

## RESEARCH ARTICLE

### Hematological changes in postmenopausal women

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#### ABSTRACT

**Background:** Ovarian function declines subsequent to menopause. This can lead to undesirable alterations in metabolism, vascular endothelium function, and also fibrinolytic and coagulative properties of blood. Menopause may, therefore, result in enhanced risk for ischemic heart disease in women due to such altered properties of blood and vascular function. This risk gets further stratified if there are coexisting lifestyle-related factors such as physical inactivity, smoking, high calorie/high-fat diet, and stressful work. **Aims and Objectives:** Our study is designed to compare some hematological values in postmenopausal women with premenopausal women as control group. This helps us to know the risk of vascular and ischemic heart disease in postmenopausal women. **Materials and Methods:** Blood samples were drawn in 50 women who have attained menopause and have weight of 55–60 kg and height of 150–160 cm and 50 control subjects who were disease-free women aged 35–40 years with matching weight and height. These women had natural menopause and were not subjected to any hormonal or surgical intervention. The vital parameters were recorded, and general examination was done. Student *t*-test was used for statistical analysis. **Results:** There was a statistically significant increase in hematocrit, and there was no statistically significant change in platelet count, activated partial thromboplastin time (APTT), and prothrombin time (PT). **Conclusion:** A higher viscosity of blood can enhance the risk of coronary artery disease by elevating platelet aggregability and adhesiveness to sub-endothelium. However, the above effect may partially be offset by unchanged APTT and PT.

**KEY WORDS:** Coronary Artery Disease; Estrogen; Hematocrit; Platelet Adhesion; Platelet Count; Subendothelium


#### INTRODUCTION

Menopause is the stoppage of ovarian cycling. It is a natural process in the reproductive phase of women's life. Many changes take place in the physiological parameters, some of which are known to enhance the risk of vascular-related diseases such as stroke and ischemic heart disease.<sup>[1]</sup> Such changes may include alterations in fat distribution and metabolism and also coagulative and fibrinolytic properties of blood.<sup>[2]</sup>

Endothelial dysfunction along with undesirable alterations in fibrinolysis, coagulation, and other metabolic processes has been known to occur.<sup>[1]</sup>

Some studies have revealed that there is a higher risk of coronary artery disease for women after menopause, especially, if there are coexisting lifestyle factors such as physical inactivity, habits like smoking, high calorie/high-fat diet, and stress full work conditions.

Our study is designed to find out that if changes in hematological values occur in women after menopause. Also whether their lifestyle factors like physical inactivity, habits like smoking, high calorie/high fat diet and stress full work conditions are co-existing or not. Identifying such changes at the right time can help them to prevent vascular-related complications and to adopt treatment if necessary.

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## MATERIALS AND METHODS

Ethical clearance to conduct the tests was obtained from the Institutional Ethical Committee. Blood samples were collected from both the groups. Individuals were taken on random and both the groups were matched for height and weight. 50 women who had attained menopause were taken after a thorough general physical examination. 50 premenopausal disease-free women were taken for control group. Menopause was considered when there were no periods for a minimum of 12 months.

### Inclusion Criteria

Healthy women who had natural menopause without any hormonal or surgical intervention and have weight of 55–60 kg and height of 150–160 cm were included. Weight- and height-matched women with regular menstrual periods were taken for control group. The age for control group was 30–40 years.

### Exclusion Criteria

Women with habits related to tobacco chewing and smoking, known cases of diabetes and hypertension, surgically induced menopause such as oophorectomy, history of cerebrovascular disease, history of coagulopathies, thyroid diseases, and medications known to affect the hematological values were excluded from the study.

### Statistical Analysis

The statistical analysis was performed using Student's *t*-test.

Anthropometric data were collected and vital parameters were measured.

Venous blood was collected, and hematological values were measured by KX-21 Sysmex hematology analyzer. Activated partial thromboplastin time (APTT) and prothrombin time (PT) were measured by coagulometer.

## RESULTS

There was no statistically significant difference in the anthropometric values among the two groups. Body mass index was also not statistically significantly different [Table 1].

### Hematocrit (Hct)

There is a high statistical difference in Hct levels between the two groups.

### Platelet Count

There is a high statistical difference in platelet count among the groups.

## DISCUSSION

Our study found that hematocrit to be greater in postmenopausal women and platelet count was lesser in postmenopausal women. No significant increase was found in APTT (s), PT (s), and international normalized ratio (INR), in postmenopausal women compared to control group.

Our study is consistent with Kharab.<sup>[3]</sup> Higher values for Hct and fibrinogen were found. A higher Hct might enhance red blood cell aggregation, and the raised viscosity might worsen the atherosclerotic propensity. Enhanced platelet adhesiveness to the subendothelium and higher protein exudation through vessel wall may promote atherosclerotic tendency.

Platelet count was less in postmenopausal women. Such a finding could be attributed to high hematocrit which, in turn, is due to osteoporotic changes which may reduce blood cell count. Still, these mentioned platelets of our study  $2.71 \pm 689$  are within normal range, which might not have affected APTT, PT, and INR values.

Butkiewicz *et al.*<sup>[4]</sup> concluded that reduced concentration of estrogen may be the probable cause for low platelet count in postmenopausal women. Lilian *et al.*<sup>[5]</sup> platelet count reduced was associated with menopause. They showed that there is an inverse relationship between serum ferritin and platelets. Due to the cessation of bleeding, serum ferritin stores were increased and platelet count decreased.

Other studies, i.e., Carter *et al.*<sup>[6]</sup> and Stevens and Alexander<sup>[7]</sup> showed decreased platelet count in menopause.

The limitations of the present study can be largely overcome if the same women are made to undergo the tests over a

**Table 1:** Hematological parameters of study subjects and controls

Parameters	Study subjects (mean±SD)	Controls (mean±SD)	<i>t</i> value	<i>P</i> value	Significance
Hct %	38.28±2.37	35.03±4.25	4.71	<0.001	HS
Platelet count (lakhs/cumm)	2.71±0.689	3.19±0.74	3.34	<0.001	HS
APTT (s)	29.27±1.99	28.64±1.33	1.84	>0.05	NS
PT (s)	18.1±6.29	43.37±182.4	0.978	>0.05	NS
INR	1.28±0.42	1.25±0.39	0.385	>0.05	NS

Hct: Hematocrit, APTT: Activated partial thromboplastin time, PT: Prothrombin time, INR: International normalized ratio, SD: Standard deviation

period of few years, few times before menopause, and few times after menopause. The differences which might then crop up can then be solely incriminated to menopause as a factor.

## CONCLUSION

Natural menopause signifies a phase of higher risk of vascular-related diseases such as stroke and ischemic heart disease. This could be due to the lack of estrogen and/or increasing age. Higher viscosity of blood could lead to greater platelet adhesiveness to subendothelium.

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