Body Mass Index, Blood Pressure and Blood Sugar in Adult Women of Delhi – Is Their Co-Existence Inevitable?

Anthropology

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ABSTRACT   At least two-thirds of the prevalence of hypertension is directly attributed to obesity and increasing incidence in blood sugar level. The study comprised of 415 Premenopausal women (still menstruating) in the age group 25-50 years and 203 Postmenopausal women (who had attained menopause) in the age group of 40-65 years, residing in Delhi. The women were tested for obesity level as assessed by Body Mass Index (BMI), systolic and diastolic blood pressure, pulse rate and heart rate and random blood sugar. Systolic and diastolic blood pressure was significantly correlated to BMI in premenopausal women while it was not in post-menopausal women. No statistically significant correlation between BMI and heart rate and pulse rate was found among both groups of women. Random blood sugar was more in postmenopausal women than in premenopausal women though maintaining normal range. It requires further research to ascertain the genesis and evolution of obesity-related co-morbidity.

INTRODUCTION

Overweight and obesity, an outcome of changing lifestyle are considered public health crisis contributing substantially to a variety of chronic diseases, disability and premature mortality (Sharma, 2007). Concerns of excess weight gain shows that populations in developing countries, now suffer from unexpectedly high levels of obesity, thus a need to understand the relationship between obesity and society.

The emerging epidemic of obesity and associated co-morbities represents an enormous public health burden with economic and societal consequences of major significance (Mokdad et al, 2001; Ford et al, 2005). Obesity is a complex disorder detrimental to good health and well-being associated with number of adverse health outcomes. However, among the women, weight gained at various physiological transitions like puberty, pregnancy and menopause make more them vulnerable. The site of fat accumulation is considered a predominant factor for metabolic disorders of obesity (van Gaal, 1988).

The present study was undertaken as the relevance of blood pressure and blood sugar with **obesity is an** important public health challenge.

MATERIAL AND METHODS

The study was carried out in Delhi with women who were still experiencing menstrual period designated as premenopausal women (n=415) in the age group 25-50 years and those who had attained menopause were referred to as postmenopausal women (n=203) in the age group 40-65 years. Each subject was measured for stature (cm) using standard techniques as given by (Weiner & Laurie, 1981) and physiological variable- blood pressure (mmHg), pulse rate (p/m),heart rate (b/m) and random blood sugar. BMI was assessed using Tanita Body Composition Analyser. A letter of consent was obtained after explaining the objectives of the study to women before commencing the data collection.

RESULTS

Table 1 Basic Data of the subjects

Variables	Premenopausal women		Postmenopausal women	
	Mean	+ SD	Mean	+ SD
Age (yrs)	34.55	6.51	53.46	7.05
Age at menarche (yrs)	13.39	1.42	13.81	1.40
Age at menopause (yrs)	-	-	46.19	4.55
Weight (kg)	63.69	11.47	68.42	12.00
Stature (cm)	155.24	5.82	153.43	4.96
Body Mass Index (kg/m^2)	26.47	4.37	29.34	5.50
Systolic blood pressure (mm Hg)	116.54	14.02	130.05	20.46
Diastolic blood pressure (mm Hg)	75.95	9.81	80.58	12.72
Heart rate (beats/min)	83.36	11.56	82.04	11.57
Pulse rate (pulse/min)	82.91	11.63	82.28	11.15
Random blood sugar (mg/dl)	111.84	27.52	130.36	56.81

Table 1 show the average age and age at menarche of women in premenopausal group is 34.55 years and 13.39 years respectively whereas in postmenopausal group it is 53.46 years and 13.81 years respectively. The age at menopause is 46.19 years in postmenopausal group.

Postmenopausal women were found to be heavier (68.42 kg) and shorter (153.43 cm) than premenopausal women (63.69 kg, 155.24 cm). Body mass index (BMI) of postmenopausal women (29.34 kg/m2) is more than premenopausal women (26.47 kg/m2).

Blood pressure is more in postmenopausal women (130.05/80.58 mmHg) than in premenopausal women (116.54/75.95 mmHg). Heart rate and pulse rate show reverse trend with premenopausal women showing more value (83.36 b/m and 82.91 p/m) than postmenopausal women (82.04 b/m and 82.28 p/m respectively). Random blood sugar is more in postmenopausal women (130.36) than in premenopausal women (111.84) though still in normal range.

Table 2: Correlation of Body Mass Index with Blood Pressure among Women

Physiological parameters Groups	Systolic blood pressure	Diastolic blood pressure	Heart rate	Pulse rate
Premenopausal women	.248**	.270**	.030	-.001
Postmenopausal women	.095	-.129	-.097	.039

** Correlation significant at 0.01 level

The correlation of Systolic and Diastolic blood Pressure for premenopausal women is found to be statistically significant at 0.01significance level as shown in table 2. However, no such association is found for postmenopausal women. Similarly, no statistically significant correlation was found for Heart Rate and Pulse rate among both Premenopausal and Postmenopausal women.

Table 3: Correlation between Random Blood Sugar, Age, Age at Menarche and Age at Menopause

Groups	Age	Age at menarche	Age at menopause
Premenopausal women	.192**	-.036	-
Postmenopausal women	-.062	-.063	-.153*

* Correlation significant at 0.05 level
** Correlation significant at 0.01 level

Age is statistically significantly correlated at 0.01 level in premenopausal women and age at menopause at 0.05 level in postmenopausal women to random blood sugar as depicted in depicted in table 3.

DISCUSSION
The trends in obesity indicate that the primary cause of the global obesity lies in environmental and behavioral changes. The prognostic significance of obesity in cardiovascular disease and total mortality is mainly accounted for by its close associations with hypertension, dyslipidemia, hyperinsulinemia and glucose intolerance (Jousilahti et al, 1996).

Obesity is a major chronic disorder affecting 20-40% adults in India. The prevalence of obesity is higher among women in India and also among the economically better off individuals who live in urban areas with sedentary lifestyles and having family history of obesity. Women of lower socioeconomic status experience the greatest risk for underweight and those in higher socioeconomic status experience the greatest risk for being pre-overweight, overweight and obese (Shukla et al, 2002; Subramanium and Smith, 2006). Studies from India have shown that changes in dietary patterns, physical activity levels and lifestyles associated with diet and urbanization are related to increasing incidence of obesity (Dhurandhar and Kulkarni, 1992; Singh et, 2004; Zagar et al 2000; Bhasin et al, 2001).

This study was undertaken to study the association of obesity (BMI) with blood pressure and blood sugar among adult women categorized as premenopausal (415 women) and postmenopausal group (203 women) depending on their menarchial status.

It is noticed that age at menarche in premenopausal women is earlier than postmenopausal women (Table 1) this early advent of menarche shows secular trend a resultant of improved condition of living, nutrition etc. agreeing with study by Khanna & Kapoor (2004). Premenopausal women were taller and heavier than postmenopausal women, showing secular trend in these two variables; again an outcome of better living and improved condition of living, At this age, increase in weight can only be attributed to increase in fatness A consistent increase in fatness establishes the fact that there continues to be an increase in fat content in females throughout life (Sinha & Kapoor, 2007). An increase in stature in succeeding generations as found by Kapoor et al, (1984) and Khanna & Kapoor (2004) lend support to present findings.

There are also close associations between various anthropometric measures of body fatness and multiple cardiovascular risk factors (Esmaillzadeh, 2004; Jonkers et al, 2006). Blood pressure both systolic and diastolic is more in postmenopausal women than in premenopausal women. However, heart rate and pulse rate show reverse trend with premenopausal women showing more value than postmenopausal women. However postmenopausal women have increased blood pressure than premenopausal women. Hypertension is well known to be linked to increased weight. Bordoloi & Kapoor (2013) found that Kalita population of Assam have increased trend in prevalence of hypertension with increase in age. Tyagi et al (2015) demonstrated that increasing obesity and adiposity levels in conjunction with improved socioeconomic status are driving the epidemic of hypertension. In India, where diversity and variation are found in large scale, biological and social factors should be incorporated while tackling any global health issue.

Both the accumulation of visceral fat and ectopic fat storage in a number of tissues and organs may be important in the cause and consequences of obesity hypertension. Arlappa et al (2014) found overweight/obesity is significantly associated with the high prevalence of hypertension in elderly. Therefore, effective preventive interventions, such as healthy lifestyles, regular physical activity and prudent dietary practices have to be adopted during middle age for the health promotion during old age.

It is unambiguous that when women reach the milestone of maturation be it from menarchial status or aging, there is tendency to gain fat. It is this opportune moment, when one needs counseling to curtail the increase in fat percent as it is found to be associated with obesity as shown while studying association of age, reproductive maturity and sugar levels. Kumar et al (2011) concluded that with an increase in BMI there is increase in blood sugar and blood pressure. Etukumana et al (2013) in their study to determine the relationship between Random blood glucose levels and Body Mass Index among rural adults in North Central Nigeria found no relationship between the levels of random blood glucose and Body Mass Index among the rural adult in the north central Nigeria and reflects that BMI would not be a good predictor of Diabetes Mellitus among rural adults. However, Patil et al (2012) concluded a positive correlation between fasting blood glucose and BMI, and that BMI could be used to predict incidence of obesity in Indian population. Further, it is the need of the hour to set guidelines for detection of obesity in Indian population to enable early detection of obesity, so that early and prompt treatment or prevention measures can be started in India. Among the middle class Indian population, there is a high prevalence of obesity, hypertension and diabetes, which are all modifiable coronary artery disease risk factors. Sekhri et al (2014) showed a direct correlation between increased BMI and diabetes and hypertension. According to Radhakrishnan & Ekbaram (2015) the two giant chronic

morbidities diabetes and hypertension now a pandemic is a new challenge to the modern world. The prevalence usually varies from nation-to-nation, area to area, people to people and even in the same group people. The differential prevalence among people is decided by their socioeconomic, cultural, and topographical conditions.

The developing world appears to be at greater risk of the diseases associated with overweight. In fact, cardiovascular diseases (CVD) have become the leading cause of disability and death in many developing countries (He et al, 2005). It is predicted that growing body mass will halt and perhaps even reverse the millennia long trend of rising human life expectancy. Emphasis of should be laid on complexities of the inter-relationships between diet, physical activity, and a host of possible confounding factors in the causation of obesity and its related metabolic disturbances.

CONCLUSION

Obesity has been consistently associated with increased cardiovascular risk in at least two-thirds of **hypertensives and with increasing incidence in blood sugar level. T**he study on 618 women residing in Delhi revealed that systolic and diastolic blood pressure was significantly correlated to BMI in premenopausal women and no statistically significant correlation between BMI and heart rate and pulse rate was found among both groups of women. Random blood sugar was more in postmenopausal women than in premenopausal women while maintaining normal range. It becomes imperative to develop a global strategy for managing the increasing number of overweight **and** obese subjects since obesity is associated with increased health complications and adverse outcomes in premenopausal and postmenopausal women.

ACKNOWLEDGEMENT

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