSION

Our study showed the relation between BMI and ABO blood groups. Blood groups O and B are prone to overweight or obesity and increasing prevalence of mainly in younger generation require more public and medical awareness and educational programs to prevent its expansion in future. The lack of regular exercise makes them victims of chronic diseases like diabetes, hypertension, asthma, gout, joint problems and cancers. Extra-curricular activities like sports, dancing, swimming should be encouraged by medical colleges through proper set-ups of re-creational buildings in the campus. Aerobic activities like High Intensity Interval Training (HIIT), brisk walks, resistance training and weight training should be encouraged for at least 40 minutes-3 days a week. Larger future studies are required to assess current prevention and treatment programs and to study the potential genetic and environmental factors of increasing prevalence of overweight and obesity.

ACKNOWLEDGEMENTS

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

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