



A COMPARATIVE STUDY OF HYPERTENSION IN PRE-MENOPAUSAL AND POST-MENOPAUSAL WOMEN

Physiology

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ABSTRACT

Objectives – To examine the association between hypertension in the pre-menopausal and post-menopausal women. **Methods** – This cross-sectional study was conducted from November 2022 to April 2023 in the physiology department of Dr. S. N. Medical College, Jodhpur, Rajasthan. Forty postmenopausal women and forty premenopausal women were selected after taking medical history and interview based on the inclusion and exclusion criteria listed below. The data were presented as mean (SD). Student's Independent t-test was used to find the statistical difference between the two groups. p -value < 0.001 was considered statistically significant. We employed convenience sampling. Amenorrhea lasting at least 12 months was taken into consideration for postmenopausal status in women. **Results** – The systolic blood pressure in postmenopausal group was 124.10 ± 16.85 and in premenopausal 140.15 ± 24.87 mm Hg. The pulse pressure in postmenopausal group was 93.55 ± 12.19 mm Hg and in premenopausal 99.15 ± 17.02 mm Hg. Higher statistical difference ($p < 0.000$) in the blood pressure is observed in systolic blood pressures and pulse pressure between the two different groups. There was a higher diastolic blood pressure 81.55 ± 13.90 in postmenopausal women. **Conclusion** – Systolic blood pressure and pulse pressure were significantly higher ($p < 0.000$) in the postmenopausal women than the premenopausal women. It may be due to lack of estrogen which further promotes oxidative stress, resulting in the formation of reactive oxygen species (ROS), or free radicals, contributing to a number of diseases, including hypertension. In women who have gone through menopause, oxidative stress can lead to oxidative damage to cells, which can result in illnesses at this phase of life.

KEYWORDS

INTRODUCTION –

The primary modifiable risk factor for cardiovascular disease (CVD) is hypertension (HTN). The frequency of HTN is rising along with the obesity pandemic in both industrialized and developing countries, and preventative efforts should be given more attention. Given the situations that are specific to women throughout their lives, HTN in women deserves special consideration. It is commonly recognized that HTN can be linked to circumstances including pregnancy and post-menopause. Through a number of hormonal pathways, other illnesses specific to women, such as the menstrual cycle, polycystic ovarian syndrome (PCOS), perimenopause, and menopause, have been linked to variations in blood pressure (BP). This study addresses how hormonal changes may impact the emergence of hypertension and focuses on the causes and treatment of hypertension in women throughout their lives.

According to the ACA/AHA recommendations for HTN, BP 130–139/80–89 mmHg is considered stage I HTN, whereas BP more than 140/90 mmHg is considered stage II HTN.¹ "Elevated BP" is defined as blood pressure between 120 and 129/ < 80 mmHg, and it takes the position of "pre-hypertension." We currently define normal blood pressure as less than 120/80.² According to the updated recommendations, the prevalence of HTN has risen to 19% in premenopausal women, 44% in perimenopausal women, and 75% in postmenopausal women aged 65–74. Compared to males of the same age, women over 75 years old now have a greater prevalence of HTN (85%).¹

MATERIALS AND METHODS –

This study was a cross-sectional study undertaken in Department of Physiology, Dr. S.N. Medical College, Jodhpur, Rajasthan from November 2022 to April 2023. Study data was collected from postmenopausal and premenopausal women of similar height and weight of general population of Jodhpur city, Jodhpur. After a detailed medical history on the basis of the following inclusion and exclusion criteria 40 postmenopausal women and 40 pre-menopausal women were taken. We used convenience type of sampling. 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 cm 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 dyslipidemia blood disorders, surgical menopause, hypertension, Diabetes Mellitus, thyroid disorders, renal diseases they should not have received estrogen therapy or supportive treatment for menopausal symptoms. The height was measured using stadiometer. Clinical weighing machine was used to record weight of subjects dressed in light clothing. The BP of the subjects were measured three times in sitting position first by palpatory method and then by auscultatory method using Mercury Sphygmomanometer.

Methods Of Collection Of Data:

Women from the population of Jodhpur District 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 informed consents are taken recorded during interviews using questionnaire. History of past illness or any hormonal replacement therapy were excluded. Beside this, examination of respiratory, cardiovascular, central nervous system and gynecological examination was performed. Statistical analysis was done by using student's Independent 't' test using SPSS version 26.

RESULTS –

The data of the healthy pre- and post-menopausal women has been showed in and table 1.

Resting Pulse Rate showed the [mean $\pm$ SD] pulse rate at rest in postmenopausal group groups was 58.68 ± 15.84 beats/ min and in premenopausal group 44.38 ± 10.26 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 140.15 ± 24.87 mm Hg and in premenopausal 124.10 ± 16.85 mm Hg.

The [mean $\pm$ SD] diastolic blood pressure in postmenopausal group was 81.55 ± 13.90 mm Hg and in premenopausal 79.80 ± 10.65 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) (93.55 ± 12.19), Systolic Blood Pressure (mmHg) (140.15 ± 24.87), in postmenopausal women.

Table 1 – Comparison of Blood Pressure parameters in pre-and post-menopausal women.

Groups	Pre-menopausal women (Mean $\pm$ SD)	Post-menopausal women (Mean $\pm$ SD)	p-value	Significance
Blood Pressure parameters (mmHg)				
SBP	124.10 $\pm$ 16.85	140.15 $\pm$ 24.87	0.000	HS
DBP	79.80 $\pm$ 10.65	81.55 $\pm$ 13.90	0.037	NS
PP	93.55 $\pm$ 12.19	99.15 $\pm$ 17.02	0.000	HS

SBP = Systolic Blood Pressure, DBP = Diastolic Blood Pressure, PP = Pulse Pressure. Statistically significant, p-value ≤ 0.05 . S = Significant, NS = non-significant.

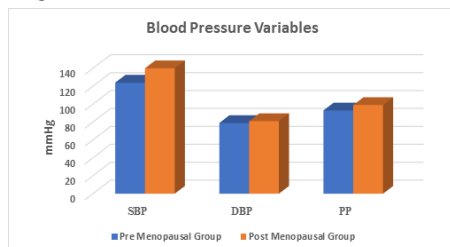


Figure 1 - Comparison of Blood pressure parameters in pre-menopausal and post-menopausal women.

DISCUSSION –

Blood pressure increases during the menopausal transition as a result of the compounding influence of additional hormone-related variables. Around menopause, a drop in estrogen levels leads to an increase in plasma renin activity and an upregulation of the Renin Angiotensin System (RAS). Compared to age-matched males, postmenopausal women have greater levels of sympathetic activity, particularly if they are overweight.³ Abdominal visceral fat, which is closely linked to elevated inflammatory markers and oxidative stress, is linked to sympathetic hyperactivity.⁴ Premenopausal women had lower blood pressure than postmenopausal women, according to Zanchetti A et al. (2005).⁵ Additionally, postmenopausal women frequently have alterations in their lipid and glucose metabolism in addition to arterial hypertension.⁶ Numerous studies indicate that there is an increase in catecholamine synthesis and a noticeable change in autonomic regulation toward increased sympathetic activity of the cardiovascular system. This increased sympathetic drive, which happens a few days after a surgical oophorectomy and is counteracted by estrogens, is intimately linked to the condition of estrogen insufficiency. The metabolic syndrome is caused in part by postmenopausal metabolic alterations with increased sympathetic drive. Hypertension develops as a result of the anatomical and physiological alterations brought on by an increased sympathetic drive.^{7,8}

CONCLUSION –

Postmenopausal women had significantly higher systolic and diastolic blood pressures than premenopausal women. An increase in plasma renin activity and an upregulation of the Renin Angiotensin System (RAS) may result from reduced estrogen levels around menopause. Due to the generation of free radicals or reactive oxygen species (ROS), oxidative stress brought on by an estrogen shortage results in a number of diseases, including hypertension. Oxidative stress in postmenopausal women may result in oxidative damage to cells, which can lead to disorders at this phase of life. Heart disease, which can be caused by both age and estrogen insufficiency, does not always worsen with natural menopause. Abdominal visceral fat, which is closely linked to elevated inflammatory markers and oxidative stress, is linked to sympathetic overactivity.

Ethics Committee Approval: The study was approved by The Institutional Ethical Committee of Dr. S.N. Medical College, Jodhpur.

Conflict Of Interest: The authors declare that there is no conflict of interest.

REFERENCES –

- Whelton R, Carey P, et al. ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for prevention, detection, evaluation, and management of high blood pressure in adults. *J Am Coll Cardiol*. 2017;17: e127–248 2018.
- Recent guidelines on HTN management. Falkner, Gidding. SPRINT commentary, Is the

SPRINT blood pressure treatment target of 120/80mmhg relevant for children? *Hypertension*. 2016; 67:826–8.

- Scuteri A, Bos AJ, Brant LJ, Talbot L, Lakatta EG, Fleg JL. Hormone replacement therapy and longitudinal changes in blood pressure in postmenopausal women. *Ann Intern Med*. 2001;135(4):229-238.
- Amigoni S, Morelli P, Parazzini F, Chatenoud L. Determinants of elevated blood pressure in women around menopause: results from a cross-sectional study in Italy. *Maturitas*. 2000;34(1):25-32.
- Zanchetti A, Facchetti R, Cesana GC, Modena MG, Pirrelli A, Sega R. Menopause-related blood pressure increase and its relationship to age and body mass index: the SIMONA epidemiological study. *J Hypertens*. 2005;23(12):2269-2276.
- Cifkova R, Pitha J, Lejskova M, Lanska V, Zecova S. Blood pressure around the menopause: a population study. *J Hypertens*. 2008;26(10):1976-1982.
- Cagnacci A, Zanin R, Cannolella M, Generali M, Caretto S, Volpe A. Menopause, estrogens, progestins, or their combination on body weight and anthropometric measures. *Fertil Steril*. 2007;88(6):1603-1608.
- Cagnacci A, Cannolella M, Palma F, Zanin R, Xholli A, Volpe A. Menopausal symptoms and risk factors for cardiovascular disease in postmenopause. *Climacteric*. 2012;15(2):157-162.