

Anthropometric profile and nutrient intake of urban women

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The study included 200 urban women from Sambalpur district, Odisha. Normal women and women with risk of obesity were recruited for conducting the study. Data on general information, socio-economic status, and anthropometric measurements and nutritional profile were collected using interview schedule. The results revealed that about 21.5 per cent were normal women, 50 per cent were pre-obese, 24.5 per cent belonged to obese class-I type and only 4.0% belonged to obese class-III category. Data on assessment of nutrient intake against the recommended dietary allowance (RDA) indicates that the intake of protein and calorie were found to be higher than the RDA. Comparison of mean height, weight and BMI of urban women with ICMR and NNMB data of urban areas indicates that the mean height, weight and BMI of the women in this study were higher. Test of hypothesis revealed no association of calorie intake with BMI and WHR.

Key Words : Body mass index, Waist hip ratio, Obesity, Women, Nutrients

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INTRODUCTION

Obesity is prevalent in several developing countries, affecting children, adolescents and adults particularly in those countries experiencing rapid industrialization and urbanization, obesity is growing faster and coexists with under-nutrition and infectious diseases, becoming one of the greatest public health problems (Ribeiro *et al.*, 2003).

Nutrition plays a very important role in the physical, mental and emotional development of human beings. The nutritional requirements of females also follow the same pattern in males, but they differ from males in certain important aspect during certain age periods. There is less difference between men and women in nutritional requirements during infancy and early childhood. During

adolescent and adult periods, however the nutrients of women's are lower than men, since the growth rate during adolescence and adult body weight attained are lower in women than in men. During reproductive age period, due to blood loss during the menstrual period, women's need for certain nutrients concerned with blood formation (*viz.*, Iron, folic acid, vitamin B₁₂) is much higher than in men. Obese women are at higher risk for multiple cancers, including endometrial cancers, cervical cancers, breast cancers and perhaps ovarian cancers (Kulie *et al.*, 2011).

From National Family Health Survey (NFHS) it was found that Indian women are more obese than Indian men. Moreover, as per the NFHS data there is not a single state in India where more number of men are obese than women. Only Tripura is one state where this difference is small of 0.1 per cent (in Tripura number of obese male 5.2 per cent and number of obese female 5.3%), while in rest of state this difference is very significant. Whereas Punjab tops overall obese people chart with 30.3 per cent

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obese male and 37.5 per cent obese female. Overall, India results are 12.1 per cent obese male and 16 per cent obese female. From this data, we can clearly conclude that women are more obese than men in India. In recent years obesity has increased significantly in India and it looks that this trend has affected Indian women more than Indian men. It is difficult to define exact reason between these trends and why Indian women are more obese than Indian men, however, it looks that Indian women are enjoying life more comfortably than Indian men because comfortable life is mostly associated with obesity. Overall, this is not a good sign for health conscious women, because chances of numbers of health related problems increases significantly (Garg *et al.*, 2009). Health care providers should encourage women to consume a diet high in fruits and vegetables and low in total and saturated fats (Morin *et al.*, 2004).

According to the 2011 census, the state population is 41.9 million out of which 18.6 million are females. A review of literature reveals that no systematic study has been made on the anthropometric measurements and the nutrient intake among the urban women of Odisha. A humble attempt has been made in this paper to study the anthropometric measurements and the nutrient intake among the urban women within Sambalpur municipality.

METHODOLOGY

According to the 2011 census the total population of Sambalpur district is 1,044,410 out of which 529,424 are males and 514,986 are females. The urban women who were 25 years of age and above in different area of Sambalpur town *i.e.* Modipara, Cheruapara, Gopalmal,

Housing Board Colony, Baraipali, Labour Colony, Station colony, constitute the universe of our study.

The study was conducted by interviewing 200 urban women of Sambalpur district of western Odisha selected by purposive sampling technique. A personal interview schedule was designed, pretested, and refined for the collection of information on demography and other socio economic condition of family. Anthropometric measurements of the subjects recorded were height, weight, waist and hip circumferences. Body mass index was calculated by using formula $BMI = \text{Weight (kg)} / \text{Height (mtr}^2)$. According to "Jelliffee and Jelliffee, 1991" to determine whether an individual is obese or not, his body mass index is compared with a reference standard. For the present study oral questionnaire method (24 hours recall) was followed to estimate the mean intake of food by the urban women. The nutrient contents of the diet taken by the women during the day were estimated following the tables of nutritive value of Indian foods given by ICMR (Gopalan *et al.*, 1996).

OBSERVATIONS AND ASSESSMENT

Table 1 presents the prevalence of obesity among the urban women on the basis of BMI level. It was observed that out of total 200 data, about 21.5 per cent were normal women having BMI level 18.5-24.9. About 50 per cent were pre-obese women having BMI level ranging from 25.0-29.9. 24.5 per cent belonged to obese class I type where the BMI level is 30.0-34.9. None of them belong to obese class II category. Only 4 per cent of women belonged to obese class III category where BMI level is 40 or higher.

Table 1 : Prevalence of obesity and BMI [wt/(ht)²]

Weight status	Number of subjects	Percentage	BMI range
Normal	43	21.5	18.5-24.9
Pre-obese	100	50	25.0-29.9
Obese-I	49	24.5	30.0-34.9
Obese-II	-	-	35.0-39.9
Obese-III	8	4	40 or higher

Table 2 : Comparison of mean body mass index of the urban women with ICMR and NNMB data on adult women and with other related studies

	Obese women of Coimbatore 1(2002)	Obese women of Tamil Nadu 2(2009)	Present study 3 (2011)	NNMB 4(1980)	ICMR 5(1980)
Height (cm)	154.8	158	155.63	154.9	154.1
Weight (kg)	77.0	67.7	67.58	52.2	46.2
BMI (kg/m ²)	32.5	27.2	28.29	21.76	19.45

1=Thilakavathi and Purushothaman (2002) 2=Parimalavalli *et al.* (2009) 3 = Present study (2011) 4=NNMB(1980) 5=ICMR(1980)

Comparison of anthropometric measurements with other related data:

Comparison of mean height, weight and body mass index of the urban women with the ICMR and NNMB data of urban areas (Table 2) indicate that the mean height, weight and BMI of women of present study were higher than the mean of urban women of India [NNMB (1980), ICMR (1980)].

The comparison of mean height, weight and BMI of the present study with that of mean height and weight of women in India (age group of 25-44 yrs of 10 states) including Orissa shows that all the three mean were higher in the present study, when compared with other states (Table 3).

Obesity and anthropometric measurement:

The Table 4 presents the relation of obesity with the five anthropometric measurements of women of. In case of obese women weight, waist circumference and MUAC are higher than the non-obese in the present study. The difference in anthropometric measurements like

height, weight, MUAC, waist circumference were found to be highly significant, ($P < 0.05$) with prevalence of obesity on the basis of analysis variance.

Nutrient intake among women:

The average intake of protein and calories were found to be 45.88 and 47.96 per cent higher than the RDA. The intake of iron was found to be 19.06 per cent less than the RDA. The intake of calcium was 112.18 per cent higher than the RDA. The high energy intake was contributed mainly by a higher fat intake and high carbohydrate intake. The excess calories intake by the urban women was mainly due to the inclusion of different types of cereal products in breakfast and also in evening Tiffin. In urban areas it was found that every family are using more amount of ghee and cooking oils in food preparation which are very rich sources of fat. Iron intake was observed to be less in urban areas because of less inclusion of pulses and green leafy vegetables in the diets. The excess calcium intake by the urban women was mainly due to the inclusion of more amounts of milk and

Table 3 : Comparison of mean height and weight of women in India (age 25-44 years of 10 states) with mean height and weight of urban women of present study (25-55 years and above)

State	N/age	Height(cm)	Weight (kg)	BMI (kg/m ²)	References
Kerala	1290 (25-44)	149.3	42.3	18.98	National
Tamil Nadu	1385(-do-)	150.7	43.5	28.90	Nutrition
Karnataka	1972(-do-)	151.5	42.6	18.56	Monitoring
Andhra Pradesh	1645(-do-)	150.8	42.7	18.80	Bureaus.
Maharashtra	1560(-do-)	150.1	41.5	18.42	Annual Report (1974-79)
Gujarat	1791(-do-)	152.9	43.6	18.66	NNMB, ICMR (1980)
Madhya Pradesh	873(-do-)	150.7	44.4	19.55	*NNMB- 1996
West Bengal	1344(-do-)	148.5	39.9	18.10	
Uttar Pradesh	1288(-do-)	150.0	41.9	18.62	
Odisha	478(-do-)	148.6	42.0	19.02	
*Odisha	-	150.9	42.5	-	
Present study	200 (25-55 and above)	155.63	67.58	28.29	

Table 4 : Obesity and anthropometric measurement (Number, Mean \pm S.D)

Category	Height	Weight	Waist	Hip	MUAC
Non obese	143	143	143	143	143
	156.81 \pm 4.39	64.57 \pm 6.66	81.53 \pm 5.12	101.75 \pm 3.76	33.51 \pm 3.44
Obese	57	57	57	57	57
	152.66 \pm 5.12	75.12 \pm 4.48	87.64 \pm 1.93	101.91 \pm 2.01	38.28 \pm 2.71
Total	200	200	200	200	200
	155.63 \pm 4.97	67.58 \pm 7.75	83.27 \pm 5.24	101.80 \pm 3.35	34.87 \pm 3.89
F	14.643	99.404	62.542	0.106	72.177
Sig	0.000	0.000	0.000	0.745	0.000

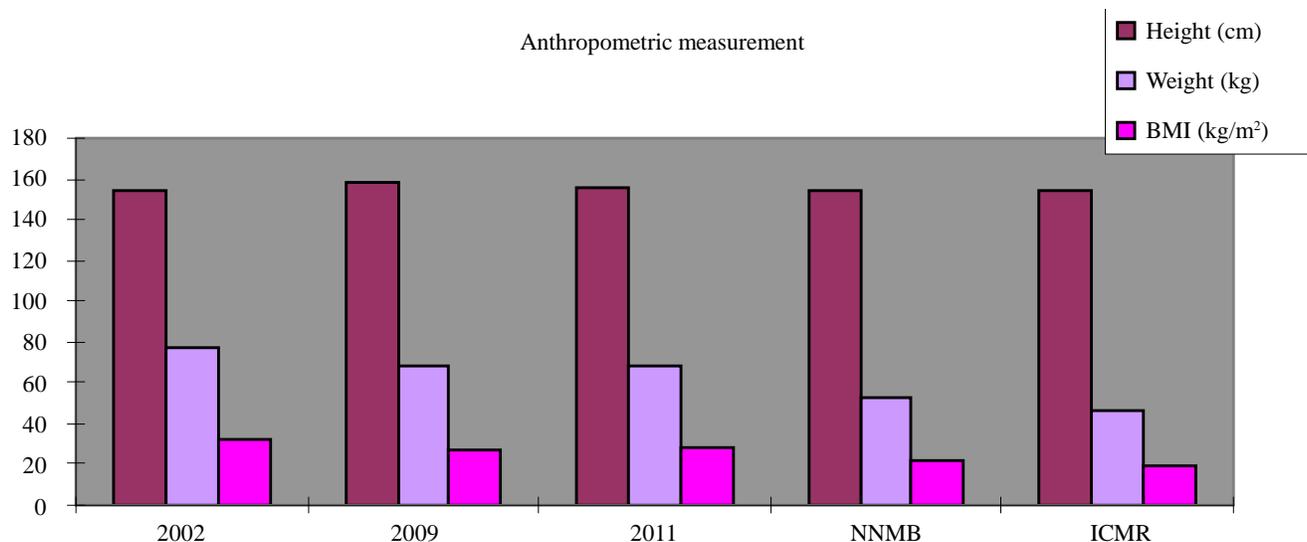


Fig. 1 : Comparison of Mean body mass index of the urban women with ICMR and NNMB data on adult women and with other related studies

milk products, fruits like bananas and other pulses, groundnuts, egg and fish in their daily diets, which are very rich sources of calcium. (Table 5).

Obesity and nutrient intake:

Table 6 presents the relation between obesity and nutrient intake of the urban women. Based on the BMI, women are categorized into obese and non-obese groups. In the present study, intake of calories, fat and carbohydrate were found higher in obese women than

the non-obese. These three nutrients are the major cause for obesity among women. The difference in the average intake of calories and fat were observed to be significant, (P<0.05) with prevalence of obesity. Analysis of Variance showed no significant difference with other nutrients.

Calorie intake and prevalence of obesity:

The Table 7 presents the calorie intake of the urban women and the prevalence of obesity on the basis of their BMI and WHR value. Calorie intake is divided into three

Table 5 : Average daily nutrient intake by the urban women compared with RDA

	(Mean, S.E, ±S.D)	RDA	Excess (+) or Deficit (-)%
Protein(g)	72.94, 0.94, (±13.37)	50	+45.88
Calories(Kcal)	2700.38, 24.42, (±345.35)	1825	+47.96
Fat(g)	73.22, 0.90, (±12.85)	-	-
Carbohydrate	402.59, 3.19, (±45.14)	-	-
Iron(mg)	24.28, 0.36, (±5.13)	30	-19.06
Calcium(mg)	848.72, 22.05, (±311.91)	400	+112.18

Table 6 : Obesity and nutrient intake (Number, Mean ± S.D)

Category	Protein	Calorie	Fat	Carbohydrate	Iron	Calcium
Non obese	143	143	143	143	143	143
	72.74±13.22	2659.75±354.05	71.26±13.28	401.12±46.39	24.19±5.10	877.70±320.72
Obese	57	57	57	57	57	57
	73.46±13.85	2802.32±301.96	78.14±10.26	406.27±42.03	24.49±5.25	776.02±278.16
Total	200	200	200	200	200	200
	72.94±13.37	2700.38±345.35	73.22±12.85	402.59±45.14	24.28±5.13	848.72±311.91
F	0.000	4.672	8.743	1.412	0.291	2.523
Sig	0.990	0.032	0.004	0.236	0.590	0.114

Table 7 : Calorie-intake in relation to BMI and WHR value

Calorie-intake	BMI			
	Normal	Pre obese	Obese –I	Obese- III
Below average (<1460 kcal)	1 (100)	-	-	-
Average (1460-2190 kcal)	7 (38.88)	8 (44.44)	3 (16.66)	-
Above average (>2190 kcal)	35 (19.33)	92 (50.82)	46 (25.41)	8 (4.41)
Total	43 (21.50)	100 (50.00)	49 (24.50)	8 (4.00)
Calorie intake	WHR			
		Normal		Obese
Below average(< 1460 kcal)		1 (100)		-
Average (1460-2190 kcal)		15 (83.33)		3 (16.66)
Above average(>2190 kcal)		122 (67.40)		59 (32.59)
Total		138 (69.0)		62 (31.0)

(Figures in parentheses indicates percentage)

$\chi^2 = 4.08$ and 1.93 (NS)

categories *i.e.* below average, average and above average group. Similarly according to BMI level of the women there are four sub categories *i.e.* Normal, Pre-obese, Obese-I and Obese-III. In the present study with the increase in calorie intake from average to above average, the percentage of women having normal BMI decreases but the percentage of pre-obese and obese-I category goes on increasing. This shows that the increase in calorie intake has a direct impact in BMI level of the women and increases the prevalence of obesity. Test of hypothesis on association of attributes revealed that calorie intake was not associated with BMI ($\chi^2 = 4.08$, $p < 0.05$).

Similarly according to WHR, there are two groups, *i.e.* Normal and Obese. From the table it is clear that the increase in calorie intake has a direct impact on the WHR value of the women. With the increase in calorie intake from average to above average, the percentage of women having normal WHR decreases but obese percentage increases. Test of hypothesis revealed no association of calorie intake and WHR. ($\chi^2 = 1.93$, $p < 0.05$). Similar work related to the present investigation was also conducted by Srivastava and Chakravarty (2010); Singh *et al.* (2013); Ghatge (2013) and Singh and Singh (2013).

Conclusion:

It is concluded that out of total 200 data, 50 per cent women were in pre-obese category, 24.5 per cent in Obese-class I type and only 4 per cent were in Obese-class III category. Both BMI and WHR of the women increase with the increase in age of the urban women. Education is directly related to increase in BMI and WHR. Comparison of mean height, weight and body

mass Index of urban women with ICMR and NNMB data of urban areas indicates that the mean height, weight and BMI of the women of present study were higher than the mean of urban women of India (NNMB, 1980 and ICMR, 1980). Calorie intake has a direct impact on BMI and WHR level of the women. With the increase in calorie intake both BMI and WHR value increases.

The mean nutrient intake was significantly higher than the recommended dietary allowances. In the present study, intake of calories, fat and carbohydrate were found higher in obese women than the non-obese. These three nutrients are the major cause for obesity among women. So awareness programme should be conducted where the hazardous effect of obesity must be central point. Nutrition education has an important role for promoting health and reducing the risk of developing chronic diseases of life style. Various sources are available for the communication of nutrition messages to the public, such as mass media (articles in magazines, news paper, radio and television), health education materials and books as well as through food labelling and food packaging. Nutrition messages may also be delivered by means of individual counselling or health promotion activities provided by health professionals including dieticians, doctors, nurses and primary health care workers.

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