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PREVALENCE OF OBESITY RELATED HEALTH RISK FACTORS IN ADULT POPULATION

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ABSTRACT

Overweight and obesity aggravate into a large number of health issues, both independently and in association with other diseases, obesity is among the most remarkable contributor to diseased conditions. The associations of body mass index and chronic conditions like type 2 Diabetes, hypertension, cardiovascular diseases, osteoarthritis, sleep-breathing problems and others may differ between Asian and Western populations. BMI alone cannot reflect the viability in body composition in ethnic groups of south Asian and result in misclassification. This survey included 130 participants and was a cross-sectional study. Participants were provided self-administered questionnaire on gender, level of education, employment status, marital status, eating habits, and exercise and health complications. Chi-square was used to determine association between categorical variables. Classified by BMI 21.8% were overweight and 54.6% were obese. Male participants were found more obese than female participants. Central obesity was highly prevalent among females, the mean weight of males was 91.7 kg and in female participants it was found to be 83.27 kg. The top six obesity related complications were found to be hypertension, diabetes, joint or muscle pain, arthritis and metabolic syndromes. Nearly twenty percent male and nearly twenty four female were on medication for various chronic conditions on regular basis. Considering South-Asian cut-offs this study showed a prevalence of many co-morbid illnesses of obesity. Although these illnesses were most common among elderly people but middle aged people were also found at risk.

KEY WORDS: Body mass index, Waist circumference, Diabetes, Hypertension, Osteoarthritis, Cardiovascular diseases.

INTRODUCTION

Epidemically in the world Obesity is sequel for developing cardiovascular diseases (CVD), such as hypertension, diabetes and dyslipidemia (Sowers, 2003). Obesity is a perplexing condition involving an excessive amount of body fat. Overweight and obesity cause or aggravate a huge number of health problems, both independently and in association with other diseases (Willett *et al*., 1999, Ezzati *et al*., 2002). Globally there is increasing burden of non-communicable diseases and have been strongly associated with unhealthy lifestyle habits (Sajwani *et al*., 2009).Overweight and obesity result from the association of numerous variables, including hereditary, metabolic, behavioral and environmental impacts (Harnack *et al*., 2000). Obesity leads to diseases by involving some direct pathways such as mechanical stress of carrying extra pounds and other complex changes in hormones and metabolism (Nielsen *et al*., 2002). Other dietary factors besides dietary fat are now considered to influence obesity i.e. carbohydrate, protein, fiber, energy density and glycemic index. Body fat distribution is considered one of the risk factors related to obesity in addition to BMI. To define overweight and obesity in Asia many studies have attempted to find optimal BMI cut-off values. For evaluating obesity and overweight different optimal BMI values are used in different countries. In 2002 Asian countries were recommended by lower BMI cut-off values by WHO. Body mass index (BMI) standard identification tool to classify obesity and patients at risk of worse health outcomes. For adults, overweight and obesity ranges are determined by using weight and height to calculate a number called the "Body Mass Index" (BMI) (World Health Organization).

Waist circumference and hip circumference: "Abdominal obesity" is simply and most commonly measured by waist circumference. Abdominal obesity is defined as extra fat that is surrounding the middle of body. Waist circumference measurement independent of BMI can be used to isolate people who are at risk of developing diseases. Waist circumference measurements are taken by measuring circumference of abdomen (natural waist) and measurement of narrowest area of the midsection (belly button) (Hu, 2008).

Finally, various cross sectional and longitudinal studies in many populations have elaborated the direct relation between BMI and waist circumference to mortality and morbidity rate (Barba *et al*., 2004, Grinker, 2000, Woo *et al*., 2002, Taylor *et al*., 1999). It has been proven that waist circumference is even more important than BMI. If a person carries greater amount of fat also known as visceral fat around his abdomen then there is a greater risk of developing conditions like type 2 diabetes and heart diseases.

In measurement of abdominal obesity along with waist to hip ratio, waist circumference is also considered as important parameter. The waist and hips are measured at the widest diameter of buttocks, and then waist measurement is divided by hip measurement. Studies have shown that morbidity and mortality can be predicted by using waist-to-hip ratio (Hu, 2008).

According to the Center for Disease Control, "we are eating ourselves into a diabetes epidemic". The International Diabetes Foundation (IDF) says that, "Diabetes and obesity are the biggest public health challenge of the 21st century."

Greater body weights strongly prompts Type 2 diabetes. In Pakistan prevalence range of obesity is high from 7.6 to 11% (Jafer *et al*., 2004). Obesity and physical inactive lifestyle are well-known risk factors to prompt type 2 diabetes as well as insulin resistance. Adipose tissues in obese person secrete non-esterifies fatty acids, glycerol hormones, pro-inflammatory cytokines and other factors in bulk which are also responsible for insulin resistance. Inflammation may also cause type 2 diabetes. In obesity LTB4 is released from extra fat which triggers inflammation, LTB4 binds to receptor which are present on macrophages as a result those macrophages are activated. Now these cells also become inflamed and become resistant to insulin. Inflammation is triggered by fat cells which are present around the waist which secrete hormone and other substances and it has become now well-known factor that inflammation causes different diseases (Zachary, 2000).

The relationship of obesity with the CVD risk is identified with the level of obesity as well as is by all accounts basically subject to body fat appropriation. People with more noteworthy degrees of central adiposity develop CVD more as often as possible as do those with a peripheral body fat distribution (Kissebah *et al*., 1994).Fat cells increase in number and size and release different kind of proteins and metabolites which are responsible for pathophysiology of hypertrophic obesity. The proteins such as lipoprotein lipase hydrolyses triglycerides of VLDL chylomicrons, and cytokines for example tumor necrosis factor (TNF) and interlukin-6 (IL-6) and in addition angiotensinogen. The highly enlarged fat cell likewise creates a hormone which is included in study of animal models of obesity, known as leptin. Hypertrophic weight associates with metabolic intricacies of obesity, including debilitated insulin resistance, antagonistic lipid profile, high blood pressure, and CHD (Bray, 1997).Fat tissue secretes vasoactive substances which might add to the improvement of obesity related hypertension (Gorzelniak *et al*., 2002). Hypertension is the result of cardiac output and systemic vascular resistance, and cardiovascular yield is expanded in obese patients in view of raised blood flow to the adipose tissue (Mori *et al*., 2004). Marked systolic abnormality happens when ventricles are unable to accommodate to volume which is highly increased. Contraction of ventricles is decreased as a result of dilated left ventricle cavity. Heart failure occurs due to systolic as well as diastolic dysfunction (Yusuf *et al*., 2005).

Sleep apnea is a main consideration to consider in obesity. In the adult population, the commonness of OSA is estimated to be ~25%, and as high as 45% in obese subjects (Kim *et al*., 2004 and Sharma *et al*., 2006). Fat stores in the upper airway's surrounding tissues seems to bring about a littler lumen and expanded collapsibility of the upper airway route, inclining to apnea (Schwab *et al*., 2003). Recent study recommend that OSA might itself bring about weight gain (Abel Romero-Corral *et al*., 2009).

Osteoarthritis (OA) is an agonizing degenerative condition that can influence one or a greater amount of the joints. Weight-bearing joints (e.g. spine, hip, knee, and ankle) are frequently included in the disorder process. Mechanical stress applied on the joints are a critical reason for OA and a standout amongst the most modifiable danger components as for weight reduction and movement alteration (Peter *et al*., 2008). Obesity has for quite some time been recognized as a danger variable for prevalent osteoarthritis (Coggon *et al*., 2001). Distinguished levels of Leptin, adiponectin and resisting levels in the synovial fluid and plasma are found in patients with osteoarthritis and obesity (Dumond *et al*., 2003, Chen *et al*., 2006).

Methodology: Cross sectional study was conducted including obese adults aged 17-60 years living in the Karachi Pakistan. A structured questionnaire that included variables on socio demographic characteristics, dietary fat intake, exercise patterns, weight gain patterns, risk factors for obesity, and physical examination findings such as body weight, height, hip and waist circumferences, were used for data collection. The participants were divided into 3 age groups, first age group was 17-29 years, second age group was 30-45 years and third age group was 46-60 years of age. Exclusion criteria was set in which gestating females (pregnant females), mentally/physically restrained and bed ridden patients were excluded from participating.

Measurements: In our study Anthropometric measurements were obtained from all participants using standardized anthropometric measurement techniques. Data were collected on the basis of following:
1. Body weight 2. Body height 3. BMI 4. Waist circumference 5. Hip circumference.

Statistical analysis: Mean and percentages were computed for variables like age, BMI, waist circumference hip circumference waist–hip ratio. Results are presented as percentages and bar charts. Chi-square was used for quantitative variables. P-value less than 0.05 was considered significant p-value.

RESULTS

Among the participants 66 percent were male and 64 percent were female, three age groups 17–19, 20–45 and 46–60 were set. The most of the participants (69%) were married. About 46 percent participants have completed up to secondary education and 36 percent participants have attended college/University and primary level of education was completed by 3 percent, among the remaining 15 percent were illiterate.

The mean weights of males were 91.7 Kg and mean weights of females were 83.265 Kg. The mean waist circumference of male 105cm and mean hip circumference of male 104cm ($p<0.05$) which is significant. The mean waist

circumference of female 87cm and mean hip circumference of male 109cm ($p<0.05$) which is significant. According to the survey males were found to be much more obese than females ($p<0.03$). Females were found to be more overweight than males. Males were found to have greater hip circumference than females and females had greater waist circumference i.e. centrally obese. Waist to hip ratio of males were found to be 1 and waist to hip ratio of females were found to be 0.836.

Table 1. shows the distribution of obesity related morbidities and addictions in males and females. Among participants 23 percent did not report any co-morbid illnesses (such as diabetes, hypertension, sleep apnea, heart disease, and shortness of breath, arthritis, joint/muscle pain, headache and other chronic illnesses). Hypertension was reported by 59% of the male and 39% of the female participants. Male (30.3%) and female (15.6%) reported diabetes. 22.7% of male and 35.9% female reported arthritis/osteoarthritis. Joint pain or muscle pain was reported by 43.9% of male and 51.56%. 24.2% of male and 37.5% of female reported having head-ache. 24.2% male and 28.1% of female reported metabolic syndrome. 9% of male and 15.6% of female reported sleep apnea/day time sleepiness/snoring 18.1 percent of male reported having shortness of breath and 15.6 percent of female reported having shortness of breath. Asthma was reported only by 1.5 percent of the male and no female reported having asthma. No male reported having osteoporosis and 21.8 percent female reported having osteoporosis.

Table 1. Distribution of different co-morbid illnesses and parameters among males and females.

Parameters	Co-morbid illnesses	Male (n=130)	Percentage (%)	Female (n=130)	Percentage (%)	Total	Total percentage (%)
	Control	15	22.727	15	23.437	30	23.076
	Hypertension	39	59.090	25	39.062	64	49.230
	Diabetes	20	30.303	10	15.625	30	23.076
	Sleep apnea/ Day time sleepiness/ Snoring	6	9.090	10	15.625	16	12.307
	Heart disease	9	13.636	3	4.6875	12	9.230
	Shortness of breath	12	18.181	10	15.625	22	16.923
	Asthma	1	1.5151	0	0	1	0.769
	Arthritis/Osteoarthritis	15	22.727	23	35.937	38	29.230
	Joint/Muscle pain	29	43.939	33	51.5625	62	47.692
	Headache	16	24.242	24	37.5	40	30.769
	Osteoporosis	0	0	14	21.875	14	10.769
	Metabolic syndrome	16	24.242	18	28.125	34	26.153
Use of tobacco							
	Yes	15	29.411	12	24.489	27	27
	No	36	70.588	37	75.510	73	73
Use of drug							
	Yes	10	19.607	12	24.489	22	22
	No	41	80.392	37	75.510	78	78

The top six obesity related complications were found to be hypertension, diabetes, joint or muscle pain, arthritis and metabolic syndromes among both genders (males' $p< 0.001$) and (female $p<0.02$) which is statistically different in both genders. Among males 29.4 percent males and 24.4 percent females smoked cigarettes and used tobacco. 19.6% of male and 24.4% of females among the participants were using medication on regular basis for different chronic conditions like diabetes musculoskeletal pain, cardiac diseases and blood pressure.

A total of 15.15 percent participants were overweight according to the South Asian cut-off (BMI 23.1- 27.5 kg/m²) and 62.12 (BMI >27.5 kg/m²) were found to be obese among the participants and 22 percent were with normal weight. A total of 21.87 percent female were overweight according to the South Asian cut-off value and 54.68 percent female were obese and 23.43 percent females were with normal weight (Fig. 1). According to our survey 76 percent of the participants reported sedentary life style and 18 percent of the participants reported the moderate life style only 6 percent of the participants reported active life style (Fig. 2). Participants reported their energy level in the survey 51.5 percent of the participants reported lack of energy/stamina. 46.15 percent of the participants had trouble waking up and starting a day each morning. 45.3 percent of the participants experienced low energy with no motivation (Fig. 3).

According to the survey 55 percent of the participants reported that their weight gain pattern was steady that is gradually increase of weight with the years and 16 percent of the participants reported sudden weight gain that is increase of weight with the pregnancies and 29 percent of the participants reported variable weight gain due to the intermittent diet (Fig. 4).

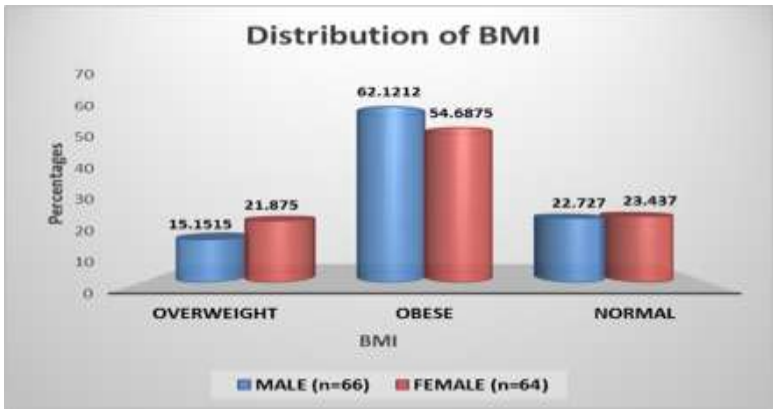

Fig. 1. Percentages of different BMI in male and female.

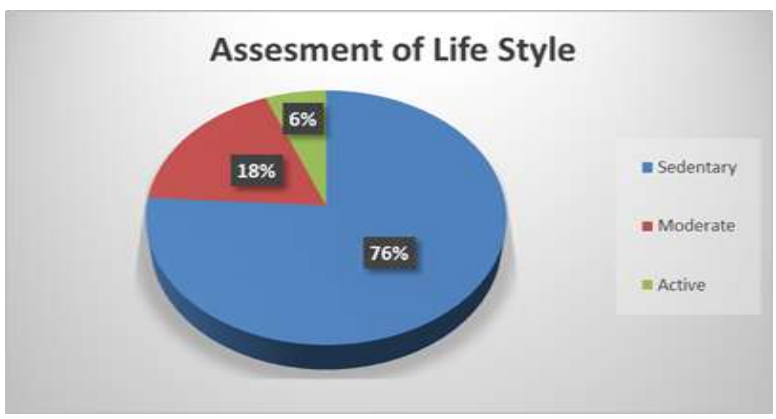

Fig. 2. Assessment of life style.

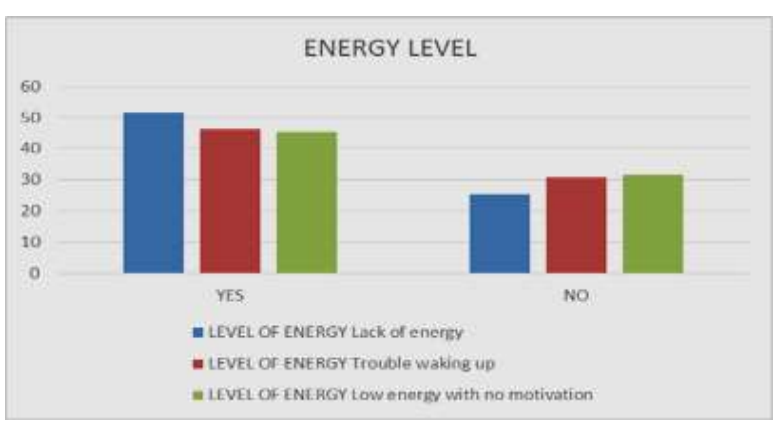

Fig. 3. Energy level among participants.

Fig. 4. Weight Gain pattern among participants.

DISCUSSION

In Pakistan obesity is creating a large burden of diseases, which is prevalent not only in urban but also in less privileged population. There is increase of obesity in both genders, all ages and all educational levels. We found that around 54.6% of the female participants were obese and 62.1% of the male participant were obese. Our results shows that male participants are more obese than female as calculated from their BMI. Obesity is much more prevalent in females. According to the study in the past females were found to be more obese and with higher prevalence of central obesity, lower muscle mass and waist to hip ratio (Faridah *et al*., 2015). If we overview a National Health Survey in 1990-94, the prevalence of obesity was 11% for men and it was 19% for women, although, It is not a recent survey but increased prevalence of obesity is still observed in Pakistan. It is even underestimated as the BMI cut-off values used for BMI are abnormal (Nanan, 2002).

The physical activity is defined as assessment of life style. According to our survey 76 percent of the participants reported sedentary life style that include only the physical activity like normal walking, walking downstairs, bowling, mopping etc. and 18 percent of the participants reported the moderate life style that includes physical activity of walking about 1.5 to 3 miles per day/hour, in addition to sedentary life style. Only 6 percent of the participants reported active life style that include physical activity of walking more than 3 miles per day/hour. In our study Female participants were found to be living more sedentary life which is major health problem in all societies. One of the study shows that the excess weight is epidemic globally and the cause is known to be physical inactivity. Sedentary life-style, unhealthy diet, overweight/obesity greatly increase the risk of cardio-vascular diseases. Un-healthy weight gain and obesity can be prevented by regular physical activity of 45-60 min/day, whereas sedentary behaviors such as couch potato life or T.V watching promote them (Lakka and Bouchard, 2005). An active lifestyle helps people maintaining healthy weight or it can also result in weight loss. It can likewise bring down the risks of heart diseases strokes, hypertension, osteoporosis and certain tumors, additionally lessen the chances of being stressed. Sedentary lifestyle is contrary to active life style and increases the risk of being obese and worse health outcomes. In epidemiological studies Sedentary lifestyle and not exercising are linked to increase the rates of metabolic syndrome, type 2 diabetes, obesity, and CVD.

In our study we observed high dietary intake among participants. It is obvious that if person takes more calories than a body can burn it will increase the weight so high amount of the dietary intake is also one of the reason in our participants for being overweight or obese. Female are found to be more obese than males which is consistent with previous study in Pakistan in which females had greater waist circumference measurements but had waist to hip ratio similar for both the genders (Khan *et al*., 2008). Our study shows high prevalence of overweight/obesity and abnormal W.C and Waist to Hip Ratio in population. obesity related problems also showed up high in which the prevalence of hypertension was found to be 49%, it is comparable with other study that held in Karachi Pakistan in 2009 which showed the prevalence of hypertension 9.4% in urban population and 12.1% in Punjab (Hydrie *et al*., 2009). Nutrition transition is observed in a population with higher prevalence of overweight/obesity in our study. Problems such as obesity require appropriate policies and prevention programs.

CONCLUSION

Considering South-Asian cut-offs our study shows a prevalence of many co-morbid illnesses of obesity. Although these illnesses were most common among elderly people but middle aged people were also found at risk. Waist-hip ratio and BMI both are reliable ways of screening and identifying population at risk.

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