

A Comparative Cross Sectional Study of Blood Pressure Changes in Postmenopausal Women

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Abstract

Introduction: Menopause is a natural event with loss of cyclic ovarian functions. Lipid profile changes leading to heart disease may be due to oestrogen deficiency. Vascular tone changes occur due to raise in nitric oxide production which in turn is under oestrogen influence. This further increases the antioxidant effects. Endothelial cells are stabilized, altering fibrinolytic protein. Cardio protective mechanisms are lost in menopause.

Materials and Methods: This study was done in the department of Physiology, Santhiram Medical College and hospital, Nandyal. Study was undertaken from data collected from postmenopausal and premenopausal women of similar height and weight of general population of Nandyal. After a detailed medical history on the basis of the following inclusion and exclusion criteria 70 postmenopausal women and 70 premenopausal women were taken. We used convenience type of sampling. It is a non-probability sampling design. Postmenopausal state was considered in women who had at least 12 months amenorrhea.

Results: The [mean $\pm$ SD] systolic blood pressure in postmenopausal group was 122.0 ± 2.18 mm Hg and in premenopausal 116 ± 2.87 mm Hg. The [mean $\pm$ SD] diastolic blood pressure in postmenopausal group was 80.15 ± 1.16 mm Hg and in premenopausal 80.13 ± 4.08 mm Hg. Higher statistical difference in the blood pressure is observed in both systolic and diastolic phases between the two different groups. There was a higher in Pulse rate (bpm) (81.23 ± 2.10), Systolic Blood Pressure (mmHg) (122 ± 2.18), Diastolic Blood Pressure (mmHg) (80.15 ± 1.16), in postmenopausal women.

Conclusion: Both systolic blood pressure and diastolic blood pressure showed markedly higher in postmenopausal women. The decline in oestrogen levels around menopause causes an up regulation of the RAS with a plasma renin activity. Sympathetic over activity is associated with abdominal visceral fat which is strongly related to higher inflammatory markers and oxidative stress. In postmenopausal women both systolic and DBP, pulse rate is remarkably higher.

Key Words: Menopause, oestrogen, systolic blood pressure,

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I. Introduction

Menopause is a natural event with loss of cyclic ovarian functions. Lipid profile changes leading to heart disease may be due to oestrogen deficiency. Vascular tone changes occur due to raise in nitric oxide production which in turn is under oestrogen influence. This further increases the antioxidant effects. Endothelial cells are stabilized, altering fibrinolytic protein. Cardio protective mechanisms are lost in menopause.¹

Hypertension is a continuous, non-occasional state of elevated blood pressure (BP). BP increases with age. As a consequence of longer life expectancy and modern lifestyle, the prevalence of hypertension is expected to increase.² While diastolic BP starts to increase earlier, systolic BP starts to increase after 50 years of age. The increase of systolic BP is a higher health risk. A higher incidence of cardiovascular and cerebrovascular diseases is observed respectively 10 and 20 years after BP increase. A 2012 World Health Organization report shows that the rise of BP causes 51% of deaths from stroke, and 45% of deaths from coronary artery diseases.³ There are sex differences in the development of hypertension. The National Health and Nutrition Examination Survey (NHANES) shows that, prior to 45 years of age, prevalence of hypertension is higher in men than in women. From 45 to 54 years and from 55 to 64 years of age, the percentage of hypertensive men is similar to that of hypertensive women. After 65 years of age, BP levels increase faster in women than in men.⁴ It has been suggested that sex steroids protect fertile women from hypertension, and that gonadal steroid withdrawal may play a role in the modifications of BP control.⁵ In fact, the role played by steroid withdrawal at menopause is still controversial.

II. Materials And Methods

This study was done in the department of Physiology, Santhiram Medical College and hospital, Nandyal. Study was undertaken from data collected from postmenopausal and premenopausal women of similar height and weight of general population of Nandyal. After a detailed medical history on the basis of the following inclusion and exclusion criteria 70 postmenopausal women and 70 premenopausal women were taken. We used convenience type of sampling. It is a non-probability sampling design. Postmenopausal state was considered in women who had at least 12 months amenorrhea.

Inclusion Criteria:

- Fifty post-menopausal women aged 50-55 years with active physical life and attained menopause naturally.
- Weight -60 to 65 kgs.
- Height -155-157.5 cms. were measured.
- Normal healthy aged 35 to 40 years with height and weight matched fifty premenopausal women with regular menstrual cycles were taken.

Exclusion Criteria:

- Participants with these diseases were excluded. Diseases like dyslipidaemia, blood disorders, surgical menopause, hypertension, Diabetes Mellitus, thyroid disorders, renal diseases, they should not have received oestrogen therapy or supportive treatment for menopausal symptoms. Statistical analysis is done by student 't' test.

Anthropometric Data: Subjects were relaxed standing erect with their arms at their sides and feet together. Height and weight measurement were recorded. Wall mounted stadiometer was used to record body height. Clinical weighing machine was used to record weight for subjects dressed in light clothes and no shoes. BMI was calculated as per formula: $\text{Weight (Kg)}/\text{Height (meter)}^2$ (Quetelet, s Index). Vital parameters like pulse rate, BP were recorded. Mercury Sphygmomanometer was used to measure Blood pressure. The BP of the subjects were measured in supine position or sitting position first by palpatory method and then by auscultatory method. Accordingly, Korotkoff sounds, appearance of sound (Phase I) is taken as Systolic BP, and disappearance of (phase V) Korotkoff sound is taken as Diastolic BP.

Methods of Collection of Data: Women population of Nandyal was randomly selected with similar height and weight matched both pre and post-menopausal women were taken for study. Proforma was given to all of them. Written consents are taken during the face to face questionnaire interview. An examination of respiratory, cardiovascular, central nervous system and gynaecological examination was done.

III. Results

S.No	Parameter	Postmenopausal Group (Mean $\pm$ SD)	Premenopausal Group (Mean $\pm$ SD)	P Value
1	Pulse (beats/min)	81.23 $\pm$ 2.10	80.67 $\pm$ 2.12	<0.001
2	Systolic Blood Pressure (mmHg)	122 $\pm$ 2.18	116 $\pm$ 2.87	<0.002
3	Diastolic Blood Pressure (mmHg)	80.15 $\pm$ 1.16	80.13 $\pm$ 4.08	<0.05

Table 1: Vital Data of Study of Postmenopausal Group and Premenopausal Group

The vital data of the healthy postmenopausal women and the healthy premenopausal is shown in table.

Resting Pulse Rate: The [mean $\pm$ SD] pulse rate at rest in postmenopausal group groups was 81.23 $\pm$ 2.10 beats/ min and in premenopausal group 80.67 $\pm$ 2.12 beats/min. Higher statistical difference is seen in the resting pulse rate between the two different groups.

Blood Pressure: The [mean $\pm$ SD] systolic blood pressure in postmenopausal group was 122.0 $\pm$ 2.18 mm Hg and in premenopausal 116 $\pm$ 2.87 mm Hg. The [mean $\pm$ SD] diastolic blood pressure in postmenopausal group was 80.15 $\pm$ 1.16 mm Hg and in premenopausal 80.13 $\pm$ 4.08 mm Hg. Higher statistical difference in the blood pressure is observed in both systolic and diastolic phases between the two different groups. There was a higher in Pulse rate (bpm) (81.23 $\pm$ 2.10), Systolic Blood Pressure (mmHg) (122 $\pm$ 2.18), Diastolic Blood Pressure (mmHg) (80.15 $\pm$ 1.16), in postmenopausal women.

IV. Discussion

Giuseppe, et al (2006)⁶ says premenopausal women have low blood pressure than in age-matched men arterial blood pressure higher after the cessation of menses and that after the menopause women develop arterial hypertension often together with changes in lipid and glucose metabolism.

Many studies convey that production of catecholamines is raised and a clear shift of the autonomic control towards a higher sympathetic activity of the cardiovascular system. This higher sympathetic drive is

closely related to the state of oestrogen deficiency as it occurs in a few days after surgical oophorectomy and is reversed by oestrogens.^{7,8}

Metabolic changes with raised sympathetic drive occurring after the menopause, contribute to cause the metabolic syndrome. The physiological and structural changes, due to higher sympathetic drive leads to hypertension development. Chow, et al (1997),^{9,10} says after menopause both systolic and diastolic blood pressures are higher than in men of the same age, suggesting that age-related higher in blood pressure may be due to oestrogen deficiency¹¹.

V. Conclusion

Both systolic blood pressure and diastolic blood pressure showed markedly higher in postmenopausal women. The decline in oestrogen levels around menopause causes an up regulation of the RAS with a plasma renin activity. Sympathetic over activity is associated with abdominal visceral fat which is strongly related to higher inflammatory markers and oxidative stress. In postmenopausal women both systolic and DBP, pulse rate is remarkably higher. Similar results were observed in Giuseppe et al 2006 studies. These differences may be due to higher oestrogen levels around menopause that causes an up regulation of RAS with a raise in plasma renin activity.

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