Original Article

Obesity Related Complications in 100 Obese Subjects and their Age Matched Controls

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Abstract

Objective: To note obesity related complications in subjects of age range 50-59 years.

Methods: A case control study was conducted at Medical Unit of District Headquarters Hospital, Rawalpindi for 6 months. Hundred obese subjects in the age range 50-59 years and their age matched non-obese 100 controls were included consecutively from general population. Obese subjects had body mass index (BMI) >30Kg/m^2. Controls had BMI of 18.5-22.9Kg/m^2 and normal waist hip ratio. Obesity related complications i.e., hypertension, diabetes mellitus, ischemic heart disease, stroke, hyperlipidemia, gall stones, varicose veins, psychological problems, sleep related problems, and degenerative arthritis, were sought in all subjects. Waist hip ratio was noted as measure of central distribution of body fat in obese subjects.

Results: Of the 200 subjects, 59% (n=118) were female and 41% (n=82) male. Of the obese subjects 74% and 44% of non-obese controls were female. Mean age of obese subjects and their controls was 54.4±3.22 and 54.57±3.54 years respectively. Central obesity was noted in 84% of obese subjects. Hyperlipidemia (87%), hypertension (71%), diabetes mellitus (65%), gallstones (57%), ischaemic heart disease (49%), osteoarthritis (46%), and sleep disorders (35%) were significant (p<0.05) obesity related complications.

Conclusion: Hyperlipidemia, hypertension, diabetes mellitus, gallstones, ischaemic heart disease, osteoarthritis and sleep disorders are common obesity related complications in subjects of age range 50-59 years (JPMA 56:50;2006).

Introduction

Obesity refers to having an abnormal proportion of body fat. It is a multifactorial disease associated with numerous causes. Obesity occurs when energy intake repeatedly exceeds energy expenditure. Its precise etiology is unknown but genetic, metabolic, endocrine, psychological and cultural factors are involved.[1] Prevalence of obesity is rising to epidemic with proportions around the world and 33% of adults in United States are obese[2] with 13.05% of Saudi males and 20.26% females also bieng obese. In the Canadian population, obesity prevalence is 14.9%. In Pakistan and India obesity occurs in 10-28% of population and is more common in females and upper socioeconomic class.[1]

Mortality and morbidity rates are higher in obese subjects. Obesity is associated with a number of physical,

Table 1. Mean systolic and diastolic blood pressures, fasting sugar, cholesterol and triglyceride levels.

	Obese (n=100)	Controls (n=100)
Mean systolic blood pressure (mmHg)	158.54 ± 36.39	135.6 ± 34
Mean diastolic blood pressure (mmHg)	98.31 ± 17.31	84.5 ± 18.27
Mean fasting blood sugar (mg%)	180.79 ± 78.25*	143.65 ± 82.58**
Mean fasting cholesterol (mg%)	240.42 ± 96.84	135.09 ± 79.81
Mean fasting triglycerides (mg%)	298.73 ± 141.67	187.41 ± 131.98

*Mean fasting blood sugar of diabetic obese (n=65) was 228.05 53.59 and of non-diabetic obese (n=35) was 93.08 15.56.

**Mean fasting blood pressure of diabetic controls (n=37) was 237.37 63.5 and of non-diabetic controls (n=63) was 88.60 15.05.

Table 2. Obesity related complications (% wise).

Complication	Obese n=100	Controls n=100	p-value
Lipid abnormalities*	76	38	0.0000001
Hypertension	71	43	0.0001
Diabetes mellitus	65	42	0.001
Gall stones	57	17	0.0000000
Ischemic heart disease	49	31	0.014
Osteoarthritis	46	7	0.0000000
Sleep disorders	35	16	0.003
Psychiatric problems	26	19	0.3
Stroke	14	11	0.18
Heart failure	12	4	0.06
Hernias	12	5	0.12
Dermatological abnormalities	6	3	0.47
Varicose veins	6	2	0.21

*Lipid abnormalities included hypertriglycedemia and or hypercholesterolemia.

psychological, social and economic hazards.[2] Ischaemic heart disease, hypertension, hyperlipidaemia, type II diabetes mellitus, gall-stones etc are common physical complications of obesity.[4] Socially it is considered as last remaining acceptable form of prejudice. Economic wise obesity is estimated to account for 2-7% of total health care costs of developed countries.[5]

Prevalence of obesity increases with age. Obesity is common in age group 50-59 years. Various studies have been done in Pakistan to note prevalence of obesity in diabetic, hypertensive and stroke patients.[6,7] Studies to note complications of obesity are however deficient. This study was conducted to note presence of physical and psychological obesity related complications in subjects of age range 50-59 years.

Subjects and Methods

This case control study was conducted at Medical Unit of District Headquarters Hospital, Rawalpindi for 6 months (from January to June 2004). Two hundred subjects in the age range 50-59 years (100 obese and 100 non-obese controls) were included consecutively from general population. Differentiation in obese and non-obese was based on body mass index (BMI). BMI was estimated in standard way i.e., weight in Kg/height in m[2]. BMI of obese subjects was >30, while BMI of controls was 18.5-22.9 (obese I and normal range according to proposed classification of weight by BMI in adult Asians).[8]

In obese waist hip ratio (WHR) was considered as measure of central/peripheral distribution of body fat. Controls had normal WHR. WHR was calculated in standard way i.e., firstly waist circumference (a) was measured below rib cage (just above umbilicus), secondly hip circumference (b) was measured at widest part, and lastly WHR was calculated by dividing (a) to (b). Obese subjects with waist hip ratio >1 in men and >0.9 in women were considered to have central obesity, also those with ratio <0.85 in men and <0.75 in women were considered to have peripheral obesity. Subjects suffering from diseases like cirrhosis, cardiac failure, tuberculosis, and renal disease were excluded.

Obesity related complications as hypertension, diabetes mellitus, ischaemic heart disease, stroke, hyperlipidemia, gallstones, varicose veins, psychological problems, sleep related problems, skin abnormalities and degenerative arthritis, were sought in obese and non-obese subjects.

All subjects, not previously known hypertensives, underwent blood pressure estimation to note presence or absence of hypertension. Average of two or more readings was taken at each of two or more visits after initial screening for this purpose. Diagnosis of hypertension in these subjects was based on recommendations of the Seventh Report of the Joint National Committee of Prevention, Detection, Evaluation and Treatment of High Blood Pressure ONC VII), I.E., systolic blood pressure ≥140, and diastolic blood pressure ≥90mmHg.[9]

Fasting and two hour post-prandial glucose of subjects who were not known diabetics were estimated, to diagnose diabetes. In diabetic subjects only fasting glucose was measured. Enzyme calorimetric method was used for these measurements. If a subject was known to be suffering from ischaemic heart disease, this was confirmed by reviewing his/her record including ECG, excercise tolerance test, echocardiogram and angiography reports. An ECG was done for screening subjects who were not known to be suffering from ischaemic heart disease. Diagnosis of ischaemic heart disease in these subjects was based on standard ECG criteria i.e., Q waves, ST and T wave changes.

Fasting lipid profile (triglycerides/cholesterol levels) of each subject was sought to note lipid profile abnormalities by enzyme calorimetric method. Diagnosis of stroke, varicose veins and skin disorders (intertrigo, acanthosis nigricans, hirsutism, increased risk for cellulitis and carbunces) were clinical examination based. Degenerative arthritis (knees) was sought clinically and confirmed by X-rays. Sleep related (symptoms suggestive of obstructive sleep apnoea, obesity hypoventilation syndrome), and psychological/psychiatric problems (social stigmatization, depression etc) were sought by using a questionnaire.

Ultrasound to note gallstones was done in all subjects. Individuals with history of cholecystectomy were considered to have gallstones. Data obtained in this way converted in variables, which were analyzed using computer based statistical programme SPSS version 10. Chi square test was used for calculating p-value.

Results

Out of 200 subjects 59% (n=118) were female and 41% (n=82) male. Of the obese subjects, 74% were female and 26% male. Non-obese controls included 56% males and 44% females. Mean age of obese, and non-obese controls was 54.4±3.22, and 54.57±3.54 years respectively. Mean BMI and WHR values of obese subjects were 32.93 and 0.98, while those of controls were 21.54 and 0.83 respectively. Waist hip ratio consistent with central obesity was noted in 84% of obese subjects. Most of obese females (n=70) were housewives. Mean systolic and diastolic blood pressures, fasting sugar, cholesterol and triglycerides levels of obese and non-obese study participants are detailed in Table 1. Obesity related complications noted in obese and non-obese subjects are given in Table 2.

Discussion

Lipid abnormalities, hypertension, diabetes mellitus, ischaemic heart disease, arthritis, and sleep disorders were significantly associated with obesity in our study. Of these lipid abnormalities were most frequently noted. Hypercholesterolemia, elevated low density lipoprotein (LDL), and triglycerides all are associated with obesity.[8] Obesity is also linked to low levels of high density lipoprotein (HDL). Lipid abnormalities are very common in obese and are considered a major risk factor for development of atherosclerosis in these subjects.

Obesity is a risk factor for cardiovascular disease. This may be an independent effect or it may be secondary to other obesity related complications like hypertension, diabetes, and hypercholesterolemia. Over activity of sympathetic nervous system, stimulation of renin angiotensin system and impairment in baroreflex cardiovascular control are causes of cardiovascular related complications mainly hypertension in obese subjects.

In our study hypertension was second commonest obesity related complication. Obesity is an important risk factor for development of hypertension. Upto 51% of obese subjects have been reported to be hypertensive in various studies.[10,11] Ischaemic heart disease was another significant obesity related cardiovascular complication in our study. In a Pakistani study conducted by Iqbal and colleagues obesity was identified as risk factor for coronary artery disease in 24% of patients.[12] Akram and colleagues in another study noted that 21.2% of ischaemic heart disease patients were obese.[13]

Nearly all patients with type 2 diabetes mellitus are either overweight or obese at the time of diagnosis. Risk of developing diabetes increases to 28 folds in subjects with BMI of 30.[14] This increased risk is most significantly attributed to insulin resistance and increased hepatic glucose production.[14] A Hungarian study reported 39% obese subjects to be diabetic.[15] In another related study, diabetes was noted in 38.29% of over weight people.[12] Mumtaz and colleagues in a Pakistani study observed that obesity was common in diabetic women compared to non-diabetic (21.7%:7.6%).[8] Diabetes was present in 65% of our obese subjects.

Gallstones and osteoarthritis were most significantly associated with obesity in this study. Gallbladder disease and gallstones are frequently noted in obese subjects.[16] Obese women have seven times the risk of forming gallstones compared to non-obese women.[17] Obesity related hyperinsulinaemia and hypertriglycedaemia lead to increased risk of developing gallstones. Link between obesity and osteoarthritis has been consistently documented in population-based studies. In National Health and Nutrition Examination Survey (NHANES 1) obese subjects had up to five times the risk of knee osteoarthritis.[18] Subjects in highest quintile of body weight have up to 10 times risk of osteoarthritis compared to those in lowest quintile.[19]

Sleep related disorders were also common in our obese subjects. Anatomic and functional consideration of pharyngeal airway, central nervous system, central obesity and leptins interact in development of these disorders. Obstructive Sleep Apnea (OSA) is the most common of sleep related disorders. In a local study it was noted that snorers were more often obese (p<0.001) than non-snorer.[20]

Psychological problems, hernias, dermatological abnormalities and varicose veins were common but not significantly associated with obesity in out study. Though stroke was noted in our obese subjects, it was not significantly associated with obesity. Obesity and its related complications like hypertension, diabetes, hyperlipidemia are important risk factors for development of stroke.[21] In various Pakistani studies obesity has been reported in 32% of stroke patients.[21]

WHR was abnormal in most of our obese subjects compared to controls. Central obesity estimated with WHR is considered a better indicator of visceral fat and is a risk of developing type 2 diabetes and cardiovascular disease. This has been documented in Pakistani studies as well.[22,23] Majority of obese subjects in this study were female and housewives. If we exclude sampling limitation this gender

specificity correlates with national and international figures.[24,25] Housewives have propensity to become obese. This had been attributed to modernization that leads to minimal physical work.

Conclusion

Hyperlipidemia, hypertension, diabetes mellitus, gallstones, ischaemic heart disease, osteoarthritis, and sleep disorders are common obesity related complications in subjects of age range 50-59 years. Of these hyperlipademia, gallstones and osteoarthritis were most significantly associated with obesity. Central obesity was common in our obese subjects.

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