Association of Cardio-Respiratory Endurance and BMI among Postmenopausal Indian Population

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Abstract: *Menopause is a physiological event occurs in every women's life after the age of 51 in western world and around 44yrs of age in India. The climacteric changes in postmenopausal women has a direct effect on women's health and are more prone to complications like metabolic diseases (obesity) and increased CVD risk factors. The objective of this study was to find the association between BMI and cardio-respiratory endurance in postmenopausal women of India. This pilot study included 16 postmenopausal women. Outcomes such as body mass index(kg/m^2) and six minute walk test(VO_{2max}) were calculated. The Pearson's product moment correlation coefficient of BMI and VO_{2max} was -0.331. There is weak negative correlation between BMI and cardio-respiratory endurance(VO_{2max}).*

Keywords: Postmenopausal, Cardiorespiratory endurance, BMI

1. Introduction

Menopause is a Physiological change in a women's life which refers to cessation of menses. In India age of menopause is comparatively less than the Western world. The Average age of menopause in Indian woman is 46.2 years where else of other Western countries it is 51 years [1]. The climacteric changes which occur in Postmenopausal women has a direct effect on elderly women's health. Studies show that Metabolic Syndrome and CVD are more common in women above 55 years of age with significant increase in individual risk factors in the postmenopausal phase [2-3]. One of the Effects of estrogen deficiency is changes in the lipid-lipoprotein profile further leading to cardiovascular diseases in postmenopausal [4-5]. Obesity is positively associated with cardiovascular disease and cardiovascular disease risk factors such as plasma lipids and lipoproteins hyperinsulinemia, and insulin resistance [6]. Previous studies also suggest that menopause is related to modest increase in total fatness and accelerated accumulation of central body fat and changes may increase the risk for cardiovascular and metabolic disease in aging women [7].

Cardio-respiratory Fitness (CRF) is the ability of the circulatory and respiratory system to supply oxygen during sustained physical activity. Therefore it quantifies the functional capacity of an individual and is in turn reflection of total body health. CRF is expressed in terms of VO2 max which can be measured directly or indirectly by maximal or sub-maximal tests. The sub maximal tests are of various types based on the mode of testing which include treadmills, cycle ergometers, steps, and field tests(1.5-mi [2.4 km] walk/run test; 1-mi and 6-min walk test). The 6MWT is a self-paced test which is a useful measure of functional capacity. It has been proved to be reliable, inexpensive, safe and easy to apply [8-10]. Abundant literature have looked at the relationship between 6 MWT and peak VO2 in individuals, Based on those literature, Recently a study conducted overlooking the relationships between 6MWD and peak VO2, has accurately derived a generalized equation for estimation of mean peak VO2 from mean 6

MWD. The Equation is Mean Peak VO2 (ml / kg /min) = 4.948 + 0.023*Mean 6 MWD [11].

Studies done previously to find association between body fat and physical activity reveals that with lesser physical activity, higher is the BMI, body fat %, waist circumference and visceral fat % [12]. There is scarcity of literature which looks at the relation of Cardio-respiratory endurance and BMI among Indian postmenopausal women, hence the need of the study.

2. Aim and Objectives

Aim: To study the association of aerobic capacity with BMI in Postmenopausal women

Objectives:
- To find out the level of Cardio-respiratory endurance among Postmenopausal women.
- To find out the BMI among postmenopausal women.
- To find the association between BMI and cardio-respiratory endurance

3. Materials and Methodology

Study design: Observational Analytical study
Study setting: Rural area women
Sampling method: Purposive sampling
Sample size: 16

3.1 Eligibility Criteria

Inclusion criteria
- Postmenopausal women aged 40-65.
- Be at least 1 year post-cessation of menses.
- Not taking estrogen therapy.
- Have no limitations that might preclude walking.

Exclusion criteria:
- Premature menopause.
- Severe liver, kidney or blood diseases.

- Existence of cardiovascular diseases.
- Use of blockers and antiarrhythmic agents.
- Existence of skeletal muscle conditions, neuro-muscular and neurophysiological diseases that might prevent their participation in physical exercises or might have symptoms aggravated by them.

3.2 Outcome

- VO_{2max} level
- Body mass index(BMI)

3.3 Procedure

Ethical committee clearance was obtained from the Institutional Ethical Committee of DVVPF's College of Physiotherapy. The participants were included on the basis of inclusion and exclusion criteria from the Out Patient Department of the Dr. Vithalrao Vikhe Patil Hospital, Ahmednagar. Prior to data collection, the study was explained and written consent was obtained from the participants. The assessment form consisted of demographic data and outcome measures. The BMI was measured by assessing height(m^2) and weight(kg) using Stadiometer and a weighing machine. Endurance testing was done using six minute walk test[9] in which subjects were asked to walk a distance of 30m and the distance parameter was noted. The calculation of VO2 max was done using the mean pick formula [11].

4. Data Analysis

Data was analysed using software Graphpad Instat. Descriptive statistics for the age of participants, Duration of menopause, BMI and VO2max measures were calculated. The Pearson product-moment correlation coefficient was calculated to analyze the relation between the BMI and aerobic endurance (VO2 max) using the software.

5. Result

Demographic data was studied in the population. Table no 1 shows the mean age of postmenopausal women 52.87±6.18 years and the mean duration of menopause was 7.31±1.42 years. The mean and the standard deviations of the outcome measures were VO_{2max}: 14.67±1.42 mL/Kg/min and BMI: 24.96±3.82 kg/m^2. The Correlation coefficient(r) for BMI with Aerobic endurance was -0.331 indicating a weak negative correlation between cardiorespiratory endurance and BMI. The downward slope in Graph 1 indicates negative relationship of BMI and Cardiorespiratory endurance.

5.1 Tables and Graphs

Table 1: Descriptive Statistics

	Mean SD
Age	52 ± 6.18
Duration of menopause menopausemen Menopause	7 ± 4.31
Body mass index(BMI)	24 ± 3.82
Aerobic Endurance	14 ± 1.42
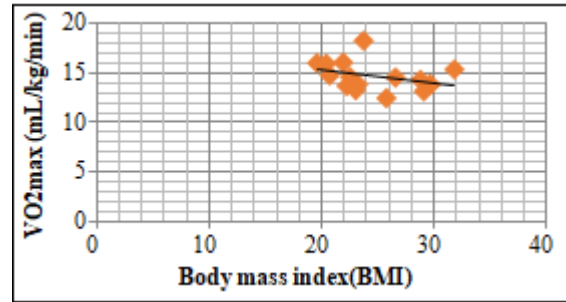
Graph 1: Association of BMI and VO_{2max}

6. Discussion

The present study focused on finding association of cardio-respiratory endurance with Body mass index among postmenopausal women. According to the literature, Reduced energy levels plays a major role in increasing central adiposity in women undergoing menopausal transition. Also this predisposes the postmenopausal women for cardiovascular diseases as obesity is one of the factor [4-5]. Previous studies have concluded that a reduction in physical activity levels increases the BMI, visceral fat % and body fat % [12].

In our study, we found a weak negative correlation between the BMI and VO2max values which suggests that when there is increase in body fat in postmenopausal women, there may be decrease in the cardio-respiratory endurance The findings of our study is contradictory to a study done by Helena Moriera et al, (2014) in Portuguese postmenopausal women which suggests that regardless of effects of age and menopausal characteristics, the cardio-respiratory fitness is influenced by Visceral fat area and Basal metabolic rate, Also presence of higher levels of Vo_{2max} was associated with reduction in fat and improved muscle condition in postmenopausal population [13]. The findings of the above study may differ because of the cultural and ethnic differences present among Portuguese and Indian population. The results of Niyati Khona et al(2017) in postmenopausal women, were similar to our study. Here they found, weak negative correlation of physical activity level with body and visceral fat % and waist circumference [14]. A weak negative relationship may be due to the factors such as low physical activity level, Age, which leads to decline in the cardio-respiratory endurance in postmenopausal women.

7. Conclusion

From our study, we found a weak negative correlation between cardio-respiratory endurance and body mass index indicating that the two variables does not influence each other to produce clinically significant change.

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