



## RESEARCH PAPER

# Assessment of nutritional status of obese women

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**Abstract :** Assessment of nutritional status of obese women was carried out with an objective to assess nutritional status by assessment of anthropometric measurements, food and nutrient intake by 24 hours recall method. Total 210 obese women of age group 30 to 60 years from overweight (120) and obese (90) areas of Parbhani district of Maharashtra was purposively selected. The general information, anthropometric measurements, dietary pattern by 24 hour recall method by the obese women were obtained through a well- structured interview schedule. Results of the study revealed that the mean value of weight of women was  $82.44 \pm 9.25$  and the mean value of body height of women was  $150.6 \pm 5.95$ , respectively. The BMI of women subjects was  $33.22 \pm 4.358$ , mid upper arm circumference ( $34.89 \pm 3.916$ ). The skinfold thickness of selected women was  $20.87 \pm 2.808$ . The mean values of waist and hip circumference of the subjects were  $94.43 \pm 3.26$  and  $114.2 \pm 3.54$ , respectively. The intake of all the nutrients were significantly higher than RDA's among overweight and obese women except for calcium intake was significantly lower than RDA's. In conclusion, the study stated that all the respondents were having more than normal BMI. The intake of all the nutrients were significantly higher than RDA's except calcium intake. The extra amount of energy associated with sedentary lifestyle might had resulted in positive energy balance, ultimately leading to deposition of fat in the adipose tissue. Findings regarding food consumption frequencies concluded that the consumption of calorie rich foods such as bakery products, nuts, oilseeds and dry fruits, soft drinks, sago, street foods and fried items was practiced by studied women which might have resulted in creation of positive energy balance among them.

**Key Words :** Obesity, Anthropometric measurements, Food, Nutrient intake

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## INTRODUCTION

Obesity is a pathological condition in which excess body fat accumulated, leading adverse effects on health and life expectancy. It is a chronic disorder with complex interaction between genetic and environmental factors. Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A body mass index (BMI) over 25 is considered overweight and over 30 is obese. Obesity is the most

prevalent nutritional disorder in which there is excessive storage of energy in the form of fat as per height, weight, race and gender (WHO, 2005). Obesity is prevalent among all age groups and is on the rise among adults especially the women worldwide in both developed and developing countries (Wang and Hoy, 2004 and Flegal, 2005).

Obesity and overweight are creating a global epidemic. They are the risk factors for many non-

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communicable diseases. Rapidly changing diets and lifestyles are fueling the global obesity epidemic. Once being considered as a problem related to affluence, obesity is now growing fast in many developing countries. In Asian populations, the health risks which are associated with overweight and obesity occur at lower levels of BMI than in North America or Europe, and now lower cutoff points for BMI are used to categorize overweight and obese conditions for the Asian populations. According to the National Family Health Survey-3 in India, overweight and obesity are three times higher in urban areas than in rural areas and are more common among women. The burden of the slum population and the magnitude of their health problems are on the rise. There is a rising prevalence of obesity among the slum population.

Globally, about one-third of adults are overweight/obese and about 10% of adults are underweight. Due to differences in biological (e.g., hormones) and behavioral characteristics. Females are more prone to being underweight, overweight and obese compared to their male counterparts. Women with extreme body weight categories (*i.e.*, underweight and overweight/obesity) suffer from infertility and adverse perinatal outcomes including abortion, preterm birth, and neonatal mortality (Kibria *et al.*, 2019).

Menopause is a stage of women's life when reproductive capacity ceases. In this stage weight gain, onset or worsening of obesity are favoured. During this period the prevalence of obesity is highest (de Paz *et al.*, 2006 and Sharma *et al.*, 2008). The average age of menopause is 47.5 years. India has a large population, with 43 million postmenopausal women and it is projected to be 103 million by 2026 (Unni, 2008). The prevalence of overweight and obesity among postmenopausal women of United Kingdom has been reported as 41% and 36% respectively whereas less than half of the premenopausal women (48.27%) of U.K. were observed as overweight/obese by Begum *et al.* (2009). Rappelli (2002) has also reported that the prevalence of being overweight and obesity is higher in postmenopausal women.

## MATERIAL AND METHODS

### Selection of sample:

A total number of 250 women in the age group of 30-60 years from urban areas of Parbhani city were screened for BMI. Out of these 210 women having body

mass index more than 23.0 were selected following purposive sampling technique.

### Anthropometric measurements of the selected obese women:

Nutritional anthropometry has been defined as "measurements of the variations of the physical dimensions and the gross composition of the human body at different age levels and degrees of nutrition" (Jelliffe, 1966). The anthropometric measurements of the selected obese women were measured by following standard procedures as prescribed by Jelliffe (1966). Anthropometric measurements like height (cm), weight (kg), waist circumference (cm), hip circumference (cm) and tricipital skinfold thickness (cm) were recorded and body mass index (BMI) in kg/m<sup>2</sup> was calculated.

### Assessment of dietary intake:

A representative sample of 100 obese women from a total sample was randomly selected for assessment of food and nutrient intake by 24-hours recall method. All subjects were interviewed with the help of pretested questionnaire schedule. The information regarding their dietary habits, frequency of consumption of different food groups in a day etc., were collected. The actual food intake of the selected elderly was recalled for the immediate past 24 hours. The intake of different nutrients per day by each selected obese women was then calculated from the food intake values using nutritive value of Indian foods (Gopalan *et al.*, 2010). Food and nutrients adequacy was calculated based on recommended dietary allowances. For this a questionnaire was formed and each food items taken by the elderly subjects is recorded in terms of standardized cups.

## RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

### Socio-economic status of selected overweight and obese women:

Socio-economic status of selected overweight and obese women was presented in Table 1.

Majority of the subjects selected for the study were in the age group of 40-50 years and 50-60 years *i.e.* (35.71%) on the other hand (28.57%) women were

belonging to the age group 30-40 years. Highest percentage of subjects (97.61%) were belonging to nuclear families. Only (2.38%) subjects were belonging to joint families. It can be concluded from above data that nuclear families having very few members will facilitate more share of food per individual and less

physical work. Both these factors are responsible for development or overweight and obesity.

In case of educational status it was noticed that high per cent of (57.14%) subjects were secondary school educated whereas (31.90%) subjects were graduate followed by primary school education (8.09%). Among surveyed subjects only (2.875%) subjects were post graduate.

Regarding occupation, majority of the subjects were housewives (94.76%) and (3.333%) were doctor and (1.42%) subjects were employed as a professor and (0.476%) subjects were having CA profession. It is clear from the table that there were most of the selected subjects were housewives but there is general trend to appoint a house maid specially for those household chores which require little more energy expenditure. Hence this factor may be responsible for less energy expenditure and prone to develop overweight and obesity.

Income of the subjects varied between Rs. 20,000 to above 50,000/-. Majority of the subjects were having income above Rs. 50,000 whereas (28.57%) subjects had income between Rs. 20,000-30,000. It is further revealed that 20 per cent subjects had income between Rs.40,000-50,000 and (16.19%) subjects were having monthly income from Rs.30,000-40,000. From the results it was noticed that income has association with development of obesity. The results are in line with the Mendez *et al.* (2004), it shows that income was positively associated with obesity.

The data of activity pattern of the subjects indicated that most of the subjects were found to be following sedentary working pattern (96.19%). Only (3.8%) subjects were moderate workers. No subject was there in the heavy work activity pattern. Data regarding activity pattern of selected overweight and obese women were found to be following sedentary activity pattern in day to day life, which is an indication of less energy expenditure leading to development of overweight and obesity among women.

Particulars	Female (n = 210)	
	Frequency (n)	Percentage (%)
<b>Age groups</b>		
30-40	60	28.57
40-50	75	35.71
50-60	75	35.71
<b>Type of family</b>		
Nuclear	205	97.61
Joint	5	2.38
<b>Education</b>		
Primary	17	8.095
Secondary	120	57.14
Graduation	67	31.90
Post- Graduation	6	2.875
<b>Occupation</b>		
Housewife	199	94.76
Doctor	7	3.333
Professor	3	1.428
CA	1	0.4761
<b>Income</b>		
20,000 – 30,000	60	28.57
30,000 – 40,000	34	16.19
40,000 – 50,000	42	20
>50,000	74	35.23
<b>Activity pattern</b>		
Sedentary	202	96.19
Moderate	8	3.809
Heavy	0	0.00

**Table 2: Age wise height and weight of selected overweight and obese women (n=210)**

Age (years)	Weight (kg) (Mean $\pm$ S.D)	Weight range (kg)	Height (cm) (Mean $\pm$ S.D.)	Height range (cm)
30-35	78.1 $\pm$ 11.02	62- 80	152.3 $\pm$ 5.37	150- 162
35-40	76.29 $\pm$ 9.53	70- 85	152.1 $\pm$ 8.61	151- 164
40-45	76.67 $\pm$ 10.09	72- 90	153.6 $\pm$ 8.17	149-160
45-50	76.56 $\pm$ 9.00	72-98	156.2 $\pm$ 6.11	145-165
50-55	82.44 $\pm$ 9.25	78- 100	152.8 $\pm$ 8.19	151- 161
55-60	76.82 $\pm$ 6.99	82-105	150.6 $\pm$ 5.95	148-164

Age wise height and weight of selected overweight and obese women is presented in Table 2. The mean weight of women corresponding to above age groups 30-35 was  $78.1 \pm 11.02$  followed by  $76.29 \pm 9.53$ ,  $76.67 \pm 10.09$ ,  $76.56 \pm 9.00$ ,  $82.44 \pm 9.25$ ,  $76.82 \pm 6.99$  for 35-40, 40-45, 45-50, 50-55, 55-60, respectively. The data with regard to weight range indicated that the minimum observed weight of women was 62 kg which ranged to maximum of 105 kg.

The height of 30-35, 35-40, 40-45, 45-50, 50-55 and 55-60 years old selected women was  $152.3 \pm 5.37$ ,  $152.1 \pm 8.61$ ,  $153.6 \pm 8.17$ ,  $156.2 \pm 6.11$ ,  $152.8 \pm 8.19$  and  $150.6 \pm 5.95$ , respectively. The height of selected overweight and obese women ranged from 150-164cm.

In a nut shell, the above data depicts that there was no specific trend of weight and height according to age of overweight and obese subjects. Shukla *et al.* (2002) in a study conducted on urban adult population indicated that the mean height and weight of the subjects were 161.0 cm and 56.7 kg.

Table 3 depicts the anthropometric measurements of selected overweight and obese women. The observations for body mass index, mid upper arm circumference, triceps skinfold thickness, waist circumference and hip circumference are given in Table 4. The results showed that BMI of the selected subjects was  $33.22 \pm 4.358$ , mid upper arm circumference ( $34.89 \pm 3.916$ ), skinfold thickness  $20.87 \pm 2.808$ , waist and hip

circumference  $94.43 \pm 3.26$  and  $114.2 \pm 3.54$ , respectively. It was noticed that mean values of all the recorded anthropometric measurements of the subjects were more than standard values and statistically highly significant.

The above findings indicate that all the studied anthropometric parameters of adults under study are higher than that of the cut off values. Skinfold thickness measure subcutaneous body fat and therefore indicate body composition. The elevated values of waist and hip circumference suggest the prevalence of central obesity and accumulation of visceral fat among the selected subjects.

The results of present investigation are in line with findings of the study conducted by Lourenco *et al.* (2008) all the subjects with  $BMI \geq 30 \text{ kg/m}^2$  showed WC values suggestive of increased risk for chronic noncommunicable diseases.

Distribution of selected subjects according to age is presented in Table 4. A total 210 women having BMI more than 23.0 were selected for the study. It was observed that out of 210 women, there were (120) overweight and (90) obese women between the age group of 30-60 years. Majority of the subjects were overweight (25%) and obese (27.77%) from age group of 45-50 years followed by 50-55 year age *i.e.* overweight (23.33%) and obese (20%) whereas (20.83%) overweight and (20%) obese subjects were from 40-45 years of age. Further it was found that

Sr. No.	Parameters	Women (n=210) (Mean± S.E.)	Standard value	t value
1.	BMI (kg/m <sup>2</sup> )	$33.22 \pm 4.358$	22	37.4**
2.	Mid upper arm circumference (cm)	$34.89 \pm 3.916$	28.5	23.7**
3.	Triceps skinfold thickness (mm)	$20.87 \pm 2.808$	16.5	22.6**
4.	Waist circumference (cm)	$94.43 \pm 3.265$	88	28.5**
5.	Hip circumference (cm)	$114.2 \pm 3.545$	109	21.1**

\*\* indicate significance of value at P=0.01

Age group (years)	Overweight (n=120)		Obese (n=90)		Z value
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	
30-35	15	12.5	7	7.7	3.606**
35-40	8	6.66	12	13.33	4.559**
40-45	25	20.83	18	20	0.299 <sup>NS</sup>
45-50	30	25	25	27.77	0.760 <sup>NS</sup>
50-55	28	23.33	18	20	1.137 <sup>NS</sup>
55-60	14	11.66	10	11.11	0.363 <sup>NS</sup>

\*\* indicate significance of value at P=0.01 NS= Non-significant

(12.5%) overweight and (7.7%) obese subjects from 30-35 years of age while (11.66%) and (6.66%) overweight and (11.11%) and (13.33%) obese from 55-60 and 35-40 years of age, respectively.

Age wise prevalence of overweight and obesity among selected subjects according to BMI is depicted in Table 5. From the table it was noticed that majority of women from age group of 30-35 years were overweight (4.28%). Highest per cent of women from age group of 35-40 were from obese I category (5.71%) followed by obese III category (4.28%). Minimum number of women of 40-45 year age group were more prone to obese II category (9.5%) whereas only (1.4%) women were overweight. Further it was noticed that maximum number of 45-50 years of women were from obese III category (3.8 %) and minimum were from overweight (0.95%) category. From the age group of 50-55 and 55-60, (8.57%) and (6.66%) women were from obese II category, respectively. While very less per cent of women *i.e.* (1.4%) obese III from 50-55 years and (1.90%) overweight from 55-60 year of age group, respectively. Hence, it is concluded from the results that women from age group of 30-35 years were not prone to obesity because of their activity pattern.

Categorization of selected subjects according to BMI is presented in Table 6. The categorization of data showed that out of 210 subjects, majority of the subjects (34.28%) were from obese II category (34.28) followed by obese I (27.61%) and obese III (22.85%). The minimum subjects were from overweight category *i.e.* (15.23%).

In conclusion, it can be said that the prevalence of obese grade I and obese grade II among selected women from Parbhani city was very high (27.61%) and (34.28 %), respectively which is an indication that a large segment of selected women is at risk to develop the non communicable diseases.

The data regarding food consumption frequencies of selected overweight and obese women is given in Table 7.

It is indicated from the table that fruits were consumed by majority of the respondents. The frequency of consumptions of fruits was weekly by overweight (53.60%) and obese (61.53%) respondents. The respondents consuming fruits were significantly higher than that of not consuming.

Almost all the respondents consumed fried items. Weekly consumption of fried items by overweight women was more *i.e.* (58.46%) than that of daily and occasionally whereas occasional consumption of fried items was more by obese women (46.87%). There was no significant difference among overweight and obese women with respect to consumption of fried foods.

More number of respondents from both the groups were consuming sago weekly. However, it was not consumed daily by even a single number of respondents. There was no statistical difference among overweight and obese women in the consumption of sago. Statistically significant difference was noticed between the overweight and obese women with regard to not consuming sago.

Weekly consumption of street foods (38.88%) was

Age groups	Overweight (23.0-27.49)		Obese-I (27.5-32.49)		Obese-II (32.5-37.49)		Obese-III >37.5	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
30-35	9	4.28	5	2.3	8	3.8	4	1.90
35-40	8	3.8	12	5.71	5	2.3	9	4.28
40-45	3	1.4	15	7.14	20	9.5	15	7.14
45-50	2	0.95	4	1.90	7	3.33	8	3.8
50-55	6	2.8	13	6.1	18	8.57	3	1.4
55-60	4	1.90	9	4.28	14	6.66	9	4.28

Particular	Frequency (n)	Percentage (%)
Overweight (23.0-27.49)	32	15.23
Obese-I (27.5-32.49)	58	27.61
Obese-II (32.5-37.49)	72	34.28
Obese-III > 37.5	48	22.85

Table 7: Consumption of food frequencies of selected overweight and obese women (n=210)					(n=210)
Consumption frequencies	Overweight (n=120)		Obese (n=90)		Z value
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	
<b>Fruits</b>					
Consume	97	80.83	78	86.66	0.499 <sup>NS</sup>
Do not consume	23	19.16	12	13.33	2.681 <sup>**</sup>
Daily	45	46.39	30	38.46	1.251 <sup>NS</sup>
Weekly	52	53.60	48	61.53	0.904 <sup>NS</sup>
Occasionally	0	0.00	0	0.00	0.00
<b>Fried items</b>					
Consume	78	65	64	71.11	0.643 <sup>NS</sup>
Do not consume	42	35	26	28.88	1.409 <sup>NS</sup>
Daily	20	30.76	20	31.25	0.095 <sup>NS</sup>
Weekly	38	58.46	28	43.57	1.754 <sup>NS</sup>
Occasionally	20	30.76	30	46.87	2.392 <sup>NS</sup>
<b>Sago</b>					
Consume	87	72.5	78	86.66	1.263 <sup>NS</sup>
Do not consume	33	27.5	12	13.33	5.041 <sup>**</sup>
Daily	0	0.00	0	0.00	0.00
Weekly	61	70.11	55	70.51	0.036 <sup>NS</sup>
Occasionally	26	29.88	23	29.48	0.087 <sup>NS</sup>
<b>Street foods</b>					
Consume	72	60	68	75.55	1.620 <sup>NS</sup>
Do not consume	48	40	22	24.44	3.535 <sup>**</sup>
Daily	25	34.72	27	39.70	0.798 <sup>NS</sup>
Weekly	28	38.88	21	30.88	1.371 <sup>NS</sup>
Occasionally	19	26.38	20	29.41	0.652 <sup>NS</sup>
<b>Nuts and oilseeds</b>					
Consume	98	81.66	71	78.88	0.250 <sup>NS</sup>
Do not consume	22	18.33	19	21.11	1.024 <sup>NS</sup>
Daily	50	51.02	40	56.33	0.634 <sup>NS</sup>
Weekly	25	25.51	21	29.57	0.949 <sup>NS</sup>
Occasionally	23	23.46	10	14.08	3.322 <sup>**</sup>
<b>Soft drinks</b>					
Consume	82	68.33	50	55.55	1.506 <sup>NS</sup>
Do not consume	38	31.66	40	44.44	2.351 <sup>NS</sup>
Daily	15	18.29	18	36	3.285 <sup>**</sup>
Weekly	20	24.39	20	40	2.527 <sup>NS</sup>
Occasionally	47	57.31	12	24	4.692 <sup>**</sup>
<b>Bakery products</b>					
Consume	102	85	75	83.33	0.143 <sup>NS</sup>
Do not consume	18	15	15	16.66	0.769 <sup>NS</sup>
Daily	34	33.33	22	29.33	0.859 <sup>NS</sup>
Weekly	50	49.01	42	56	0.872 <sup>NS</sup>
Occasionally	18	17.64	11	14.66	1.265 <sup>NS</sup>

\*\*Significant at 1 per cent level

NS= Non Significant

observed in overweight and obese women whereas daily consumption of street foods was seen more in obese women (39.70%). Statistically highly significant difference for consuming the street foods was noticed for overweight and obese women.

Daily consumption of nuts or oilseeds was more in overweight (51.02%) and obese (56.33%) women followed by weekly and occasionally. The number of overweight women respondents consuming nuts and oilseed occasionally were significantly higher than obese women respondents.

Majority of the respondents were taking soft drinks. (68.33%) overweight and (55.55%) obese subjects. Whereas, (31.66%) overweight and (44.44%) obese women were not taking soft drinks. There was statistically significant difference with respect to consumption of soft drinks daily and occasionally in the overweight and obese women.

Consumption of bakery products in the overweight and obese women was (85.0%) and (83.33%), respectively. Only (15%) overweight and (16.66%) obese women respondents were not consuming bakery products. However, majority of overweight women (49.01%) and obese women (56%) were consuming bakery products weekly. Relatively less number of women from both the groups were consuming bakery items occasionally. Almost all respondents consumed bakery product such as biscuits, bread, cake, toast etc. The trend of eating bakery products was same among overweight and obese subjects, as there was no significant

difference among overweight and obese women. This may be one of the reason of development of obesity as bakery products are empty calorie foods which may lead to development of positive energy balance.

Findings regarding food consumption frequencies concluded that the consumption of calorie rich foods such as bakery products, nuts, oilseeds and dry fruits, soft drinks, sago and fried items was practiced by studied women which might have resulted in creation of positive energy balance among them.

The mean intake of different nutrients by the selected overweight and obese women presented in Table 8.

The average consumption of nutrients by overweight and obese women such as energy ( $1959 \pm 212$ ), protein ( $53.076 \pm 4.179$ ), fat ( $25.528 \pm 3.892$ ), carbohydrate ( $176.612 \pm 19.504$ ), fibre ( $39.284 \pm 4.235$ ), calcium ( $900.26 \pm 80.597$ ), iron ( $19.444 \pm 3.95$ ), thiamine ( $1.518 \pm 0.248$ ), riboflavin ( $1.8 \pm 0.137$ ), niacin ( $13.365 \pm 3.246$ ), carotene ( $1430.8 \pm 1220.9$ ), folic acid ( $204.657 \pm 23.378$ ), vitamin C ( $82.486 \pm 9.141$ ) and zinc ( $21.049 \pm 5.299$ ) by the respondents, respectively.

The nutritional intake of subjects were computed and compared with recommended dietary allowances suggested by ICMR (2020). It is evident from the data that intake of energy, protein and fat were significantly higher than RDA's among overweight and obese women. While calcium intake was significantly lower than RDA's. The carbohydrate, fiber, iron, thiamine, riboflavin, niacin, carotene, folic acid, vitamin C, zinc were significantly higher than RDA's among overweight and obese women.

Sr. No.	Nutrient	Women (Mean± S.E.)	RDA	t value
1.	Energy (Kcal)	1959 ± 212	1660	14.1**
2.	Protein (g)	53.076 ± 4.179	45.7	17.6**
3.	Fat (g)	25.528 ± 3.892	20	14.1**
4.	Carbohydrate (g)	176.612 ± 19.504	130	23.9**
5.	Fibre (g)	39.284 ± 4.235	33	14.8**
6.	Calcium (mg)	900.26 ± 80.597	1000	-12.38**
7.	Iron (mg)	19.444 ± 3.95	29	-24.19**
8.	Thiamine	1.518 ± 0.248	1.1	16.9**
9.	Riboflavin	1.8 ± 0.137	1.6	14.7**
10.	Niacin	13.365 ± 3.246	9	13.4**
11.	Carotene	1430.8 ± 1220.9	390	8.5**
12.	Folic acid	204.657 ± 23.378	180	10.5**
13.	Vitamin C	82.486 ± 9.141	65	19.1**
14.	Zinc	21.049 ± 5.299	13.2	14.8**

\*\* indicate significance of value at P=0.01

The women respondents were taking still higher amount of energy (299 kcal) daily. Such extra amount of energy associated with sedentary lifestyle might have resulted in positive energy balance, ultimately leading to deposition of fat in the adipose tissue.

The values of fat consumption by the women are more than RDA's. Women were noticed to be taking 25 g of fat against 20 g of RDA which is more intake by 5 g every day. Consumption of fat more than requirement every day would have resulted in accumulation of excess amount of fat mass in the body leading to development of overweight and obesity. Women were noticed to be taking 53 g of protein against 45 g of RDA which is more intake by 8 g every day.

The women respondents were taking still higher amount of carbohydrate (46g) daily. Such extra amount of carbohydrate which gives empty calorie and ultimately leading to deposition of fat in the adipose tissue. Women were noticed to be taking 39 g of fibre against 33g of RDA which is more intake by 6 g every day. Inclusion of high fibre foods in diets for obese has many advantages. Women were noticed to be taking 900 g of calcium against 1000 g of RDA which is less intake by 100 g per day. Ultimately calcium may depress certain hormones which consequently improves the body's ability to breakdown fat in cells and slow fat production.

Women were noticed to be taking 19 g of iron against 29 g of RDA which is less intake by 10 g every day. The 1.5 mg of thiamine against 1.1mg of RDA which is more intake by 0.4 mg, 1.8 mg of riboflavin against 1.6 mg of RDA which is more intake by 0.2 mg, 13 mg of niacin against 9 mg of RDA which is more intake by 4 mg, 1430 mg of carotene against 390 mg of RDA which is more intake by 1040 mg, 204 mg of folic acid against 180 mg of RDA which is more intake by 24 mg, 82 mg of vitamin C against 65 mg of RDA which is more intake by 17 mg, 21 mg of zinc against 13 mg of RDA which is more intake by 8 mg every day.

### Conclusion:

It is evident from the result that the above data depicts that there was no specific trend of weight and height according to age of overweight and obese subjects. Skinfold thickness measure subcutaneous body fat and therefore, indicate body composition. The elevated values of waist and hip circumference suggest the prevalence of central obesity and accumulation of visceral fat among the selected subjects. Findings

regarding food consumption frequencies concluded that the consumption of calorie rich foods such as bakery products, nuts, oilseeds and dry fruits, soft drinks, sago, street foods and fried items was practiced by studied women which might have resulted in creation of positive energy balance among them. It is evident from the data that intake of energy, protein and fat were significantly higher than RDA's among overweight and obese women. While calcium intake was significantly lower than RDA's. The carbohydrate, fiber, iron, thiamine, riboflavin, niacin, carotene, folic acid, vitamin C, zinc were significantly higher than RDA's among overweight and obese women.

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