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IS APPLE SWEETER THAN A PEAR? ABDOMINAL ADIPOSITY VS HIGH BMI IN ASSOCIATION WITH TYPE II DIABETES

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ABSTRACT

Objective: To find out the frequency of association of central abdominal obesity (Apple shape) versus generalized body obesity as measured by body mass index (Pear shape) in patients with type II Diabetes.

Material and Methods: This was a cross sectional observational study conducted on patients with type II diabetes presenting to the department of medicine at Khyber Teaching Hospital from September 2014 to November 2014. Patients had their abdominal girth measured and BMI calculated. Various demographic data were collected using a standardized questionner and results were tabulated.

Results: Of the 329 type II diabetics who were studied, 224 (68.08%) had an above normal abdominal girth. Out of these 62.95% were females, while 205 (62.31%) had a BMI of ≥23 out of which 127 (61.95%) were females. Abdominal obesity was much more closely associated with type II diabetes especially in females.

Key Words: Type II Diabetes. Abdominal obesity. Body Mass Index. Diabetes.

INTRODUCTION

The prevalence of obesity has gained epidemic proportions across the world. In many countries, 50 to 80% of adults are either overweight or obese[1]. Type 2 diabetes has also become an epidemic in the same proportion. It has serious complications and reduces life expectancy by 8-10 years and implies life-long expensive management. According to the International Diabetes Federation projections Pakistan will have a 90.7% increase in the number of people with diabetes between 2013 and 2035, becoming the eighth most populous country with diabetic population of 12.8 million[2].

The situation regarding obesity is also alarming in Pakistan with prevalence for the 45 to 64 years old age group being 23% in men and 40% in females, in urban areas[3]. People with obesity and increased abdominal adiposity account for about 80 to 90% of all type 2 diabetics. In fact, those with BMI of more than 35 have a 93 fold increased risk of type 2 diabetes[4].

Studies have shown clear differences in the definition of obesity according to ethnicity[5]. It has also been shown that a much closer relationship exists between adiposity and type 2 diabetes particularly in the female Asians[6]. As such the International Association for study of Obesity and International Obesity Task Force in collaboration with WHO has proposed BMI cut off point of 23 to 24.9 kg per meter square for being overweight and ≥ 25 for obesity in adult Asians[7]. International Diabetes Federation has also redefined waist circumference for Asian population as more than 90 cm for males and more than 80 cm for females as indicator for abdominal obesity[8]. This study was performed to see whether central obesity is more commonly associated with diabetes than high BMI in our population.

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MATERIAL AND METHODS

This was a cross sectional observational study conducted on Type 2 Diabetics presenting to department of medicine Khyber Teaching Hospital from September 2014 to November 2014. Patients between the ages of 18 and 70 of both genders were included in the study irrespective of the duration of diabetes. Patients with Type 1 Diabetes and females with gestational diabetes were excluded. Height was measured to the nearest 0.5 centimeter without shoes using a Stadometer. Weight was measured to the nearest 0.1 kg using a mechanical beam balance without shoes and excess clothing. BMI was calculated as weight in kg divided by square of height in meters. Waist circumference was measured halfway between the lower border of ribs and iliac crest on a horizontal plane. Measurement to the nearest 0.5 centimeters was recorded. A standard proforma was used to collect the data and the results were analyzed using SPSS 16.

RESULTS

A total of 329 type 2 diabetes were studied out of which 198 (60.2%) were females and 131 (39.8%)

were males with patients between the age group 30-59 constituting the majority with 72.6%. Mean weight was 68.05. Ten males (7.6%) were overweight with BMI of 23-24.9 while 68 (51.9%) were obese with BMI ≥ 25. Among females 31 (15.7%) were overweight while 96 (48.5%) were obese.

Table 1 summarizes the analysis of the BMI distribution according to gender which revealed somewhat similar pattern of BMI in both males and females; most of the diabetic patients were found to be on the obese side of the BMI spectrum. Fewer patients were found to be overweight. However abdominal adiposity as measured by waist circumference revealed a much more closer relationship with type 2 diabetes with 62.4% females having a waist circumference of more than 80 cm while 55% males had an abnormal waist circumference of more than 90 cm. This is shown in Table 2.

DISCUSSION

Obesity and diabetes has seen an exponential rise in prevalence so much so that "diabesity" has become an epidemic and the most common non-communicable disease. This has severe implications for developing world especially Southeast Asia with limited resources for its population. Obesity is a precursor of type 2 diabetes and if type 2 Diabetes is to be prevented, strategies have to be developed to identify the high risk groups and target them for preventive measures.

Table 1: Abnormal BMI distribution among males and females

Males		Females
BMI Category	**No. of patients & %age**	**No. of patients & %age**
Over weight (23-25)	10 (7.6)	31 (15.7)
Obese (≥25)	68 (51.9)	96 (48.5)

Table 2: Pattern of waist circumference observed in the diabetic patients normal waist circumference: ≤ 90 cm in males and ≤ 80 cm in females

Males		Females
Waist Circumstances	**No. of patients & %age**	**No. of patients & %age**
Normal	48 (36.6)	57 (28.8)
Abnormal	83 (63.4)	141 (71.2)

But the problem arises in the exact definition of obesity as all obese persons are overweight but all overweight persons are not necessarily obese. Obesity can either be defined by BMI or excess of abdominal adiposity[9]. Up to now Body Mass Index has been considered as the gold standard in measuring obesity and associated risk factors like diabetes. But over the last couple of years, this has been questioned, and now central abdominal obesity is frequently recognized as a more sensitive marker of true obesity, and metabolic syndromes like type 2 Diabetes where the main problem lies with insulin resistance. This has been specially recognized in Asian population[10]. Both these markers have been described as apple shaped for central abdominal obesity vs. the pear shaped phenotype for more peripheral obesity. In view of this the WHO has revised the definition of obesity to account for cultural differences[11].

There are several mechanisms through which the metabolically active abdominal adiposity i.e. the apple shaped phenotype, contributes to the risk of diabetes rather than the peripheral fat deposition i.e. the pear shaped phenotype. Numerous cytokines secreted by the adipose tissue in the abdomen are linked to metabolic abnormalities including the metabolic syndrome the precursor of type 2 diabetes, dyslipidemia and coronary artery disease[12]. These include adiponectin, liptin, resistin and vistatin[13]. The detailed discussion of these cytokines is beyond the scope of this article. Our study favors the results from other studies and international data[14] that in Asian population the abdominal obesity more closely reflects the higher risk for type 2 diabetes especially in women. Pakistan National Diabetes Survey for KPK published in 1999[15] clearly demonstrates waist adiposity as having a closer association with type 2 diabetes than high BMI. Hence a simple tape measure might be all that is needed to identify the high risk group for developing preventive strategies in the future.

CONCLUSION

Effective intervention for weight management should commence as soon as diabetes or better

Table 3: BMI Vs WC in Males and Females

Gender	Above normal BMI (Frequency)	Above normal BMI (percentage)	Above normal WC (Frequency)	Above normal WC (percentage)	Difference between Abnormal BMI and Abnormal WC
Males	78	59.5	83	63.4	3.9%
Females	127	64.2	141	71.2	7.0%

Table 3 clearly shows a closer association of abdominal adiposity in type 2 diabetics especially in females [p value= 0.001].

still its precursors impaired glucose tolerance or abdominal obesity are diagnosed. The term diabesity is much more apt in that it reflects both etiology and clinical presentation. Its adoption could help promote recognition of excess body fat around the abdomen i.e. apple shaped, as the cause of type 2 diabetes.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Azam HU: Idea and supervision.

Rahman SU: Data collection and typing

Manzoor M: Bibliography.

Babar B: Statistics.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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