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Overweight and Obesity Among Hospital in-Patients

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Introduction: *Obesity is well known to be associated with adverse health events. However, there is little information about prevalence of overweight and obesity in individuals who are admitted for management of medical conditions. To provide initial data on the pattern of overweight and obesity among those admitted in a medical unit from a medical college located in a rural area of southern India, the present study was carried out.*

Materials and Methods: *One hundred inpatients older than 18 years with BMI>25kg/m^2 admitted to the medical wards of PES Hospital Kuppam were studied. All patients were older than 18 years with BMI>25kg/m^2. The prevalence of the following co-morbid conditions in these subjects was assessed: Hypertension, Type 2 Diabetes, Metabolic Syndrome, Dyslipidemia, Coronary Artery Disease, Obstructive Sleep Apnoea, Gastroesophageal Reflux Disease, Osteoarthritis, Fatty liver, and Pancreatitis.*

Results: *The prevalence of overweight was 60% (n:60). Women tended to have higher BMI and cutaneous manifestations of acanthosisnigricans. They also tended to have greater systolic and diastolic blood pressure. In general the lipid parameters were comparable between the sexes. In decreasing order of prevalence, the coexisting conditions were Diabetes 54% (n:54), Hypertension52% (n:52), Dyslipidemia 44% (n:44), Obstructive Sleep Apnea30% (n:30), Non Alcoholic Fatty Liver Disease(30%), Osteoarthritis(30%),Cardiovascular Disease(26%), Gastroesophageal Reflux Disease18% (n:18) and Pancreatitis 4%(n:4).*

Conclusions: *In this rural medical hospital from south India, among those admitted to the medical wards, women tended to have adverse anthropometric and cardiovascular risk profile compared to men. Considering the increasing prevalence of obesity, metabolic syndrome and type 2 diabetes mellitus across all areas of India, primary preventive measures are necessary.*

Key words: *Body mass index, morbidity, dyslipidemia, diabetes, osteoarthritis, metabolic syndrome, acanthosisnigricans.*

Introduction

It is well recognized that the prevalence of overweight and obesity in India is increasing (1,2). The adverse effects are also well known, including the risk of metabolic syndrome and type 2 diabetes mellitus. However, most reports originate from population samples and from out-patient clinics (2). There is sparse information on subjects who are admitted as in-patients. Many of the reports among in-patients studied the outcome of obesity on surgical procedures (3) and recently, following bariatric surgery. There has not been documentation of patterns of overweight and obesity among subjects who were admitted as in patients of medical wards, particularly from rural areas of South India. Considering that preventing and treating obesity aims to prevent illness, we performed this exploratory study to determine the pattern of overweight and obese subjects who were admitted to PES Hospital, a referral centre situated in a rural area of Andhra Pradesh adjoining Karnataka and Tamil Nadu borders.

Anthropometric data, prevailing medical illnesses, and gender differences amongoverweight and obese patients admitted to PES Hospital were assessed and variables were correlated.

Material and Methods

Source of Data: This was an inpatient based cross sectional study, considering 100 patients older than 18 years with BMI>25kg/m^2 admitted to the medical wards of PES Hospital Kuppam between August 2012 and August 2013.

Inclusion criteria: All patients older than 18 years with BMI>25kg/m^2admitted to the medical wards of PES Hospital, Kuppam.

Exclusion criteria: Pregnant women, patients with conditions causing fluid retention like heart failure, renal failure, and decompensated liver disease ; Patients with neurological conditions or otherwise, which interfere with measurement of anthropometric features, and patients with thyromegaly were excluded.

The selected patients' anthropometric measurements were taken as per established guidelines, and patients underwent workup for medical diseases associated with obesity like Hypertension, Type 2 Diabetes, Metabolic Syndrome, Dyslipidemia, Coronary Artery Disease, Obstructive Sleep Apnoea, Gastroesophageal Reflux Disease, Osteoarthritis, Fatty liver, and Pancreatitis. Situations like steroid abuse, hypothyroidism and other drugs which may lead to obesity were documented.

Measurement of waist, hip circumference: Waist circumference was measured at the midpoint of the lower margin of last palpable rib and the top of the iliac cress, with the subject standing up and at the end of normal expiration. Hip circumference was measured at the level of the posterior protuberance of the gluteals (widest portion of buttocks). Body mass index (BMI) was taken as body weight (kilogram) divided by square of height (expressed in meters). Classes of obesity were taken according to WHO guidelines (4).

Results

Most subjects were aged between 41 and 70 years (Table 1); overweight (BMI 25-29.9) was the most common (60%) (Table 2). Women tended to have a greater BMI, and a lower waist-hip ratio (Table 3). Acanthosis and acrochordon were also more common in women (Table 4). Compared to men, women tended to have greater systolic and diastolic blood pressure (Table 5). In general the lipid parameters were comparable between the sexes

Table 1: Age distribution of patients studied

Age in years	Gender		Total
	Male	Female	
<30	0(0%)	2(3.3%)	2(2%)
30-40	6(15%)	4(6.7%)	10(10%)
41-50	6(15%)	15(25%)	21(21%)
51-60	15(37.5%)	20(33.3%)	35(35%)
61-70	9(22.5%)	12(20%)	21(21%)
>70	4(10%)	7(11.7%)	11(11%)
Total	40(100%)	60(100%)	100(100%)
Mean ± SD	55.95±12.62	56.07±12.87	56.02±12.71

P = 0.964, not significant, student t test

Table 2: Obesity class

Obesity class	Gender		Total
	Male	Female	
Obesity 1	8(20%)	23(38.3%)	31(31%)
Obesity 2	1(2.5%)	6(10%)	7(7%)
Obesity 3	0(0%)	2(3.3%)	2(2%)
Overweight	31(77.5%)	29(48.3%)	60(60%)
Total	40(100%)	60(100%)	100(100%)

Table 3: Anthropometric variables according to gender

Anthropometric variables	Gender		Total	P value
	Male	Female		
Age in years	55.95±12.62	56.07±12.87	56.02±12.71	0.964
Height (cm)	163.53±7.20	152.48±6.86	156.90±8.83	<0.001**
Weight (kg)	75.70±9.32	70.83±10.34	72.78±10.18	0.018*
BMI (kg/m^2)	28.16±2.62	30.25±3.83	29.41±3.54	0.003**
Neck (cm)	37.38±3.27	35.37±2.46	36.17±2.97	0.001**
Waist circumference (cm)	95.88±8.57	91.48±10.39	93.24±9.90	0.029*
Hip circumference (cm)	104.25±11.02	103.08±10.12	103.55±10.45	0.587
Waist-Height ratio	0.58±0.05	0.60±0.07	0.59±0.06	0.276
Waist-Hip ratio	0.92±0.04	0.88±0.05	0.90±0.05	<0.001**

Table 4: Acanthosis/ Acrochordon according to gender

	Gender		Total (n=100)
	Male (n=40)	Female (n=60)	
Acanthosis	12(30%)	28(46.7%)	40(40%)
Acrochordon	11(27.5%)	24(40%)	35(35%)

(Table 6). Interestingly, one woman consumed alcohol. Osteoarthritis was more common in women. Co-morbid conditions in decreasing order were Diabetes (54%), Hypertension (52%), Dyslipidemia (44%), Obstructive Sleep Apnea (30%), Non Alcoholic Fatty Liver Disease (30%), Osteoarthritis (30%), Cardiovascular Disease (26%), Gastroesophageal Reflux Disease (18%) and Pancreatitis (4%) (Table 7).

Table 5: Comparison of BP according to gender

	Gender		Total	P value
	Male	Female		
SBP (mm Hg)	130.65±21.92	143.60±28.15	138.42±26.50	0.016*
DBP (mm Hg)	82.05±12.39	88.07±15.48	85.66±14.56	0.042*

Table 6: Comparison of lipid parameters according to gender

	Gender		Total	P value
	Male	Female		
Total cholesterol	193.50±77.70	183.90±67.57	187.74±71.57	0.514
TGL	155.93±54.88	162.20±80.03	159.69±70.80	0.666
HDL	38.73±12.81	36.62±13.54	37.46±13.23	0.438
LDL	87.85±35.62	82.57±32.88	84.68±33.92	0.448

Table 7: Comorbid conditions

Comorbid conditions	Gender		Total (n=100)	P value
	Male (n=40)	Female (n=60)		
Hypertension	13(32.5%)	39(65%)	52(52%)	0.001**
Type 2 Diabetes Mellitus	19(47.5%)	35(58.3%)	54(54%)	0.287
Dyslipidemia	21(52.5%)	23(38.3%)	44(44%)	0.162
Cardiovascular disease	11(27.5%)	15(25%)	26(26%)	0.780
Obstructive Sleep Apnea Syndrome	11(27.5%)	19(31.7%)	30(30%)	0.656
Gastro esophageal Reflux Disease	7(17.5%)	11(18.3%)	18(18%)	0.915
Osteoarthritis	7(17.5%)	22(36.7%)	29(29%)	0.119
Fatty liver	13(32.5%)	17(28.3%)	30(30%)	0.119
Pancreatitis	3(7.5%)	1(1.7%)	4(4%)	

Table 8: A comparison of different study populations

Study	Average BMI
Smita P. Patil et al (2012)[11], Maharasthra	23.48±2.71 in males and 26.41±4.86 in females
Present Study (2013), Kuppam, Andhra Pradesh	30.25±3.83 in males and 28.16±2.62 in females

Table 9: A comparison of different study populations

Study	Waist-hip ratio
Danilo Ramos Haun et al, (2010)[12], Brazil	0.91±0.07 in males, and 0.83±0.08 in females.
Smita Patil et al (2012)[(11)], Maharasthra	0.96±0.05 in males and 0.94±0.12 in females
Present study (2013), Kuppam, Andhra Pradesh	0.92±0.04 in males and 0.88±0.05 in females.

Discussion

Prevalence of BMI >25 in non hospitalized subjects from India range from 8.5% to 3.24% (1). Among rural women, the prevalence ranged from 10% to 17.3% (1). A recent study reported from Punjab in 2013 showed that BMI and waist hip ratios were higher in urban women and lower in rural women (5). A study on young rural adolescents from south India showed that obesity and overweight were low in low socio economic group, due, mostly to lifestyle factors (6). In this hospital-based study, the pattern of overweight and obesity was assessed in subjects from southern India. This may be considered a reflection of morbidities seen in people who were not of normal weight. As expected, middle aged and elderly formed the most common age group. Overweight, rather than obesity was found in 60% of the whole sample, but it was more in men (77.5%) than in women (48.3%). In general, more women than men had obesity of all grades (viz 1-3); interestingly none of the men had grade 3 obesity. This implies that to be admitted in hospital, women had worse anthropometric parameters, and may have had more severe disorders to be brought to medical attention, in line with gender differences in access to medical care (7). An earlier study reported that American adults in the age group 40-59 were more likely to be obese (8). Besides, most admitted men in the current study were because of alcohol abuse and of chronic smoking. This could also be related to rural setting of the hospital, and most men did manual work in contrast to fewer women who were sedentary.

Rather than just residence, a study from Karnataka, located in proximity to Kuppam, showed that migration of women from rural to urban areas was a risk factor for overweight (9). Even in a township from Maharastra, among 365 shopkeepers who were sedentary, obesity was reported in 22% and overweight in 43.3% (10).

In the current study, the body mass index was also higher in women, who also had greater prevalence of acanthosis and acrochordon, both manifestations of insulin resistance. Interestingly, there was no significant difference in the lipid parameters between the sexes. A higher BMI among women was reported by Patil et al (11) (Table 8). The waist hip ratio was higher in the current study than that reported from Brazil in 2010 (12) (Table 9). Acanthosis

and acrochordon are external signs of insulin resistance representing proliferative conditions due to growth factors causing keratinocytes and dermal fibroblast proliferation. Obesity is associated with hyperinsulinism and activation of IGF receptors; multiple skin tags are recognized as markers for diabetes (13). Indians have been reported to have abdominal adiposity as well as ectopic fat deposition and metabolic syndrome, both under and over nutrition pose a double edged problem (1).

The co-morbidities found in the present study in the descending order of prevalence were Diabetes (54%), Hypertension (52%), Dyslipidemia (44%), Obstructive Sleep Apnea (30%), Non Alcoholic Fatty Liver Disease (30%), Osteoarthritis(30%),Cardiovascular Disease (26%), Gastroesophageal Reflux Disease (18%) and Pancreatitis (4%) (Table 7).

Except hypertension, which was more common in women and chronic obstructive pulmonary disease which was more in men, the other disorders were equally distributed (viz diabetes mellitus, dyslipidemia, ischemic heart disease, obstructive sleep apnea and gastroesophageal reflux). The greater female preponderance of hypertension could be due to non-compliance to treatment in women, and reasons for admission in men being organ failure, critical illness with edema, rendering them ineligible for the study.

The lack of dyslipidemia is of interest. Despite admission for a variety of conditions, the lipids were not abnormal, caused in part by lack of access to animal fat belonging as they do, to lower socioeconomic status. What is of importance is that despite lower BMI and not having dyslipidemia, co-morbid conditions can still occur even in rural areas. Other behavioural risk factors such as smoking and the consumption of alcohol must be looked into to prevent illness.

Osteoarthritis was more than twice as common in women. Increasing age, and greater weight could account for the discrepancy. Obesity is a modifiable risk factor for osteoarthritis (10). Osteoarthritis of both knee and hip were increased by obesity (14).

There are few studies on association of inpatients subjects globally. A report from San Diego California showed that obese patients who underwent total joint arthroplasty were at greater risk of infection (3). The proportion of obese women who underwent surgery was higher compared to men, in line with a greater number of admissions in the current study for joint symptoms among women.

It is therefore important to try to prevent overweight and obesity so that the adverse consequences can be minimized. Not only should focus be placed on diet and exercise, but other potentially preventable aspects such as smoking and consumption of alcohol should be attended to (15).

Strengths and limitations: This is an exploratory study to assess the morbidity among subjects who were overweight and obese admitted to a rural medical college hospital in south India. To our knowledge this is the first such evaluation from India. Being preliminary, the sample size and geographical location are limited, as is the limitation inherent in a hospital-based study. Future studies can be planned including larger number of subjects extending over wider geographical regions, finally expanding to community based surveys.

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