

# Cardiovascular Disease and Menopause

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## ABSTRACT

**Aim:** The aim of the study was to study the abnormalities in the cardiovascular profile in postmenopausal Indian women and to compare the same with the cardiovascular profile of premenopausal Indian women belonging to the same age group; taken as controls. The goal was to throw some light on the cardiovascular risk in postmenopausal women of the Indian population as this population is thought to be at higher risk than their western counterparts and significant studies of the same kind in this population have been few.

**Materials and Methods:** A cross-sectional comparative study on 100 women who were either postmenopausal or premenopausal and were between the age group of 40 to 55 years was carried out over a period of ten months at our hospital. The variations in the cardiovascular profile between both groups were studied. All the women were subjected to a detailed history, thorough examination, investigations and imaging studies.

**Results:** The evaluation revealed that Coronary Artery Disease (CAD), hypertension, abnormal Body Mass Index (BMI) and abnormal Waist Hip Ratio (WHR) were significantly higher in the postmenopausal group as compared to the premenopausal group. The postmenopausal women had significantly higher prevalence of abnormal lipid profiles as compared to their premenopausal counterparts. The postmenopausal women with a normal lipid profile also had increased prevalence of CAD and SAHT, which emphasizes the non-lipid cardiovascular benefits of estrogen.

**Conclusion:** Thus, we can conclude that cardiovascular disease was more common in postmenopausal women of age group 40-55 years as compared to those not yet achieved menopause in a population of western Indian women. And this risk was significantly associated with central obesity, an abnormal lipid profile and the postmenopausal state in itself.

**Keywords:** Menopause, Coronary artery disease, Estrogen

## INTRODUCTION

The incidence and prevalence of CAD in developing countries is increasing alarmingly [1,2]. Major differences have been demonstrated in studies on western populations in the incidence of CAD in males and premenopausal females even when the other risk factors are matched in both the groups [3]. Hormonal factors like the cardio protective role of estrogen are thought to be responsible [4-6]. Hypertension and central obesity too play a contributory role [7-9]. Cardiovascular risk has been shown to manifest at a lower level of adiposity and abdominal obesity in Asian Indians as compared to their Western counterparts [10,11]. The data on the cardiovascular risk in postmenopausal women in Asian Indians is extremely limited. An attempt was made to find a relation between the menopausal state and increased CAD, Systemic Arterial Hypertension and abnormal lipid profile in our study of one hundred women at a tertiary hospital in western India.

## MATERIALS AND METHODS

This cross-sectional comparative study on 100 women who were either postmenopausal or premenopausal (50 women in each group) and were between the age group of 40 to 55 years was carried out over a period of ten months at our Hospital. The aim of the study was to study the abnormalities in the cardiovascular profile in postmenopausal women and to compare the same with the cardiovascular profile of premenopausal women belonging to the same age group; taken as controls. The variations in the cardiovascular profile between both groups were studied. The inclusion criterion was postmenopausal women aged 40-55 years as cases and premenopausal women of the same age group as

controls. This nullified any effect of senile changes affecting the cardiovascular diseases and lipid profile abnormalities in post and premenopausal women. Women with premature/surgical menopause, renal disease, liver disease, endocrine disorders including diabetes mellitus, alcohol consumption, smokers and those with collagen vascular disease as well as women taking any form of hormone replacement therapy were excluded.

Thus, 50 cases and 50 controls satisfying the inclusion criteria were subjected to a detailed questionnaire (with special focus on cardiovascular risk factors and health) which included past history with reference to the duration, investigation and treatment of cardiac disease or hypertension, a history of major diseases like diabetes mellitus, tuberculosis, renal, liver diseases and other endocrine diseases. Family history of diabetes mellitus, hypertension, tuberculosis, and ischemic heart disease including angina, MI and sudden cardiac death was enquired into. A detailed menstrual history (to help rule out any premature or surgical menopause) and an obstetric history was noted; especially for any form of contraception used including oral contraceptive pills and their compositions. A thorough general examination was performed and anthropometric measurements of BMI, WHR, vitals and presence of signs of CCF and atherosclerosis were taken note of. A detailed system wise clinical examination with special attention to the cardiovascular system was done. The subjects underwent routine investigations like complete blood count, urinalysis and biochemical investigations like fasting and 2 hours post-glucose, blood glucose levels, blood urea, serum creatinine, lipid profile (total cholesterol, LDL-C, HDL-C, VLDL-C and triglyceride). Chest X-ray, electrocardiography and echocardiography were done in each of the subjects.

## RESULTS

The control group consists of 50 age matched premenopausal women and the case group has 50 postmenopausal women.

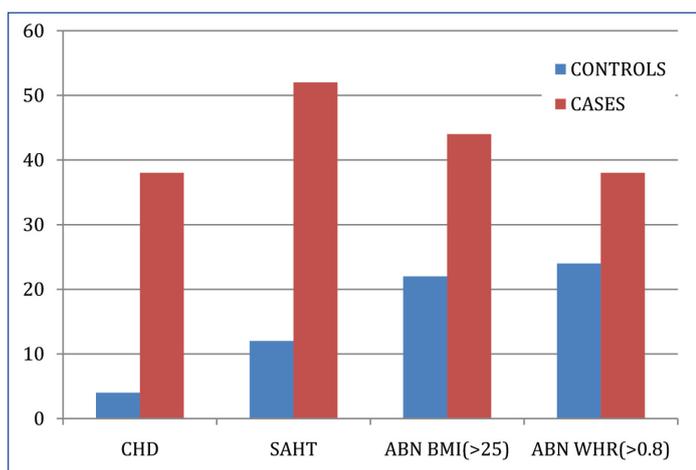
The evaluation revealed the CAD prevalence was 38% (19/50) among postmenopausal women and 4% (2/50) in the control population making the difference statistically significant ( $p < 0.001$ ). Hypertension was present in 52% (26/50) of the cases and 12% (6/50) of the controls, thus the prevalence of hypertension in postmenopausal women was highly significant ( $p < 0.001$ ). The general examination showed 44% (22/50) of the postmenopausal women to have high BMI and 22% (11/50) of the premenopausal women to have high BMI. Thus the prevalence of abnormal BMI in postmenopausal women is statistically significant ( $p < 0.05$ ). The WHR was abnormal in 38% cases and 24% controls ( $p = 0.08$ ) [Table/Fig-1].

Abnormalities in the lipid profile as revealed by the investigations are outlined in the [Table/Fig-2].

The analysis of prevalence of CAD and SAHT in women with normal lipid profile showed that hypertension was present in 58.33% (7/12) of postmenopausal women while 5.26% (1/19) of premenopausal women had hypertension. CAD prevalence in postmenopausal women with normal lipid profile was 33.33% (4/12) whereas it was 0 in the premenopausal age group. Thus, the difference in prevalence for CAD and Hypertension in pre and postmenopausal women with normal lipid profile was found to be highly significant ( $p < 0.001$ ); [Table/Fig-3].

## DISCUSSION

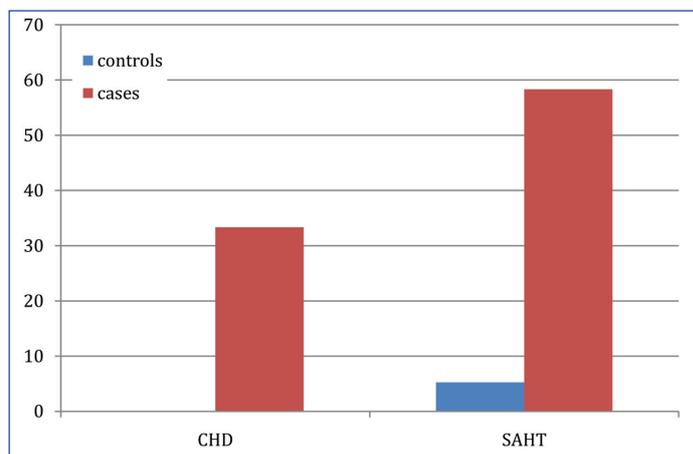
Menopause, permanent cessation of menstruation following loss of ovarian activity, has considerable impact on social, reproductive, physical and psychological health. Women in India are prone to an earlier menopause [12-14] and all its implications on their health at an earlier age than their counterparts in the industrialized world. Estrogen has protective effects on the cardiovascular system due to which there is an increase in the prevalence of cardiovascular diseases in postmenopausal women [6] [Table/Fig-4]. Estrogen also has a favorable effect on body fat distribution and improvement



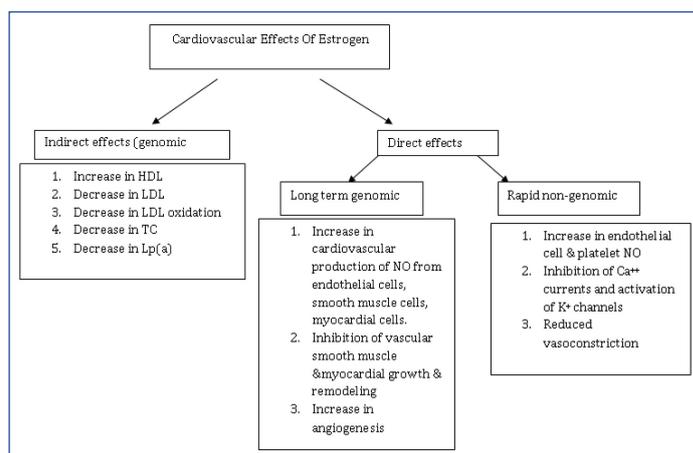
[Table/Fig-1]: Prevalence of CHD, SAHT, abnormal BMI and abnormal WHR in cases and controls of the Study

	Cholesterol abnormalities						LDL-C abnormalities						HDL-C abnormalities					
	200 to 240 mg/dL		>240 mg/dL		Total		130 to 160 mg/dL		>160 mg/dL		Total		<40 mg/dL		40-60 mg/dL		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Case (n=50)	10	20	20	40	30	60	11	22	20	40	31	62	13	26	29	58	42	84
Control (n=50)	19	38	07	14	26	52	9	18	16	32	25	50	9	18	30	60	39	78
p-value	<0.05		<0.01		<0.05		>0.05		>0.05		<0.05		>0.05		>0.05			

[Table/Fig-2]: Prevalence of cholesterol abnormalities (total cholesterol >200mg/dl), LDL-C abnormalities (>130 mg/dL) and HDL-C abnormalities (<60mg/dl)



[Table/Fig-3]: Prevalence of CAD and SAHT in women with normal lipid profile



[Table/Fig-4]: Cardiovascular Effects Of Estrogen

in the insulin sensitivity [15]. Cardiovascular disease is one of the leading causes of death in women [16,17]. The incidence of myocardial infarction in women, although lower than in men, increases dramatically after menopause, which can be attributed mainly to the lack of estrogen and its direct and indirect cardio-protective effects.

Yamamoto A et al., [18] and Tcherno A et al., [19] demonstrated an increased prevalence of CAD in postmenopausal women. Trémollières FA et al., has similarly found increased prevalence of CAD up to 36% in postmenopausal women [20]. Moreover studies have also shown an increased prevalence of hypertension in this group [21]. Thus, our findings of increased prevalence of CAD and SAHT in postmenopausal women are consistent with these studies done in western populations.

Our findings with regards to a comparison of the lipid profiles between the two groups are also comparable to studies done in industrialized nations. Trémollières FA et al., have found 30.6% of postmenopausal women had an increased total cholesterol and LDL cholesterol compared to only 20.4% of premenopausal women ( $p < 0.0005$ ) [20]. Moreover 16.1% of postmenopausal women had an abnormally low HDL-C as compared to 13.3% of pre menopausal women [20]. However this difference was not significant. Other workers in other parts of the world reported similar

findings [22,23].

Similar to our findings of higher prevalence of central obesity in postmenopausal women Tchernof A et al., [19] have also found higher prevalence of central obesity in postmenopausal women. Central obesity is now a well-established to risk factor in itself for CAD [24].

We found that postmenopausal women with a normal lipid profile also had increased prevalence of CAD and SAHT, which emphasizes the non-lipid cardiovascular benefits of estrogen. This can be attributed to the direct protective mechanism of estrogen for the vasculature involving inhibition of smooth muscle proliferation, vasodilation and protection of endothelium [6,25].

The use of estrogen and progesterone as a replacement therapy in postmenopausal women is currently limited to the management of severe vasomotor symptoms and bone disease especially in women with premature menopause [26,27] based on the findings of the Women's Health Initiative (WHI) [28]. However evidence from more recent studies may argue that the jury is still out on the final verdict on hormone replacement therapy [29] and we may be underusing a powerful tool against a major source of morbidity and mortality in a cohort of patients that are rapidly growing in number.

## CONCLUSION

Fifty post and premenopausal women were studied. The aim of this study was to compare the presence of coronary heart disease and hypertension as well as the risk factors associated with cardiovascular disease in postmenopausal women with similar age matched premenopausal controls in an Asian Indian population. From the results of the study we can conclude that CAD and SAHT were more common in postmenopausal women as compared to premenopausal women. Lipid profile abnormalities were more prevalent in postmenopausal women. A higher prevalence on central obesity was noted in postmenopausal women. The prevalence of CAD and SAHT was more in postmenopausal women with normal lipid profiles as compared to their premenopausal counterparts. Thus, we can conclude that cardiovascular disease in women of age group 40-55 years was significantly associated with central obesity, an abnormal lipid profile and the postmenopausal state in itself in a population of western Indian women.

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