Predictive Power of Body Visceral Adiposity Index, Body Adiposity Index and Body Mass Index for Type 2 Diabetes in Qatari Population

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INTRODUCTION

Diabetes mellitus (DM) is the ninth leading cause of death worldwide and approximately 90% of cases are T2D. In Qatar, it is estimated that by 2050, one Qatari in every four will have diabetes.1 Evidence shows that higher body fat is associated with increased risk for several metabolic disorders.2 Since the 1990s, BMI has been used to define underweight, overweight, and obesity. Many studies have questioned the utility of BMI in weight classification as it cannot differentiate between lean mass and fat mass.3 BMI was first introduced in 2011, based on anthropometric measurements such as waist circumference (WC), hip circumference (HC), body fat (BF) and body fat percentage (BF%). BMI has been noted for its low cost and ease of administration.4 However, BMI seems to be a better predictor for metabolic disorders associated with insulin resistance than a single anthropometric index. Although both VAI and BAI can predict the risk of metabolic diseases such as T2D, it is not known which of these is a better predictor of T2D in Qatari adults. Therefore, the aim of this study was to investigate the effectiveness of VAI and BAI in predicting the risk of T2D in the Qatari adult population.

METHODOLOGY

Study Design and Population

This study used data from the Qatar Biobank. A random sample of 1103 adults over 20 years old, who had lived in Qatar for more than 15 years, was included. Sociodemographic data, lifestyle factors and dietary habits were collected by a self-administered questionnaire. Data regarding health condition, family history of disease and medication use was collected by a registered nurse through face-to-face interviews. All the study protocols were approved by the Qatar Biobank Institutional Review Board.

Independent Variables

BMI was calculated as weight in kg divided by standing height in m². BAI was calculated as: BAI = hip circumference (cm)/height (m)² ∗ 1.18. VAI scores for men and women were calculated with the following formulas:

\[
\text{Nekes VAI} = \frac{\text{WC} \times \text{HC}}{\text{HC} - \text{WC}}
\]

\[
\text{Female VAI} = -0.396 + \left(\frac{\text{WC} \times \text{HC}}{\text{HC} - \text{WC}}\right)
\]

\[
\text{Male VAI} = 0.655 + \left(\frac{\text{WC} \times \text{HC}}{\text{HC} - \text{WC}}\right)
\]

Anthropometric Measurements

Body weight, height and waist circumference (WC) were measured according to the standard methods. Body fat and visceral fat were measured by DXA scan.

Biochemical Measurements

Blood samples were collected after at least 8 hours of overnight fasting. Measurements included fasting blood glucose (FBG) and HbA1c as well as blood lipid profiles of total cholesterol (TC), total triglycerides (TG), low-density lipoprotein-cholesterol (LDL-C) and HDL-C were obtained.

Statistical Analysis

Chi-square test was used to compare the differences between genders for categorical variables and t-test for continuous variables. Multivariable logistic regression was used to assess the association between different measures of obesity (3 scores of VAI, BAI, and BMI) and diabetes. All the analyses were performed by using STATA 16. Statistical significance was considered when P<0.05 (two sided).

REFERENCES


Undergraduate Students, Population, Health & wellness

Table 1 shows the characteristics of the study sample by diabetes status. More than 50% of participants with diabetes were women, while non-diabetic participants were mostly men. Moreover, after adjusting for age and gender, the VAI z-score was directly associated with the prevalence of diabetes while BMI z-scores showed lower association. With a further adjustment for education and physical activity, the VAI z-score was more strongly associated with the prevalence of diabetes compared to the BMI z-score. There was no relationship between BMI z-score and the prevalence of diabetes (Table 2).

Table 2. Association of VAI and BAI with diabetes among Qatari adults.

<table>
<thead>
<tr>
<th>VAI z-score</th>
<th>BAI z-score</th>
<th>BMI z-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Model 1</td>
<td>1.44 (1.24–1.68)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Model 2</td>
<td>1.39 (1.19–1.63)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Model 3</td>
<td>1.22 (1.14–1.31)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Model 4</td>
<td>1.18 (1.10–1.25)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

CONCLUSION

In conclusion, our study indicated that VAI is a strong and independent predictor of T2D among the Qatari population. The predictive ability of VAI is superior to that of BMI and BAI. Therefore, VAI could be a useful tool for predicting the risk of T2D among Qatari adults. If VAI were not available, BMI is still known to be non-invasive and the most applicable compared with other measurements.

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