

Relationship between random blood sugar and body mass index in an African population

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Abstract

Background: Obesity is the most important modifiable risk factor in the pathogenesis of type-2 diabetes reported in most cross-sectional studies. However, racial factors seem to be important in the relationship between body mass index (BMI) and glucose intolerance. **Methods:** Three-hundred and seventeen subjects participated in the study. Mean age of subjects was 35.0 ± 9.8 years (33.0 ± 9.6 among females and 36.2 ± 9.6 among males $p=0.1007$). **Results:** Female subjects had significantly higher BMI than their male counterparts, (26.6 ± 7.2 kg/m² versus 24.0 ± 5.4 kg/m² $p=0.0341$). Random blood sugar levels were, however, similar between males and females (85.2 ± 27.0 mg/dl versus 85.9 ± 14.7 mg/dl, $p=0.8868$). There was a positive but non significant correlation between casual blood sugar and BMI among female subjects ($r=+0.1520$, $p>0.05$). In the males however, there was no correlation between these variables ($r=-0.0395$, $p>0.5$). **Conclusion:** BMI is higher among females in this community and correlates with random blood glucose levels. Concerted efforts need to be made to address the issue of weight in this community within the framework of what is culturally acceptable. (Int J Diabetes Metab 14:144-145, 2006)

Key words: BMI, Casual Blood Glucose, obesity

Introduction

Obesity is the most important modifiable risk factor in the pathogenesis of type 2 diabetes reported in most cross-sectional studies.^{1,2} A positive correlation is therefore assumed to exist between random blood glucose and obesity. However, racial factors seem to be important in the relationship between body mass index (an index of adiposity) and glucose intolerance even though large studies such as the Scottish study did not demonstrate a correlation between casual blood sugar and BMI.³ There are no previous studies in this region that sought to define the relationships between these variables. This study was therefore undertaken to determine whether BMI and casual blood sugar are related.

Subjects And Methods

Adult population samples aged 55 years or younger, in two communities near Zaria, northern Nigeria were studied. Those with blood sugar levels in the diabetic range were excluded. Weights were taken to the nearest 0.5 kg and heights to the nearest 0.5cm from which BMI was calculated for each subject using the standard formula¹. Capillary blood was obtained from a finger prick. Random blood glucose levels were determined using an Ames glucometer.

Students *t*-test was used to compare continuous variables

while Pearson's correlation coefficient was used for discontinuous variables. The level of significance was $p<0.05$ in each case.

Results

317 subjects participated in the study. 267 (84.2%) were males and 50 (15.8%) females. Of these 43 (33 males and 10 females) were excluded from analysis; 5 for blood sugar in the diabetic range and the rest for age reasons.

Mean age of subjects was 35.03 ± 9.79 years (33.00 ± 9.64 among females and 36.18 ± 9.59 among males $p=0.1007$). The females had significantly higher BMI than their male counterparts (26.6 ± 7.2 versus 24.0 ± 5.4 , $p=0.0341$).

Random blood sugar levels were, however, similar between males and females 85.2 ± 27.0 mg/dl versus 85.9 ± 14.7 mg/dl, $p=0.8868$. There was a positive but non statistically significant correlation between random blood sugar and BMI among female subjects ($r=+0.1520$, $p>0.05$). However, there was no correlation between these variables ($r=-0.0395$, $p=0.5$) in male subjects.

Discussion

Obesity is probably the most important modifiable acquired risk factor in the aetiology of type 2 diabetes found in many cross-sectional and longitudinal studies.^{2,4,5} For example, a prospective study involving a cohort of normoglycaemic Swedish men, followed up for the development of type 2 diabetes mellitus, found that the incidence of diabetes mellitus rose by a factor of twenty-two when individuals with the highest body mass index (BMI) were compared with those who had the lowest BMI.⁴ Similarly, a

Received on: 15/11/05

Accepted on: 30/11/05

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prospective study involving more than 7000 British men (mean follow-up of 12.8 years) established a strong positive correlation between a high BMI and the development of type 2 diabetes. These observations are expected as obesity is known to induce insulin resistance.^{1,6}

It is expected, therefore that BMI should correlate with blood glucose levels. This is, however, not always the case. A Scottish study has previously shown no significant correlation between random blood sugar levels and BMI³. Racial and other biological factors may be responsible for this difference as was suggested in a study involving Caucasian and African-American women.⁷

Our study has shown a correlation among the females whereas in the males there was no significant correlation. Furthermore the females in these communities had significantly higher BMI than their male counterparts. The explanation for these findings, apart from racial factors, may also be found in the differences in the roles played by males and females in the traditional Hausa-Fulani communities. In these communities the males are the bread winners and are naturally more involved in physical activities to meet their day to day responsibilities as the head of the household. The females, on the other hand, are usually confined to their matrimonial homes and can only go out of their homes with the express permission of their spouses or male guardians. Consequently, they live a more-or-less sedentary lifestyle.

These differences in lifestyle may account for the differences observed as exercise is known to improve insulin sensitivity⁸ which is a significant determinant of random blood glucose levels⁹. Our current findings are consistent with our previous observation that glucose intolerance may indeed be commoner among females than males in our community.¹⁰

A previous study in Nigeria had established the reliability of the 'Ames Glucometer' in the assessment of blood glucose levels¹¹ and hence its use in the present study. It is also convenient in a community-based study.

We conclude that BMI is higher among females in this community and correlates with random blood glucose

levels. Concerted efforts need to be made to encourage some form of physical activity for both males and females in this community within the framework of what is culturally acceptable. This is important considering the public health implications of these findings in this community.

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