

# Does obesity influence by blood group of a person: An observational study

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## Abstract

**Background:** ABO blood groups are associated with certain diseases. Obesity is assessed by Body Mass Index. Present study was conducted to see any association between BMI and ABO blood group. **Aim and objective:** To study the association between blood group and Body Mass Index Of a person. **Methodology:** Present study was an observational study carried out in Class 1 and 2 staff members of B J Medical college and family members of some of them. Data was collected with pre tested questionnaire. Data included demographic data, blood group and BMI of the patients. Blood group was determined by the agglutination reaction. BMI of the patient was calculated and participants were classified into normal weight and overweight, obese participants. **Results:** Mean B.M.I. of AB blood group subjects (26.87±1.73kg/m<sup>2</sup>) is higher than mean B.M.I. of A blood group subjects (24.15±3.17 kg/m<sup>2</sup>, Z value 2.8 ) and O blood group subjects (24.88±3.8 kg/m<sup>2</sup>, Z value 1.97≈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±4.26 kg/m<sup>2</sup>) blood group subjects. (Z value < 2, p > 0.05).

**Key Word:** Obesity.

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## INTRODUCTION

Obesity is often defined simply as a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired. <sup>1</sup> Overweight and obesity are the fifth leading risk for global deaths. At least 2.8 million adults die each year as a result of being overweight or obese. In addition, 44% of the diabetes burden, 23% of the ischaemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity.<sup>2</sup> Obesity is

associated with an increased risk of morbidity and mortality as well as reduced life expectancy. Three blood groups (A, B and O) were discovered in 1900 by Landsteiner. He tested blood samples from himself and several colleagues by combining serum specimens with a suspension of RBCs from each person. By observing agglutination in some mixtures but not in others, he was able to classify the blood samples into three groups. Two years later, indications of a fourth group (AB) were found by two of Landsteiner's students.<sup>3</sup> Genes for the ABO blood grouping system are located on chromosome 9q34. Evidence of correlation between polygenic modes of expression of hypertension, diabetes have been established with ABO genes in mice models, however the exact interlooping of genes is yet to be ascertained as a proper relation is difficult to assess in polygenic expression.<sup>4</sup> Several studies in the past have studied the relationship of ABO blood group and obesity. <sup>4,5</sup> some studies denied the association between BMI and ABO blood group. <sup>6,7</sup> some studies suggest the ABO system as a genotype marker for obesity<sup>8</sup> but this relationship is still under intense investigation due to these conflicting results. New studies

are needed to see the association between blood groups and BMI. Present study was conducted to see the association between blood group and Body Mass Index.

**Aim and objective:** To study the association between blood group and Body Mass Index Of a person

**MATERIAL AND METHODS**

Present study was an observational study carried out in B J Medical college, Ahmedabad. Study population was Class 1 and 2 staff members of B J Medical college and family members of some of them.

**Inclusion Criteria:**

1. Class 1 and 2 staff members of B J Medical college and their family members
2. Participants willing to participate in the study

**Exclusion Criteria:**

1. Staff members other than class 1 and 2
2. Participants with chronic illness
3. Participants with fever, swelling etc. Study was approved by ethical committee of the institute. A valid written consent was taken from the participants after explaining study to them.

Data was collected with pre tested questionnaire. Data included demographic characters like age, gender, occupation etc. other factors noted were dietary habits, sleep habits, bowel and bladder habits, physical activity, Information about smoking or any other addiction. Blood samples of the participants were collected by finger prick method, and blood typing did by slide agglutination method using Anti sera-A, Anti sera-B, and anti-D antibodies. ABO typing was done by classic (antigen antibody agglutination test) method of making slides. Aseptic measures were ensured and blood was taken by finger pricking with sterile lancet. Three clean slides were labeled as “A”, “B” and “D” followed by placing drops of blood over them. Anti-sera A, antisera-B and antisera D were added on each slide and mixed with blood properly. The agglutination reaction was used to check blood groups.<sup>9</sup> Blood group of the participants was noted. Height was measured using a stadiometer to the nearest of 0.1 cm. weight was measured using weighing machine nearest to 100 grams. B.M.I. of every subject was calculated using the formula,  $B.M.I. = \text{weight (kg)} / (\text{height})^2(\text{m}^2)$ . BMI was classified according to the proposed criteria of the WHO,<sup>10</sup> where BMI of the following values:  $<18.5 \text{ kg/m}^2$ ,  $18.5-24.9 \text{ kg/m}^2$ ,  $25-29.9 \text{ kg/m}^2$ , and  $\geq 30 \text{ kg/m}^2$ , is categorized as underweight, normal weight, overweight, and obese, respectively. Data was entered in Excel sheet. Data was analysed with appropriate statistical tests.

**RESULTS**

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. Fig 1 shows distribution of participants according to blood group. Majority of the participants were with blood group of A (36.71%) followed by O group (30.38%). B blood group was observed in 24.05% participants. AB blood group was observed in 8.86% participants. Fig 2 shows Distribution of participants according to blood group and BMI. Among the O blood group participants, majority were Normal weight subjects (54.67%) followed by overweight subjects (33.33%). Obese subjects were 12.5%. Among the A blood group subjects 14(48.27%) were normal weight subjects, 12(41.38%) were and 3(10.35%) were obese subjects. Among the B blood group subjects 9(47.37%) and 10(52.63%) were normal weight and overweight subjects respectively. None of the subject was obese. Among the subjects with AB blood group all patients were overweight. None of them was normal weight or obese. 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 blood group subjects ( $24.15 \pm 3.17 \text{ kg/m}^2$ , Z value 2.8 ) and O blood group subjects ( $24.88 \pm 3.8 \text{ kg/m}^2$ , 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 ( $25.42 \pm 4.26 \text{ kg/m}^2$ ) 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 ( $p < 0.001$ ).



Figure 1: Distribution of Participants according to Blood group

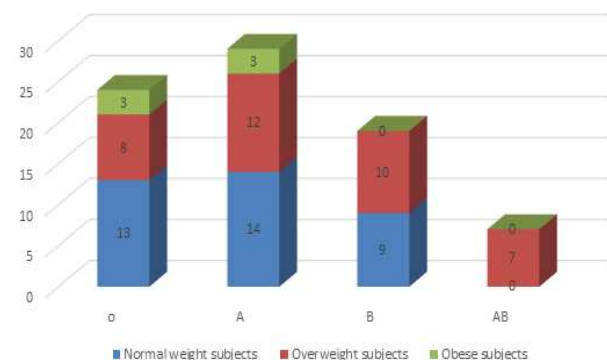
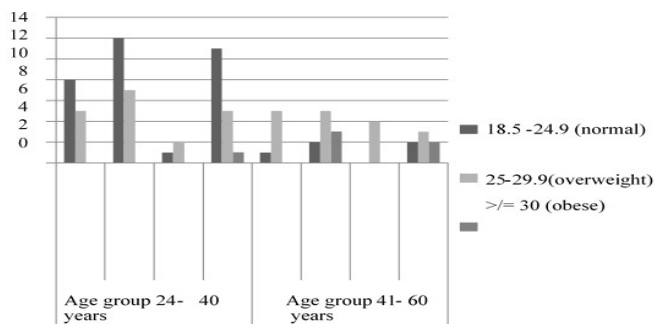


Figure 2: Distribution of participants according to blood group and BMI

**Table 1: Distribution of participants according to Rh blood group and BMI**

Blood group	Rh positive subjects	Rh negative subjects	Total	Mean BMI
O	22	02	24	24.90
A	26	03	29	25.42
B	17	02	19	24.16
AB	07	00	07	26.87

**Figure 3: Distribution of blood group of participants according to age group and BMI**

## DISCUSSION

In our study, Majority of the participants were with blood group of A (36.71%) followed by O group (30.38%). B blood group was observed in 24.05% participants. AB blood group was observed in 8.86% participants. Similar findings were seen in a study by Kanwal S *et al.*<sup>11</sup> some of the studies showed that B blood group was more common.<sup>12-14</sup> Similar to our study various previous studies also observed that AB blood group was most commonly observed blood group.<sup>15,16</sup> In our study, 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 blood group subjects ( $24.15 \pm 3.17 \text{ kg/m}^2$ , Z value 2.8) and O blood group subjects ( $24.88 \pm 3.8 \text{ kg/m}^2$ , 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 ( $25.42 \pm 4.26 \text{ kg/m}^2$ ) blood group subjects. (Z value  $< 2$ ,  $p > 0.05$ ).

Previous studies showed different results. One study showed that O blood group was significantly associated with BMI. One study demonstrated that blood group O was associated with increased BMI.<sup>13</sup> in a study by Chandra T *et al.* showed that blood group B was associated with obesity.<sup>17</sup>

## CONCLUSION

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.

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