COMPARSION OF ANTHROPOMETRY AND BLOOD PRESSURE OF OBESE AND NON-OBESE POSTMENOPAUSAL WOMEN OF KARACHI, PAKISTAN

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خلاصہ

پس منظر: درمیانی عمر کے خواتین میں زیادہ وزن یا موٹاپا کی شدت، رجحانات کے ارد گرد اور بعد میں زیادہ ہے اور دنیا بھر میں بڑھتی ہوئی 40 سال کی عمر سے زیادہ خواتین میں تیزی سے بڑھتی ہوئی ہے، جن میں 65 فیصد یا زیادہ وزن یا موٹے اور 30 سے زیادہ٪ یا زیادہ موٹے ہونے والا ہے. یہ مطالعہ منصوبہ بندی کرنے کی منصوبہ بندی کی گئی تھی کہ بی ایم آئی، ڈبلیو ایچ آر اور بی پی میں موقوف پودوں میں عام خواتین کے مقابلے میں عام وزن کے بعد معمولی وزن کے مقابلے میں اختلافات کی جانچ پڑتال کی جائے.

طریقوں: ہم کراچی شہر کے مختلف علاقوں میں طبّی کیمپ منظم اور بندوبست کرتے ہیں. ہم نے عمر گروپ کو کم سے کم ایک سال کے لئے بند ہونے والے مہاسوں کے ساتھ دونوں کے کنٹرول (ن= 13) اور موٹے (ن= 71) کے درمیان عمر کے 40 سے 55 سال کے درمیان منتخب کیا. جسمانی وزن اور اونچائی BMI کا حساب کرنے کے لئے لیا گیا تھا. شرکاء کے آرام کی پوزیشن میں بلڈ پریشر ماپا. ایک سوالنامہ رضاکاروں سے تفصیلی معلومات جمع کرنے کے لئے ڈیزائن کیا گیا ہے.

نتائج: موصول ہونے والی خواتین کے بی ایم آئی (کلو گرام / ایم 2) کا اندازہ ہمارے کنٹرولوں سے متعلق خواتین (پی <0.001) سے نمایاں تھا. دونوں گروہوں کے WHR کے معنی اقدار کی موازنہ موٹے گروہ (P <0.01) میں نمایاں طور پر زیادہ قدر دکھاتا ہے. موٹے خواتین کی بازو کی فریم نمایاں طور پر زیادہ سے زیادہ تھی (پی <0.001). موٹے پوسٹ مینوپاسل خواتین کے ایس بی پی اور ڈی بی پی دونوں (ایم ایم ایچ جی) بالترتیب زیادہ (پی <0.001 اور پی <0.01) ہیں.

نتیجہ: اس مطالعہ سے معلوم ہوتا ہے کہ پودوں کے عضو تناسل میں خواتین کی پیٹ کی موٹائی بڑھ رہی ہے. بی ایم آئی، ڈبلیو ایچ آر اور موٹے پودوں کے پودوں کے بی بی کے بی پی غیر موٹے خواتین کے مقابلے میں نمایاں طور پر بلند ہوتے ہیں.

Abstract

The prevalence of overweight or obesity in middle-aged women, around and after menopause is high and is rising worldwide, more rapidly in women over the age of 40 years, with up to 65% being either overweight or obese and up to 30% or more being obese. This study was planned to examine the differences in body mas index (BMI), arm circumference (Arm C), waist hip ratio (WHR) and blood pressure (BP) in obese post-menopausal women as compared to normal weight post-menopausal women. We conducted and arrange the medical camps in different localities of Karachi city. We selected age group between 40 to 55 years of females both control (n=13) and obese (n=71) with ceased menstruation for at least one year. Body weight and height was taken to calculate BMI. Blood pressure was measured in resting position of participants. A questionnaire has been designed to collect the detail information from the volunteers. Our findings evaluated the BMI (kg/m^2) of obese females were significantly higher than control females (P<0.001). Arm circumferences of obese women were significantly greater (P<0.001). Comparison of mean values of WHR of both the groups showed significantly higher values in obese group (P<0.01). Both Systolic blood pressure (SBP) and diastolic blood pressure (DBP) (mmHg) of Obese postmenopausal women significantly higher (P<0.001 and P<0.01) respectively. This study found that growing issues of abdominal obesity were higher for postmenopausal women. BMI, Arm C, WHR and BP of obese postmenopausal women were significantly elevated than non-obese females.

Introduction

Postmenopausal women are usually troubled by increasing weight and waist circumference caused by obesity and androidal fat redistribution (Stachowiak *et al*., 2015). This is mostly attributed to estrogen depletion though other factors such as chronological aging and decline in physical activity play a significant role (Lizcano and Guzmán, 2014). The deleterious health consequences of obesity and visceral fat deposition after middle age encompass a variety of problems; from dyslipidemia and metabolic syndrome to increased risk of cardiovascular disease (CVD), osteoporosis, malignancies and mortality (Matvienko *et al*., 2011). The mean age at natural menopause is reported to vary from 45-52.8 years (Schoenaker *et al*., 2014; Gold, 2011). With the increase in life expectancy resulting in women living one half to one third of their lives after menopause, the high incidence

of overweight and obesity in women during menopause transition and beyond have become important public health concerns (Lizcano and Guzmán, 2014). Obesity in postmenopausal women is attributed to both genetic (Kelemen *et al*., 2010) and environmental factors, with adverse lifestyle practices playing a major role in the increase in body mass index (BMI) and waist circumference (Bray and Bellanger, 2006; Gravena *et al*., 2013).

Weight was found to be significantly heavier in postmenopausal women than in premenopausal women (Larsson *et al*., 2003). The postmenopausal women were lighter than the premenopausal women and they attributed this to the aging process (Meuriége *et al*., 2000; Lyu *et al*., 2001; Ferrara *et al*., 2003).

Postmenopausal women were significantly having more mean values of body circumferences than the premenopausal women (Azizi and Ainy, 2003; Hwu *et al*., 2003, Kontagianni *et al*., 2004). They reported that the increase of body circumferences after menopause is mainly due to the increase of the total body fat and also due to the redistribution of the body fat with deposition of the adipose tissue over the abdomen and the buttocks regions. No changes in body circumferences occur after the menopause (Hughes and Harris, 1992).

Body mass index was found to be significantly higher in postmenopausal women than in premenopausal women (Juntunen *et al*., 2003; Larsson *et al*., 2004; You *et al*., 2004).

The upper-arm fat and muscle areas were significantly more in the postmenopausal than in premenopausal women (Reid *et al.*, 1992).

The blood pressure values, both systolic and diastolic, were significantly higher in postmenopausal women than in premenopausal women (Juntunen *et al*., 2003). The incidence of hypertension and ischemic heart diseases was found to increase in postmenopausal women (Blumel *et al*., 2001). The blood pressure either systolic or diastolic was not affected by the menopause (Kuller *et al*., 1994). Some authors reported that the postmenopausal women had lower diastolic blood pressure than the premenopausal women (Stefan *et al*., 2000).

The aim of the present work was to examine the possible differences in body anthropometric variables and blood pressure in a sample of obese and normal weight post-menopausal women.

Materials and Methods

This experiment was carried out in Karachi city of Pakistan between, January 2015 to April 2015. We included women aged 40-55 years with ceased menstruation for at least 12 month and had a natural menopause. The home visits included the use of a face-to-face questionnaire and written consent was obtained from each subject. A total of 84 postmenopausal women were volunteered for the study which included 13 normal control and 71 obese. Various anthropometric measurements were taken like weight, heights, WC, HC, arm and wrist circumference, then BMI and WHR was calculated. Anthropometric measurements were taken by one observer at the same sitting. For each variable two measurements were taken and the mean value was recorded. Weight was measured with a calibrated Seca scale (Itin Scale Co., Inc. Germany) with the precision of 0.1 kg. Height was measured by a cotton ruler which was attached to the wall. BMI was calculated as weight in kilograms divided by height in meters squared. Asian BMI cut-offs were use to categorized the females (Low *et al*., 2009). Waist circumference (WC) was obtained by measuring the smallest area below the rib cage and above the umbilicus. Hip circumference (HC) was measured at the intertrochanteric level while the person was standing up. SBP and DBP (BP apparatus CERTEZA, Gemany) were measured when the subjects were in sitting position for at least five minutes.

Results and Discussion

Mean age of normal control postmenopausal women (n=13) was 49.31 ± 1.01 years, while mean age of obese women (n=71) was 50.21 ± 0.63 years.

Our findings evaluated the significant differences in the average BMI values of control (22.14 ± 0.023) kg/m^2 and obese postmenopausal women (35.93 ± 0.72) kg/m^2. BMI of obese females were significantly higher than control females ($P<0.001$). Arm circumference of control and obese women were 10.78 ± 0.39 cm and 14.16 ± 0.36 cm respectively. And it was significantly greater in obese postmenopausal women ($P<0.001$) (Fig 1). WHR average values of control females were 0.79 ± 0.01 and obese females were 0.85 ± 0.007. Comparison of mean values of WHR of both the groups showed significantly higher values in obese group ($P<0.01$) (Fig 2). SBP and DBP mean values of control females were (103.85 ± 3.72) and 73.85 ± 1.71 respectively, while SBP and DBP mean values of obese women were 121.18 ± 1.48 and 81.76 ± 1.04 respectively. Obese postmenopausal women significantly higher SBP and DBP average values than control women ($P<0.001$ and $P<0.01$) respectively (Fig 3).

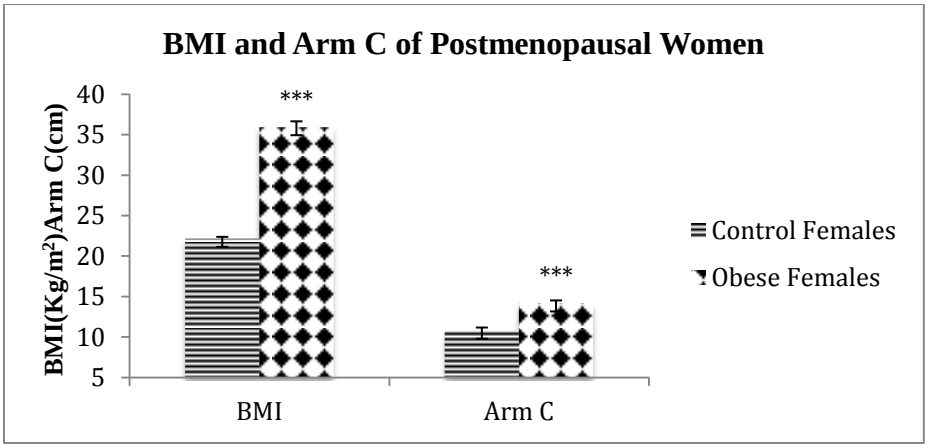

Fig. 1. BMI (Kg/m^2) and Arm circumference (cm) of control and obese postmenopausal women (P<0.001)

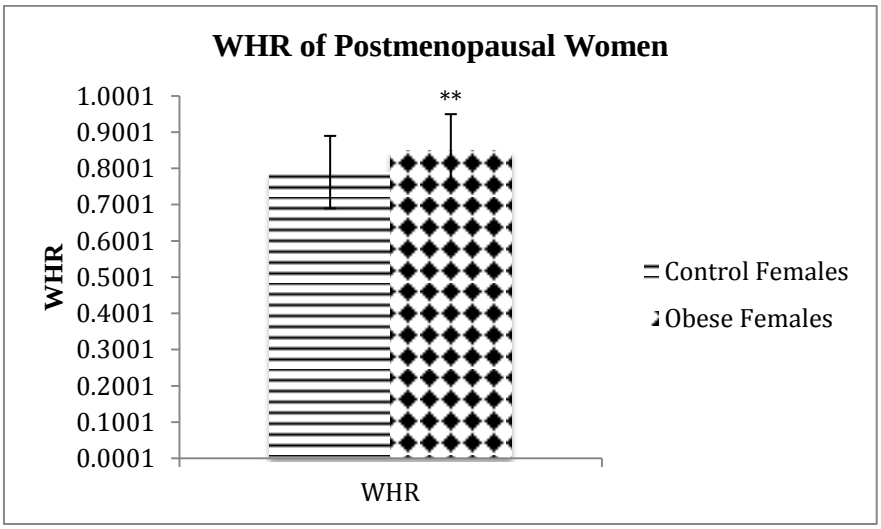

Fig. 2. WHR of control and obese postmenopausal women (P<0.01)

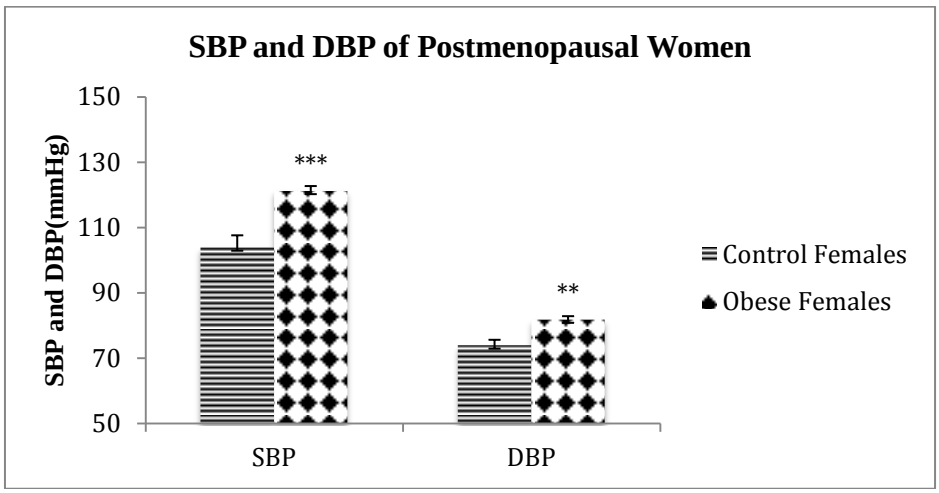

Fig. 3. SBP (mmHg) and DBP (mmHg) of control and obese postmenopausal women (P<0.001; P<0.01)

Discussion

In the present study, post-menopausal women were, statistically, found to be significantly heavier, have more mean values of body circumferences than the normal weight menopausal women. In our study, the prevalence of risk factor associated with MS in postmenopausal obese women was higher than normal control women. Body mass index of obese postmenopausal women were significantly higher than age matched control women in our study (P<0.001; Fig 1). Our findings are in harmony with previously reported studies by various authors (Hwu *et al*., 2003; Juntunen *et al*., 2003; Larsson *et al*., 2004; You *et al*., 2004).

WHR mean values of postmenopausal obese women were statistically higher as compared to control women (P<0.01; Fig 2). Our findings are consistent with many previous studies (Azizi and Ainy, 2003; Hwu *et al*., 2003; Kontagianni *et al*., 2004). All of them reported the reason of increased WHR and WC in postmenopausal women due to aggregation of the total body fat and also due to the redistribution of the body fat with accumulation of adipose tissue on the abdomen and around the buttock regions. No significant changes occur in abdominal adiposity and body circumference after the menopause (Hughes and Harris, 1992).

The upper-arm fat and muscle areas were significantly higher in obese group of our experiment than control group (P<0.001; Fig 3). Our results are in harmony with other researches (Reid *et al*., 1992).

Both SBP and DBP of obese women were significantly higher in our study (P<0.000; P<0.01) (Fig 4 and 5). Our findings are consistent with many previous studies. These authors reported that both SBP and DBP were significantly increased in postmenopausal females than premenopausal. The risk of CVD's and high blood pressure was found to increase in the postmenopausal females (Larsson *et al*., 2003; Juntunen *et al*., 2003; Blumel *et al*., 2001). While opposed to these findings some authors demonstrated that both SBP and DBP were not significantly related with menopause (Kuller *et al*., 1994). Some authors found different result in the way that the lower DBP was noted in post-menopausal women (Meuriége *et al*., 2000; Stefan *et al*., 2000).

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References

Azizi, F. and Ainy, E. (2003). Coronary heart disease risk factors and menopause: a study in 1980 Tehranian women, then tehran lipid and glucose study. *Climacteric*; 6(4): 330-6.

Blumel, J.E., Castelo-Branco, C. Rocangliolo, M.E. Bifa, L. Taclax and Mamani, L. (2001). Changes in body mass index around menopause: a population study of Chilean women. *Menopause*; 8(4): 239-244

Bray, G.A. and Bellanger, T. (2006). Epidemiology, trends, and morbidities of obesity and the metabolic syndrome. *Endocrine* 29: 109-117.

Ferrara, C.M., Lynch, N.A. Nicklas, B.J. Ryan, A.S. and Berman, D.M. (2003). Differences in adipose tissue metabolism between postmenopausal and perimenopausal women. *J. of Clin. Endocrinol. and Metab.*; 87(9): 4166- 4170.

Gold, E.B. (2011). The timing of the age at which natural menopause occurs. *Obstet Gynecol Clin North Am* 38: 425-440.

Gravena, A.A., Brischiliari, S.C. Lopes, T.C. Agnolo, C.M. Carvalho, M.D. *et al*. (2013). Excess weight and abdominal obesity in postmenopausal Brazilian women: a population based study. *BMC Womens Health* 13: 46. doi: 10.1186/1472-6874-13-46.

Hughes, D.B. and Harris, S. (1992). Regional changes in body composition by time of year in healthy postmenopausal women. *Am J. Clin. Nutr*.; 56: 307-313.

Hwu. C.M., Fuh, J.C. Hsiao, C.F. Wang, S.J. Lu, S.R. Wei, M.C. Kao, W.Y. Hsiao, L.C. and Ho, L.T. (2003). Waist circumference predicts metabolic cardio-vascular-risk in postmenopausal chinese women. *Menopause*; 10(1): 73-80.

Juntunen, K.S., Laaksonen, D.E. Poutanen, K.S. Niskanen, L.K. and Mykkänen, H.M. (2003). High-fiber rye bread and insulin secretion and sensitivity in healthy postmenopausal women. *Am. J. of Clin. Nut*.; 77(2): 385-391.

Kelemen, L.E., Atkinson, E.J. de Andrade, M. Pankratz, V.S. Cunningham, J.M. *et al*. (2010). Linkage analysis of obesity phenotypes in pre- and postmenopausal women from a United States mid-western population. *BMC Med Genet* 11: 156.

Kontagianni, M.D., Panagiotakos, D.B. and Skopouli, F.N. (2004). Does body mass index reflect adequately the body fat content in perimenopausal women? *Maturitas*; 51(3): 307-13.

Kuller, L.H., Meilahn, E.N. Gauley, J.A. Gutai, J.P. and Matthews, K.A. (1994). Epidemiologic studies of menopause: changes in risk factors and disease. *Exp. Gerontol*; 29: 495-509.

Larsson, H., Berglund, G. and Ahrén, B. (2003). Insulin sensitivity, insulin secretion and glucose tolerance versus Intima-Media thickness in non diabetic postmenopausal women. *J. Clin. Endecrinol. and Metab.*; 88(10): 4791-4797.

Larsson, I., Forslund, H.B. Lindroos, A.K. Lissner, L. Näslund, I. Peltonen, M. and Sjoström, L. (2004). Body composition in the SOS (Swedish Obese Subjects) reference study. *Int J Obes Relat Metab Disord*; 28(10): 1317-1324.

Lizcano, F. and Guzmán, G. (2014). Estrogen Deficiency and the Origin of Obesity during Menopause. *Biomed Res Int*: 2014:757461. doi: 10.1155/2014/757461.

Low, S., Chin, M.C., Ma, S., Heng, D. and Deurenberg-Yap, M. (2009). Rationale for Redefining Obesity in Asian. *Annals Academy of Medicine Singapore*; 38: 66-69.

Lyu, L.C, Yeh, C.Y. Lichtenstein, A.H. Li, Z. Ordovas, J.M. and Schaefer, E.J. (2001). Association of sex, adiposity and diet with HDL subclasses in middle-aged chinese. *Am. J. of Clin. Nut*.; 74(1): 64-71.

Matvienko, O.A., Alekel, D.L. Bhupathiraju, S.N. Hofmann, H. Ritland, L.M, *et al*. (2010). Androidal fat dominates in predicting cardiometabolic risk in postmenopausal women. *Cardiol Res Pract* 2011: 904878.

Meuriége, P., Imbeault, P. Prud'homme, P. Tremblay, A. Nadeau, A. and Després, J.P. (2000). Subcutaneous Adipose tissue metobolism at menopause: Importance of body fatness and regional fat distribution. *Am. J. Endocrinol. Metab*; 85(7): 2446 - 2454.

Reid, I.R., Evans, M.C. and Ames, R. (1992). Relationship between upper- arm anthropometry and soft-tissue composition in postmenopuauasal women. *Am. J. Clin. Nutr*; 56: 463-466.

Schoenaker, D.A., Jackson, C.A. Rowlands, J.V. and Mishra, G.D. (2014). Socioeconomic position, lifestyle factors and age at natural menopause: a systematic review and meta-analyses of studies across six continents. *Int J Epidemiol* 43: 1542-1562.

Stachowiak, G., Pertyński, T. and Pertyska-Marczewska, M. (2015). Metabolic disorders in menopause. *Prz Menopauzalny* 14: 59-64.

Stefan. J., Johannes, J. Markus, P.S. Christian, D. and Roland, E.S. (2000). Effects of oral contraceptives on vascular epithelium in premenopausal women. *Am. J. of Obest. Gynacol.*; 183(1): 28-33.

You. T., Ryan, A.S. and Nicklas, B.J. (2004). The metabolic syndrome in obese postmenopausal women: relationship to body composition, visceral fat and inflammation. *J. Clin. Endecrinol. Metab.*; 89(11): 5517-5522.