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ORIGINAL ARTICLE

Association of Central Obesity with Cardiovascular Diseases

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ABSTRACT

Background: An increased trend of central obesity in general population has increased their risk of cardiovascular disease in various populations.
Aims: To find an association between central obesity and cardiovascular disease.
Study Design: Survey based study
Place and Duration of Study: Department of Cardiology, MTI Lady Reading Hospital, Peshawar from 1st October 2020 to 30th September 2021.
Methodology: Four hundred and twenty community participants were assessed for their central obesity via waist circumference measurement. Their lipid profiling, fasting blood sugar and exercise tolerance test was also conducted.
Results: The mean age was 56.77±12.6 years with 61.9% females and 38.09% as male participants. The waist circumference ≥90cm in males was 7.5% while it was 15.3% in females. The socioeconomic status of the males and females with higher waist circumference was more as low to middle class. The odds ratio comparison within males and females showed a significant variance among ages, BMI and socioeconomic status in term of family income. The biochemical analysis of various participants blood samples showed dyslipidemia, ischemia and risk of atherosclerosis to be higher in central obesity participants than normal weight (p value <0.005).
Conclusion: There is a strong association of central obesity and cardiovascular diseases.
Keywords: Association, Central Obesity, Cardiovascular disease

INTRODUCTION

Obesity has been termed as abnormal accumulation of adipose tissues around body parts. It leads to increased weight and severe health related risks. Obesity was defined by the criteria of body mass index (BMI), however recent literature debates that BMI may not be an efficient tool to assess obesity if the body weight exceeds value 30 kg/m^2.[1,2] Recent investigation has reported that abdominal obesity instead of simple defined obesity on basis of BMI is strongly related with cardiovascular as well as metabolic diseases.[3]

Canadian and American studies have elaborated that abdominal obesity is related with high risk cardiovascular diseases.[4-6] There is also an increased prevalence of mortalities associated with abdominal obesity affected population than normal weight.[7,8] The most accurate method for determining abdominal obesity is by the use of computed tomographic scan however the application of this test is limited due to radiological imaging and high cost.

Visceral fat is highly correlated with waist circumference therefore substituting the measurement of waist circumference instead of CT scan in general population.[9] The prevalence and tendency of abdominal obesity is reported much higher in Asian population and is defined as ≥90 cm in males while ≥80 cm in females.[10] The present study was designed to assess the association of central obesity with the risk of cardiovascular disease in general population. The result of this study will be beneficial for limiting the risk factors which lead to poor health outcomes.

MATERIALS AND METHODS

This survey based study was conducted at Department of Cardiology, MTI Lady Reading Hospital, Peshawar from 1st October 2020 to 30th September 2021. The study was permitted from review committee and also was consented by each participant. As it was a survey based study therefore the city was divided into four cardinal points for sampling. The sample size was taken as 420 considering the prevalence of central obesity as 12%for increasing the incidence of heart diseases.[11] The margin of error was taken as 5% while confidence interval as 95% for this. The councils in a cardinal point were calculated and two councils from each cardinal point were randomly selected. Fifty participants were enrolled from various households in each council. The strategy adapted was to start from east households and one participant from one house hold until 50 houses were reached. The age for enrolment was taken as between 40-55 years. The 5cc fasting blood was withdrawn from each participant. The blood sampling was performed prior a day information through brochure circulation within each council. The waist circumference was measured by using an inchi tape rolled around the waist without clothing aver the umbilical part. The blood was stored in ice box and transferred to laboratory where serum was separated and stores at -20ºC until analysis. Lipid Profile, fasting blood sugar test was analyzed for each patient. Age, gender, waist circumference, BMI and exercise tolerance test results were entered in well prepared proforma. Biochemical analytes results were also documented on it. ETT was performed by requesting each patient to attend the hospital cardio lab where their tests were made free of cost. Chi square and odds ration analysis was performed through SPSS version 25.0 with p value less than 0.05 as significant.

RESULTS

The mean age was 56.77±12.6 years. The mean BMI of all the participants was below 25kg/m^2 value. However the waist circumference presented significant findings. Differences in general characteristics according to the presence of abdominal obesity in adults with normal BMI, however each participant was divided into greater or less than 90cm waist circumference value which presented significant findings. There were 58.09% males and 61.9% females in the present study respectively. The waist circumference ≥90cm in males was 7.5% while in females it was 15.3% with the similar waist circumference. The socioeconomic status of the males and females with higher waist circumference was more as low to middle class (Table 1)

Majority of the participants with higher WC as ≥90 cm were reluctant towards exercise routine. Around 50% of males and 40% of females only did exercise in form of walking for 0-2 days in a week, which added to their obesity status (Table 2).

The odds ratio comparison within males and females showed a significant variance among ages , BMI and

socioeconomic status in term of family income. The walking as an exercise routine also presented with a significant association in cases unadjusted for age and BMI. There was a highest number of obese participants who only exercised 0-2 days in a week (Table 3).

The biochemical analysis of various participants blood samples showed dyslipidemia, ischemia and risk of atherosclerosis to be higher in central obesity participants than normal weight. However the atherosclerosis was not significantly variant among groups while dyslipidemia and ischemia (Fig. 1).

Table 1: Age, gender and socioeconomic comparison between different waist circumference participants

Variable	Waist circumference (Male =160)			Waist circumference (Female =260)		
	<90 cm (n=148, 92.5)	≥90 cm (n=12, 7.5%)	P value	<85 cm (n=220, 84.6%)	≥85 cm (n=40, 15.3 %)	P value
WC (cm)	80.2±5.5	93.1±43.1	<0.001	74.5±5.6	88.1±2.7	<0.001
BMI (kg/m^2)	23.1±1.64	24.3±0.80	<0.001	22.3±1.7	23.8±0.7	<0.001
Age (years)	50.81±17.3	63.3±12.64	<0.001	49.1±16.3	63.9±4.5	<0.001
Income Family						
Low to middle	59 (39.86%)	6 (50%)	0.010	84 (38.1%)	19 (47.5%)	<0.001
Middle to high	44 (29.7%)	3 (25%)		65(29.5%)	10 (25%)	
High	45 (30.4%)	3 (25%)		71(32.3%)	11 (27.5%)	

Table 2: Weekly exercise comparison between different waist circumference participants

Exercise (days per week)	Waist circumference (Male =160)			Waist circumference (Female =260)		
	<90 cm (n=148, 92.5)	≥90 cm (n=12, 7.5%)	P value	<85 cm (n=220, 84.6%)	≥85 cm (n=40, 15.3 %)	P value
0–2	66 (44.5%)	6 (50%)	<0.001	75 (34.1)	16 (40)	0.002
3–5	41 (27.7%)	4 (33.35%)		62 (28.1)	11 (27.5)	
6–7	44 (29.7%)	2 (16.6%)		83 (37.7)	13 (32.5)	

Table 3: Odd ration comparison between different waist circumference participants

Variable	Male				Female			
	Unadjusted		Age and BMI adjusted		Unadjusted		Age and BMI adjusted	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Age	1.05 (1.047–1.065)	<0.001			1.06 (1.05–1.07)	<0.001		
BMI	1.82 (1.68–1.97)	<0.001			1.67 (1.6–1.71)	<0.001		
Family income								
Low–middle	1.31 (0.88–1.94)	0.192	1.2 (0.8–1.84)	0.48	2.4(1.7–3.4)	<0.001	1.88(1.31–2.7)	0.001
Middle–high	1.11(0.73–1.69)	0.643	1.22 (0.8–1.91)	0.41	1.45 (0.1–2.1)	0.051	1.3 (0.91–1.963)	0.15
High	1		1		1		1	
Walking exercise (day/wk)								
0–2	2.31(1.6–3.3)	<0.001	1.8 (1.22–2.7)	0.004	1.4 (1.1–1.91)	0.010	1.2 (0.86–1.6)	0.83
3–5	1.4 (0.992–1.99)	0.056	1.2 (0.82–1.8)	0.36	0.92 (0.7–1.3)	0.581	0.92 (0.662–1.3)	0.23
6–7	1		1		1		1	

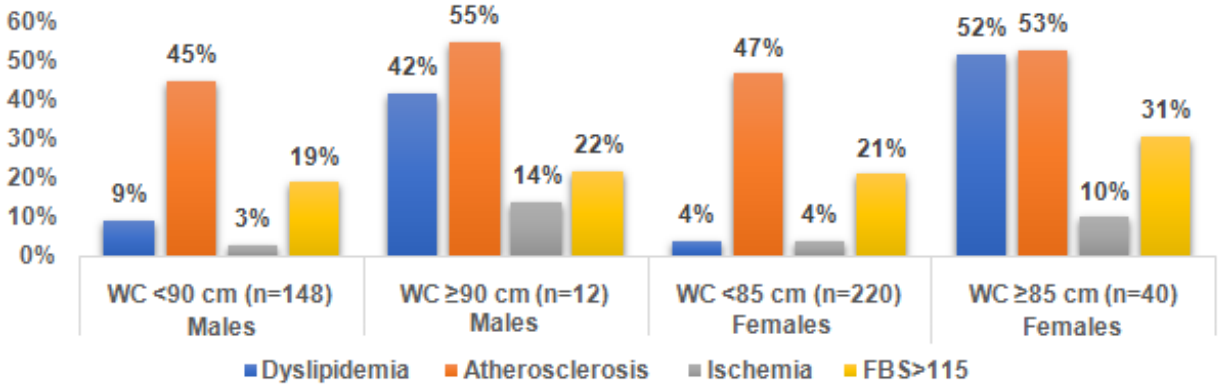

Fig 1: Various biochemical analysis of blood samples

DISCUSSION

Obesity has long been associated with various disease formation including diabetes, cardiovascular disease, respiratory distress and depression. The current research was only focused on the association of central obesity with cardiovascular diseases. The gender distribution of the present research elaborated that there were more females than males present in this study. However, studies from other part of Asia has presented higher ratio of males suffering from central obesity than females.[12-17] The reason could be difference in climate and dietary habits of various countries belonging to same region. Another important finding of the current study was that the mean age of the enrolled males and females with central obesity was much higher than those participants who had no central obesity. The similar results have been published in Koran research.

The effect of sociodemographic variables on central obesity was not significantly linked with the cardiovascular disease in case of male gender in case of age adjustment, however in females' family income had a greater impact on central obesity formation and association with cardiovascular diseases. A Swedish study has reported similar findings where it is described that educational levels has greater influence on females' central obesity as higher education brings higher awareness about the hazards of central obesity in females.[18]

In countries where alcoholism is at higher trend the risk of central obesity greatly increases in males. Different researches

had highlighted this issue in their research[19], however the present study as was conducted in Pakistan did not identify this population as it is a Muslim country and the religious norms forbade drinking of alcohol. Activity rate has a great influence on controlling central obesity and its cardio vascular consequences as reported in earlier studies as well as current research.[20]

The present study testified that the frequency of dyslipidemia, arthrosclerosis and ischemia was higher in cases of central obesity than normal population. This clearly demonstrated a strong association between central obesity and cardiovascular events. The similar findings have been documented in other researched which emphasized on the fact that dyslipidemia as well as diabetes and hypertension risk are associated with central obesity.[21]

CONCLUSION

There is a strong association of central obesity and cardiovascular diseases which need to be addressed on urgent basis.

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