A CROSS SECTIONAL STUDY TO ASSESS THE PREVALENCE OF HYPERTENSION AND DIABETES AMONG OBESE AND NON OBESE PERSONS, IN ABOVE 40 YEARS AGE GROUP IN A SLUM AREA OF CHENNAI

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ABSTRACT:
CONTEXT: Obesity is increasing in the developed as well as developing countries. The prevalence of obesity is on the rise among the slum population. Increased incidence of visceral adiposity, hypertension, non insulin dependent diabetes mellitus (NIDDM) and coronary heart disease often cluster in the same individual and there have been speculations that a common mechanism may be responsible for all these pathological conditions. This risk factor constellation, which is associated with an enhanced risk for cardiovascular disease, is referred to as "Syndrome X. **AIMS**: To assess the prevalence of diabetes and hypertension among obese and non obese in above 40 years age group in a slum area of Chennai. **SETTINGS AND DESIGN**: Urban slum in Chennai, Cross sectional study. **MATERIALS AND METHODS**: Present study was undertaken in a slum in Chennai in persons above 40 years age group. One slum was selected randomly and the households in the slum were sampled by a systematic random sampling method. A pre-designed and pre-tested questionnaire was used to collect information regarding the socio-demographic profile, the diet pattern, the intake of non- vegetarian and oily foods, past history of hypertension and diabetes. Anthropometric data regarding height and weight was taken to assess body mass index (BMI), blood pressure was checked using mercury column sphygmomanometer and blood glucose level by Glucometer. **STATISTICAL ANALYSIS**: The prevalence was expressed in percentage and the Chi square test was used to find association with the factors. **RESULTS**: The prevalence of obesity was 13.66% and of overweight was 27.72%. The prevalence of Hypertension among obese was 39.13%, pre obese 32.39% and non obese 24.93%. The prevalence of Diabetes among obese was 28.98%, pre obese 19.71% and non obese 15.34%. **CONCLUSION**: There is a rising prevalence of overweight and obesity among the urban slum dwellers. The prevalence of hypertension and diabetes was found to be significantly higher among obese as compared to non obese. The prevalence of diabetes and hypertension was more in those having central adiposity indicating that most important complications of obesity such as insulin resistance, diabetes and hypertension are linked more strongly to intra abdominal fat deposition.

KEY WORDS: Obesity, Hypertension, Diabetes, Body Mass Index, Syndrome X.

INTRODUCTION:

The prevalence of Obesity is increasing in the developed as well as developing countries (1). The number of people who are obese is rising rapidly throughout the world, making obesity as one of the fastest developing public health problems. The World health Organization has described the problem of obesity as a "world wide epidemic" (2). In addition to being a disease in its own right, obesity substantially increases the risk of several fatal and non fatal, but highly debilitating non communicable diseases, particularly cardiovascular diseases, type- 2 diabetes mellitus, endocrine and metabolic disturbances, sleep apnea, osteoarthritis, certain types of cancer and several psychological problems (3). In 1977, Haller used the term "Metabolic Syndrome" (Syndrome X) for association of obesity, diabetes mellitus, hyper lipo-protenemia, hypercuricemia and steatosis hepatis when describing the additive effects of risk factors on atherosclerosis(4). Central adiposity increases the risk of diabetes and hyperlipidemia (5). Accumulation of abdominal fat lower the levels of cardiac output and higher the peripheral resistance compared to individuals with lower body weight or subcutaneous obesity (6). Since there were not many studies about prevalence of hypertension and diabetes among obese and non obese, the present study was undertaken in urban slum of Chennai to depict the prevalence of three non- communicable diseases namely, obesity, hypertension and diabetes and to study the relationship between them.

MATERIALS AND METHODS:

The present study was a community based, cross sectional study carried out in an urban slum in Chennai among persons aged 40 years and above from January 2012– March 2012. Ethical clearance was obtained. Among 10 big slums of Chennai, the slum of Gandhi Nagar and Satyavani Muthu Nagar was randomly chosen by lottery method. This slum is located in the heart of the city, opposite the Central Railway station. 800 meters in length, 200 meters wide, it is bordered in the north by the sewage-river Kuvam. It shelters about 2,600 families, i.e. 15,000 people. All 2496 houses were surveyed using complete enumeration technique. House to house approach was used for the initial enumeration. During the survey a total of 1683 persons above the age of 40 years were found to be residing in this slum.

Out of these 30%, i.e. 505 subjects were included for the study and interviewed by using a pretested, formatted, close ended proforma. The first house was selected by random sampling technique. All persons in this household in above 40 years age group were interviewed. The next house was selected by systematic sampling technique by taking every K^{th} house by below formula

$$K = \frac{\text{Total population above 40 year}}{\text{Sample size desired}} = \frac{1683}{30\% \text{ of total}} = \frac{1683}{30\% \text{ of } 1683} = \frac{1683}{505} = 3.33$$

Thus every third house was selected for the study and all persons above 40 years in a particular house were interviewed till a total of 505 persons were interviewed. Information regarding socio- demographic profile was questioned. The persons were also enquired about the known history of hypertension and diabetes. Dietary history was asked about the type of diet,

frequency of eating non- vegetarian food and of oily foods i.e. chicken, mutton, fried fish and oily snacks.

The height and weight of the subjects were recorded and BMI was calculated. The blood pressure of every individual was checked with a mercury column sphygmomanometer. Waist Hip Ratio (WHR) was calculated by measuring tape. The blood glucose level of study subject was measured using a glucometer and a random capillary blood was used for measuring blood glucose. Obese was classified as per "Classification of obesity in Adults as per BMI"(7). Hypertension was classified as per "Association of Physicians of India"(8). Diabetes was classified as per "Diagnostic values for oral GTT and Clinical classification of Diabetes Mellitus"(9). Central adiposity was classified as per Waist Hip Ratio (8).

RESULTS:

The overall prevalence of Obesity in this urban slum was 13.66% (males 12.50% and females 14.65%). The prevalence of overweight was 27.72%.

Sex	Obese (o)	Overweight (n)	Study Population (p)	Prevalence Rate %	
				Obese o/p x 100	Overweight n/p x 100
Males	29	61	232	12.50	26.29
Females	40	79	273	14.65	28.93
Total	69	140	506	13.66	27.72

Table 1: Prevalence of Obesity in Study population

The total prevalence of Hypertension (HTN) was 27.92% and Diabetes (DM) 17.82%.

Sex	Persons with HTN (n)	Persons with DM (o)	Study Population (p)	Prevalence Rate %	
				HTN n/p x 100	DM o/p x 100
Males	62	31	232	26.72	13.36
Females	79	59	273	28.93	21.69
Total	141	90	506	27.92	17.82

Table 2: Prevalence of Hypertension and Diabetes in study population

The prevalence of hypertension (HTN) among obese was 39.13% and non obese 24.93%.

BMI	Persons with HTN (n)	Persons without disease	Study population (p)	Prevalence rate n/p X 100
Obese BMI> 30	27	42	69	39.13
Pre obese BMI= 25-29.9	23	48	71	32.39
Non obese BMI< 25	91	274	365	24.93
Total	141	364	505	27.92

Table 3: Prevalence of hypertension in Study population. (Chi square6.62,P<0.05@d.f.=2, Table value 5.99)

The prevalence of type 2 Diabetes (DM) among obese was 28.98% and non obese 15.34%.

BMI	Persons with Diabetes (o)	Persons without disease	Study population (p)	Prevalence rate o/p X 100
Obese BMI> 30	20	49	69	28.98
Pre obese BMI= 25-29.9	14	57	71	19.71
Non obese BMI< 25	56	309	365	15.34
Total	90	415	505	17.82

Table 4: Prevalence of diabetes in Study population. (Chi square7.59,P<0.05@d.f.=2, Table value 5.99)

The prevalence of hypertension and diabetes was higher among those having central adiposity as compared to those who did not have central adiposity.

WHR	Persons with HTN (n)	Persons without disease	Study population (p)	Prevalence rate n/p X 100
< 0.99	40	133	173	23.12
> 1	22	37	59	37.28
Total	62	170	232	26.72

Table 5: Hypertension in males wrt WHR. Chi square 4.50 at P < 0.05 @ d.f.=1 table value 3.84

WHR	Persons with HTN (n)	Persons without disease	Study population (p)	Prevalence rate n/p X 100
< 0.84	49	145	194	25.25
> 0.85	30	49	79	37.97
Total	79	194	273	28.93

Table 6: Hypertension in females wrt WHR. Chi square 4.41 at P < 0.05 @ d.f.=1 table value 3.84

WHR	Persons with DM (o)	Persons without disease	Study population (p)	Prevalence rate Rate o/p X 100
< 0.99	18	155	173	10.40
> 1	13	46	59	22.03
Total	31	201	232	13.36

Table 7: Diabetes in males wrt WHR. Chi square 5.13 at P< 0.05@ d.f.=1 table value 3.84

WHR	Persons with DM (o)	Persons without disease	Study population (p)	Prevalence rate o/p X 100
< 0.84	33	161	194	17.01
> 0.85	26	53	79	32.91
Total	59	214	273	21.61

Table 8: Diabetes in females wrt WHR. Chi square 8.33 at P < 0.05 @ d.f.=1 table value 3.84

It was found that about 47.82% of obese, 49.29% pre obese, 47.72% hypertensive, 21.12% diabetics and 52.63% having both hypertension and diabetes consumed oily foods daily.

DISCUSSION:

The study was carried out in an urban slum of Chennai, to find out the prevalence of hypertension and diabetes among obese and non obese in above 40 years age group. The prevalence of obesity (BMI>30) was 13.66% (males 12.50% and females 14.65%) and pre obese (BMI= 25-29.9) was 27.72%. In a study conducted by Anuradha R et. al. in a slum area of Chennai, the prevalence of obesity in women above 20 years of age was 19.8%. (10). An epidemiological study of obesity conducted in above 40 years age group in Shimla town showed that the prevalence of Obesity was 21.5%, using cut of levels of BMI 25 (11).

The prevalence of hypertension in the study subjects was found to be 27.92% (males 26.72% and females 28.93%). A community survey carried out in India in different geographical location, showed the prevalence of hypertension in urban population as 23.5% and in rural 18%. (8). The prevalence of Diabetes in study group was 17.82% (males 13.63% and females 21.69%).A study conducted in elderly population in Chandigarh showed the prevalence of diabetes as 11.6% (1). The prevalence of hypertension and diabetes among obese was 39.13% and 28.98% respectively. Thus obesity is associated with increased risk of developing hypertension (3). Obesity is also a major risk factor for NIDDM (9). A similar study conducted among elderly showed the prevalence of hypertension among obese as 82.5% as compared to non obese where it was 45.87% (1). In another study, when women aged 30- 60 years were monitored for 14 years the additional risk of developing NIDDM for those who were obese was over 40 times greater than for women who remained slim i.e. BMI < 22. (12).

Research has shown that excess fat stored in abdominal area poses a higher risk to health than fat distribution elsewhere (13). About 37.28% males and 37.97% females with central adiposity were hypertensive and 22.03% males and 32.91% females with central adiposity were diabetics. High blood pressure is present in more than half the people with metabolic syndrome X and in setting of insulin resistance; high blood pressure is especially important risk factor (13). Many of the important complications of obesity, such insulin resistance, diabetes and hypertension are linked more strongly to intra abdominal fat deposition (14). Among hypertensive, 46.72% and among diabetics 21.12% consumed oily foods daily. A diet rich in fat can pose threat to human health by encouraging obesity. In fat people adipose tissue may increase upto 30 percent. (7).

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