



Association of Anthropometric Measurements with pre and post Menopausal women:
A survey based cross sectional study

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Abstract: Anthropometric measurements are the litmus during the transition of any woman from normal menstrual cycle to menopause. Several changes occur in the body during this transition from change of body shape to hormonal fluctuations, from social status to psychological and neurological alterations. The present study thus explored the pre and post menopausal changes in the anthropometric indicators and its significance level. Methodology: A survey based cross sectional study was carried out. Total 190 female aged 40-60, were randomly selected from the district Hyderabad. Results: age, weight, BMI and WC (in rural, urban and accumulative) in post menopausal women are significantly less ($p=0.0001$, $p=0.01$, $p=0.004$ and $p=0.01$ respectively) than those who were having normal menstrual cycles. Waist to height ratio (WHtR), height, Bicep and triceps measurements were not significantly different in the aforementioned groups. Conclusion: In a representative study of woman, the natural transition is strongly associated with decrease in BMI (Body Mass Index), WC (Waist circumference) and weight.

Keywords: menopause, cross sectional study, BMI.

1. INTRODUCTION

The menstrual cycle is the rhythmic changes in hormones occurs every month in the female reproductive system particularly in uterus and in ovaries which is the preparation for pregnancy (Sharma, *et al.*, 2016). Menarche is the first menstrual period usually occurs at the age of 13 (Abdulla and Ibraheem, 2010). Menstruation is a monthly shedding of endometrial walls leading to discharge of blood usually after every 28 days (Sharma *et al.*, 2016). The average bleeding last for approximately 5 days (Chiou, *et al.*, 2007). Menopause is the time when ovaries stop producing eggs because of hormonal fluctuations; however different definitions are existing (Gracia *et al.*, 2005). The onset of menopause in west is between 40 to 61 (Minkin and Wright, 1997), in India median age is 44 (Ringa, 2000) while in Pakistan the mean age is 47.7 (Yahya and Rehan, 2002).

The menopause transition is associated with obesity, blood pressure and metabolic syndrome (Kuh *et al.*, 2005), furthermore elevated blood pressure was reported in pre menopausal woman than post menopause (Trémollières, *et al.*, 1999) however some other studies could not show rise in blood pressure in menopause transition (Kuh *et al.*, 2005). Total cholesterol level was reported high at the time of onset of menopause (Bittner, 2002) However the association of cardiovascular risk factors with onset of menopause is debatable (Barrett-Connor, 2003; Barrett-Connor and

Bush, 1991), moreover HbA1c is a reliable indicator to estimate blood glucose level particularly in menopausal women, higher level of HbA1c (glycosylated hemoglobin) was reported in post menopausal women (Chang *et al.*, 2000) (Simon, *et al.*, 1989).

The anthropometric indicators: increase waist-hip ratio was associated with menopause transition (Gaspard, *et al.*, 1995) The association of waist to hip ratio is already established with the especial reference to breast cancer (Huang *et al.*, 1999). BMI was strongly associated with pre, peri and post menopausal women (Akaoshi *et al.*, 2002; Kuh *et al.*, 2005). The premenopausal women had less waist circumference and less waist to hip ratio than postmenopausal women (Donato, *et al.*, 2006).

The present study thus explored whether the anthropometric indicators in pre and post menopausal women are consistent with the rest of the world in typical Pakistani scenario.

2. MATERIALS AND METHODS

A survey based cross sectional study was carried out from June 2016 to November 2016 (06 months). The sample area was District Hyderabad rural and urban population (Sindh, Pakistan). A self designed questionnaire was administered to the female aged between 40- 60 years. The sample comprises of all marital status groups (single, married and divorced).

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Those female who were less than 40 or more than 60 years of age, were excluded from the study, furthermore; female on medication (Suffering from any disease), drug addicted, smokers, breast feeders and conceived were also excluded from the study. An anthropometric measurement BMI was calculated by the formulae (Weight/Height²). Weight is measured by simple weighing machine and Height by Stadiometer. Bicep, tricep and waist circumferences were measured by flexible but non stretchable plastic measuring tape. A self designed questionnaire was as follows:

QUESTIONNAIRE

Personal Information:

1) Name: _____
 2) Age: _____
 3) Material Status: Single
 Married
 Long Term Relationship
 Divorced
 4) District: Urban
 Rural
 5) Any Diseases: _____
 6) Mensis: Yes
 No
 Irregular: Months _____
 Years _____

Anthropometric Measurement:

Triceps: _____
 Biceps: _____
 Waist: _____
 Height: _____
 Weight: _____
 WHtR: _____
 BMI: _____

Statistical Analysis

Data are provided as arithmetic means ± SD and percentages; n represents the number of female investigated. All data were tested for significance by using ANOVA (Tukey test) or t-test (student t test), as appropriate. Results with p<0.05 were considered statistically significant.

3. RESULTS

For this study; 190 females were recruited. Out of 190; 09 questionnaire were incomplete/not filled properly; hence were not included in this study. The response was 181(95%). As shown in (Table.1); 132 (72.90%) participant were the resident of urban areas and 49 (27.10%) were rural residents.90 (49.70%) participants were having a normal menstrual cycles whereas 91 (50.30%) female were on menopause. Out of 90 female who were having a normal menstrual cycles; 65 (35.90%) were the resident of urban areas and 25 (13.80%) were rural residents. Out of 91 post menopausal females; 67 (37%) were urban residents and 24 (13.30%) belonged to rural areas.

Table. 1: Area wise distribution of participant.

Rural Urban distribution	Pre menopause	Post menopause	Total (n=181)
Rural	25(13.80%)	24(13.30%)	49(27.10%)
Urban	65(35.90%)	67(37.0%)	132(72.90%)
Total	90(49.70%)	91(50.30%)	181(100%)

As shown in (Table.2); age, weight, BMI and WC (in rural, urban and accumulative) in post menopausal women are significantly less (p=0.0001, p=0.01, p=0.004 and p=0.01 respectively) than those who were having normal menstrual cycles. The WC of urban female in post menopause is also less than pre menopause group however it was not significant (p=0.8).Interestingly, waist to height ratio (WHtR), height, Bicep and triceps measurements were not significantly different in the aforementioned groups.

Table. 2: Anthropometric measurements of participants (mean±SD).

Anthropometric indicators	Pre menopause (n=90)	Post menopause (n= 91)	p-Value
Age(years)	41.9±2.3	50.4±4.9	<0.05
Rural	43.2±3.8	50.2±5.9	<0.05
Urban	42.8 ±3.5	50.2±5.6	<0.05
Total	59.6±13.6	48.4±12.9	<0.05
Weight(Kg)	60.6±14.4	54.3±13.6	<0.05
Rural	60.4±14.1	52.7 ±13.6	<0.05
Urban	89.1±16.7	73.3±25.3	<0.05
Total	86.5±19.3	86.0±18.0	>0.05
WC(cm)	87.2±20	82.8±18.6	<0.05
Rural	152.6±9.7	148.3±19.0	>0.05
Urban	151.7±12.9	147.9±13.0	>0.05
Total	152.1±12.1	148.0±14.7	>0.05
Height (cm)	0.59±0.12	0.51±0.20	>0.05
Rural	0.57±0.16	0.58±0.13	>0.05
Urban	0.57±0.14	0.56±0.15	>0.05
Total	25.8±6.5	21.1±5.7	<0.05
WHtR	25.6±5.7	24.6±6.6	>0.05
Rural	25.7±5.9	23.7±6.5	<0.05
Urban	31.0±4.8	23.6±8.1	<0.05
Total	29.1±5.6	31.2±2.3	>0.05
Bicep (cm)	29.6±5.4	29.2±2.0	>0.05
Rural	25.3±12.6	23.8±7.7	>0.05
Urban	24.9±6.8	25.6±7.2	>0.05
Total	25.0±8.7	25.1±7.3	>0.05

4. **DISCUSSION**

The present study reveals that the anthropometric measurements are altered after the transition from normal menstrual cycle to menopause. Weight, BMI and WC in post menopausal women were significantly less than those who were having normal menstrual cycles. According to a cross sectional study conducted on a Brazilian medical students, body weight and body mass index was not changed significantly (Donato *et al.*, 2006) similarly, most of the studies could not find any positive or negative correlation between two groups (Matthews *et al.*, 1989) (Crawford, *et al.*, 2000) furthermore the leptin level which plays a vital role in fat storage was found higher in menstruating female than post menopausal woman (Ayub, *et al.*, 2006).

In our study the weight was found less in menopause group similarly observed by a study conducted previously (Ayub *et al.*, 2006). The less BMI in menopause group in our study could be correlated with multiple factors in Pakistani society such as malnutrition (Chatterjee and Lambert, 2007), prevalence of eating disorders (Choudry and Mumford, 1992). Moreover the mean age of the post menopausal group was significantly more than menstruating woman which indicates that the post menopausal group was aged than normal one and the aging might be a factor which is decreasing the BMI (Cordisco *et al.*, 2010). Interestingly BMI is the variable which is related to age at menopause: greater BMI causes the delay in menopause (Akahoshi *et al.*, 2002). Whereas we could not find any association between bicep and triceps measurement with the pre or post menopausal status of female. Waist to height ratio (WHtR) and height was not significantly different in aforementioned groups.

The limitations of our studies are: The study was a descriptive cross sectional study in which data was collected in a point of time, the sample size was small hence so should be carried out with a big sample size with different sampling community in order to portrait a big story. Further molecular investigations are needed to find out the molecular and hormonal mechanism behind the prevailing trend of getting decreased the anthropometric indicators.

5. **CONCLUSION**

Anthropometric indicators (age, weight, BMI and WC) are less in menopausal women as compared to normal menstruating women.

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