

RELATIONSHIPS OF BLOOD GROUPS WITH BODY MASS INDEX (B.M.I.).

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Background: Blood group is genetically determined. Obesity is a risk factor for many diseases like cardiovascular diseases, type 2 diabetes mellitus, obstructive sleep apnoea, certain types of cancer and osteoarthritis. Body Mass Index (B.M.I.) is an indirect measure of body fat. **Objective:** objective of this study is to find whether any relationship between blood group and B.M.I. of a person exists or not. **Materials and methods:** a cross sectional study on 79 subjects was done. Subjects were class 1 and 2 staff members of B. J. Medical College, Ahmedabad and family members of some of them. A thorough history, height, weight and blood group of every subject were taken. The data was analyzed statistically. **Observations and results:** mean B.M.I. of AB blood group subjects ($26.87 \pm 1.73 \text{ kg/m}^2$) is higher than mean B.M.I. of A ($24.15 \pm 3.17 \text{ kg/m}^2$) and O ($24.88 \pm 3.8 \text{ kg/m}^2$) blood group subjects and these differences are statistically significant ($p < 0.05$). Whereas there are no significant differences between mean B.M.I. of A, B and O blood group subjects as well as AB and B ($25.42 \pm 4.26 \text{ kg/m}^2$) blood group subjects. Also, in age group 41-60 years overweight and obese subjects are more in number as compared to age group 24-40 years, and this difference is highly significant statistically ($p < 0.001$). **Conclusion:** subjects having AB blood group have higher B.M.I. as compared to subjects having A and O blood group.

Key Words: Body Mass Index, obesity, blood group.

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Introduction:

With the discovery of ABO blood group system in 1901 by Landsteiner,¹ it was studied as an etiological factor of many diseases for example peptic ulcer and carcinoma of stomach.² Clinical studies have shown that individuals of the A phenotype blood group are more susceptible to cardio vascular diseases.^{6,7} Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy or increased health problems.^{8,9} B.M.I. is closely related to both percentage body fat and total body fat.¹² The most commonly used definitions, established by the World Health Organization (WHO) in 1997 and published in 2000, provide the values listed in the table :

B.M.I. (kg/m^2)	Classification
< 18.5	underweight
18.5–24.9	normal weight

25.0–29.9	overweight
30.0–34.9	class I obesity
35.0–39.9	class II obesity
≥ 40.0	class III obesity

[Table 1: definition of obesity given by WHO]⁸

Blood group is genetically determined and association of blood group with Body Mass Index (B.M.I.) is not well established. This study is done to check existence of this association.

Objective: Objective of this study is to find whether any relationship between blood group and B.M.I. of a person exists or not. B.M.I. is considered as a tool to classify obesity, thus by this study we want to find the role of blood group as a genetic determinant in occurrence of obesity.

Material and Methods:

A cross sectional study on 79 subjects aged between 24 years and 60 years was done. Subjects were class 1 and 2 staff members of B. J. Medical College, Ahmedabad and family members of some of them. This selection of subjects was done to

include subjects of same socio economic class. A written consent of each subject was taken. The questionnaire included self-reported information about age, gender, occupation, dietary habits, sleep habits, bowel and bladder habits, physical activity, Information about smoking or any other addiction, type of ABO blood groups, body weight(in kg) and height (in centimeter). B.M.I. of every subject was calculated using the formula, $B.M.I. = \text{weight (kg)} / (\text{height})^2 (m^2)$.

Results:

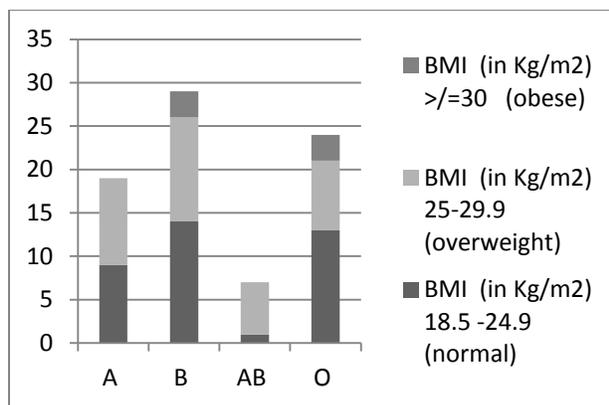
In our study, no subject had B.M.I. less than 18.5

Blood group	Normal weight subjects	Overweight subjects	Obese subjects	Total
O	13	8	3	24
B	14	12	3	29
A	9	10	0	19
AB	0	7	0	7

kg/m^2 , therefore no subject was classified as underweight.

[Table 3: Distribution of normal, overweight and obese subjects in A, B, AB and O groups.]

Subjects were divided in four groups according to the type of their ABO blood groups: A, B, AB and O. Mean B.M.I. of each group was calculated and this data was analyzed statistically using Z test

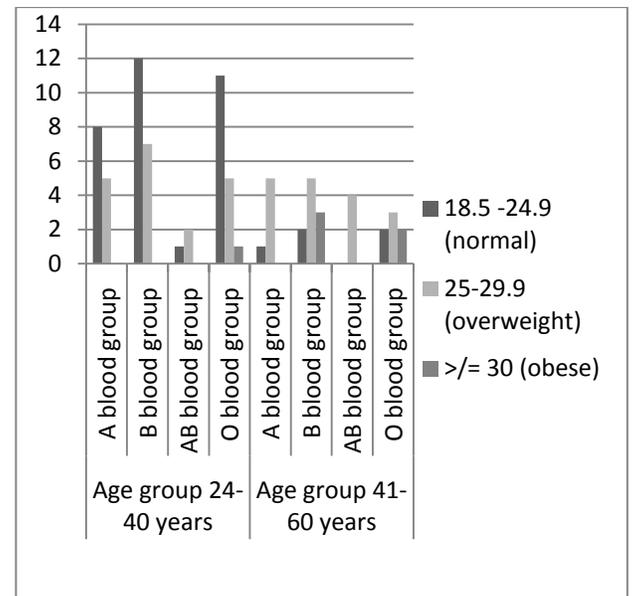


[Graph : 1- Distribution of normal, overweight and obese subjects in A, B, AB and O groups.]

Blood group	Rh positive subjects	Rh negative subjects	Total	Mean B.M.I. (in kg/m^2)
O	22	2	24	24.90
B	26	3	29	25.42
A	17	2	19	24.16
AB	7	0	7	26.87

[Table 2: mean B.M.I. of subjects of different blood groups]

Mean B.M.I. of AB blood group subjects ($26.87 \pm 1.73 kg/m^2$) is higher than mean B.M.I. of A blood group subjects ($24.15 \pm 3.17 kg/m^2$, Z value 2.8) and O blood group subjects ($24.88 \pm 3.8 kg/m^2$, Z value $1.97 \approx 2$) and these differences are statistically significant ($p < 0.05$). Whereas there is no significant difference between mean B.M.I. of A, B and O blood group subjects as well as AB and B ($25.42 \pm 4.26 kg/m^2$) blood group subjects. (Z value < 2 , $p > 0.05$) Also, in age group 41-60 years overweight and obese subjects are more in number as compared to age group 24-40 years, and this difference is highly significant statistically ($p < 0.001$).



[Graph 2: Distribution of normal, overweight and obese subjects in age groups 24 – 40 years and 41 – 60 years]

Discussion:

Blood group B is the most common blood group in Gujarat as evident from a study done by Gujarat Cancer Research Institute.¹³ Though the sample of our study was small, it represented the population of Gujarat in percentage distribution of blood groups. Subjects of similar socio economic class rule out the effect of socio economic class on B.M.I. Blood group is genetically determined. If particular blood group is associated with increased B.M.I., then there may be the role of genetic factors in weight gain and obesity. Further research is needed on this subject.

Conclusion: We can conclude that subjects having AB blood group have higher B.M.I. as compared to subjects having A and O blood group and blood group phenotype AB is associated with a substantial risk for increased B.M.I. Subjects having blood groups A, B and O do not show significant differences in B.M.I. Also, there is no significant difference between mean B.M.I. of subjects having AB and B blood group.

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