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## Assessment of nutritional status of overweight adult people of Udaipur city

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### Abstract

Overweight and obesity are the fifth leading risk for global deaths. At least 2.8 million adults die each year as a result of being overweight or obese. In the present study an attempt was made to investigate the assessment of nutritional status of overweight adult people of Udaipur city of Rajasthan. The study has consisted one hundred eighty adult (180) peoples (90 male and 90 female) in the age group of 30-40 year. Data on anthropometric measurements including weight, height, waist circumference and hip circumference were recorded using standard equipment and techniques. Obesity was assessed using BMI and WHR. Information related subjects to were collected using interview schedule. Food and nutrient intake was assessed using 24 hour dietary recall method. Results of the present study the average BMI of the subjects when calculated it was found that the mean value was  $28.7 \pm 0.3 \text{ kg/m}^2$ . These subjects were classified as per the WHO classification for Asia pacific region (2000), all of the subjects were placed in the category of obesity. Results revealed that majority of the subjects (75 per cent) were found to be in the category of high risk while minority of the respondents (25 per cent) had normal WHR ( $< 0.8$ ). The mean WHR was  $0.83 \pm 0.0$ . and the fat values exceed the normal range of fat, representing the excess fat deposition in the subjects owing to obesity. Data in case of subjects revealed that diet of subjects in comparison to the balanced diet was substantially inadequate in food groups such as green leafy vegetables and pulses and slightly inadequate in milk and its product, cereals and fruits whereas intake of fats, sugars and roots and tubers were high.

**Keywords:** Adult, Overweight, BMI, WHR and Nutritional status

### 1. Introduction

Overweight and obesity is increasing worldwide at an alarming rate. Health is a dynamic life process, which begins at birth is governed by genetic and environmental factors throughout life. Now a day, due to sedentary life style and industrialization several health problems have cropped into people's life among which obesity is predominant (Vijya Lakshmi *et al.* 2005) [12].

Asian Indian phenotypes have high body fat with relatively less BMI, less lean body mass and marked abdominal obesity. A growing number of urban women aged above 35 years are falling victim to sedentary life styles, rich food, lack of exercise and a gradual slowing down of metabolic rate.

Obesity is usually determined using body mass index (BMI), calculated as the weight in kilograms divided by the square of the height in meters ( $\text{kg/m}^2$ ). A BMI over  $25 \text{ kg/m}^2$  is defined as over weight, and a BMI of over  $30 \text{ kg/m}^2$  as obese. These markers provide common bench marks for assessment, but the risk of disease in all population can increase progressively from lower BMI levels.

India is passing through a transitional phase of socio-economic development while the country has still to overcome problems arising from under development and poverty. India 14% populations is suffering from obesity (12% males and 16% females) while a third of India's population stills falls below the poverty line (NFHS, 2007) [7].

Body weight is the sum of bone, muscle, organs, body fluids and adipose tissues, some or all of these components are subject to normal change as a reflection of growth, reproductive status, variation in exercise levels, and the effect of aging. Maintaining a constant body weight is orchestrated by a complex system of neural, hormonal and chemical mechanism that keeps balance between energy intake and energy expenditure within fairly precise limits. Abnormalities of these mechanisms result in exaggerated weight fluctuation.

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Of these, the most common are overweight and obesity.

Convenience foods are becoming very popular with urbanites become of tremendous increase in the numbers of working women, busy life schedules, changing life style etc. These convenience foods are usually rich in trans fatty acids, cholesterol, saturated fats, sugar's energy contribute to rise in the incidence of obesity. Regular physical activity is associated with the lower morbidity and mortality rates from cardiovascular diseases, diabetes, cancer and osteoporosis. Despite this proven health benefits the majority of the adult population does not meet the public health recommendation for physical activity. Obesity is one of the biggest health problems today, which affect a person not only physically but psychologically as well. In developing countries, obesity is more common in middle-aged men and women, people of higher Socio-Economic status and those living in urban communities.

The importance of measuring body composition has increased due to the need to evaluate changes in the nutritional status, which can affect body reserves differentially. Subjects can gain body fat, fat-free mass, cellular mass components as a result of overeating and sedentary lifestyle. These changes can only be detected by using valid body composition techniques. One of the important aspects of health of individuals is their nutritional status which is defined as a result of interaction of body composition, energy balance and body functionality. Body composition assessment in terms of lean body mass and fat mass is the best long term indicator of nutritional status. The occupationally sedentary women are prone to obesity and sarcopenia. Age is an important criterion, which contributes to these two metabolic disorders posing them to an increased risk of several degenerative diseases. In the present study an attempt was made to investigate the assessment of nutritional status of overweight adult people of Udaipur city of Rajasthan.

## 2. Material and Methods

The study was conducted within the municipal limits of Udaipur City, Rajasthan. An overweight adult person with equal representation from both the sexes in the age range of 30-40 years was selected. For the assessment of overweight and nutritional status of adult people, an interview schedule was developed to collect the information about respondent's age, religion, caste, type and size of family, education, family occupation, marital status. Basic anthropometric measurements such as height, waist and hip circumference measurements were taken using standard methods given by Jelliffe (1966) [5]. The derived anthropometric measurements viz. body mass index and waist and hip ratio were calculated. Weight and Body composition of the subjects was determined using bioelectrical impedance using Body composition analyzer. In body composition parameters viz. fat mass, muscle mass, bone mass, lean body mass, total body water and visceral fat rating were determined.

## 3. Results and Discussion

The general information of the survey group obtained through a structured questionnaire has been summarized to depict a clear picture of the sample under survey study which included general profile and anthropometric measurements.

Perusal of table 1 depicting general information of the subjects reveals that majority of the participants (73.3 per cent) were in the younger strata i.e. 30-35 years followed by those (23.6 per cent) who were above 36 but less than 40 years of age. This may be due to the reason that younger population was more health conscious. Soni (2010) [11] also reported that the most of

the people (73.3 per cent) were joining the health centres in age of 18-30 years. Remaining 5 per cent of the study population was falling in the age range of 46 to 60 years. Information on religion of the participants depicted that 86.6 respondents i.e. cent per cent were Hindu, 8.88% were Muslim and 4.44% were other by religion. Information about caste depicted that majority of subjects 80.5% were belong to general caste, 14.4% were OBC and 5% were belong to SC, Data on the type of family have shown that 19.4% of the subjects were from joint family and remaining 80.5% of the respondents belongs to nuclear family. When subjects were enquired about the food habits, it was found that majority of the respondents (72.7 per cent) were vegetarians, 18.33% were non-vegetarians and remaining 8.8 per cent subjects reported themselves as ovo-vegetarians. Figures on profession illustrates that (12.2 per cent) of female respondents were housewives and 55 per cent were engaged in service and 9 per cent were engaged in business. Rest of the 4 per cent subjects were students. It was found that majority of the 55% male respondents were in service, 9% in business and only 3% subjects were students. Marital status of the subjects has also concised in the table 1 which indicate that 87.7% of the subjects were married, 10.5% were single and only 3 female subjects were widow.

**Table 1:** Distribution of the subjects on the basis of their general profile

S. No.	Information	Male (n=90)	Female (n=90)	Percentage (n=180)
1	Age (years)			
	30-35	58(64.4)	74(82)	132(73.3)
	36-40	32(35.5)	16(17.7)	48(26.6)
2	Religion			
	Hindu	80(88.8)	76 (84.4)	156(86.6)
	Muslim	06 (6.6)	10 (11.1)	16(8.88)
	Other	04 (4.4)	04 (4.4)	8(4.44)
3	Caste			
	General	76 (84.4)	69 (76.6)	145(80.5)
	OBC	10 (11.1)	16 (17.7)	26(14.4)
	SC	04 (4.4)	05 (5.5)	09(5)
4	Family			
	Nuclear	72 (80)	73 (81.1)	145(80.5)
	Joint	18 (20)	17 (18.8)	35(19.4)
5	Food habits			
	Vegetarian	62 (68.8)	69 (76.6)	131(72.7)
	Non-vegetarian	18(20)	15(16.6)	33(18.33)
	Ovo-vegetarian	10(11.1)	06 (6.66)	16(8.8)
6	Profession			
	Housewife	00	22 (24.4)	22(12.2)
	Business	32(35.5)	09(10)	41(22.7)
	Service	55 (11.1)	55 (11.1)	110(61.1)
	Students	03 (3.33)	04 (4.4)	07(3.8)
7	Marital Status			
	Married	79 (87.7)	79 (87.7)	158(87.7)
	Single	11 (12.2)	08 (8.88)	19(10.5)
	Widow	00	03 (3.33)	03(1.66)

### 3.1 Anthropometric measurements

Anthropometry is the single, most portable, universally applicable, inexpensive and non-invasive method available to assess the proportions, size and composition of the human body. It reflects both health and nutritional status. For these reasons, it is used for selecting individuals from population for health and nutrition interventions as well as for monitoring

their health status. Table 2 shows the mean values and standard error of anthropometric measurements of the subjects.

**Table 2:** Anthropometric measurements of the subjects

S. No	Body Measurements	Mean ± SE	
		Male	Female
1	Weight (kg)	85.6 ± 9.6	72.83 ± 11.1
2	Height (cm)	173.2 ± 6.8	161.72 ± 6.7
3	BMI (kg/m <sup>2</sup> )	28.3 ± 1.9	28.06 ± 1.9
4	WHR	0.96 ± 0.12	0.86 ± 0.05
5	Body composition		
a)	Fat (%)	33.8±0.6	39.4 ± 0.6
b)	Body fat mass(kg)	30.1 ±0.8	27.9 ± 0.9
c)	Total body water(kg)	29.9 ±0.9	27.9 ± 0.9
d)	Fat free mass(kg)	50.5 ±0.6	40.6 ± 0.6

**Table 3:** Distribution of subjects with respect to Waist Hip Ratio

Waist Hip Ratio (WHR)	Classification*	Male (90)	Female (90)	Percentage (number) (n=180)
< 0.8	Normal	5.5(05)	44.4 (40)	25(45)
≥ 0.8	High risk	94.4(85)	55.5(50)	75(135)

\*Classification devised by WHO Expert Committee, 1997.

- 1. Body composition:** Body composition data forms the basis for a wide variety of therapeutic health and fitness prescriptions.
- 2. Body fat percent:** In the present study, the mean value of body fat in the male subjects was evolved out to be 33.8±0.6 per cent and 39.4±0.6. These values exceed the normal range of fat, representing the excess fat deposition in the women owing to obesity.
- 3. Body fat mass:** Mean total fat mass at initial level of the study population emerged from Table 4.5 and revealed that males had 30.1±0.8 kg fat mass and females had 27.9±0.9 kg fat mass.
- 4. Total body water (TBW):** The overall mean value of total body water among all the male subjects was observed to be 29.9±0.6 kg and female subjects was 27.9±0.9 kg.
- 5. Fat free mass (FFM):** Fat free mass includes muscles, bones, body water and organs. The mean fat free mass of the study population of male subject was 50.5±0.6 kg and a female subject was 40.6±0.6. As the fat mass increases in the body due to development of the obesity, fat free mass reduces proportionately.

**Table 4:** Distribution of subjects with respect to grade wise BMI

S. No	Male (90)	Female (90)	Percentage (n=180)
Normal BMI<25.0	( 00)	3.3(03)	1.66(03)
Grade 1 BMI 25.0-29.9	61.1 ( 55)	71.1(64)	66.1(119)
Grade 11 BMI 30.0-39.9	33.3( 30)	22.2(20)	27.7(50)
Grade 111 BMI >40.0	5.5 ( 05)	3.3(03)	3.8(07)

- 6. Dietary intake:** The nutritional status of any individual is directly affected by his/her food intake. Person needs a wide range of nutrients to lead a healthy and active life and these are derived through diet, he consumes daily. The components of the diet should be chosen judiciously so that it provides all the nutrients in adequate amount and in proper proportion (ICMR, 2010) [4].

**Table 5:** Mean ± SE values of food intake of Females

S. No	Food groups	Balanced diet	Mean±SE	% to BD*
1	Cereals (g)	270	170.2±4.6	63
2	Pulses (g)	60	28.3±1.7	47.1
3	Leafy vegetables (g)	100	36.2±5.6	36.2
4	Roots and tubers (g)	100	125±6.9	125
5	Other vegetables (g)	100	89.7±8.5	89.7
6	Fruits (g)	100	72.5±9.9	72.5
7	Milk and its products (ml)	400	151.2±6.8	50.4
8	Sugars (g)	20	51.2±0.7	256
9	Fat and oils (g)	20	91±1.5	455

\*BD- Balanced Diet

- 7. Food intake:** In the present investigation food intake of subjects was studied by “24 hour recall method”. Data in case of subjects revealed that diet of women in comparison to the balanced diet was substantially inadequate in food groups such as green leafy vegetables and pulses and slightly inadequate in milk and its product, cereals and fruits whereas intake of fats, sugars and roots and tubers were high (Table 5).

**Table 6:** Mean ± SE values of food intake of Males

S. No	Food groups	Balanced diet	Mean±SE	% to BD*
1	Cereals (g)	350	290±2.8	83.4
2	Pulses (g)	70	40.8±3.5	61.4
3	Leafy vegetables (g)	100	46.2±1.1	47
4	Roots and tubers (g)	100	145±6.9	151
5	Other vegetables (g)	100	48.2±9.0	57
6	Fruits (g)	100	70.2±8.9	71.5
7	Milk and its products (ml)	600	229.7±32.5	43.5
8	Sugars (g)	30	50.2±9.8	196.6
9	Fat and oils (g)	35	90.5±1.0	450

\*BD- Balanced Diet

- 8. Food intake:** In the present investigation food intake of male subjects was studied by “24 hour recall method”. Data in case of subjects revealed that diet of male in comparison to the balanced diet was also inadequate in food groups such as green leafy vegetables and pulses and slightly inadequate in milk and its product, cereals and fruits whereas intake of fats, sugars and roots and tubers were also high (Table 6).
- 9. Nutrient intake:** Life cannot be sustained without adequate nourishment. Man needs sufficient food for growth, development and to lead an active and healthy life. (ICMR, 2010) [4].

**Table 7:** Mean daily intake of nutrients by male subjects

S. No	Nutrient intake	RDA	Mean ± SE	% to RDA
1	Energy(Kcal)*	1900	2053.4 ±291.5	108.0
2	Protein(g)*	55	39.5 ±0.6	9.6
3	Fat(g)*	20	105.6 ±2.6	291
4	Carbohydrates(g)*	400	252.1 ±3.9	102.6
5	Fiber(g)	20	7.2±0.1	36.4
6	Calcium(mg)	600	268.4±50.5	44.66
7	Iron(mg)	31	10.69±3.75	34.1
8	Thiamin(mg)*	1.0	0.44 ±0.17	44.0
9	Riboflavin(mg)*	1.1	0.52 ±0.17	47.2
10	Niacin(mg)*	10.8	8.31±2.7	78.8
11	Vitamin C(mg)	40	20.58±7.8	51.2

RDA- Recommended Dietary Allowance suggested by ICMR, 2010 [4]

\*Khanna *et al.*, 2003 [6]

Table 7 indicates that diet of male obese subjects was higher in energy, fat, carbohydrates, and niacin as compared to respective recommended values, slightly inadequate in calcium, iron, riboflavin and niacin whereas extremely low in fiber and protein. It indicates that fruits, green leafy vegetables, pulses need to be increased in the diet of subjects under study.

**Table 8:** Mean daily intake of nutrients by female subjects

S. No	Nutrient intake	RDA	Mean $\pm$ SE	% to RDA
1	Energy(Kcal)*	2320	2438 $\pm$ 398.1	105.0
2	Protein(g)*	60	119.1 $\pm$ 22.4	198.3
3	Fat(g)*	25	62.07 $\pm$ 62.6	248
4	Carbohydrates(g)*	400	330.12 $\pm$ 52	82.5
5	Fiber(g)	20	10.78 $\pm$ 4.2	53.9
6	Calcium(mg)	600	322.5 $\pm$ 64.8	53.66
7	Iron(mg)	17	9.99 $\pm$ 2.23	58.7
8	Thiamin(mg)*	1.2	0.68 $\pm$ 0.15	56.6
9	Riboflavin(mg)*	1.4	0.74 $\pm$ 0.21	52.8
10	Niacin(mg)*	16	9.61 $\pm$ 2.79	60.0
11	Vitamin C(mg)	40	15.66 $\pm$ 4.3	39.1

RDA- Recommended Dietary Allowance suggested by ICMR, 2010 [4]

\*Khanna *et al.*, 2003 [6]

Table indicates that diet of female obese subjects was also higher in energy, fat, carbohydrates and niacin as compared to respective recommended values, slightly inadequate in calcium, iron, riboflavin and niacin whereas extremely low in vitamin C

#### 4. Conclusion

The present study investigated the assessment of nutritional status of overweight adult people. The prevalence of overweight and obesity indicates that our country is facing double burden of diseases and prevalence of obesity is increasing year by year. The lifestyle factors do have the influence on body weight of adults. The study confirmed that age is a strong factor associated with body composition. Therefore, preservation of muscle mass and prevention of sarcopenia through appropriate diet and exercise can be a useful strategy to increase functional independence and to decrease the prevalence of age associated chronic diseases among population with sedentary life style

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