

## COMPARISON OF AEROBIC CAPACITY USING 6MWD BETWEEN PRE-MENOPAUSAL AND POST-MENOPAUSAL WOMEN

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### ABSTRACT

**Introduction:** Menopause is best defined as the absence of menses for 12 consecutive months. It is associated with atherogenic changes, including a worsening of cardiovascular disease and decreased aerobic fitness compared with premenopausal women. Low levels of aerobic capacity are independently associated with an increased risk of cardiovascular disease mortality. So the aim of the study was to assess and compare the aerobic capacity using 6 minute walk distance between pre-menopausal and post-menopausal women.

**Method:** A comparative study was conducted in Ahmedabad with 40 women aged between 35-55 years divided into Group A (Pre-menopausal group) and group B (Post-menopausal). Subjects were asked to perform 6 minute walk test. Pre and post Heart rate, Respiratory rate, Blood pressure, Borg scale of perceived exertion were recorded of subjects 6 minute walk distance and VO<sub>2</sub>max were calculated of all subjects. Level of significance was kept at 5%.

**Result:** The mean VO<sub>2</sub>max for group A was 18.30ml/kg/min and for group B was 13.51ml/kg/min. Between groups analysis for mean difference in VO<sub>2</sub>max was done using Mann Whitney U test showed significant difference (U=0.500, p=0.001).

**Conclusion:** There is difference in aerobic capacity between pre-menopausal and post-menopausal women.

**Key Words:** Aerobic capacity, Pre-menopause, Post-menopause, 6 minute walk test, VO<sub>2</sub>max

### INTRODUCTION

Pre-menopause is the first stage of the menopause process. It is the time in which women are fully fertile. It starts with a woman's first period and finishes with the first symptoms of menopause, such as hot flashes, mood swings, etc. Perimenopause means the time period during which a woman's body makes its natural transition toward permanent infertility. It commences when the first features of approaching menopause begin until at least 1 year after final menstrual period (FMP). [1] The World Health Organization has defined menopause as the permanent cessation of menstruation resulting from loss of ovarian follicular activity. [1] Menopause is associated with atherogenic changes, including a worsening of cardiovascular disease, decreased aerobic fitness, reduced lean body mass (muscle) and this appears to be related to decreased physical activity compared with

premenopausal women. [2]

Aerobic capacity is the maximum amount of oxygen (VO<sub>2</sub>max) that the body can utilize during an exercise session and it decreases with advancing age. The lungs and cardiovascular system work in tandem to deliver oxygen to the body. Low levels of aerobic capacity are independently associated with an increased risk of cardio-vascular disease mortality. Cardio-vascular disease is the leading cause of death of women in developed countries, but very little is known about atherosclerotic disease progression in women. [3] Traditional risk factors of cardio-vascular disease are hypertension, hyperlipidemia, and cigarette smoking. [4] In women cardio-vascular disease risk is increased with high levels of total triglycerides (TC) and low density lipoprotein (LDL-C) cholesterol and with low levels of high density lipoprotein cholesterol (HDL-C). [5, 6]

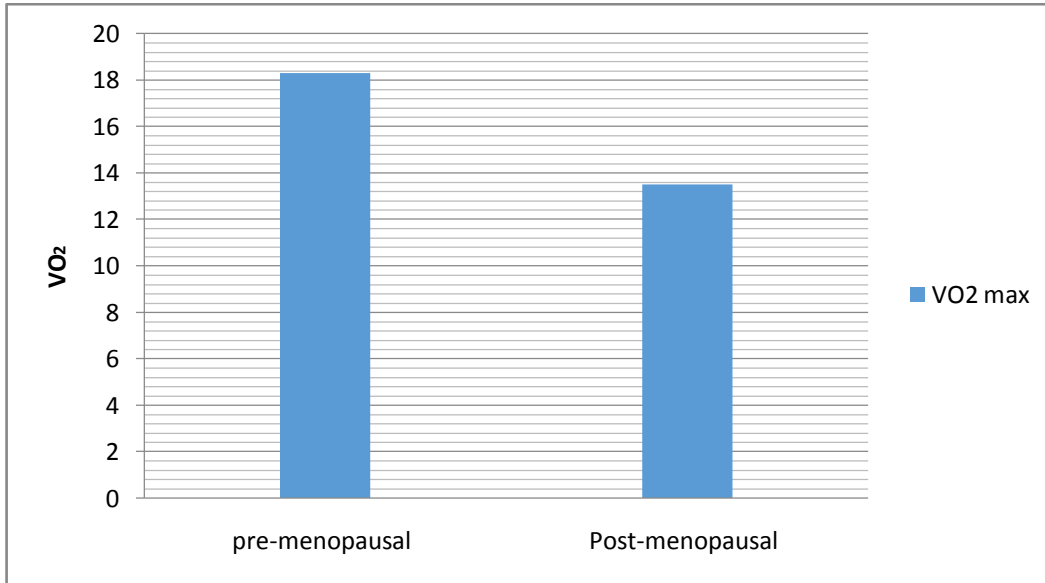
Menopause is associated with progressive reductions of estradiol, progesterone, and 17-hydroxyprogesterone in plasma, along with increased gonadotropin concentrations. [7, 8]. Cross-sectional studies have shown that postmenopausal women have higher TC, triglyceride, very low density lipoprotein cholesterol (VLDL-C), and LDL-C levels than do their premenopausal counterparts. [9, 10]. It

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**Figure 1:- Comparison of VO<sub>2</sub>max between pre-menopausal and post-menopausal women**

is also associated with reduced lean body mass (muscle) and this appears to be related to decrease physical activity. [11]

Lynch et al recently reported lower maximal oxygen consumption (VO<sub>2</sub> max) in sedentary postmenopausal (VO<sub>2</sub> max) women compared with sedentary age-matched premenopausal women and found an inverse relationship between visceral adiposity and maximal oxygen consumption.[12]Wanga JH in his study reported that postmenopausal women in rural China had worse aerobic fitness than the premenopausal and that would increase the cardiovascular disease burden during and after their middle ages.[13]So the study was done to compare the aerobic capacity of pre-menopausal and post-menopausal women in Ahmedabad.

**MATERIALS AND METHODS**

A comparative study was conducted in Ahmedabad. Forty women aged 35-55 years, who volunteered to participate were included by convenience sampling. Subjects who had dysmenorrhea, gynecological, endocrine, respiratory

or musculoskeletal disorders and taking hormonal replacement therapy were excluded.

Nature and purpose of the study was explained to the subjects. Oral informed consent was taken from participants prior to study. Subjects fulfilling inclusion criteria were selected for the study. They were divided into two groups: Group A (Pre-menopausal group) and group B (Post-menopausal). The six minute walk test was explained[14]. They were asked to perform six minute walk test. Pre and post Heart rate, Respiratory rate, Blood pressure, Borg scale of perceived exertion were recorded of the subjects. Six minute walk distance and VO<sub>2</sub>max were calculated of all subjects.

Formula used for VO<sub>2</sub>max[15]was:

$$VO_2max = 0.02 * distance(m) - 0.191 * age(year) - 0.07 * weight(kg) + 0.09 * height(cm) + 0.26 * RPP * (10^3) + 2.45$$

$$(RPP = Heart\ rate * systolic\ blood\ pressure * 0.001)$$

Level of significance was kept at 5%.

**Table 1:- Comparison of VO<sub>2</sub>max between pre-menopausal and post-menopausal women**

Outcome Measure	Mean $\pm$ SD of pre-menopausal group	Mean $\pm$ SD of Post-menopausal group	Mann Whitney U value	p value
VO <sub>2</sub> max(ml/kg/min)	18.30 $\pm$ 0.95	13.51 $\pm$ 1.68	0.500	0.001

## RESULTS

All the subjects completed the test. Statistical analysis was done using SPSS version 16. In this study Mann Whitney U test was used to compare aerobic capacity between pre-menopausal and post-menopausal women. Mean and SD of  $VO_{2max}$  of group1 and group2 was  $18.30 \pm 0.95$  and  $13.51 \pm 1.68$  ml/kg/min respectively. U value and p value was 0.500 and 0.001 respectively. The results of this study showed that there was a significant difference between aerobic capacity between pre-menopausal and post-menopausal women as shown in table 1 and Fig. 1.

## DISCUSSION

The present study shows that there was significant difference found in aerobic capacity between pre-menopausal and post-menopausal women. The findings of this study are similar to the study of Nicole AL [20] and Sonia MN [21].

An aetiological relation between menopause and increased risk of cardiac disease is corroborated by a higher age-adjusted rate of this disease among post-menopausal women and by the finding that postmenopausal women have a two-fold higher risk of developing the disease than premenopausal women, after adjustment for age. Adverse changes in other factors that mediate the risk of coronary heart disease, such as sedentary lifestyle, physical inactivity, insulin resistance, increased thrombotic tendency, and less favorable hemodynamic profiles, may also lead to increased cardiac risk with the menopause. [16]

There is strong and consistent evidence from observational studies that physical inactivity and poor cardiorespiratory fitness are associated with higher morbidity and mortality from all causes, including cardiovascular disease (CVD). United States population reports describe an increasingly less physically active society, with marked downturns in reported physical activity. [17] Cardiorespiratory fitness (CRF) is the ability to perform dynamic exercise, using large-muscle mass, at moderate to high intensity for prolonged periods, and is a key component for good health. The maximal oxygen consumption ( $\dot{V}O_{2max}$ ) is known to decline with age at a rate of approximately 10% per decade from age 30 years. [18]

Jacqueline C M Witteman and colleagues have reported that atherosclerosis diagnosed by

radiographic detection of calcified deposits in the abdominal aorta was more common in postmenopausal than in premenopausal women and suggested that the menopause was associated with an acceleration of atherosclerosis. [17]

Nicole AL et al reported that  $VO_{2max}$  is higher in perimenopausal women compared with similarly aged postmenopausal women. [19] Sonia M.N. et al suggested that large-scale epidemiological studies of subjects with and without cardiovascular disease demonstrate that low aerobic capacity is a stronger predictor of mortality than other established risk factors. [20] So post-menopausal women have less aerobic capacity than pre-menopausal women.

## CONCLUSION

Comparison of aerobic capacity between pre-menopausal and post-menopausal women shows a decrease post menopause.

Further studies can be carried out to see effect of aerobic exercise training in post-menopausal women on their aerobic capacity.

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