ORIGINAL ARTICLE

FREQUENCY OF ABDOMINAL OBESITY AND ITS ASSOCIATION WITH DIABETES MELLITUS AMONG PEOPLE OF PESHAWAR

Attaullah Khan, Muhammad Faheem, Syed Tahir Shah, Abdul Hadi, Rafiullah, Salman Ahmad, Adnan Mahmood Gul, Sayyad Farhat Abbas Shah, Hikmatullah Jan, Mohammad Hafizullah

Department of Cardiology, Lady Reading Hospital, Peshawar-Pakistan

Background: Increased body weight is a major risk factor for the metabolic syndrome which is a cluster of coronary heart disease risk factors, like: hypertension, diabetes mellitus and dyslipidaemia. This study was conducted to determine the frequency of abdominal obesity and diabetes mellitus in the population of Peshawar and association between them. **Methods:** This was a cross sectional study, performed by the Cardiology Department, Lady Reading Hospital Peshawar, in the population of Peshawar. All participants were interviewed in detail regarding known risk factors for coronary artery disease. Waist circumference (≥102 cm in male and ≥88 cm in females) was used as the surrogate marker for abdominal obesity in already diagnosed patients of type-2 diabetes mellitus. **Results:** A total of 2548 individuals were included, 71.1% were male. Mean age was 37.94±12.59 years. Mean waist circumference was 90.25±13.45cm in males and 90.52±12.52cm in females. Diabetes was present in 4.4% of the participants and abdominal obesity in 56.6% .Among the male, abdominal obesity was present in 39.4% and diabetes in 2.9%. Out of 39.4% males with abdominal obesity, 2% were diabetic. Out of 38.6% males with no abdominal obesity, 0.9% was diabetic. Amongst the total 559 (21.1%) female subjects, 17.2% were having abdominal obesity and 1.4% was diabetics. Among 123 (4.8%) females with no abdominal obesity, 0.1% was diabetic. A positive association was established between abdominal obesity and diabetes mellitus with a significant p-valve (<0.05). **Conclusion:** Abdominal obesity is more common in the local population of Peshawar and associated with type-2 diabetes mellitus.

Keywords: Abdominal Obesity, Diabetes Mellitus, Waist Circumference

INTRODUCTION

Obesity is a chronic metabolic disorder associated with cardiovascular diseases and increased morbidity and mortality. Worldwide, in both developed and developing countries, the prevalence of obesity has reached an epidemic level.[1] Urbanization and economic development have led to a nutritional transition characterized by a shift to diets of higher energy content and/or to the reduction of physical activity, resulting in changes in individuals' body composition.[2] Individuals from disadvantaged communities are not exempt and are at a substantial risk of obesity and its complications.[3,4] The World Health Organization (WHO) has projected that more than 700 million adults worldwide will be obese by 2015.[1]

Obesity is defined as a condition of abnormal or excessive fat accumulation in the adipose tissue of the body.[5] Waist circumference (WC) is considered a good anthropometric alternative for assessing abdominal adiposity. WC is an aggregate measurement of the actual amount of total and abdominal fat accumulation and is a crucial correlate of metabolic syndromes found amongst obese and overweight patients.[6] The National Cholesterol Education Program Adult Treatment Panel III recommended WC cut-off levels to define abdominal obesity as ≥102 cm for men and ≥88 cm for women.[6,7]

Increased body weight is a major risk factor for the metabolic syndrome which is an important cluster of coronary heart disease risk factors, like: hypertension, diabetes mellitus, and dyslipidemia.[7–9] Many studies have demonstrated that individuals with metabolic syndrome are at high risk for subsequent development of Type-2 diabetes mellitus (T2DM).[10,11] T2DM is strongly associated with overweight and obesity.[12,13] Positive correlation between BMI, glucose, lipids and Blood Pressure have been previously reported.[14–16]

The aim of this study was to determine the frequency of abdominal obesity and diabetes mellitus and further to determine the association between abdominal obesity and diabetes mellitus in population of Peshawar.

MATERIAL AND METHODS

This was a cross sectional study, conducted in Peshawar, launched with an aim to find out frequency of abdominal obesity and its association with diabetes mellitus among the people of Peshawar. The field work of data gathering was performed by the team of

cardiology department, Lady reading Hospital Peshawar. Sample size of this study was calculated as 2548 based on, 95% confidence interval, 13% prevalence of obesity and its association with diabetes mellitus[17] and 1.3% precision. Adult individuals of 18 or above years, any gender, any professions and any socioeconomic class were selected by non-probability convenient sampling technique. Afghan refugees were excluded from this study.

All of the examinees were first interviewed by one of the trained surveyors, using a questionnaire developed specifically for this research program. The questionnaire was designed for collecting extensive information on personal data (name, gender, marital status, occupation and various life style variables including exercise, smoking etc.), current and past medical history and drug intake. Blood pressure was measured on both arms in sitting position and the average was recorded. Waist circumference was determined in centimetre (cm) with measuring tape. Random blood glucose and total cholesterol of each individual was measured using strip method.

Data was analysed using SPSS-l6. To measure association between abdominal obesity and diabetes mellitus Chi-square test was used at a level of 5% significance.

RESULTS

A total of 2548 individuals were studied. Baseline characteristic are shown in Table-1. Mean age was 37.94±12.59 years. Majority of study population were male (71.10%). Mean waist circumference in male was 90.25±13.45cm while in female it was 90.52±12.52 cm. Out of total abdominal obese population 1443 (56.6%), diabetic were 89 (3.4%) and non-diabetic were 1354 (53.2%). Out of total non-abdominal obese 1105 (43.4%), diabetics were 24 (1%) and non-diabetic were 1081 (42.4%) as shown in table-2. Males were more diabetic as compared to female 76 (2.9%) versus 37 (1.5%)] respectively. Amongst 1007 (39.4%) male with abdominal obesity, 54 (2%) were diabetic. Out of 982 (38.6%) males with no abdominal obesity, 22 (0.9%) were diabetics and 960 (37.7%) were non diabetic. Amongst female out of 559 (21.9%), 436 (17.2%) were having abdominal obesity and 123 (4.8%) were having no abdominal obesity. Among 436 (17.2%) female with abdominal obesity, 35 (1.4%) were diabetics and 401 (15.7%) were non diabetic. Out of 123 (4.8%) female with no abdominal obesity, 2 (0.1%) were diabetic and 121 (4.7%) were non diabetic. A positive association was established between abdominal obesity and diabetes mellitus with a significant *p*-valve (<0.05) (Table-2). Gender-wise differences in obesity are given in table-3.

Table-1: Baseline characteristics of study population

Baseline Characteristics	Frequencies
Study Sample	2548
Mean Age	37.94±12.59
Gender	
Male	1989 (78.1%)
Female	559 (21.9%)
Mean Waist (cm)	90.31±13.250
BMI (kg/m^2)	26.27±4.980
Mean Systolic BP (mmHg)	126.80±19.295
Mean Diastolic BP (mmHg)	83.01±12.062
Mean working hours per day	8.33±3.214
Abdominal Obesity	
Male	1007 (39.4%)
Female	436 (17.2%)
Exercise performed	983 (38.6%)
Past Medical History	
Diabetic	113 (4.4%)
Hypertensive	238 (9.3%)
High Cholesterol	19 (0.7%)
CAD	19 (0.7%)
Others	217 (8.5%)
None	1941 (76.20%)
Family history of CAD	588 (23.07%)
Smoking	
Current Smoker	430 (16.9%)
Ex-smoker	94 (3.7%)
Non-smoker	2024 (79.4 %)
RBS	112.65±46.452
Cholesterol	168.11±28.132

Table-2: Frequency of abdominal obesity and its association with Diabetes Mellitus.

	Diabetic	Non Diabetic	Total	*p*
Obese	89 (63.99) [9.77]	1354 (1379.01) [0.45]	1443	
Non Obese	24 (49.01) [12.76]	1081 (1055.99) [0.59]	1105	<0.05
Total	113	2435	2548	

Table-3: Gender wise frequency of abdominal obesity

Diabetes status	Obese and non-Obese according to gender				Total
	Male Obese	Male non obese	Female obese	female non obese	
Diabetics	54 (2%)	22 (0.9%)	35 (1.4%)	2 (0.1%)	113 (4.4%)
Non diabetics	953 (37.4%)	960 (37.7%)	401 (15.8%)	121 (4.7%)	2435 (95.6%)
Total	1007 (39.4%)	982 (38.6%)	436 (17.2%)	123 (4.8%)	2548 (100.0%)

DISCUSSION

Obesity is an independent risk factor for cardiovascular diseases and it is known to be associated with other risk factors such as diabetes mellitus, hypertension and dyslipidaemia. We considered waist circumference which is a good anthropometric indicator for abdominal obesity because it is an aggregate measurement of the actual amount of total and abdominal fat accumulation.

We found that more than half of our study population was having abdominal obesity. Diabetes was

three times more prevalent in obese as compared to non-obese and two third of them were male. The abdominal obesity was present in 56.6% of our subjects but 38% was reported by Zaher ZMM *et al*.[6] The reason might be that majority of our study population (61.4%) was performing no exercise. The gender distribution of abdominal obesity in our study population was 39.4% versus 17.2% in male and female respectively. Tariq M *et al*[7] reported 27.9% male and 51.9% female as diabetic obese. The male predominance in our study is because of the larger portion of our study population constituted by males, i.e., 78.1%. The reason might be male dominated study sample in a community, in contrast to Tariq M *et al*[7] study, which was hospital based.

Diabetes mellitus was reported as 4.4% in this study and out of it, 3.4% were obese, against 1% non-obese. The prevalence of diabetes in obese individuals is 13% as documented by Harris MI *et al*.[17] The reason for high prevalence of diabetes mellitus documented by Harris MI *et al*[17] is that their study probed into the prevalence of diabetes, impaired fasting glucose and impaired glucose tolerance, while in our study we only probed into the prevalence of diabetes mellitus on the basis of past history of known diabetes mellitus.

In this study, we observed that the mean waist circumference was 90.31±13.25cm, while Heydari ST *et al*[6] documented the mean waist circumference as 82.9±11.2cm. The reason for less waist circumference in study by Heydari ST *et al*[6] was that the study population was military personals with active life style as compared to our study population performing no exercises (61.4%) and having sedentary lifestyle. A weakness of our study was that we could not collect a random sample due to multiple reasons that could have affected the representativeness of our study. Nonetheless the results could be useful for future reference.

CONCLUSION

Abdominal obesity is more common in the local population of Peshawar and associated with type 2 diabetes mellitus.

AUTHOR'S CONTRIBUTION

AK: Principal Investigator (Data Collection, analysis and write-up). MF, STS, AH: Data collection, compilation and data entry). R, SA: Data collection. AMG, SFAS, HJ, MH: Supervision during data collection, analysis and write-up. Review of final draft

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Address for Correspondence:

Dr Attaullah Khan, House No. 104, sector F-2, Street-3, Phase-6, Hayatabad, Peshawar-Pakistan
Cell: +92 333 974 6580
Email: dr.atta.lrh@gmail.com