Somatic Status Of Rural And Urban Over Weight And Obese Women

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Abstract

Indian studies, however, indicate that the living conditions in rural areas have improved considerably. Transport facilities, medical care and food habits, educational status, and family income have dramatically improved, which along with easy access to city and television watching, result in unwanted changes in lifestyle. These have eventually led to significant increase in body mass index (BMI) as well as abdominal obesity in both sexes as compared to a similar study conducted in the year 1989. The prevalence of overweight rose from 2 to 17.1 percent. The changing lifestyle of the rural dwellers was found to be a contributory factor for the rising rates of obesity and associated metabolic diseases such as diabetes (Ramachandran et al, 2010). In this study the data on anthropometric measurements such as height, weight, Body Mass Index (BMI), Waist Hip, Ratio (WHR) and Body Fat (BF), Basal Metabolic Rate (BMR), Haemoglobin (Hb) of the women were collected to assess their nutritional status as part of the study. The sample did not differ significantly (p =0.181) based on their place of residence and they varied significantly as the standard deviation values were large. The study results revealed that there was significant difference (p=0.000) in Haemoglobin levels of rural and urban women at 0.001 level indicating a difference health status.

Key words: obesity, overweight, rural women, urban women, somatic status.

1. Introduction

Now a days, obesity has become a chronic disorder affecting the larger population than any other chronic disease in the world. It mostly affects the adult population but children and adolescent are also prone to develop obesity. Obesity is not just limited to urban and affluent society but also affects the rural areas and persons belonging to the lower socio-economic strata. Various epidemiological determinants have been responsible for the development of obesity, notably among them are dietary habits, physical inactivity,
alcoholism, Smoking etc. Body Mass Index (BMI) has been one of the easiest ways to determine the transition of a person from normal weight to obesity. It is simple to calculate and it categorizes a person as underweight, normal, overweight and obese with its stages. Thus, BMI not only identifies obesity but also persons in pre-obese stages. So a screening program based on BMI would be helpful not only in identifying obese but also pre-obese persons so that timely measures could be taken for its correction, prevention and control and achieve physical fitness through appropriate activities.

A need based health education and lifestyle change motivation interventions should be targeted at these women to prevent the onset of non-communicable diseases. Furthermore, it is important for public health care providers, researchers, and nutrition practitioners to minimize weight bias by educating women and the public alike about the complex regulation of energy balance and body weight. Only then will realistic expectations be met without undue apprehension when addressing the causes and consequences of obesity and unhealthy weight control behaviours.

2. Methodology

The study was conducted on 300 overweight and obese women with a BMI above 25 and aged between 21-40 years with no co-morbidity and living in the Tirupati rural and urban mandals of Chittoor district in Andhra Pradesh (India). Using the random cluster sampling method the subjects meeting the criteria (sex, age, physiological status, BMI and no morbidity) were selected from each village/ ward selected for the study. The study areas (village/ ward) were surveyed for overweight and obese women aged between 21-40 years with no co-morbidity, non-pregnant and non-nursing and having BMI above 25 and willing to participate (oral consent) in the study formed the sample frame for the present study. The BMI of all the obese looking women was assessed by taking their weight and height using platform type of Weighing scale and Height rod. The list of women meeting the study criteria was prepared for each ward and village and those women willing to participate in the study were included, thus the total sample for pre-test of the research undertaken was 300 women.

3. Results and discussion:

Obesity is connected with an increased risk for developing hypertension, hyperlipidemia, diabetes, coronary heart disease(Gregg et al., 2005), stroke (Curioni et al., 2006),
osteoarthritis (Wang et al., 2009) and certain cancers (McKiernan, 2005). The results of pre-test conducted as part of doctoral research programme is presented and discussed as follows.

3.1. Somatic status of the sample:

The cost of obesity to the Australian health system exceeded $8 billion in 2008, and this integrated costs related to consequent metabolic disease, cardiac disease and surgical complications (Parliament of Australia 2009). Furthermore, obesity is found to be a risk factor for early all-cause mortality (McGee, 2005). It looks like the health advantages inspired by modern medicine are being eroded by the present obesity epidemic.

Table 1: Distribution of women according to their somatic status

<table>
<thead>
<tr>
<th>S. No</th>
<th>Variable</th>
<th>Classification</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BMI</td>
<td>Over weight</td>
<td>203</td>
<td>67.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obese grade-I</td>
<td>91</td>
<td>30.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obese Grade-II</td>
<td>6</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100.0</strong></td>
</tr>
<tr>
<td>2</td>
<td>WHR</td>
<td>Moderate Risk</td>
<td>136</td>
<td>45.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Risk</td>
<td>164</td>
<td>54.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100.0</strong></td>
</tr>
<tr>
<td>3</td>
<td>Body Fat</td>
<td>Normal</td>
<td>57</td>
<td>19.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Above Normal</td>
<td>243</td>
<td>81.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100.0</strong></td>
</tr>
<tr>
<td>4</td>
<td>BMR</td>
<td>Normal</td>
<td>100</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Above Normal</td>
<td>200</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Body Mass Index:

In the 19th century, the mathematician and social statistician, Adolphe Quetelet (1869), observed that the weight of the average man was proportional to the square of the height. The ratio of body weight measured in kilograms divided by the square of the height measured in meters was termed the Quetelet’s Index and later renamed the Body Mass Index.
The Body mass Index (BMI) is the measurement used as an index to classify adults into underweight, normal, overweight, obese groups. It also is widely used as a tool for screening obese as a risk screening obese as a risk factor for the prevalence of several health issues. The table 1 shows the Body Mass Index of women, which indicates that among the sample studied 67.7 percent were overweight (BMI = 25 to 29.9), 30.3 percent were obese grade I (BMI = 30 to 34.9) and a 2 percent were obese grade II (BMI = 35 to 39.9). This reveal that majority of women were overweight and a notable percent of sample were obese. Anthropometric measures such as the body mass index (BMI) and waist and circumference are widely used as suitable indices of adiposity, yet there are limitations in their estimates of body fat (Pasco, 2012).

**Waist Hip Ratio (WHR):**

The waist circumference and hip circumference was used to calculate Waist Hip Ratio (WHR) of women. This measurement is valuable to examine android and ganoids obesity, as the greater WHRs is a health risk factor in both men and women. It is important waist hip ratio should be less than 0.8 and even lower to be fit and healthy. The table 1, reveals that 45.4 percent of women had moderate health risk (WHR: 0.81 – 0.85) and around 54.7 percent of women had high health risk (WHR: 0.86 or higher) due to central obesity. Huxley et al. (2010) presented a conclusion after a thorough review that there was evidence that values of general obesity (e.g. BMI) and measures of abdominal adiposity (e.g. waist circumference, waist–hip ratio and waist–height ratio) are associated with CVD risk factors and incident CVD events.

**Body Fat (BF):**

Average percentage body fat mass values range from 10–15 percent in adult men and 20–30 percent in adult women. However, there are large variations with age, race, other genetic factors, and diet (Ojha and Symonds, 2014). Using the Omron Full Body Sensor Body Composition Monitor and Scale Model HBF-510, body fat percentage of the sample was assessed, a 19 percent had normal body fat (21.0 - 32.9) and 81 percent had above normal body fat (33.0 - 38.9). Study results of Reis (1999) results suggest ratio measures of abdominal adiposity, especially WTR in both sexes and WHR in women, strongly and positively predict mortality, independent of BMI, among white and black adults.

**Basal Metabolic Rate (BMR):**

The BMR is the rate of energy expenditure of a person at rest; it eliminates the variable effect of physical activity. The BMR accounts for approximately 60 percent of the
daily energy expenditure. Thus it includes energy used for normal body cellular homeostasis, cardiac function, brain and other nerve function etc. (Pelley, 2012). The main determinant of BMR is Fat Free Mass (Heshka et al., 2007), whereas Fat Mass is significant only in obese subjects (Johnstone et al., 2005). Gender is also a significant determinant of BMR, with men having a greater BMR than females after change for body composition (Goran et al., 1994).

In the present study a 33.3 percent of women had normal and 66.7 percent had above normal BMR.

Table 2: Difference between rural and urban women in BMR

<table>
<thead>
<tr>
<th>Variable</th>
<th>Locality</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMR</td>
<td>Rural</td>
<td>150</td>
<td>1,539.25</td>
<td>172.018</td>
<td>1.342</td>
<td>0.181</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>150</td>
<td>1,564.83</td>
<td>158.039</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table 2 indicates that the sample did not differ significantly (p =0.181) based on their place of residence and they varied significantly as the standard deviation values were large. These results were consistent with the findings of a Chinese study, where the BMR of overweight and obese people was greater than normal healthy people and the important factor influencing BMR is lean body mass (Zhang, 2016). BMR depends on body composition as expressed by fat-free mass (FFM) and fat mass (FM) and on gender, age, physical activity, and nutritional status.

Haemoglobin level:

In India, it is classified as a major public health problem as it is estimated that 52 percent of non-pregnant women of reproductive age are anaemic (WHO, 2008). Although the primary cause of anaemia is iron-deficiency, it is seldom present in isolation (Anu Rammohan, 2012). Compromised iron status, as indicated by iron deficiency (Neufeld, 2008) and anaemia, also disproportionately affects women. The causes of iron deficiency (ID) and anaemia are multi-factorial and include insufficient intake of iron-dense foods, consumption of staple foods that are poor iron sources or contain iron absorption inhibitors (WHO, 2001), parasitic infections (Stoltzfus, 1997), and vitamin deficiencies (Fishman, 2000). Despite increased national and international awareness and recent governmental
intervention programmes, the occurrence of anaemia among Indian women has remained higher than 45 percent since 1990, and anaemia trends remain strongly correlated with iron-deficiency (WHO, 2007; Kotecha, 2008; Seshadri, 2001; MHFW, 2006).

Anaemia is the condition of having a lower than normal number of Red Blood Cells (RBC) and Haemoglobin levels less than 13-15 gram percentage. To improve the Haemoglobin levels, the dietary intake of women should be improved in, Green Leafy Vegetables, citrus fruits, yellow to Red colour vegetables and fruits, protein rich foods. The Ferritin levels of the individuals should also be normal. In the present study the blood Haemoglobin levels of the sample was assessed and the sample classified as normal (12-16 g/dl), mild anaemia (10-12 g/dl), moderate anaemia (8-10 g/dl), severe anaemia (<8 g/dl), based on their Haemoglobin levels.

Table 3: Distribution of sample according to their Hb levels.

<table>
<thead>
<tr>
<th>S NO</th>
<th>Category</th>
<th>Normal Range</th>
<th>Percentage of sample (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal</td>
<td>12-16g/dl</td>
<td>4.7</td>
</tr>
<tr>
<td>2</td>
<td>Mild Anaemia</td>
<td>10-12g/dl</td>
<td>23.7</td>
</tr>
<tr>
<td>3</td>
<td>Moderate Anaemia</td>
<td>8&lt;10g/dl</td>
<td>31.7</td>
</tr>
<tr>
<td>4</td>
<td>Severe Anaemia</td>
<td>&lt;8g/dl</td>
<td>40.7</td>
</tr>
</tbody>
</table>

Figure 1: Distribution of sample according to their Hb levels.
The table 3 and figure 1 indicates that only 4.7 percent of women were normal, 23.7 percent had mild anaemia 31.7 percent had moderate Anaemia and 40.7 percent had severe anaemia. The Co-existence of over Weight and obesity (OWOB) and micronutrient deficiencies or anaemia within individuals suggests that these forms of over and under nutrition may have unique etiologies unique etiologies. Decision – makers should still consider the prevalence, consequences, and etiology of the individual components of the Double Burden of Malnutrition (DBM) as programs move towards double-duty interventions aimed at addressing OWOB and under nutrition simultaneously (Anne M Williams, 2020).

### Table 4: Difference between rural and urban women in Haemoglobin levels

<table>
<thead>
<tr>
<th>Variable</th>
<th>Locality</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin</td>
<td>Rural</td>
<td>150</td>
<td>7.92</td>
<td>4.497</td>
<td>3.939</td>
<td>0.000**</td>
</tr>
<tr>
<td>(Hb %)</td>
<td>Urban</td>
<td>150</td>
<td>5.70</td>
<td>5.231</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table 4 a reveals that there was significant difference (p=0.000) in Haemoglobin levels of rural and urban women at 0.001 level indicating a difference health status. Shedole et al., found (2017) that the prevalence of anaemia is higher among rural girls compared to urban girls considering it to be a major health problem among the adolescents in rural areas.

4. Conclusion:

The results of the study allows to conclude that the majority of women were overweight (67.7%) and a notable percent (2%) of sample were obese. The WHR of women reflects moderate health risk (WHR: 0.81–0.85) and high health risk (WHR: 0.86 or higher) due to central obesity. A major percent of women (81%) had above normal body fat (33.0 - 38.9). The BMR of women was above normal for major percent of obese women and most of the women had moderate (31.7 %) to severe anaemia (40.7%) indicating association of anaemia with overweight and obesity. These findings forms the basis for educational intervention programme to improve intake of healthy food with low fat, low carbohydrates and moderate protein with high dietary diversity and optimum physical activity to reduce overweight and obesity.

References:

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