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Prevalence of Over-Weight and Obesity and its Association with Hypertension among Women in Urban Area of Southern Rajasthan

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Running Title of Article: Obesity with associated hypertension in women

Abstract: ***Objective: To describe the prevalence of overweight and obesity and its association with hypertension among women in an urban area of Southern Rajasthan. Design: A cross sectional community based descriptive study conducted among 940 Women aged 15-49 years residing in selected urban area after taking consent. Result: For women, aged 15-49 years, the prevalence of overweight and obesity is 17% and 40% respectively. Distribution of females according to BP value showed that majority of overweight (15.25%) and obese (55.28%) females were from hypertension class I,while 18.56% overweight and 35.26% obese females had pre- hypertension. 51.66% obese and 5% overweight females had Grade II hypertension. Conclusion: Obesity is the leading cause of origin of non communicable diseases. The adverse effects of obesity to emerge in population in transition are hypertension, hyperlipidaemia and glucose intolerance, while CAD and the long term complication to emerge several years later.***

Keywords: Obesity, BMI, hypertension

1. Introduction

Overweight and obesity are defined as an abnormal or excessive fat accumulation that may impair health. Obesity is a complex health issue to address. Obesity results from a combination of causes and contributing factors, including individual factors such as behavior and genetics[3]. BMI provides the most useful population-level measure of overweight and obesity as it is the same for both sexes and for all ages of adults. Obesity is an epidemic disease that threatens to inundate health care resources by increasing the incidence of diabetes, heart disease, hypertension, and cancer. In this study, only females were selected for research, as prevalence of obesity is highest among females. NFHS- IV (2015-2016) data revealed that obesity in female is more prevalent than obesity in male in Rajasthan state[2]. This was also supported by British Journal of India which published that India's women are more likely to be obese than their male counterparts. There were 20 million obese women in India in 2014 compared with 9.8 million obese men[1]. Direct associations between obesity and several diseases, including diabetes mellitus, hypertension, dyslipidaemia and ischaemic heart disease, are well recognized. Despite this, the relationship between body weight and all-cause mortality is more controversial. A very high degree of obesity (BMI $\geqslant 35\ kg/m^2$) seems to be linked to higher mortality rates,[5] but the relationship between more modest degrees of overweight and mortality is unclear.

2. Materials and Methods

Study Design**:** The study was cross sectional community based descriptive study. ***Study Period*****;** Six month from the starting.

Study Area: The study was conducted in urban area of Udaipur city.***Study Population***: Women aged 15-49 year residing in selected urban area willing to participate in the study were included in the study. ***Sampling*****:** Population of Udaipur city is 5 lac, out of which approximate 50% i.e. 2.5 lac were women. Sample size was calculated by using formula N= 4pq/l² on the basis of previous study by Girdhar Sangeeta et al in 2014 in an urban area of Ludhiana where prevalence of obesity was 30%. A minimum sample size of 933 is required to study prevalence of obesity at confidence level of 95%. To drop out the failure we rounded up the sample size to 940.There are 50 wards in Udaipur city, out of which 10 wards were randomly selected for the study. Researcher identified a landmark in each ward and collected data house to house. Total sample size calculated is ~940 women, for investigation 94 women from each ward was taken and when 94th women was reached researcher moved to next ward.

Exclusion Criteria

1) Females who were pregnant were excluded from the study.
2) Not willing to participate.

Tools and Technique

1) A pre-designed pre-tested semi-structured questionnaire was used by researcher for data collection.
2) This questionnaire was filled by person taking part in interview and used to record socio-demographic profile, dietary pattern, the intake of vegetables and fruits, history of traumatic events, physical activity, the duration of television watching in a day and the duration of sleep at night of the study subjects.
3) Anthropometric data regarding height and weight was also taken. Height was taken by using heightometer and weight was recorded by using weighing machine. WHO Asian Classification of the body mass index (BMI) was us ed to classify the study population.

BMI	*Classification*
< 18.5	Underweight
18.5–24.9	normal weight
25.0–29.9	Overweight
30.0–34.9	class I obesity
35.0–39.9	class II obesity
≥ 40.0	class III obesity

4) Measurement of BP was recorded by sphygnomanometer. WHO Asian Classification of the hypertension was used to classify the study population.

Category	Normal	Pre hypertension	Stage 1 HTN	Stage 2 HTN
Blood Pressure, (mm Hg)	SBP 90-119 and ,DBP 60-79	SBP 120-139 or DBP 80-89	SBP 140-159 or DBP 90-99	SBP ≥160 or DBP ≥100

3. Results

Table 1: Distribution of Females According to Age and Nutrition

Age Groups (In Years)	Respondents	Percentage
15-24	494	52.5%
25-34	186	19.8%
>35	260	27.7%
BMI Classification	Respondents	Percentage
Under Weight (<18.5)	185	19.7%
Normal Weight (18.5-24.99)	218	23.2%
Overweight (25.00-29.99)	160	17%
Obese Class 1 (30.00-34.99)	268	28.6%
Obese Class 2 (35.00-39.99)	56	6%
Obese Class 3 (≥40)	53	5.6%
Total	940	100%

During the study period, total numbers of respondents were 940. In whom majority of females (52.5%) belonged to 15-24 year age group, 19.8% females belonged to 25-34 year age group, and 27.7% females belonged to >35year age group. In present study 19.7% were under-weight females, 23.2% normal weight, 17% over-weight and 40.01% obese (28.6% obese class I, 6% obese class II, 5.6% obese class III).

Table 2: Prevalence of hypertension in 15-45 aged female

Category of Blood pressure (mm of hg)		Respondents	Percentage
Normal	SBP (90-119) DBP(60-79)	331	35.21%
Pre Hypertension	SBP (120-139) DBP(80-89)	431	45.85%
Stage 1 HTN	SBP(140-159) DBP(90-99)	118	12.55%
Stage 2 HTN	SBP(≥160) DBP(≥100)	60	6.38%

Distribution of females according to BP value, showed that majority of women came under pre hypertension class [SBP (120-139), DBP(80-89)]. While 35.21% females were normal .12.55% female comes under stage I hypertension SBP (140-159) DBP(90-99) and 6.38% came under stage II hypertension SBP(≥160),DBP(≥100).

Table 3: Nutritional status among different age groups

Distribution of respondent Age groups	No	Classification of respondents according to nutrition							
		Under weight (N),(%)	Normal weight (N),(%)	Over-weight (N),(%)	Obese Class I (N),(%)	Obese Class II (N),(%)	Obese Class III (N),(%)	Total Obese	Over-weight& obese
15-24	494	152 (30.76)	180, (36.43)	29, (5.87)	55, (11.13)	58, (11.74)	20, (4.04)	113, (26.92)	142 (28.74)
25-34	186	11, (11.82)	26, (8.6)	37, (3.64)	32, (17.20)	64, (34.4)	16, (8.6)	122, (60.21)	149 (80.10)
35-49	260	11, (4.23)	22, (8.4)	85, (28.46)	81, (31.15)	34, (13.07)	17, (6.53)	142, (50.76)	227, (87.30)

(p value is 0.01, chi-square statistic is 62.93)

Highest proportion of obesity (87.30%) was observed among 35-49 age group females, followed by 80.10% in 25-34 year age group females, then 28.74% in 15-24 year age group.

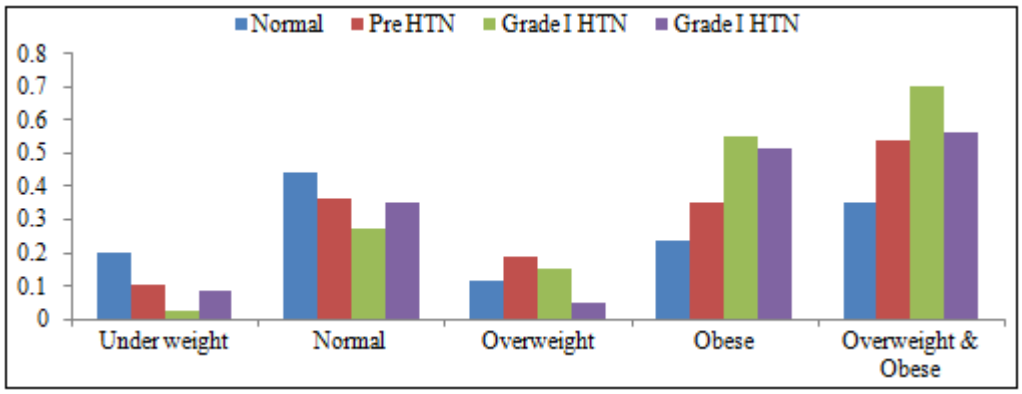

Figure I: Hypertension and nutritional status
P value is <.00001 and chi square statistic is 74.2727

Distribution of females according to BP value on instrument, showed that majority of obese females (70.33%) were from grade I hypertensive class.

Among grade II hypertensives, 56.66% females were obese. While only 35.24% obese females belonged to normal class.

4. Discussion

In our study prevalence of over-weight and obesity was 17.1% and 40.01% respectively(total obese; 57.11%) ,which is higher than national prevalence. According to findings of NFHS-IV the prevalence of obesity is 23.7% in women of Rajasthan[2]. Prevalence of over-weight and obesity was also higher than data of M Shashidhar Kotian et al, Bairwa M, Rajput M, Sachdeva S. et al, Anuradha R, Ravivarman G, Jain T Gothankar JS et al study. According to M Shashidhar Kotian et al study the overall prevalence of overweight among adolescents was 9.9% and obesity was 4.8% in southern India. Bairwa M, Rajput M, Sachdeva S. et al analyzed that the prevalence of overweight and obesity as per the modified criteria of BMI for the Asian Indians was found to be 15.0% and 34.6%, respectively[6]. Anuradha R, Ravivarman G, Jain T analyzed the prevalence of overweight (BMI ≥ 23) was 27.7% (95% confidence interval [CI] 24.3–32.2) and the prevalence of obesity (BMI ≥ 25) was 19.8% (95% CI 16.5–23.6)[7]. Gothankar JS. Et al studied that the prevalence of overweight and obesity was 15% and 34% respectively and it was predominant among women than men.

Prevalence of over-weight and obesity was also lower than study by Sidhu S, Tatla HK. Et al where the combined overall prevalence rate of overweight and obesity in the present study was 76.15%.

In the present study, females were classified in different age groups to identify their association with overweight and obesity. Among them majority of females (52.5%) belonged to 15-24 age group, 19.8% females belonged to 25-34 age groups, and 27.7% females belonged to >35 age group which are supported by data of census of India, which showed majority of population in India belongs to 15-30 age group i.e. 31.8% while 25.4% belongs to 30-44 year age group.

In our study highest proportion of obesity (87.30%) was observed among 35-49 age group females, followed by 80.10% in 25-34 year age group females, then 28.74% in 15-24 year age group . *'P value 0.01* and *chi-square statistic is 62.93*' transpired that prevalence of overweight and obesity varies with age group and it increases as age increases.

These findings were supported by many other studies. For instance a study of Sangeeta Girdhar et al (2016) showed that most of the overweight/obese women belonged to the age group of 40-60 years and prevalence increased with increase in age ($P < 0.001$). Study of N. K. Mungreiphy showed that maximum value for mean BMI was 22.3 kg/m², found among 40–49 yr age group. BMI was found to be lowest among 20–29 yr age group and declined thereafter.[10]

Distribution of females according to BP value, showed that majority of women came under pre hypertension class [SBP (120-139), DBP(80-89)]. While 35.21% females were normal .12.55% female comes under stage I hypertension SBP(140-159)DBP(90-99) and 6.38% came under stage II hypertension SBP(≥160),DBP(≥100). These data were slightly higher than NFHS-IV data, which showed that prevalence of hypertension and diabetes in urban area of Rajasthan is 8.5% and 5.6% respectively.

Highest proportion of pre hypertension (57.14%) was observed among over-weight females. While highest percentage of grade I hypertension (19.24) and grade II hypertension (9.5%) was observed among obese females. And association between over-weight & obesity with hypertension was statistically significant. (*P value is <.001 and chi square statistic is 74.2727.)*

These data were comparable with many studies. Study of Anuradha et al found that highly significant number of middle aged obese women was found to be hypertensive as compared to non obese females. In a study conducted in Africa. BMI was positively associated with systolic, diastolic and mean arterial pressure. Gothankar also found a significant association between BMI and hypertension in her study conducted in Pune.[9]

5. Summary and Conclusion

Obesity is the new era pandemic which is the leading cause of origin of other non communicable diseases. The first

adverse effects of obesity to emerge in population in transition are hypertension, hyperlipidaemia and glucose intolerance, while coronary heart diseases and the long term complication of diabetes, such as renal failure begin to emerge several years later. It is matter of time before same mortality rates for such diseases will be seen in developing countries as those prevailing 30 years ago in industrialized countries.

Projections are being made that urbanization and altered life styles, concomitants of socio economic development will lead to increase prevalence of obesity.

Demographic profile of subjects transpired that majority of females (52.5%) belonged to 15-24 year age group ,followed by 25-34 year age group. In our study prevalence of over-weight and obesity is 17.1% and 40.01% respectively.

Highest proportion of pre hypertension (57.14%) was observed among over-weight females. While highest percentage of grade I hypertension (19.24) and grade II hypertension(9.5%) was observed among obese females. And association between over-weight & obesity with hypertension was statistically significant. It inferred that there is significant association of hypertension with obesity.

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