

Body Mass Index and ABO Blood Groups among Different Ethnicities of the Golestan Cohort Study Subjects

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ABSTRACT

Background

ABO blood groups are associated with some important chronic diseases. Obesity as a major risk factor of chronic non-communicable diseases is rising rapidly in Iran as well as in developing countries. Understanding the risks for obesity is important for its control. This study seeks to determine if there is any association between ABO blood groups and body mass index (BMI).

Materials and Methods

Weight, height and blood groups were determined for participants of the Golestan Cohort Study in order to find any associations between ABO blood groups and BMI.

Results

Prevalences of overweight and obesity in participants (mean age: 52.1±8.0 years) were 33.9 and 25.4, respectively. Mean weight and BMI were significantly higher in blood group A, females and those of Turkman ethnicity. After adjustments for age, sex and ethnicity, there was no association noted between BMI and ABO blood group.

Conclusion

The prevalence of obesity and overweight in Iran is high, as seen in developing countries. There is no association between BMI and ABO blood groups in the Golestan cohort population, but Turkman ethnicity and female gender are associated with higher BMI.

Keywords: Blood groups; BMI; Ethnicity

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INTRODUCTION

Obesity is one of the most important health problems worldwide. In the United States, approximately one third of the adults are obese and more than \$50 billion per year is spent on obesity-related medical care(1). The prevalence of overweight and obesity in most developed and developing countries have been increasing markedly over the past two decades(2). The association of obesity with increased morbidity and mortality is confirmed in several studies(3). Decrease in quality of life is one of substantial psychosocial consequences of obesity as well(4-6). Recent epidemiological studies have revealed that the prevalence of obesity, overweight, and metabolic

syndrome in Iran is equal to or higher than Europe and the United States(2).

Thus, finding predisposing factors of obesity is a major concern of researchers. One of the risk factors may be ABO blood groups. Many studies show an association between ABO blood group and some obesity co-morbidities such as diabetes mellitus type 2, hypercholesteremia, hypertension, myocardial infarction and certain cancers(7-13).

In previous studies, ABO blood group was associated with height and weight however this association was not confirmed by other studies(14-15). This study sought to determine if there was any association between ABO blood groups and body mass index (BMI) in an Iranian population of different ethnicities.

MATERIALS AND METHODS

The study population consisted of participants in the Golestan Cohort Study (GCS). This study was a prospective population-based study of 50 045 men and women, aged 40-75 years, who resided in urban and rural areas of Golestan Province, Iran(16).

Overweight and obesity was defined as BMI ≥ 25 kg/m² and BMI ≥ 30 kg/m², respectively.

Statistical analysis

The paired t-test was used with a significance

level of 0.05. Adjustments for confounding variables such as age, sex and ethnicity were performed using multivariate logistic regression. SPSS version 16 software was used for analysis.

RESULTS

About 57.6% of the study population was female and 74.4% were of Turkmen ethnicity.

The distribution of ABO blood groups was as follows: blood group A (34%), group O (29.9%), group B (27.1%) and group AB (9.6%) (Figure 1).

A total of 33.9% of the population were overweight (BMI ≥ 25 kg/m²) whereas 25.4% were obese (BMI ≥ 30 kg/m²) (Figure 2).

In univariate analysis, the mean of weight and BMI were significantly higher in blood group A compared with other blood groups (weight: 68.25 kg; $p = 0.002$; BMI: 26.75 kg/m²; $p = 0.001$) but the mean height was not significantly different (Table 1).

We evaluated the associations between BMI, age, sex and ethnicity with ABO blood groups in multivariable analysis. There was no association between age and BMI in the ABO blood groups, however an association was noted between sex and ethnicity with BMI.

The BMI of women were significantly higher compared with men in all blood groups, and blood

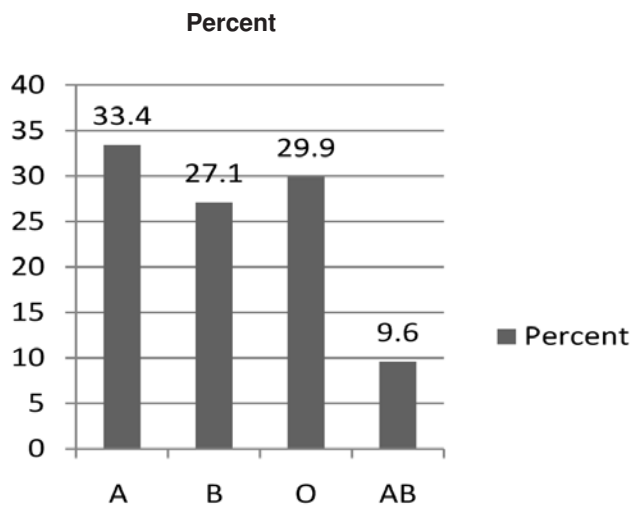


Fig 1: Distribution of ABO blood group in study population

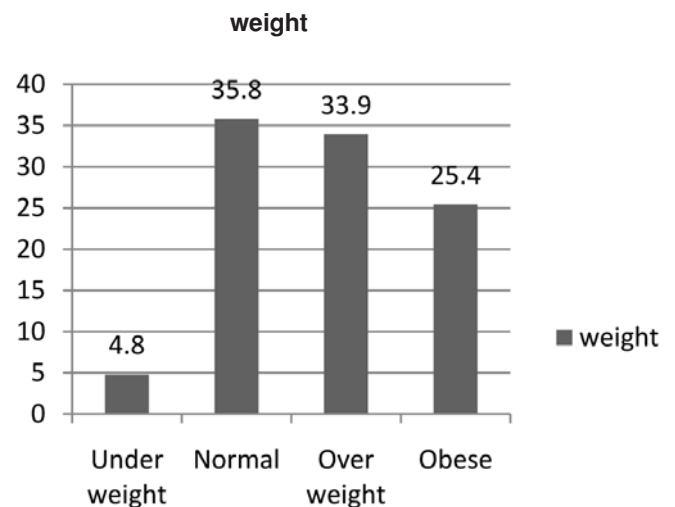


Fig 2: Distribution of weight in study population (in percent)

group A was more prevalent in women (Table 2, Figure 3).

BMI of Turkmens was significantly higher in all blood groups. Additionally, blood group A was more prevalent in Turkmens than non-Turkmens (Table 2, Figure 4). Therefore the association that existed between BMI and blood group A was not a true association, but rather a confounding effect of sex and ethnicity.

DISCUSSION

Obesity is an important public health problem worldwide, and its prevalence is increasing in both developed and developing nations, including Iran(17,18).

About two thirds of our study population were overweight (BMI: 25-29.9 kg/m²) or obese (BMI ≥ 30 kg/m²). This high prevalence is similar to Western countries, including the USA and Great

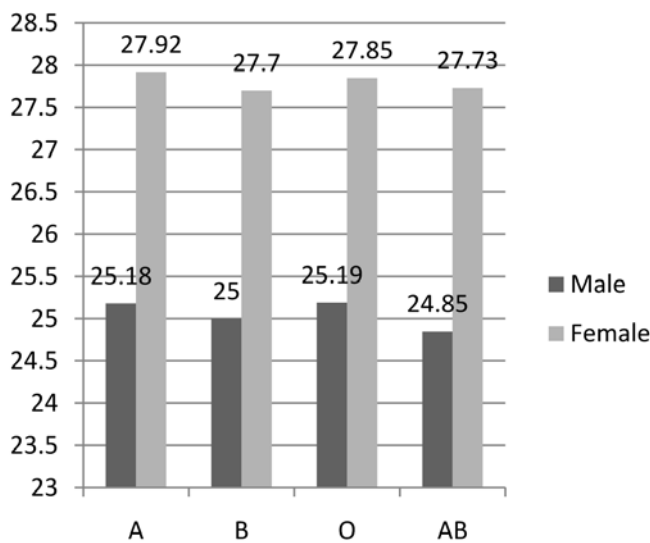


Fig 3: Mean of BMI in different blood groups by sex

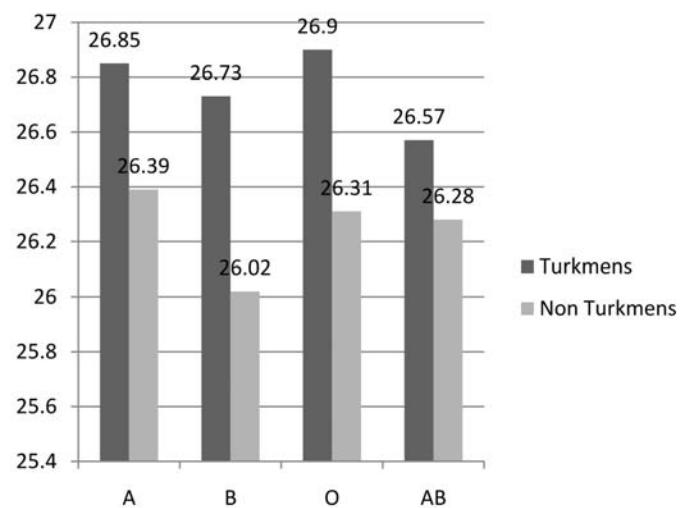


Fig 4: Mean of BMI in different blood groups by ethnicity.

Table 1: Association of anthropometric characteristic with ABO blood groups.

| Variables | Blood group of A | Blood group of B | Blood group of O | Blood group of AB | p-value |
|---------------------------|------------------|------------------|------------------|-------------------|---------|
| Weight (Kg) | 68.25 | 67.77 | 67.47 | 68.07 | 0.002 |
| Height (cm) | 159.78 | 159.80 | 159.57 | 159.71 | 0.097 |
| Waist circumferences (cm) | 95.51 | 95.15 | 95.45 | 94.82 | 0.005 |
| Hip circumferences (cm) | 99.59 | 99.33 | 99.57 | 99.25 | 0.017 |
| BMI (kg/m ²) | 26.75 | 26.55 | 26.74 | 26.52 | 0.001 |

Table 2: Distribution of ABO blood groups by ethnicity and sex.

| Blood groups | Ethnicity | | Gender | |
|--------------|-----------|-------------|--------|--------|
| | Turkmen | Non-Turkmen | Female | male |
| A | 34 % | 31.5 % | 33.6 % | 33.1 % |
| B | 26.9 % | 27.5 % | 27.2 % | 26.9 % |
| O | 29.1 % | 32.3 % | 29.3 % | 30.3 % |
| AB | 9.9 % | 8.6 % | 9.6 % | 9.5 % |

Britain(18-20). In a nationwide cross-sectional survey in Iran on 89 404 men and women, 15 to 65 years of age (Mean: 39.2 years), the age-adjusted prevalence of overweight or obesity (BMI \geq 25 kg/m²) was 42.8% among men and 57.0% among women(21). These values are slightly lower than the results of our study and may be due to the lower age of this study population, however in both studies the prevalence of overweight and obesity was elevated.

In our study, the prevalence of overweight and obesity was significantly higher among women than men. Other studies in Iran have also shown women to be more obese than men(2,21). This is probably because Iranian women have more a sedentary lifestyle compared to men.

The prevalence of overweight and obesity among Turkmen ethnicity was significantly higher than the non-Turkmen group. This was new finding of this study and could be due to differences in genetic factors and lifestyle.

In our study, height, weight and BMI were not associated with ABO blood groups. In several studies, there was no association between anthropometric measures and ABO blood groups(14,15). However a few studies have shown an association between anthropometric measures and ABO blood groups. In one study conducted among 898 young men, blood

group B (B, AB) subjects were taller than non-B (A, O) subjects(10). In another study on Brazilian infants, weights of females with blood group A were significantly more than other blood types. This difference was not found among male infants(22). A cross-sectional study conducted in Turkey evaluated the association between ABO phenotypes and risk of obesity among 3290 men with airborne occupational exposure. The researchers found a relationship of airborne exposures with obesity in men with phenotype O(23).

Our study has some strengths and limitations. The strengths included the large sample size which consisted of both urban and rural populations. By using multivariable analysis this study confirmed previous studies with more power.

The limitations of this study were the age of the study population, that included participants \geq 40 years and its localization in Golestan Province, Iran.

In summary, excess body weight appears to be quite common in Iran as with other developing and developed countries. Turkmen ethnicity and women more likely than men to be at risk for overweight and obesity. Preventive strategies are urgently needed to prevent overweight and obesity in Golestan Province as well as other parts of Iran.

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