



# A COMMUNITY BASED STUDY ON PREVALENCE OF OBESITY AND ITS RELATION WITH DIABETES AMONG ADULTS OF ALLAHABAD

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**Abstract:** *The present study entitled “A community based study on prevalence of obesity and its association with diabetes among adults of Allahabad” aimed to find out the prevalence rate of the obesity among the selected adults, to access the nutritional status of the selected respondents, to determine relation of obesity with diabetes was carried out in the five areas of Allahabad. A total of one hundred and fifty male and female sedentary respondents were randomly selected from Muthiganj, Gaughat, Arail, Mahewa, Kitganj for the study and were personally interviewed with the help of preset schedule. The anthropometric measurements (Height, Weight, BMI) and biochemical test like blood glucose level that is both fasting and post prandial using finger prick method (Urooj and Puttaraj,2000) was taken. Dietary intake (24 hours dietary recall method) was recorded and calculated using food composition table compared with RDA (ICMR, 2010). After observation, it was found that 62 percent respondents were using their own vehicle, calorie consumption was high and fibre intake was less as compared to RDA, 53.33 percent respondents were not doing any exercise, the prevalence rate of obesity (BMI  $\geq 25$ ) was 57.33 percent, 86 male and female respondents were found to be obese out of which 43.2 percent of the respondents were diabetic ( $\geq 140$  mg/dl). All respondents were having sedentary lifestyle. Hence we can conclude that obesity is the major cause of diabetes.*

**Keywords:** *Recommended Dietary Allowance, Anthropometric measurements, Body Mass Index, Sedentary Lifestyle, Prevalence*

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## Introduction:

Obesity is one and most important public health problems worldwide. Obesity is a global health burden and is now described as “New World Metabolic Syndrome”. Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy or increased health problems (Haslam *et al.*, 2005). In India, there has been an increased migration of the rural population to urban areas. This shift also has been a contributing factor to lifestyle changing including significant reduction in physical activity, increased calories, fat, salt, and sugar intake, nature



of modern work with lack of an exercise schedule, transportation, increased urbanization, tends to make one obese. According to ICMR-WHO (2006), in a multicentric study done in India, the prevalence of obesity was 72.5 percent among women and 1.1 percent among men (WHO, 2005). As an approach middle age, our physical generally decreases without the corresponding decrease in food consumption leading to obesity. Activity may be decreased because of a debilitating illness like arthritis or cardiac disease (WHO, 2009). There is a close association between obesity and type 2 diabetes, the likelihood and severity of type 2 diabetes are linked with body mass index (BMI). Hossain *et al.*, (2007) stated that Type 2 diabetes: According to the WHO projections, the death related to diabetes will rise by more than 50 percent globally in the next 10 years. Ninety percent of type 2 diabetes are related to extra weight and cardiovascular diseases such as stroke and hypertensive heart kill 17 million people worldwide each year. Osteoarthritis which is an example of musculoskeletal disorders. Obesity affects populations of all age groups. Mostly people have poor knowledge about obesity and its risks, warning signs need to be emphasized. Especially women have less knowledge, and awareness regarding obesity, associated with diabetes and hypertension. Women typically have a higher percentage of body fat mass than men with same BMI. Keeping above point in mind this study was planning to find out the “prevalence of obesity and its association with diabetes among adults of Allahabad”.

### **Methodology:**

A total of 150 sedentary respondents (59 male and 91 female respondents aged 25-45 years) from Muthiganj, Gaughat, Arail, Mahewa, Kitganj of Allahabad was purposively selected for the study and were personally interviewed. The data pertaining to the study according to the research problem, Pre-structured questionnaire was used for the collection of data from the respondents. The schedule was included the aspects which lead to the fulfilment of the objectives of the study. The interview schedule consisted of General profile, Anthropometric measurement, Measurement of Blood glucose level-Biochemical data like, fasting and random blood sugar of the respondents was measured. Finger prick method was given by Urooj and Puttaraj (2000) was used to determine the blood sugar method of the respondents. Dietary intake 24 hours dietary recall method (Swaminathan, 2013) and clinical signs and symptoms of the respondents observed (Park, 2005). The data was analysed by using appropriate statistical tool i.e. t-test (Gupta and Kapoor, 2002).

### **Results and Discussions:**

The data collected, tabulated and calculated under the study are present with the appropriate illustration and discussed in this chapter.



**Table 4.1 Distribution of the respondents according to their general information and lifestyle pattern**

S.No.	Particulars	Male=59	%	female=91	%	Total
<b>1</b>	<b>Age (year)</b>					
	25-35	17	11.33	32	21.33	32.66
	36-45	42	28	59	39.32	67.33
<b>2</b>	<b>Type of family</b>					
	Joint	31	20.66	45	30	50.66
	Nuclear	28	18.66	46	30.66	49.33
<b>3</b>	<b>Occupation</b>					
	Service	23	15.33	7	4.66	20
	Business	36	24	12	8	32
	Agriculture	0	0	3	2	2
	Homemaker	0	0	69	46	46
	Any other	0	0	0	0	0
<b>4</b>	<b>Total monthly income</b>					
	1000-5000	1	0.66	4	2.66	3.33
	6000-10000	28	18.66	44	29.33	48
	11000-15000	7	4.66	5	2.66	8
	16000-20000	1	0.66	5	2.66	4
	>20000	22	14.66	33	22	36.66
<b>5</b>	<b>Exercise</b>					
	Walking	15	10	22	14.6	24.66
	Light exercise	7	4.6	10	0.6	11.33
	Jogging	4	2.6	5	3.3	6
	Any other	3	2	4	2.6	4.66
	No	30	20	50	33.3	53.33
<b>6</b>	<b>Sleeping time</b>					
	5 hours	9	6	19	12.66	18.66
	6 hours	31	20.66	47	31.33	52
	7 hours	12	8	17	11.33	19.33
	More than that	7	4.66	8	5.33	10
<b>7</b>	<b>Medication</b>					
	Yes	14	9.33	21	14	23.33
	No	45	30	70	46.66	76.66

**Table 4.1** shows the distribution of the respondents according to the general information and life style pattern.

Out of 150 respondents (59 male and 91 female), 32.66 percent respondents were in the age group 25-35 years. Similarly, 67.33 percent of the respondents were in the age group 36-45 years. Similarly, 50.66 percent respondents belonged to joint families whereas, 49.33 percent respondents belonged to nuclear family. In case of occupation, Out of total, 20 percent were



doing service, 32 percent were businessman. 2 percent were agriculture, 46 percent of the respondents were homemaker. 36.66 percent were having an average monthly income of more than 20000 followed by 4 percent of respondents had an average monthly income between 16000-20000, followed by 8 percent had an monthly income between 11000-15000, followed by 48 percent had an average monthly income between 6000-10000, followed by 3.33 percent had an average monthly income between 1000-5000 per month. Out of 150 respondents, 10 percent male respondents and 24.66 percent female respondents preferred walking to stay fit and healthy, 11.33 percent female respondents preferred light exercise, 6 percent respondents choose jogging as an exercise, 4.66 percent respondents choose other means of exercise, and 53.33 percent respondents have never done exercise. The above table indicated the sleeping time of the selective respondents. It was found that most of the respondents slept for 6 hours (20.66% male respondents and 31.33% female), 6 percent male and 12.66 percent female respondents slept for 5 hours, 8 percent male and 11.33 percent female slept for 7 hours, 4.66 percent male and 5.33 percent female respondents slept for more than 7 hours. Out of selective respondents, 23.333 percent respondents took medicines, where as 73.33 percent respondents were not in medication.

A systematic literature review conducted by analyzing the relationship between socioeconomic status and obesity in low-income countries proved that in these countries, obesity is more common in the population of better educated people and those with higher incomes. For middle-income countries, this relationship is not equally evident (Dinsa *et al.*, 2012).

According to the study conducted by Anuradha *et al.*, 2012 in Chennai, India. It was observed that central obesity was higher among women aged 20 years and above belonging to high socioeconomic status.

According to Leu *et al.*, 2012, Unhealthy lifestyle, overweight and obesity independently increase the risk of type 2 diabetes. The magnitude of risk contributed by sedentary lifestyle and low fiber diet are much greater than that imparted by overweight and obesity.

**Table 4.2 Average nutrient content per day by adult male respondents**

parameters	energy (Kcal)	CHO (g)	protein (g)	Fat (g)	fibre (g)	calcium (mg/d)	Iron (mg/d)	Retinol (µg/d)
<b>Intake</b>	2395	314	58.9	35	20.12	706.8	34.3	460
<b>RDA</b>	2320	333	60	25	25	600	17	600
<b>Difference</b>	-75.76	19	1.1	-10	4.88	-100.8	17.3	140
<b>t-value (cal)</b>	62.24	34.05	108	6	16	12.9	47.5	7.57
<b>t-table</b>	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
<b>Result</b>	S	S	S	N.S	S	S	S	N.S

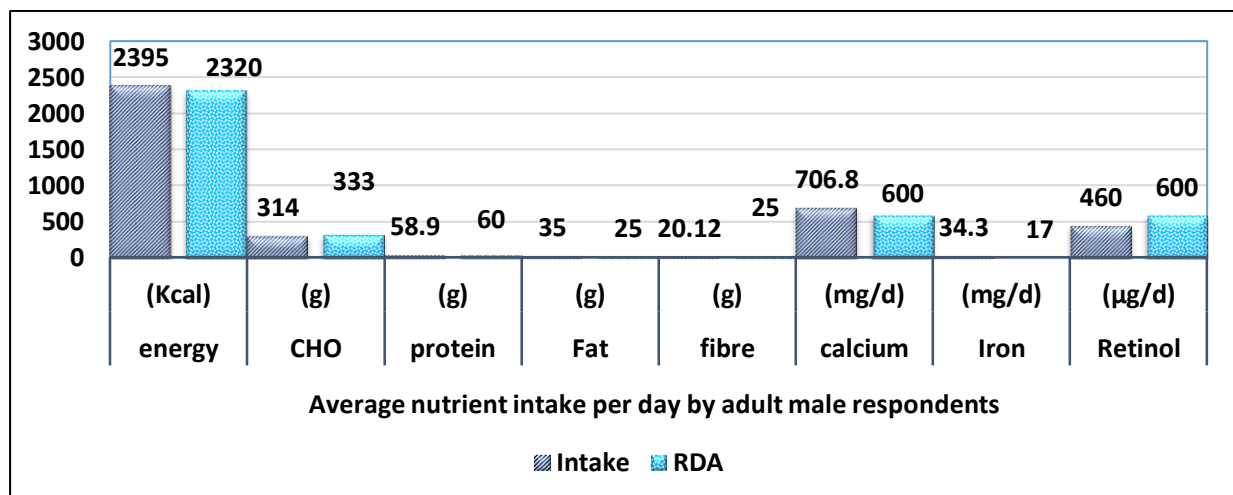
**\*Significant at 0.05 % level of significance**



**Table 4.2** shows the average value of nutrients intake by the selected male respondents with respect to energy, protein, fat, fibre, calcium, iron and retinol. After comparing all the average nutrients value with **ICMR, RDA (2010)** it was observed that carbohydrate, protein, fibre, retinol were less than the RDA whereas, energy intake and fat intake was higher than the RDA which concludes that due to increased calories consumption there is chance of getting obese. On applying t-test, significant difference were found between the intake and RDA for calories, protein, fibre, calcium and iron.

A high fat diet enriched with saturated fatty acids is the common diet in developed countries whilst in poorer countries the majority of people derive their calories from a vegetarian diet. Similarly, Proteins are more satiating than carbohydrate, and fat-reduced diets with a high protein content (20-25% of energy) may increase weight loss significantly.

A higher fiber content contributes to a lower energy density of foods (Slavin, 2005).



**Table 4.3 Average nutrient intake per day by adult sedentary female respondents**

Parameters	energy (Kcal)	CHO (g)	protein (g)	fat (g)	fibre (g)	Calcium (mg/d)	iron (mg/d)	Retinol (µg/d)
intake	1940.5	305	72.6	45.7	11.8	417	20.2	420
RDA	1900	375	55	25	25	600	21	600
difference	-40.5	70	-17.6	-20.7	13.2	183	0.8	180
t-value(cal)	94.82	36.5	44.83	3.41	2.7	13.4	51.5	5.66
t-table	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
Result	S	S	S	NS	NS	S	S	NS

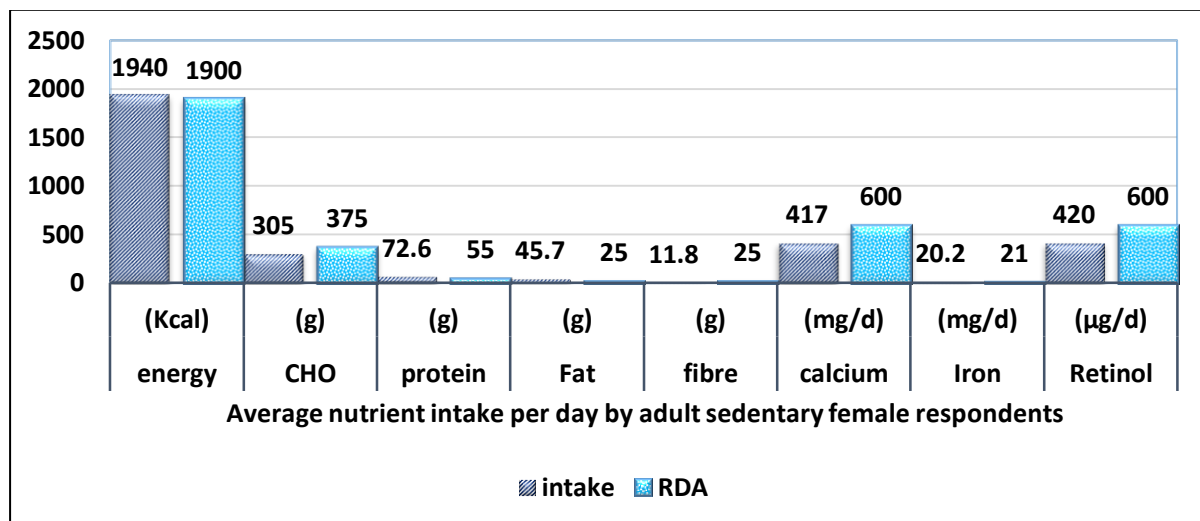
\*Significant at 0.05 % level of significance



**Table 4.3** shows the average value of nutrients intake by the selected male respondents with respect to energy, protein, fat, fibre, calcium, iron and retinol. After comparing all the average nutrients value with **ICMR, RDA (2010)** it was observed that carbohydrate, fibre, calcium and retinol were less than the RDA whereas, energy intake protein, fat intake was higher than the RDA which concludes that due to increased calories consumption there is chance of getting obese. On applying t-test, significant difference were found between the intake and RDA for calories, protein, fat, fibre, calcium, iron and retinol.

The modern diet of developed and developing countries contains more fat and considerably less fibre than the recommended levels. Thus, in one large epidemiological study, fat constituted 37.8% of the total energy intake compared to a recommended level of < 30.0%, whilst fibre intake was 8.6g/1000 kcal per day compared to a recommended intake of 14g/1000 kcal. Some studies suggest that the dietary intake of saturated and total fat was related to the risk of developing diabetes primarily through its association with greater body mass index (BMI) (Vam Dam *et al.*, 2002).

Many starchy foods induce a more rapid increase of blood glucose concentrations than many foods high in free sugars (Foster-Powell *et al.*, 2002).



**Table 4.5 Prevalence of obesity among adult respondents**

S.NO.	PARTICULARS	BMI	MALE =59		FEMALE=91		TOTAL N=150
			n=59	%	n=91	%	
1	Underweight	<16.0-18.5	1	0.66	2	1.33	2
2	Normal range	18.6-24.9	27	18	32	21.33	39.33
3	Grade I obesity	25.0-29.9	22	14.66	38	25.33	40
4	Grade II obesity	>30	7	4.6	19	12.66	17.33

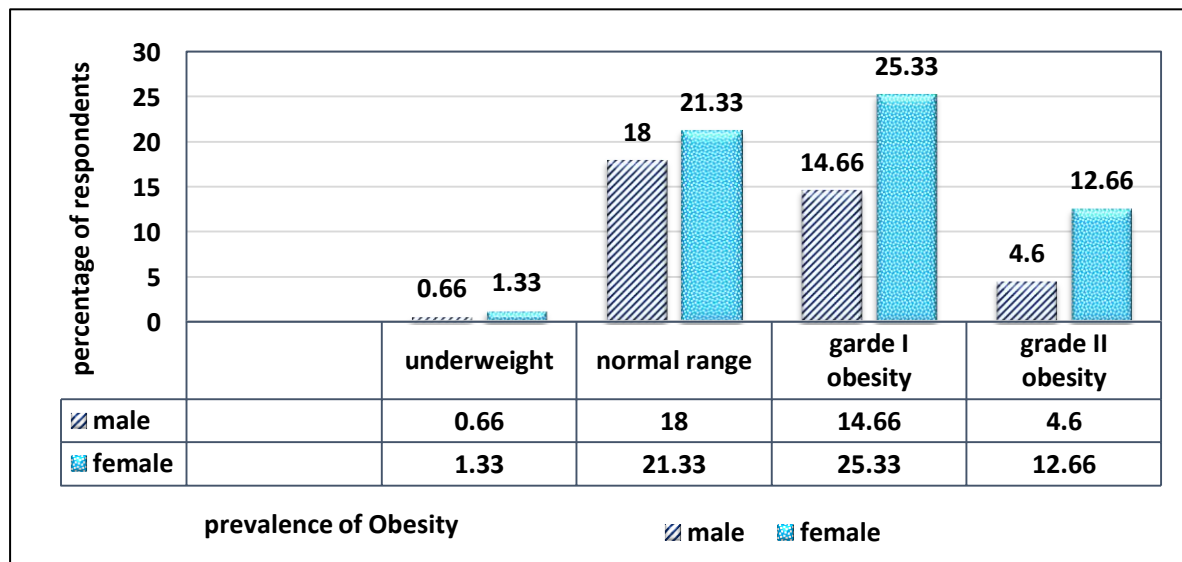


**Table 4.5** shows that out of 150 respondents, total 39.33 respondents were normal weight, out of which 18 percent were male and 21.33 percent were female, 40 percent respondents were having grade I obesity, out of which, 14.66 percent were male and 25.33 percent respondents were female, total 17.33 percent respondents were having grade II obesity, out of which, 4.6 percent were male and 12.66 percent were female, whereas, 2 percent respondents were underweight, out of which 0.66 percent were male and 1.33 percent were female. The above table shows that out of total 150 respondents, 29 (19.6%) male respondents were obese similarly, 57 (37.99%) female respondents were obese.

The BMI is associated positively with total fat mass, but only explains the variability in the extent of 60-80 and therefore represent an indicator also of the other body compartments: lean mass. Recent studies have shown that the relationship between body mass index and body fat percent differs among ethnic groups. Compared with Caucasian population some population some Asian population have 3-5 percent more body fat for the same BMI, age and gender. The world Health Organization promotes the BMI as a crude indicator for weight judgment (Srilakshmi, 2010).

An important reason to attempt weight loss is the prevention of morbidity associated with excess adiposity including type 2 diabetes, coronary heart disease and stroke (Willett *et al.*, 1999).

It has been suggested that high postprandial insulin responses may reduce fat oxidation and increase fat synthesis and storage (Mcmillan-Price and Brand-Miller, 2006).





**Table 4.6 Other health related complications of respondents**

HEALTH COMPLICATIONS	MALE=59		FEMALE=91		TOTAL N=150
	n	%	n	%	
Cardiovascular Disease	11	7.33	15	10	17.33
Diabetes Mellitus	12	8	10	6.66	14.66
Gout	3	3	12	8	10
Renal disease	1	0.66	0	0	0.66
chest pain	0	0	3	2	2
Shortness Of Breath	0	0	3	2	2
Fatigue	6	4	17	11.33	15.33
sleep apnea	5	3.333	5	3.33	6.66
Thyroid	0	0	4	2.66	2.66
No	21	14	22	14.66	28.66

**Disease:** Out of 150 respondents, 17.33 percent respondents suffered from cardiovascular disease, 14.66 percent respondents were having diabetes, 10 percent of respondents suffered from gout, 0.66 percent respondents suffered from kidney disease, 2 percent of the female respondents were having chest pain similarly 2 percent of the female respondents suffered from shortness of breath, 15.33 percent respondents suffered from fatigue, 6.66 percent respondents suffered from sleep apnea, 2.66 percent female respondents suffered from thyroid, and rest of the respondents that i.e. 28.66 percent respondents were not having any of the diseases. According to Aronne, Breathlessness is regularly cited as a common consequence of obesity. However, obesity has also been correlated with more serious respiratory diseases such as sleep apnea and asthma. Sleep apnea is associated with obesity and contributes to psychosocial morbidity, as it can result in excessive sleepiness and restless sleep. It is often suspected when a patient or patient's partner reports a history of loud snoring (Aronne, 2002). Similarly, Wang *et al.*, (2011) founded that there are tremendous health and economic burdens on society imposed by the obesity epidemic. A large number of studies identified harmful effects of obesity with various types of chronic diseases, such as cancers, diabetes, hypertension, hyperlipidemia, sleep apnea, coronary heart disease and stroke.





**Table 4.7 Relation of Diabetes with obesity among the respondents.**

OBESITY CATAGORY	MALE (N=29)		FEMALE (N=57)		TOTAL (N=86)
	n	%	n	%	%
Non diabetic(<140 mg/dl)	14	48.27	35	61.4	56.9
Diabetic(>140 mg/dl)	15	51.72	22	38.59	43.02

**Table 4.7** shows that out of total (86) obese respondents, 14 (48.27%) male respondents and 35 (61.4%) female respondents were non diabetic whose blood plasma level was less than 140 mg/dl, whereas 15 (51.72%) male respondents and 22 (38.59%) respondents were diabetic whose blood plasma level was greater than 140mg/dl. Among selected obese respondents, 43.02 percent respondents (including male and female) were diabetic.

According to the data provided by Centers for Disease Control and Prevention (CDC) (November 2004), Obesity has been found to contribute to approximately 55% of cases of type 2 Diabetes mellitus. American Diabetes Association's criteria were utilized to identify T2DM, defined as the presence of diabetes symptoms along with a casual glucose concentration on plasma  $\geq 200$  mg/dl or a fasting glucose  $\geq 126$  mg/dl and/or a previous diagnosis by a physician.

### **Conclusion:**

From the results, out of 150 respondents, the prevalence rate of obesity was found 57.33 percent. The average nutrients intake i.e. carbohydrate, protein, fibre and retinol for both male and female respondents were found less than the recommended RDA and Calories and fat intake was found more than the RDA. The significant difference were found between the average intake and RDA for calories, carbohydrate, protein, fibre, iron and calcium. Out of total selected respondents. Out of total obese respondents, 43.02 percent respondents were Diabetic. Obesity was the cause of diabetes. So it was concluded that diabetes with sedentary lifestyles are correlated with obesity.

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