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Assessment of anthropometric measurements and nutrient intake of rural overweight/obese adult women

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Abstract

The present study was an attempt to assess the nutritional status with respect to anthropometric indices and nutrient intake of the rural adult women in the age of 30-55 years in Kanava Nayakkanur village under Udumalpet block of Tirupur district, Tamil Nadu. The study was conducted among 110 rural adult women. Interview schedule was used to elicit data on general information like socio economic status, anthropometric indices and nutrient intake. The results revealed that majority (34%) were overweight and twenty one percent were obese as per their Body Mass Index (BMI). The Waist Hip Ratio (WHR) shows that majority (55%) of the subject were in the high risk group whereas twenty seven per cent were in moderate risk group. The study also shows that intake of nutrients such as energy, fat and protein were much above the Recommended Dietary Allowance. It is concluded from the study that there exist a positive correlation between Body Mass Index, Waist Hip Ratio and energy intake by the subjects.

Keywords: Anthropometric indices, BMI, WHR, Nutrient intake

Introduction

Once considered a problem related to affluence, obesity is now rapidly growing in many developing countries and in poor neighbourhoods of developed countries (WHO, 2003) [17]. It has reached epidemic proportions globally, with more than 1 billion adults as overweight - at least 300 million of them clinically obese (WHO, 2005) [18]. India, which was known typically for high prevalence of under nutrition, has now significant proportions of overweight and obesity that coexist with the undernourished (Popkin, 2002) [12]. Obesity has now become an important health problem in developing countries particularly in India which is currently experiencing a rapid epidemiological transition (Parimalavalli *et al.*, 2009) [11].

Obesity is a condition with excessive accumulation of adipose tissue to an extent that health is impaired. It is a condition in which the fat stores are excessive for an individual's height, weight, gender and race, and produces adverse health outcomes. Studies showed that the nutritional status of adults, as determined by Body Mass Index (BMI), indicates that 50% of Indian adults suffer from different types of chronic energy deficiency. However, there are reports of more overweight/obese (BMI \geq 25 kg/m²) women than men (Singh and Shankar, 2014) [15]. According to the NFHS-3 data, the highest percentage of obesity among women was found in the southern states of Tamil Nadu (IIPS, 2007) [7]. Similarly, increased prevalence of overweight among female in rural area of Kerala were also observed (Harnagle and Binu, 2014) [4].

A study conducted among women aged 35-70 year in four urban and five rural locations of India revealed that the prevalence of obesity as 45.6 and 22.5 per cent (Pandey *et al.*, 2013) [10]. Pradeepa *et al.*, (2015) [13] stated that there is a large increase in prevalence of obesity not only in urban areas but also in rural areas of India. The reasons for prevalence may be attributed to urbanization, changing lifestyle, food pattern and behaviour. Considering the above facts in mind, the present study was being carried with the objectives to assess the anthropometric profile of the subjects and their nutrient intake.

2. Methodology

2.1. Selection of Area, Subjects and Tools for the study

The study was conducted in Kanava Nayakkanur village under Udumalpet block of Tirupur district, Tamil Nadu.

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Random sampling method was adopted and a total of 110 adult women in the age group 30-55 years were selected for the study. Pregnant and lactating women were excluded in this study. Interview schedule was used to elicit data on general information like socio economic status, anthropometric indices and nutrient intake from the selected subjects.

2.2. Anthropometric Assessment

Anthropometric measurements viz height and weight were measured using standard methods and BMI was calculated. The subjects were categorized as normal, overweight and obesity using WHO standards. Waist and hip circumference were measured (Bray and Grayed, 1988) [1] and waist hip ratio was calculated and compared with WHO standards as low risk, moderate risk and high risk for obesity-related health risks.

2.3. Dietary Assessment

Three days 24-hour recall method was used to find out the food intake and nutrient intake was calculated by using Diet Cal and compared with the Recommended Dietary Allowance, 2010 of ICMR. Adequacy of nutrient intake was assessed by calculating nutrient adequacy ratio (NAR) for each nutrient (Jood *et al.*, 1999) [6].

2.4. Data Analysis

Statistical measures like frequency, mean, standard deviation, percentage and correlation was analysed by using SPSS 20.0 version.

3. Results and Discussion

3.1 Socio- Economic Profile of the Selected Subjects

The socioeconomic profile of the selected subject is depicted in Table- I which indicates that majority (38%) of the selected subjects were in the age group of 30-40 years followed by thirty four percent each in 40-50 and 50-55 years respectively. Gouda and Prusty, (2014) [3] stated that advancement in age with declining physical activity leads to weigh gain. Majority (88%) of the subjects were married whereas only ten percent of them were unmarried. It is evident that majority (80%) of the subjects belong to Hindu while twenty percent belong to Muslim religion. Community wise distribution of the subject revealed that majority (76%) of the subjects was from Backward Community (BC) and only twenty four percent were from Most Backward Community (MBC). Majority (54%) of the subjects had a joint family. All the subjects were literate with 80% primary education while 14% secondary education.

Majority (65%) of the subjects were housewives. Majority (65%) of the subjects had a monthly income of Rs. 6000/- to 10000/-.

Table 1: Socio- Economic Profile of the Selected Subjects

Characteristics	Frequency (N=110)	Percentage
Age range (in years)		
30-40	42	38.19
40-50	34	30.9
50-55	34	30.9
Marital Status		
Married	97	88.18
Unmarried	13	10.11
Religion		
Hindu	87	80
Muslim	23	20
Community		
BC	84	76.36
MBC	26	23.73
Type of family		
Nuclear	50	45.45
Joint	60	54.18
Education		
Primary	88	80
Secondary	15	13.63
Degree	7	6.38
Occupation		
Coolie	16	14.54 64.54
House wife	71	15.45
Agriculture	17	5.65
Entrepreneur	6	
Monthly family income		
<6000	16	14.54 64.54
6000-10000	71	15.45
10000- 15000	17	5.65
>15000	6	

3.2 Body Mass Index of the Selected Subjects

The BMI of the selected subjects is shown in Table -II and majority (34%) of the selected subjects were overweight and twenty one per cent were obese. The mean BMI of the selected overweight and obese subjects were 27 and 32 respectively. The result is in line with studies on prevalence of obesity and

overweight conducted in different parts of the country (IIPS, 2007) [7]. A recent analysis of anthropometric measurements among women aged 20–49 years in 36 developing countries indicated that the proportion of overweight exceeded the proportion of underweight in majority of the countries in both urban and rural areas (Mishra *et al.*, 2006) [8].

Table 2: Body Mass Index of the Selected Subjects

Body Mass Index	Mean BMI	Frequency (n=110)	Percentage
Under weight (less than 18.5)	17.49 ± 0.73	20	18.2
Normal (18.5-23.0)	20.72 ± 1.51	30	27.3
Overweight (23.0-29.9)	27.45 ± 1.53	37	33.6
Obesity (30 and above)	31.51 ± 0.98	23	20.9

3.3. Waist Hip Ratio of the Selected Subjects

The Waist Hip Ratio (WHR) is a simple measure of central obesity. The Waist Hip Ratio predicts the risk of developing several conditions associated with excess abdominal fat. The Waist Hip Ratio of the selected subjects is indicated in Table-III. The study shows that majority (55%) of the subject were in the high risk group whereas twenty seven per cent were in moderate risk group and only eighteen per cent were in low risk group for obesity related health risk. The Waist to Hip Ratio (WHR) – that means waist circumference/hip

circumference – has proven useful in daily practice. Waist and Hip measurements are useful for defining body fat distribution, which is of special value when assessing health risks (Mungreiphy and Kapoor, 2009) [9]. A ratio of 1.0 or greater in men, and greater than 0.85 in women, is particularly associated with metabolic complications. A recent study conducted by Chauhan *et al.*, (2015) [2] reported that increased Waist Hip Ratio was observed among the female subjects indicating central obesity.

Table 3: Waist Hip Ratio of the Selected Subjects

Classification of the waist hip ratio	Mean WHR	Frequency (n=110)	Percentage
<0.8(low risk)	0.7 ± 0.05	20	18.18
0.8-0.89(moderate risk)	0.84 ± 0.02	30	27.37
>0.9(high risk)	1.05 ± 0.19	60	54.54

3.4. Nutrient Intake and Nutrient Adequacy Ratio of the Selected Subjects

The mean nutrient intake and nutrient adequacy ratio of the selected subjects is presented in Table-V. It is evident from the table that nutrients like energy, fat and protein are found to be adequate in their diet. However protective nutrients like iron, fibre were found to be inadequate or marginally adequate. The increase of overweight and obesity among the middle and

higher aged individuals could be attributed to the accumulation of body fat, increased energy intake, a fat-rich diet and relatively less energy expenditure due to lesser involvement in physical activities (Sen *et al.*, 2013) [14]. Declining physical activity and increasing consumption of foods rich in saturated fat and sugar are primary reasons for a growing obesity epidemic worldwide (WHO, 2003) [17].

Table 4: Mean Nutrient Intake and Nutrient Adequacy Ratio of the Selected Subjects

Nutrients	RDA 2010 for Sedentary worker (Women)	Mean Nutrient intake	Difference	Nutrient Adequacy Ratio (%) (NAR)	Category of NAR
Energy	1900	2014.8	+210.2	106.4	Adequate
Protein	55	59.83	+4.83	108.78	Adequate
Fat	20	30	+10.00	150	Adequate
Iron	21	11.17	-9.83	55.71	Marginally inadequate
Fiber	20	6.26	-13.74	31.3	Inadequate

3.5. Correlation between BMI, Waist Hip Ratio and Energy intake of the Selected Subjects

The correlation between Waist Hip Ratio, BMI and energy intake was assessed and presented in Table-IV. It is clear that there exist a positive correlation between Body Mass Index, Waist Hip Ratio and energy intake of the subjects and it is statistically significant at $P < 0.01$. Sunanda (2006) [16] stated that high degree of correlation between WHR and the proportion of fat situated intra abdominally at the umbilical level. Further, recent study revealed that Waist, Hip circumference and Waist Hip Ratio were positively and significantly ($P < 0.01$) correlated with the Body Mass Index of the selected obese subjects (Parimalavalli *et al.*, 2009) [11].

Table 5: Pearson's Correlation between Waist Hip Ratio and BMI of the Selected Subjects

Parameters	'r' Value
BMI Vs WHR	0.759**
BMI Vs Energy	0.836**
WHR Vs Energy	0.723**

** . Correlation is significant at the 0.01 level

4. Conclusion

It has been concluded from the study that 54% of the selected subjects were overweight and obese with 27% in moderate risk and 55% in high risk for obesity related health issues. Intake of energy, protein and fat exceed the normal RDA while intake of fibre was inadequate. The study shows a positive correlation between BMI, Waist Hip Ratio and energy intake by the subjects.

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