Original Article

Behavioural and Anthropometric Risk Factors for Diabetes Mellitus among Newly Admitted Undergraduates in a Nigerian University

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Abstract

Background: Type 2 diabetes mellitus (DM) is fast becoming a global epidemic, and its prevalence is increasing in children and young adults. The aim of the study was to identify young adults who had type 2 DM or impaired fasting glucose as well as those at risk of these conditions using anthropometric data and behavioral pattern. **Methodology:** Two hundred and twenty newly admitted undergraduates who were randomly selected during the registration process were involved in the study. Anthropometric parameters were measured while information on demographic details, medical history, and family history were obtained using a standard questionnaire. Fasting blood glucose was measured using the glucose oxidase method. **Results:** Two hundred and seven (94%) participants had serum glucose within reference range, 10 (4.6%) had impaired fasting glucose, and 3 (1.4%) had serum glucose >7.1 mmol/L, which is indicative of DM. A large number (91.4%) of individuals engaged in physical activity equivalent to a walk of at least 30 min/day. Most of them (93.2%) had body mass index <25.0 while 6.8% were overweight. One hundred and three participants (46.8%) indicated that they eat 3 or more servings of whole grain per day. **Conclusion:** Most of the participants are involved in healthy lifestyle. This has resulted in very low prevalence of impaired fasting glucose and type 2 DM among the group. It will be useful to follow up the group and note if they are able to maintain this trend since the risk of developing DM is known to increase with age.

Keywords: *Impaired fasting glucose, lifestyle, prevalence, type 2 diabetes mellitus, young adults*

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Introduction

Type 2 diabetes mellitus (DM) presents multiple challenges to public health and contributes significantly to morbidity resulting from cardiovascular, cerebrovascular, and renal complications. Previously, it was predominantly a disease of middle-aged and elderly people. However, in recent times, the age of onset has decreased and type 2 diabetes has been reported in children and young adults worldwide and in all ethnicities.[1,2]

Several lifestyle factors affect the incidence of the disease.[3] The strongest and most widely accepted risk factors for noninsulin-dependent DM are obesity,[4] physical inactivity,[5] and inappropriate diet.[6] There is considerable evidence that lifestyle intervention targeting these modifiable risk factors can either prevent or delay the onset. A randomized controlled trial from China found that when patients with prediabetes were provided with intensive individual intervention promoting weight loss, regular physical exercise, and dietary modifications, the progression to type 2 diabetes was reduced by up to 58%.[7] It therefore seems evident that early intervention relating to modifiable risk factors such as diet and exercise is the key to stemming the flow of the so-called "diabetes epidemic."

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Developing strategies to screen and identify high-risk individuals should be an important public health goal. While it is widely agreed that lifestyle intervention is a major key to diabetes prevention, readiness to undergo such modifications and self-efficacy are also important considerations.[8]

Given the emerging evidence that a large proportion of diabetics worldwide are undiagnosed until the onset of complications,[9] it is important to understand the physical, biochemical, and psychosocial manifestations of the early signs of diabetes. This is to ensure that "at risk" individuals are detected early and targeted for early prevention programs.

The aim of this study was to identify newly admitted undergraduates at risk of developing DM in a Nigerian University using anthropometric parameters, behavioral pattern, as well as family history.

Methodology

Two hundred and twenty undergraduates were randomly recruited into the study during the mandatory registration exercise for freshmen. The approval to carry out the study was obtained from authorities of the University Health Centre and all participants indicated their willingness to participate in the study after they had been duly informed about what it entails. A standard questionnaire developed at the Harvard University was administered to all participants to provide information on age, gender, family history, exercise, and dietary pattern. Body weight was taken without heavy outer dress with footwear removed and recorded in kilograms, while the height was taken and recorded in meters. The body mass index (BMI) was calculated as the weight divided by the square of the height. Fasting blood sample was collected from each respondent by venipuncture, after an overnight fast. Blood samples were centrifuged and the plasma was separated. Plasma glucose was estimated the same day by the glucose oxidase method. Diabetes was defined as fasting blood glucose >7.1 mM/L, impaired fasting blood glucose as fasting blood glucose between 6.0 and 7.0 mM/L, and normal as fasting blood glucose <6.0 mM/L.[10]

All procedures were carried out between 7.30 and 10.00 am.

Statistical analysis

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) Version 17 (Chicago, SPSS Inc). Summary statistics were computed for categorical variables (number and percent).

Results

Table 1 shows the age and sex composition of the respondents. One hundred and forty-seven (66.8%) were male while 73 (33.2%) were female. They were mostly young adults, with 90.4% within the age range 15–24 years and only 9.6% were 25 years or more.

Table 2 shows the risk factors by sex of the respondents. One hundred and three individuals (46.8%) indicated that they eat 3 or more servings of whole grain per day. A proportionally large number of participants (91.4%) engaged in physical activity sufficient to work up sweat that is equivalent to a walk of at least 30 min/day.

Anthropometric indices revealed that 93.2% had BMI <25.0 while 6.8% were overweight with BMI within 25.0–29.9.

There was no significant alcohol and tobacco use in our cohort, 98.2% had never smoked, and only 3 (1.4%) respondents claimed the occasional consumption of alcohol.

The report of fasting serum level of glucose is shown on Table 3. Participants with normal serum glucose level <6.0 mmol/L were 207 (94.0%), 10 (4.6%) had impaired fasting glucose of 6.1–7.0 mmol/L, and only 3 (1.4%) had serum glucose >7.1 mmol/L

Table 1: Age-sex composition of respondents

Age (years)	Male, *n* (%)	Female, *n* (%)	Total (%)
15-19	57 (58.2)	41 (41.8)	98 (44.5)
20-24	72 (71.3)	29 (28.7)	101 (45.9)
>25	18 (85.7)	3 (16.3)	21 (9.5)
Total	147 (66.8)	73 (33.2)	220 (100)

Table 2: Risk factors by sex

	Male (*n*=147), *n* (%)	Female (*n*=73), *n* (%)	Total (*n*=220), *n* (%)
Behavioral			
Eats 3 or more servings of whole grain per day*	72 (49)	31 (42.5)	103 (46.8)
Uses oil-based salad dressing*	92 (62.6)	43 (58.9)	135 (61.4)
Walks at least 30 min/day	135 (91.8)	66 (90.4)	201 (91.4)
Hereditary			
Family history of diabetes	8 (5.4)	4 (5.5)	12 (5.5)
BMI			
<25.0	139 (94.6)	66 (90.4)	205 (93.2)
25.0-29.9 (over weight)	8 (5.4)	7 (9.6)	15 (6.8)
Present smoker	1 (0.7)	0	1 (0.5)
Past smoker	3 (2.0)	0	3 (1.4)
Never smoked	143 (97.3)	73 (100)	216 (98.2)
Alcohol consumption			
Yes	3 (2.0)	0	3 (1.4)

BMI=Body mass index

Table 3: Profile of serum glucose

Group	*n* (%)
Normal (FBG <6.0)	207 (94)
Impaired (FBG 6.0-7.0)	10 (4.6)
Diabetic (FBG >7.1)	3 (1.4)
Total	220 (100)

FBG=Fasting blood glucose

Discussion

Until recently, type 2 DM was regarded as a disease of the middle-aged and elderly people. While it is true that this age group maintains a higher risk than younger adults, evidence all over the world indicates that onset in the latter group is increasing. Reports from Italy put the prevalence of DM and impaired glucose tolerance among adolescents and children at 0.2% and 4.5%, respectively,[11] while a study from the US put the figures at 4% and 16%–26%.[12] A study conducted among obese adolescents in Japan and India found 13.9% and 13%, respectively, with DM.[13,14] These figures relect an increase in the prevalence over previous studies.

Most (90.4%) of the participants in this study had normal serum fasting glucose levels. Ten participants (4.6%) had impaired fasting blood glucose and 3 (1.4%) had DM. This compares well with the findings of Ogunkolo and Amballi[15] who reported a prevalence of 3.5% of elevated fasting blood glucose among young adults in Nigeria. It is desirable that this trend of low prevalence continues in our country, especially in the light of increased urbanization and adoption of western diet and other lifestyle changes that increase the risk of developing DM.

The low prevalence of diabetes and prediabetes in the study population can be attributed to a combination of high level of physical activity, maintenance of normal BMI, and good dietary habits found among participants. 91.4% of individuals sampled reported walking for at least 30 min/day. Physical activity 3 times/week is the threshold level recommended for beneficial effects on health.[16] Physical training improves insulin sensitivity by increasing insulin-dependent glucose transporter-4 expression in muscle[17] while physical inactivity leads to an increased prevalence of obesity.[18] Excess body fat is the single most important determinant of type 2 diabetes. Weight control appears to be the most effective way to reduce the risk of type 2 diabetes, with obesity being the most important risk factor for type 2 DM.[2] Most of the participants consumed 3 or more servings of whole grain per day. Intake of whole grain is known to be associated with a reduced risk of type 2 DM.[17]

Cigarette smoking and alcohol use were not a significant feature of this study. This is not surprising because of the relatively young age of the respondents and the fact that self-reports of alcohol and tobacco use may be biased. Only three respondents claimed that they were occasional drinkers. The relationship between diabetes and alcohol consumption is well documented[19] A research conducted in Los Angeles, minority patients with type 2 DM showed that consumption of alcohol hastens the onset of the disease.[20] Family history of DM was not a prominent feature in our findings. The association between family history of DM and risk for the disease has also been well documented.[21] People with family history of the disease are 2–6 times more likely to have type 2 diabetes than those without the family history.

Lifestyle modification is a major preventive strategy aimed at reducing the incidence of overweight, impaired glucose tolerance, and subsequent development of DM. The most challenging barriers facing adolescent and their families are related to their choice of appropriate long-term lifestyle activities, such as regular exercise and healthy eating. These activities have to be deliberately embarked upon in preference to the more attractive alternatives of spending more time watching television and playing video games. Consequently, a conscious effort must be made within families to modify the sedentary lifestyles that are contributory to the risk of obesity and type 2 DM. These efforts need to be modeled by parents and directed at all family members. Those at risk should be encouraged to follow a program of weight control through diet and regular exercise. Physical activities lasting for about 150 min/week and maintaining a healthy weight are advisable.[22]

Conclusion

Our findings suggest that the prevalence of impaired fasting glucose and DM among young adults is low. However, regular exercise, maintenance of healthy weight, and abstinence from smoking must be maintained to keep this trend up. It will be useful and interesting to follow up this group and assess their risk of developing type 2 diabetes as they grow older.

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Conflicts of interest

There are no conflicts of interest.

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