

# Dietary And Socio-Economic Factors Associated With Obesity In North Indian Population

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## Abstract

The present study was elucidated to investigate the association of socio-economic and dietary factors with obesity. For the purpose, total one hundred eighty subjects of both genders, between the ages 40~50 years were recruited randomly. Anthropometrical measurement like height, weight and waist to hip ratio was measured by standard techniques. To determine whether an adult's weight is appropriate for his height, Body Mass Index (B.M.I.) was computed. For socio-economic characters, a number The respective information was collected through questionnaire cum interview method. The dietary intakes were taken for all selected subjects by 24 hr recall method for three consecutive days. All data so obtained was coded, tabulated and statistically analyzed. The obesity was found more prevalent in women than men and urban compared to rural dwellers. Urbanization, gender, loneliness and divorced or widowed status were the strong predictors of obesity. The present dietary data indicated that obese peoples were consuming highly imbalanced diets containing more protein, fat and calcium and less amounts of fiber, iron than the Recommended Dietary Allowances. A community based approach using multiple strategies including appropriate education will be required to address the problem.

## INTRODUCTION

A proper body weight is most conducive to good health. The problem of excess body weight is confronting more and more people in the prosperous communities. Because of this, obesity can be seen as the first wave of a defined cluster of non communicable diseases called "New World Syndrome" creating an enormous socioeconomic and public health burden in poorer countries (WHO,2000) . The World Health Organization has described obesity as one of today's most neglected public health problems. Following the increase in adult obesity, the proportion of children and adolescents who are overweight and obese have also been increasing (Wong et al.,2005).

Obesity is the result of an incorrect energy balance leading to an increased store of energy mainly as fat and excess calorie in the diet and can be deadly if not cured. It is rightly said "you are shortening your life at your own dining table".

In developing countries, the incidence of obesity is increasing because of excessive consumption of low cost starchy food, as they are cheaper than lower calorie fruits and vegetables. Statistics shows that obesity is closely associated with cardiovascular problem, diabetes, and degenerative arthritis, gout and gall bladder diseases. It also

produces psychological setbacks. Few studies have been performed to study the relationship between socio economic status and obesity. So the present study is an attempt to clarify the contributions of different socio economic and dietary factors that act as precipitating factor in causing obesity .

## MATERIAL AND METHODS

### SELECTION OF SUBJECTS

The present study has been carried on total one hundred eighty subjects of both genders, between the ages 40~50 years which were recruited randomly from various regions of Haryana, Punjab and Chandigarh (India) .

### SOCIO-ECONOMIC INFORMATION

For socio-economic characters, a number of items namely age, gender, employThe respective data was collected from all the respondents with the help of a well designed questionnaire-cum-interview method information .

### ANTHROPOMETRIC MEASUREMENTS

The anthropometrical measurement of height and weight were taken in the morning before breakfast. To determine whether an adult's weight is appropriate for weight, Body mass Index (B.M.I.) was computed from these. The height

and weight of the subjects were measured by the method of Jelliffe (1966) and BMI was calculated by the given by Garrow (1986).

**Height:** The measurement of height (in cm) was taken with the help of measuring tape to the nearest 0.5 cm. and the height was measured in centimeters.

**Weight:** The body weight is the simplest measurement of growth and nutritional status. The subjects were weighed on a simple weighing machine (bathroom scale). The reading was taken to the nearest 0.5 Kg.

**Body Mass Index:** BMI is expressed as a ratio of weight in kilogram to square of height in meters.

$$\text{BMI} = \text{Weight (Kg)} / \text{Height}^2(\text{m})$$

**Figure 1**

Table 1.1 : Classification of subjects according to B.M.I.

Diagnoses	B.M.I. Class (kg/m <sup>2</sup> )	Presumptive
	18.5 - 20.0	Low Weight Normal
	20.0 - 25.0	Normal
	25.0 - 30.0	Obese Grade I
	>30.0	Obese Grade II

The classification on the basis of B.M.I. is based on the criteria given by Garrow (1986) and Naidu et al (1991).

**Waist Hip Ratio (W.H.R.):** For calculating abdominal obesity, waist and hip circumferences were measured. Waist to hip ratio was calculated.

$$\text{W.H.R.} = \text{Waist (cm)} / \text{Hip (cm)}$$

**Figure 2**

Table 1.2: Classification of subjects according to W.H.R.

W.H.R.	Classification
0.85-0.90	Normal
0.90-1.0	Obese Grade I
>1.0	Obese Grade II

## DIETARY SURVEY METHOD

Information regarding the food intake of the respondent was recorded by 24 hour recall method for three consecutive days for all selected subjects. The quantities of food consumed were converted into their raw equivalents. Standardized utensils were used for conversion. The average nutrient intake per day per subject was calculated. The intake was compared with the recommended dietary allowances (R.D.A) worked out from I.C.M.R. values (Gopalan et al., 1991).

## STATISTICAL ANALYSIS OF DATA

The suitable statistical tools were applied for the analysis of the data, collected during the course of study. For determining the significance the 't' test was applied

## RESULTS AND DISCUSSION

Perusal of table 1.3 indicated that the obesity was found more prevalent in women (62.5%) than men (37.5%) and urban (56.82%) compared to rural dwellers (43.18%). Despite the urbanization and gender, loneliness and divorced or widowed status were also the strong predictors of obesity among obese subjects rather than non-obese subjects. The reason might be that the peoples try to compensate their feeling of loneliness by over eating. Furthermore, nuclear family pattern (65.90 %) was one of the reasons for obesity as the availability of food increases.

**Figure 3**

Table 1.3: Relationship between socio-economic condition and obesity

		Non-obese		Obese	
		n=	%	n=	%
<b>Number</b>	(total- 180)	92	51.11	88	48.89
<b>Gender</b>	male	57	61.95	33	37.5
	female	35	38.04	57	62.5
<b>Location</b>	urban	52	56.52	50	56.82
	rural	40	43.48	38	43.18
<b>Marital status</b>	married	60	65.22	35	39.77
	single	12	13.04	20	22.73
	divorced	10	10.87	18	20.45
	widowed	10	10.87	15	17.04
<b>Family type</b>	nuclear	27	29.35	58	65.90
	joint	65	70.65	30	34.09
<b>Education</b>	illiterate	6	6.52	12	13.63
	primary level	10	10.87	18	20.45
	secondary level	25	27.17	18	20.45
	graduate	31	33.69	24	27.26
	post graduate or above	15	16.30	12	13.63
<b>Occupation</b>	professional degree	5	5.43	4	4.54
	administrative worker	20	21.74	26	29.54
	professional	5	5.43	5	5.68
	manual worker	10	10.87	-	-
	housewife	27	29.35	35	39.77
	businessman	20	21.74	10	11.36
	unemployed	10	10.87	12	13.63

In comparison to non-obese subjects, among obese subjects, the level of education was low. Amid obese subjects, the maximum affected peoples were who (39.77%) remain at home. No manual worker was found obese as their energy output remains high.

Table 1.4 revealed that mean height for the obese was a little more i.e. 1.68m as compared with the non-obese (1.67m) but the mean body weight of the obese (78.31 kg) was much higher than the non-obese (64.97 kg). The obese subjects had 20.77 per cent extra body weight than the standard weight for their height (64.84 kg.)

The value of B.M.I. for obese subjects was 28.22 as compared to standard value i.e. 22.97. Though, the B.M.I. of the non-obese subjects was slightly more (23.20) than the ideal (23.18) but that was in the normal range (18-25 kg/m<sup>2</sup>). This may be due to that it has long been recognized that in adult life with advancing years, body weights tend to rise slightly. This could be due to reduced energy requirements, hormonal change and sedentary life styles. According to waist hip ratio, all the non-obese subjects fell within the normal range i.e. (.85~. 90).

**Figure 4**

Table 1.4: Anthropometric measurement of non-obese vs obese subjects

Parameters	Measurement	
	Non-obese	Obese
	n=92	n=88
Mean Height (m)	1.67	1.68
Mean Weight (kg)	64.97	78.31
Mean Waist (cm)	87	101
Mean Hip (cm)	98	102
# Std. wt. for ht.(kg)	64.45	64.84
Extra Weight (kg)	.52	13.47
% Extra Weight	.806	20.77
Mean B.M.I.	23.20	28.22
*Standard B.M.I.	23.18	22.97
Mean W.H.R.	0.89	0.99

n= Indicate the number of subject

# = standard weight for height (kg) as per given in diet manual of Christian Medical College, Ludhiana

\* as calculated from present height and std. weight for height of subjects

Dietary data (table 1.5b) revealed that the diets of the obese were highly imbalanced. They were consuming excess of energy (118.66%), protein (126.79%), fat (195.56%), ascorbic acid (353.25%), vitamin A (112.75%), thiamine (116%), riboflavin (105.5%) and calcium (309.46%) of their R.D.A.'s. On the other hand carbohydrate, fiber and iron were being consumed in deficient amounts. The carbohydrate intake was 99.37 and of iron was 94.96 per cent of the R.D.A. The differences in R.D.A.'s were found to be statistically significant ( $p \leq 0.05$ ) except for carbohydrate, iron, vitamin A and riboflavin .

Table 1.4(a) cleared that non-obese were consuming energy, protein, carbohydrate, fats , iron, vitamin C and vitamin A by 99.14, 122.71, 104.32 and 106.03, 61.78, 249.9 and 106.78 per cent, respectively of their recommended allowances. Thus except for energy, carbohydrate and fats intake which was almost balanced fiber and iron were in deficient amount and remaining nutrients were being consumed in higher amounts. The differences between worked out R.D.A. 's and mean intake of the non-obese subject were statistically significant for protein, iron, Vitamin C, thiamine and calcium and not significant for other nutrients. Thus, the non-obese were consuming diets

that were better balanced in terms of all nutrients in comparison to obese subjects of present study.

**Figure 5**

Table 1.5 (a): Student't' test applied to dietary data of non-obese subjects

Nutrient	Worked out R.D.A's \$	# Mean actual intake	Deviation form R.D.A	% intake of R.D.A	Calculated 't' value
Energy (Cal)	2472.6	2451.36±59.09	-21.24	99.14	NS
Protein (g)	64.45	79.09±1.74	+14.64	122.71	*
* Carbohydrate(gm)	446.88	466.20±11.13	+19.32	104.32	NS
Fat (g)	47.4	50.26 ±2.36	+2.86	106.03	NS
Fiber (g)	10-15	9.65	-	-	-
Iron (mg)	28	17.30±59	-10.7	61.78	*
Calcium (mg)	400	1149.50±72.79	+749.5	287.37	*
Ascorbic Acid (mg)	40	99.96±7.43	+59.96	249.9	*
Thiamine (mg)	1.18	1.75±. 082	+ .57	148.30	*
Riboflavin (mg)	1.41	1.43±11.9	+ .02	101.41	NS
Vitamin A (I.U.)	2400	2562.92±88.12	+162.92	106.78	NS

**Figure 6**

Table 1.5(b): student 't' test applied to dietary data of obese subjects

Nutrient	Worked out R.D.A's \$	# Mean actual intake	Deviation form R.D.A	% intake of R.D.A	Calculated 't' value
Energy (Cal)	2489	2953.48±61.30	+464.48	118.66	*
Protein (g)	64.83	82.2±1.79	+17.37	126.79	*
Carbohydrate(gm)	450.19	447.38±10.75	-2.81	99.37	NS
Fat (g)	47.6	93.09±2.54	+45.49	195.56	*
Fiber (g)	12-15	10.46±.60	-	-	-
Iron (mg)	28	26.59±1.08	-1.41	94.96	NS
Calcium (mg)	400	1237.87±98.3	+837.87	309.46	*
Ascorbic Acid (mg)	40	141.34±11.53	+101.38	353.25	*
Thiamine (mg)	1.5	1.74±1.04	+ .24	116	*
Riboflavin (mg)	1.8	1.899±1.82	+ .099	105.5	NS
Vitamin A (I.U.)	2400	2706.01±228.6	+306.01	112.75	NS

\$= Recommended Dietary Allowances (R.D.A'. s) worked out from I.C.M.R. values (1991),

\* = Significant at ( $p \leq 0.05$ )

NS = Non-significant

# = Mean values given as mean ± standard error

Further, it was found out that most of the subjects in both the groups did not do heavy work. Their work schedule revealed that they virtually spent their whole day on very light activities. All the subjects were almost leading sedentary lives except the manual workers and all of them were non-obese.

## CONCLUSION

Decline in activity coupled with high calorie intake were the leading causes of obesity. The obesity was found more prevalent in women than men and urban compared to rural dwellers. Urbanization, gender, loneliness and divorced or widowed status were the strong predictors of obesity. The present dietary data indicated that obese peoples were consuming highly imbalanced diets containing more protein, fat and calcium and less amounts of fiber, iron than the Recommended Dietary Allowances. Coupled to this , the problem of sedentary life style and virtual lack of physical exercise, which are the precipitating factors for the so called diseases of urban life style i.e. obesity. A community based approach using multiple strategies including appropriate education will be required to address the problem

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