Antropometrics, Awareness , Prevalence And Pattern Of Obesity In Nigerian Type 2 Diabetic patients

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ABSTRACT

The University of Nigeria Teaching Hospital (UNTH) Enugu was used for the study. One hundred and thirty six Type 2 diabetic patients who attended the Diabetes clinic for the first time between Jan 1997 and Jan 1999 as well as 100 controls were assessed.
Patients and controls had their BMI, waist circumference and Waist/ hip ratio (WHR) measured.
They also responded to a questionnaire on awareness of obesity.
The diabetic patients were made up of 60 females and 76 males while the controls were 50 males and 50 females. Prevalence of obesity among the diabetics was 11% (13/136). 76/136 (55%) of diabetic patients were overweight. Abdominal obesity was present in 30/136 (22.8%) of diabetics
Forty nine out of 89 obese or overweight diabetics (55%) did not consider themselves overweight . Thirty five out of 57 obese or overweight controls (61%) did not consider themselves overweight . Only 50% of both diabetics and controls knew that obesity was a health hazard . There was no statistical difference between the diabetics and control with regards to awareness of the health hazards of obesity (p > 0.05).
The prevalence of obesity was 11% .and central obesity 22.8% in the cohort of diabetic patients studied . Central obesity was commoner among the diabetic females. It was present in   % of female diabetics and   % of male diabetics.
The majority of overweight and obese diabetic patients and controls did not consider themselves overweight . Only 50% of the study population was aware of the health hazards of obesity.
These findings have far reaching implications for primary and secondary prevention of type 2 diabetes mellitus and other health conditions for which obesity is a risk factor.

KEY WORDS: Diabetes, Obesity .Awareness .Prevalence

Type 2 diabetes is an important health problem in Nigeria, with a prevalence of 2.7% (National Survey 1993). It is well established that both genetic and environmental factors are important in the pathogenesis of type 2 diabetes (Zimmet et al, 1990). The environmental factors include obesity, increasing age, intra uterine and infant malnutrition, sedentary life style, and urbanization (Zimmet et al, 1990).

Recent studies have found that of all the environmental factors incriminated in the aetiopathogenesis of Type 2 diabetes, obesity is easily the most amenable to tackle in prevention strategies (Alberti et al 1996). Obesity predisposes to Type 2 diabetes by giving rise to insulin resistance, against a background of decline in *B cell Function in susceptible individuals (Kahn et al, 2000).*

In a study by Ossei (1997) it was found that both African Americans and indigenous Africans have a genetic predisposition towards abnormal insulin production in their healthy state (non diabetic state) yet only 1% of Africans have diabetes while 12% of African Americans develop Type 2 diabetes, probably because of their obesity.

Abdominal obesity has been found to be an independent risk factor for type 2 diabetes mellitus (Lean et al, 1998, Hans et al, 1995). In the presence of abdominal rather than peripheral obesity hyper insulinaemia is observed during fasting and during glucose challenge. Exposure of insulin receptors to increasing concentration of insulin leads to less efficient binding through down regulation (Krotkiewski et al, 1983). A widely accepted explanation is that obesity-

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induced insulin resistance in tissues such as muscle, liver, and fat increases the demand for insulin and that type 2 diabetes ensues when this heightened demand cannot be met by defective pancreatic beta cells (Olefsky 1976).

The waist circumference (WCf) has been found to be essentially a surrogate assessment of central or abdominal fat accumulation as opposed to peripheral or gluteo femoral fat accumulation (Hans et al, 1995). Abdominal obesity is an independent risk factor for morbidity associated with overweight and obesity. A high-risk WCf is (>88 cm) in women and >102 cm in males (Hans et al, 1995).

This study was undertaken to document the prevalence and pattern of obesity among Nigerian diabetics seen at the diabetes clinic of the university of Nigeria teaching Hospital (UNTH) Enugu, and also to assess the level of awareness of obesity among diabetic patients and controls. Such information will play a key role in both primary and secondary prevention of Type 2 diabetes in Nigeria.

MATERIALS AND METHODS

One hundred and thirty six consecutive, patients who attended the diabetes clinic of the UNTH Enugu, for the first time between Jan 1997 and Jan 1999 were studied. One hundred age and sex matched controls were recruited from a well-woman clinic and hospital staff. Informed consent was sought and obtained from each patient and control. The ethical committee of the University of Nigeria Teaching Hospital, Enugu, approved the study protocol.

A diagnosis of diabetes mellitus was made in accordance with the WHO criteria (Report, 1997). Patients who developed diabetes after age 40 years and had no history of ketosis or of prolonged insulin use were presumed to have type 2 diabetes.

Measurements

Body weight in light clothing was measured to the nearest 0.1 kg using an electronic scale. An average of two readings was taken. Height was measured to the nearest 0.5 cm. Waist circumference was taken at a level mid way between the lowest rib and the iliac crest using a flexible tape. Hip circumference was measured at the level of the greater trochanter to the nearest 0.5 cm, according to standardized anthropometric measurement procedures (WHO Expert, 1989, WHO Expert, 1995).

The means of the duplicate measurements were used.

Body mass index (BMI) was calculated from the formula: Weight (kg)/ height (m^2)

Waist circumference was categorized using the waist action levels proposed by Lean et al.(Lean et al, 1998, Hans et al, 1995).

Waist/Hip ratio (WHR) was calculated from the Formula:

Waist circumference (cm)/ Hip circumference (cm).

Awareness of Obesity

Each subject was asked 2 questions

a)   Do you consider yourself fat?

b)   Do you know that being fat is injurious to health?

The answers 'yes' or 'no' was required for each of the questions

Exclusion Criteria:

Subjects with hemiplegia , limb amputations or ascitis were excluded, non consenting patients were also excluded

Definitions (WHO Expert, 1995, Hans et al, 1995).

Overweight :

i. BMI 25 -29.9 kg/m^2 for females or .BMI 27 - 30 kg/m^2 for males

ii- Waist circumference >80cm for females or >94cm for males

iii. Waist /Hip ratio (WHR) >0.8 for females or >0.95cm for males

Obesity:

i BMI > 30kg/m^2 for both males and females

ii. Waist circumference >84cm for females and >102cm for males

Main Outcome Measurements

1.   BMI

2.   Waist circumference

3.   Awareness of Health Hazards of obesity

BMI was used as an indicator of obesity while waist circumference was used as an indicator of abdominal obesity.

Table 1.Classification of Overweight and obesity (WHO Expert, 1989)

Description	BMI Kg/m2	Obesity Class	Disease Risk
Underweight	<18.5		
Normal weight	18.5-24.9		
Overweight (females)	25.0-26.9	Mild	Moderately High
Overweight (males)	27.0-29.9	Mild	Moderately High
Obese	30.0-34.9	Moderate	High
	35.0-39.9	Severe	Very High
Extremely Obese	>40	III-very severe	Extremely High

Statistical Analysis:

All results were expressed as means SD. Comparisons between different groups were done by the Student t test to determine statistical significance, and statistical difference was placed at $p < 0.05$.

RESULTS

The clinical characteristics and anthropometric measurements of patients and controls are shown in Table 2 and 3

There were 76 (55.6%) males and 60 (44.4%) females. The mean age of the diabetics was 52.04 16.78 years. There were 100 control subjects, 50 males and 50 females with a mean age of 50.97 18.35 years. There was no statistical difference in age of the diabetics and controls ($p > 0.05$)

The mean BMI of the male diabetics was 25.76 5.72 kg/m2 while the mean BMI of the male controls was 23.05 5.2 kg/m2. The difference was not significant ($p > 0.05$) The mean BMI for female diabetics was 25.83 +- 5.5 kg/m2 compared with 27.08 +- 5.8 kg/m2 for the controls. The difference was marginally significant ($p = 0.042$)

Prevalence of obesity among the diabetics was 11% (15/136)

Abdominal obesity was present in 31/ 136 (22.8%) of diabetics. However abdominal obesity was commoner in diabetic females 30% than males 14%. ($p = 0.003$).

Fifty one percent of diabetic males and 45% the diabetic females were overweight; while 42.5% of controls were overweight.

Awareness of Obesity and Its Health Hazards

The level of obesity awareness was low in the study population.

To the question "Do you consider yourself fat?" Forty-nine out of 89 obese or overweight diabetics (55%) gave the answer "NO", while

TABLE 2 Clinical Characteristics of the Subjects

Parameters N	Female Diabetics (n =60)	Female controls (n=50)	Male diabetics (n-76)	Male Controls (n=50)	P value
Mean Age (yrs)	50..57±15.7	50.8±18.9	53.5±19.5	51.14±17.8	Diabetics and
Range	(35-62)	(34-66)	(40-72)	(39-74)	controls >0.05
Mean BMI (kg/m2)	25.83±5.5	27.08±5.8	25.76±5.7	23.05±5.2	Male and female
Range	(19.3-31.3)	(17.99-32.82)	(17.8-33.80)	(17.99-32.82)	diabetics P>0.05
					Diabetics and controls p>0.05
Mean WCf (cm) SD Range	94.25±10.2 (74-105)	92.58±11.1 78-110)	96.2±16.1 (77-120)	87.6±16.2 (74-112	Diabetics and controls p>0.05
Mean WHR SD Range	0.94±0.08 (0.81.1.05)	0.85±0.07 (0.78-1.00)	0.99±0.1 (0.81-1.12)	0.9±0.07 (0.83-1.03)	Diabetics and controls p>0.05

Table 3. Frequency Distribution of BMI in Diabetics and Controls (Kg/m2)

Subjects	BMI <25 (normal)	BMI 25- 29.9 (overweight)	BMI>30 (obese)
Male controls (n=50)	46%(23)	42%(21)	12%(6)
Male Diabetics (n=76)	29%(23)	60%(44)	11%(9)
Female Controls (n=50)	40%(21)	45%(22)	15%(7)
Female diabetics (n=60)	40%(24)	51%(30)	9%(6)

Table 4. Frequency distribution of WCf in diabetics and controls

	WCf (cm)			
	(Females)<80 (Males)<94 (Normal)	80-84 94-102 (Over-weight)	>84 >102 (Obese)	Total
Male controls(n=50)	50%(25)	36%(18)	14%(7)	100%
Male Diabetics(n=76)	29%(23)	42%(30)	29%(23)	100%
Female Controls (n=50)	30%(15)	40%(20)	30%(15)	100%
Female Diabetics(n=60)	48% (28)	39%(24)	13%(8)	100%

Table 5 Statistical comparison of Differences in BMI , WCf and WHR Between Male and female diabetics.

Group of Subjects	Mean BMI	Mean WCf	Mean WHR	P values
Female diabetics (n=60)	25.83(SD5.5)	94.25(SD15.30)	0.94(SD0.08)	>0.05 BMI >0.05 WCf
Female Controls (n=50)	27.08(SD5.8)	92.58(SD16.1)	0.85(SD0.07)	>0.05WHR
Male Diabetics (n=76)	25.76(SD5.7)	96.2(SD24.1)	0.99(SD0.09)	>0.05 BMI >0.05 WCf
Male Controls (n=50)	23.05(SD5.2)	87.6(SD24)	0.90(SD0.07)	>0.05WHR

thirty-five out of 57 obese or overweight controls (61%) gave the answer "No".

To the question "Do you know that being fat is Injurious to health?" 72 out of 136 diabetics (52.9%) gave the answer "Yes". fifty percent of control subjects gave the answer "yes".

There was no statistical difference between the diabetics and control with regards to awareness of the health hazards of obesity (p > 0.05).

DISCUSSION

Obesity was present in 11% of diabetics in this study. The prevalence of obesity is close to 10% reported in a cohort of diabetics in Port Harcourt (Wokoma, 1999) and 17% reported from Jos, (Chuhwak et al, 2002). All these were small-sized studies.

Rotimi et al (1995) observed a higher prevalence of 25% among African Americans and Caribbeans.

This is understandably due to higher availability of food and greater urbanization in western populations in Nigeria.

The higher prevalence of central obesity in female controls than female diabetics, 13% versus 30% respectively is probably as a result of the fact that many of the female controls in this study were drawn from a well- woman's clinic which is patronized by members of a high socioeconomic bracket in Enugu.

The 22.8% prevalence of central obesity

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among diabetics in this study is also in agreement with findings in other studies (Wokoma, 1999, Rotimi et al 1995). Central obesity is a risk factor for type 2 diabetes (Hans et al, 1995). Studies have documented a close relationship between waist circumference and intra abdominal fat mass measured by computed tomography and MRI (Ross et al,1992, Serdell et al, 1988).

The good correlation observed between BMI and waist circumference suggests that waist circumference measurement is sufficient for identifying overweight /obesity in Nigerians. Other workers have reported similar results.
The high rate of obesity unawareness and ignorance of the health risks of obesity observed in both diabetics and controls in this study is worthy of note .It is probably related to the cultural body image preferences of the Nigerian which tend to be that "plump is beautiful". It is similar to the observation among American Blacks (Kumanyika et al, 1993).. This will provide an important tool for health education in this population. Such health education should commence in childhood, long before the attainment of adult body stature.

CONCLUSION

The data from this study is important in the primary prevention of Type 2 diabetes in Nigerians. Health education programs should be packaged in such a way as to tackle the cultural perception of obesity as a desirable body image. Most obese or overweight subjects in this study did not regard themselves as fat .It is suggested that health education in this regard be directed at primary and secondary school age group children before they develop an unhealthy body image preference. The relationship of obesity to several non- communicable diseases viz: Type 2 diabetes mellitus, hypertension, coronary artery disease, osteoarthrosis, dyslipidaemia etc should be highlighted to discourage obesity in Nigerians.

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