A Study to Assess the Risk of Cariovascualar Disease among Post-Menopausal Apartment Dwelling Women

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Abstract

Background: The permanent cessation of ovarian function and the transition of a woman from a reproductive toa nonreproductive life is defined as Menopause. This period is characterized by remarkable changes in menstruationand hormonal patterns as well as psychological and physiological symptoms.

Objectives: The objectives of this study was to assess the Body-Mass Index, Waist-Hip Ratio, Submaximal Aerobic Capacity, Ankle-Brachial Index and Quality of Life using the SF-12 questionnaire among post-menopausal apartment dwelling women.

Design: Descriptive Study

Methods: 110 subjects meeting the inclusion and exclusion criteria were included in the study. The subjects were assessed based on the screening tools Body-Mass Index (BMI) and Waist- Hip Ratio. The outcome tools used to assess the risk of cardiovascular disease among post-menopausal apartment dwelling women were Ankle-Brachial Index (ABI), Six-Minute Walk Test (6MWT) and health related quality of life SF-12 Questionnaire.

Results: Out of 110 subjects, 59 subjects had a BMI of 25-29.9 kg/m^2 and 36 subjects had a BMI of ≥30 kg/m^2.56 (51%) subjects had substantially higher waist- hip ratio (≥0.85 cm). 61(55.5%) subjects had mild to moderate peripheral arterial disease on left side and 67 (60.9%) subjects had mild-moderate peripheral arterial disease on right side. The range of 6MWD is between 490-900 m. The correlation between MCS 12 and PCS 12 has an intermediate poor correlation.

Conclusion: The study shows that Post- Menopausal Apartment Dwelling Women are at risk of Cardiovascular Disease.

Key Words: Menopause, Cardiovascular Diseases, Body-Mass Index,Waist- Hip Ratio, Six- Minute Walk Test, Health Related Quality of Life, SF-12 Questionnaire.

Introduction

Menopause is defined as the end of the reproductive phase in a woman. In this period, there is reduction of ovarian function, followed with gradual decrease of female sex hormones which leads to interruption in menstrual cycle. Natural Menopause

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is defined as the experience of 12 consecutive months of amenorrhea.The time after the absence the absence of menstrual cycles for twelve months is Post-Menopause.[1]

Cardiovascular diseases (CVD) is one of the leading causes of mortality and morbidity worldwide. CVDs consists of congestive heart failure (CHF), coronary heart diseases, congenital heart diseases. Factors like tobacco exposure,ageing,diet and lifestyle factors hypertension, ethnicity, stress, physical inactivity elevates the risk of developing cardiovascular diseases.[2]

According to the INTERHEART study that included subjects from 52 countries, including high, middle, and low-income countries, 9 modifiable risks factors accounted for 90% of the risk of having a first Myocardial infarction: dyslipidemia, hypertension, smoking, diabetes, psychosocial factors, abdominal obesity, regular alcohol consumption, consumption of vegetables and fruits, and physical inactivity. The researchers concluded that 36% of the population-attributable risk of myocardial infarction was accounted to smoking.[3]

Due to the cardioprotective role of estrogen,premenopausal women are generally not at risk of developing cardiovascular diseases. Postmenopausal women are at risk of developing cardiovascular disease due to ovarian failure and redistribution of fat leading to abdominal obesity and estrogen deficiency. Studies have shown that in postmenopausal women there has been alterations in lipid levels within last one year of last menstrual cycle. Previous studies have shown that in Menopause Transition (MT) there was reduction in loss of protective effects of high-density lipoproteins (HDL) cholesterol.[4]

The climacteric changes that arise during the postmenopausal phase have an impact on elderly women's health. Studies have shown that metabolic syndrome and CVD are more common in women above 55 years of age with a significant increase in individual risk factors in the postmenopausal phase.Due to estrogen deficiency one of the outcomes seen is a change in the lipid-lipoprotein profile further leading to cardiovascular diseases in postmenopausal women. Obesity is positively linked with cardiovascular disease risk factors such as lipoproteins hyperinsulinemia and plasma lipids, and insulin resistance.[5]

Women develop Coronary heart diseases (CHD) many years later than men. During midlife there is marked increase in CHD riskwhich coincides with Menopause transition. This has led to the hypothesis that Menopause transition leads to Coronary heart diseases. Longitudinal studies that were carried out in women transitioning through menopause has contributed to a deeper understanding of the relationship between Menopause transition and CVD risk. The findings from these studies highlight the importance of MT as a time of increasing CVD risk andunderline the importance of potential monitoring and intervention during midlife.[6]

Methodology

Inclusion Criteria:

1) Postmenopausal women in the age limit of 45-65 years
2) Subjects who are willing to participate voluntarily and sign the written informed consent,
3) Subjects who do not have any limitation that might preclude walking.

Exclusion Criteria:

1) Subjects who hadPremature menopause or Surgical menopause,
2) Subjects with other diseases affecting quality of life (e.g., cancer, moderate to severe chronic renal insufficiency, chronic respiratory diseases, cardiovascular diseases including uncontrolled hypertension, diabetes, and the presence of severe cognitive, visual, or hearing impairments.
3) Subjects who are terminally ill,
4) Subjects whose disability can affect their physical activity
5) Subjects who have taken part in similar kind of study.

Procedure

Permission from the associations of selected apartment complexes was taken. A written informed consent from the selected subjects was taken after

explaining the purpose of the study. Recruitment of the subjects was done between the age limit of 45-65 years who have attained menopause and were requested for participation in the study. The recruitment of the subjects was done based on the Inclusion and Exclusion Criteria of the study. Demographic data of the subjects were recorded.

The following Screening Tools was conducted on the subjects for the Study:

1) BODY MASS INDEX (BMI): BMI was measured with measuring tape and weighing machine and was calculated based on the Quetelet's index, BMI = Weight (in kg)/ height^2 (in m) and the BMI was classified based on Asia- Pacific Classification.

2) WAIST-HIP RATIO (WHR): Using a tape measure,waist circumference was measured at the midpoint between the last palpable rib and the top of the iliac crest. The hip circumference was measured around the widest portion of the buttocks with the tape parallel to the floor.Calculation of WHR was done with the formula WHR= waist circumference (cm) / hip circumference (cm).

The following Outcome Tools was conducted on the subjects for the Study:

1) ANKLE- BRACHIAL INDEX (ABI): The subject was advised to rest for 10 minutes in the supine position. ABI was performed by measuringsystolic blood pressure from both brachial arteries and from the dorsalis pedis and posterior tibial arteries of both lower limbs using a stethoscope and a sphygmomanometer. The ABI was calculated by dividing the ankle systolic pressures between the arteries by the highest brachial pressures between the two sides.

2) SIX- MINUTE WALK TEST (6MWT): The 6 MWT was performed indoors or outdoors according to the apartment settings. The walking course was measured 100 ft hallway (30 m in length). Prior to the test the subject was asked to rest for 10 minutes and the heart rate, blood pressure, SPO_2, baseline dyspnea levels was recorded. As soon as the subject started walking the timer was started. After completion of the test the subject was asked to sit on the chair and the post walkheart rate, SPO_2 and dyspnea levels was recorded. The number of laps, additional distance covered was recorded and the total distance walked, rounding to the nearest meter was recorded.

The equation used to calculate the percent predicted 6MWD for individual adult women who performed the test for the first time:

6MWD = (2.11 × height cm) - (2.29 ×weight kg) - (5.78 ×age) + 667 m. For the lower limit normal (LLN), 139 was subtracted from the equation.

Formula used for the calculation VO2max: VO2 peak = 0.02 × distance(m)-0.191×age(year)-0.07×weight(kg)+ 0.09× height(cm) + 0.26 × RPP × (l0-3)+ 2.45

(RPP=Heart rate × systolic blood pressure×0.001).

3) Health-Related Quality of Life SF12 Questionnaire for the quality of life in post-menopausal women:The SF-12 covers eight domains of health (physical function, role physical general health, bodily pain, vitality, role emotional, social functioning, and mental health) and is summarized into two scores PCS and MCS. The SF-12 was used to assess the health-related quality of life among post-menopausal apartment-dwelling women to collect the data regarding their experience of physical and mental symptoms using direct oral interview technique.

Results

The data obtained from the study are analyzed statistically and results are as follows:

Table No. 1: Age distribution of Post-Menopausal Apartment Dwelling Women

Age (years)	Frequency	Percentage
≤ 50	12	10.91
51 - 60	62	56.36
> 60	36	32.73
Total	110	100.00

In the present study, it was observed that, out of 110 subjects studied, 12(10.91%) were in the age group of ≤50 years, 62(56.36%) were in the age group of 51-60 years, 36(32.73%) were in the group of >60 years of age.

Table No. 2: Distribution of BMI among Post-Menopausal Apartment Dwelling Women

BMI (kg/m^2)	Frequency	Percentage
Normal	7	6.4
At risk	8	7.3
Obesity class I	59	53.6
Obesity class II	36	32.7
Total	110	100.0

In the present study, it was observed that, out of 110 subjects, 7 (6.4%) were in the Normal weight class, 8 (7.3%) were in At-Risk class, 59 (53.6%) which constitutes majority were in the Obesity class I and 36 (32.7%) were in the Obesity class II.

Table No. 3: Distribution of Waist-Hip Ratio among Post-Menopausal Apartment Dwelling Women

Waist-Hip Ratio (WHR) (cm)	Frequency	Percentage
<0.85	54	49
≥0.85 Increased	56	51
Total	110	100.0

In the present study, it was observed that, out of 110 subjects, 54 (49%) had <0.85 cm of Waist Hip Ratio, 56 (51%) had Substantially increased Waist- Hip Ratio

Table No. 4: Distribution of Left ABI among Post-Menopausal Apartment Dwelling Women

Left ABI	Frequency	Percent
Normal	19	17.3
Borderline (equivocal)	30	27.3
Mild-to moderate peripheral arterial disease	61	55.5
Total	110	100.0

In the present study, it was observed that, out of 110 subjects, 19(17.3%) had Normal Left ABI, 30 (27.3%) had Borderline (equivocal), 61 (55.5%) had Mild-to moderate peripheral arterial disease.

Right ABI	Frequency	Percentage
Normal	24	21.8
Borderline (equivocal)	19	17.3
Mild-to moderate peripheral arterial disease	67	60.9
Total	110	100.0

Table No. 5: Distribution of Right ABI among Post-Menopausal Apartment Dwelling Women

In the present study, it was observed that, out of 110 subjects, 24(21.8%) had Normal Right ABI, 19 (17.3%) had Borderline (equivocal), 67 (60.9%) had Mild-to moderate peripheral arterial disease.

PCS-12	Frequency	Percentage
50 or less	78	70.9
More than 50	32	29.1
Total	110	100.0

Table No. 6: Distribution of PCS-12 Score among Post-Menopausal Apartment Dwelling Women

In the present study, it was observed that, out of 110 subjects, 78(70.9%) had 50 or less PCS-12 score, 32(29.1%) had more than 50 score on PCS-12.

Table No. 7: Distribution of MCS-12 Score among Post-Menopausal Apartment Dwelling Women

MCS - 12	Frequency	Percent
42 or less	37	33.6
More than 42	73	66.4
Total	110	100.0

In the present study, it was observed that, out of 110 subjects, 37 (33.6%)had 42 or less MCS-12 score, 73 (66.4%) had more than 42 score on MCS-12.

Table No. 8: Descriptive Statistics for Six- Minute Walk Test

6 MWT	Range	Mean	Std. Deviation	Std. Error of Mean	95% CI for mean	
					LB	UB
Total distance in 6 minutes (m)	490-900	657.09	79.94	7.622	642.152	672.030
VO_2 Peak (ml/kg/min)	11.27-20.74	16.35	1.96	0.187	15.985	16.719

The Total distance in 6 minutes (m) was in the Range between 490-900, the (Mean: 657.09, SD: 79.94), the Standard Error of Mean: 7.622 and 95% CI for mean (LB: 642.152, UB: 672.030). The VO2 Peak (ml/kg/min) was in the Range between 11.27-20.74, the (Mean: 16.35, SD: 1.96), the Standard Error of Mean: 0.187, and 95% CI for mean (LB: 15.985, UB: 16.719).

Table No. 9: Correlation between MCS-12 and PCS-12 among Post-Menopausal Apartment Dwelling Women

Correlation between MCS12 and PCS 12	0.357
R-square	0.127

The correlation between MCS-12 and PCS-12 has an intermediate negative correlation.

Interpretation:

1. For every unit change in the PCS 12 there is -0.357 unit decrease in MCS 12. This relationship is statistically significant P<0.001, stating that increased physical component of quality of life decreased the metal health component of quality of life.
2. R- square

   Of the total changes taken place in MCS 12, only 12.7% change is attributed to PCS 12.

Table No. 10: Regression model Of MCS-12 and PCS-12 among Post-Menopausal Apartment Dwelling Women

Regression model of MCS 12 on PCS 12	MCS 12 = 60.509 - 0.327PCS 12

Regression: The intercept is 60.509 with negative regression coefficient of 0.327. So, for every MCS12 value predicted will be decreased by 0.327. So, for increased mental health component quality of life decreased the physical component of quality of life.

Discussion

The present study was conducted to assess the risk of cardiovascular disease among post-menopausal apartment dwelling women in the age group of 45-65 years of age.The results of this study showed that Post-Menopausal Apartment dwelling women are at a risk of Cardiovascular Disease.

A study done in Indian population to find abnormalities of cardiovascular profile in postmenopausal women and was compared with the cardiovascular profile of premenopausal women. They have found that coronary artery disease (CAD), Hypertension, Body Mass Index and Waist- Hip ratio were significantly higher in postmenopausal group as compared to premenopausal group.[7] In the present study, out of 110 subjects, 59 (53.6%) subjects had a BMI of 25-29.9 kg/m^2 and 36 (32.7%) subjects had a BMI of ≥30 kg/m^2.

A cross-sectional prospective study was carried out to find the prevalence of cardiovascular risk factors in postmenopausal women and found that in postmenopausal women from rural areas high prevalence of most of the conventional CVRFs.[8] In the present study out of 110 subjects, 56 (51%) subjects had substantially higher waist- hip ratio (≥0.85 cm).

A recent study done to find whether ABI is a predictor of CVD among postmenopausal women had found that the Systolic and Diastolic blood pressures were higher in postmenopausal women.[4]In the present study, out of 110 subjects, 61(55.5%) subjects had mild-moderate peripheral arterial disease on left side and 30 (27.3%) subjects had Borderline ABI on the left side. 67 (60.9%) subjects had mild-moderate peripheral arterial disease on right side and 19 (17.3%) subjects had Borderline ABI on right side.

A previous study done to find the comparison of aerobic capacity using 6 MWD between premenopausal and postmenopausal women. The results of this study showed that there a decrease in aerobic capacity in postmenopausal women.[9]The Normal 6MWD is 400-700 m.[10]In the present study even though the Body Mass Index, Waist Circumference , Waist- hip Ratio have been higher in post-menopausal apartment dwelling women, this did not affect the Aerobic Capacity in postmenopausal women. In the present study the range of 6MWD is between 490-900 m.

The Study of Women's Health across the Nation (SWAN) respondents had better mental health scores than physical health scores. Factors such as physical activity, improved sleep hygiene and body mass index has shown to improve the health-related

quality of life (HRQoL) for older women.[11]The present study showed that post-menopausal women had better MCS12 scores as compared to the PCS12 scores. The correlation between MCS 12 and PCS 12 is poor. For every unit change in PCS 12 there is - 0.357 unit decrease in MCS 12. This relationship is statistically significant $P < 0.001$ stating that increased physical component of quality of life decreased the metal health component of quality of life.

Limitations

- Larger geographical area could have been considered.
- Unavailability of scales in regional languages

Conclusion

Thus, this study concluded that Post- Menopausal Apartment Dwelling Women are at risk of cardiovascular disease. The Body Mass Index, Waist-Hip Ratio is more in post-menopausal apartment dwelling women. The Ankle- Brachial Index is lower on the right side as compared to left side. Although the Body Mass Index,Waist- hip Ratio have been higher in post-menopausal apartment dwelling women, this did not affect the Aerobic Capacity in post-menopausal apartment dwelling women. The regression showed that the intercept is 60.509 with negative regression coefficient of 0.327. So, for every MCS12 value predicted will be decreased by 0.327. So, for increased mental health component quality of life decreased the physical component of quality of life.

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