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Awareness of Modifiable Risk Factors Associated with Cardiovascular Diseases among Post-Menopausal Females and Role of Physical Therapist in preventive Strategies

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[1] Substantial contributions to the conception or design of the work for the acquisition, analysis or interpretation of data for the work, [2] Drafting the work or reviewing it critically for important intellectual content, [2] Final approval of the version to be published, [1] Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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A B S T R A C T

Background: Menopause significantly increases the risk of cardiovascular diseases (CVD) due to modifiable risk factors such as visceral obesity, dyslipidemia, impaired glucose regulation, non-alcoholic fatty liver disease, and hypertension, all influenced by hormonal changes. Physical therapists play a crucial role in managing these risk factors through structured physical activity, lifestyle modifications, and rehabilitation strategies.

Objective: To assess awareness of modifiable cardiovascular disease risk factors among postmenopausal women and highlight the role of physical therapy in preventive strategies

Methodology: A cross-sectional survey of 188 postmenopausal women (aged 45–60) from six Lahore hospitals was conducted using non-probability convenience sampling. Women with prior cardiovascular diseases or severe cognitive impairments were excluded. Awareness of modifiable CVD risk factors was assessed via the CARRF-KL questionnaire (Cronbach's alpha = 0.768). Data was analyzed using SPSS 21.

Results: The participants' mean age was 49.9 ± 3.48 years. Descriptive statistics of the CARRF-KL questionnaire showed scores ranging from 11 to 27, with a mean of 20.84 ± 3.77.

Conclusion: Postmenopausal women exhibited moderate awareness of modifiable CVD risk factors. While a general understanding was present, variability in scores highlights the need for targeted educational interventions. Given the role of physical therapy in promoting preventive strategies, integrating structured exercise and lifestyle counseling into healthcare programs can enhance cardiovascular health in this population.

Keywords: Cardiovascular disease, Risk factors, Postmenopausal.

Introduction

Cardiovascular diseases have been one of the leading causes of death among postmenopausal women in developing countries for the past few decades.[1] A woman's risk of developing cardiovascular disease (CVD) rises dramatically in her fifth decade of life, a decade later than the age-related increase seen in men.[2] Hence, this occurs at the same time as menopause occurs.[3] While conventional CVD risk factors—such as tobacco use, adiposity, hypertensive condition, dyslipidemia, hyperglycemia, and a genetic background of premature CVD—are useful in determining a person's overall risk of developing CVD, it is imperative to

take into account gender-specific risk factors in order to accurately screen for, preventing, diagnosing, and treating CVD in women.[4]

Menopause is characterized as the permanent end of menstrual cycles.[5] The diagnosis is determined retrospectively after menstruation has been absent for 12 months.[6] Postmenopausal women may live in this period for a third of their lives.[7] The Climacteric phase marks the entry into a non-reproductive stage of life marked by erratic menstrual cycles, variations in hormone levels, and physical and psychological symptoms.[8] During this time, several cardiometabolic changes occur, including changes in body fat distribution, disturbances in lipoprotein levels, and variances in endothelium indicators, all of which are responsible for the elevated risk of CVD during the MI.[9]

Cardiovascular disorders and postmenopausal period are highly interlinked.[10] Women who undergo early menopause face a greater risk of developing cardio-vascular disorders after menopause.[11] For premenopausal women, estrogen has a cardiac protective effect that delays the onset of coronary artery disease (CAD) by about 8 to 10 years.[12] Research has significantly enhanced our understanding of the of the connection between CVD risk and menopausal transition. These investigations have revealed a number of sequences of changes in natural sex hormones, unfavorable alterations in fat distribution, lipid levels as well as organizational and practical indicators of arterial health during the menopause transition. Careful monitoring throughout midlife should be done as the menopausal transition is a period of accelerated CVD risk.[13]

The global burden of cardiovascular diseases is growing at very rapid rate. Cardiovascular disease is one of the leading causes of death among adult females worldwide.[14] Hypertension affects men more than women before the age of 55, but after 55 years of age it acts in a reverse manner and it is commonly linked to estrogen deficiency after natural or surgically induced menopause.[15]. Over 450,000 menopausal females experience heart diseases annually and 250,000 die of coronary heart diseases worldwide.[16] Heart diseases risk elevation after menopause is linked to metabolic and hormonal alterations.[17] Hence, menopause leads to changes in body fat distribution from gynoid to android pattern, reduced glucose tolerance, and decrease in estrogen pattern among other effects. Therefore, estrogen deficiency and heart diseases in women are related to menopause.[18] Other risk factors of cardiovascular diseases are dyslipidemia, hypertension, smoking, diabetes, obesity, components of metabolic syndrome, tobacco chewing, excess consumption of alcohol, lack of physical activity and genetic causes like complex lipid traits etc.[19]

This study aims to assess awareness of modifiable cardiovascular disease risk factors among postmenopausal women and highlight the role of physical therapy in preventive strategies. As limited literature is available regarding awareness of cardio-vascular risk factors amongst post-menopausal females in Pakistan, understanding the level of awareness of cardiovascular risk in this specific population, physical therapist can make individualized patient specific plan of care, educational program and lifestyle modifications to tackle specific demands and changes came across by postmenopausal female as 55-60% of women are post-menopausal in Pakistan.

Methodology

A total of 188 postmenopausal women were voluntarily recruited for this cross-sectional survey from six different hospitals in Lahore. The study settings included Muhammadi Eye Clinic Shad Bagh, Manawa Hospital, Services Hospital, Gangaram Hospital, Shalamar Hospital and GTTH (Ghurki Trust and Teaching Hospital). The study was approved by the ethical review board of Lahore College of Physical Therapy LCPT/DPT18/843, and was conducted between June 2023 and December 2023. Non-probability convenience sampling was used. Sample size calculator provided by WHO was used to calculate the sample quantity, providing the absolute precision d = 0.07, confidence interval 95% and expected population proportion p = 0.377.[20]

The study focused on postmenopausal women aged 45 to 60 years. Women with a history of cardiovascular diseases such as stroke, MI, hypertension and severe cognitive impairments were excluded. Stress levels were assessed using Perceived Stress Scale (PSS) and categorized accordingly. Post-menopausal women's knowledge of cardiovascular disease risk factors was assessed using the Cardiovascular Disease Risk Fact Knowledge Level Questionnaire (CARRF-KL), which has a Cronbach's alpha of 0.768 and reliability coefficient of r=0.850 with p< 0.001.[21]

The CARRF-KL scale consists of twenty-eight items. The first four questions assess variables such as age, prevention, and features of CVD. Nine items look at the results of adjustments in risk behaviors, and fifteen items evaluate risk factors for CVD. Responses are recorded in the format of "Correct," "Incorrect," or "Not sure." All items are provided as

true or false statements. A score of one is awarded for each right response. There i maximum score is 28.[22-25]

Data collection involved ensuring the anonymity of the participants and confidentiality of the provided information. The data was then entered and analyzed using version 25 of the Statistical Package for Social Science (SPSS).

Results

The, participants' ages ranged from 45 to 60 years, with a mean age of 49.9 ± 3.48 years. Table 1 presents the age-wise distribution of participants. Table 2 presents the descriptive statistics of BMI among postmenopausal women. Table 3 shows BMI categorization among postmenopausal women which is also illustrated graphically in figure 1 and figure 2 illustrates the participants stress levels based on the perceived stress Scale (PSS).

Table 1: Age-Wise Distribution of Participants

Age Group (Years)	Frequency (f)	Percentage (%)
45–50	69	36.7%
50–55	65	34.6%
55–60	54	28.7%

able 2. Descriptive Statistics of BMI kg/m²

No. of participants	Minimum	Maximum	Mean	S.D.
188	15.22	45.10	25.29	4.53

Table 3: Categorization of BMI Among Postmenopausal Women

BMI Category	BMI Range (kg/m²)	Frequency (n)	Percentage (%)
Underweight	< 18.5	8	4.3%
Normal weight	18.5 – 22.9	43	22.9%
At Risk of Overweight	23.0 – 24.9	37	19.7%
Overweight	25.0 – 29.9	78	41.4%
Obese	≥ 30.0	22	11.7%

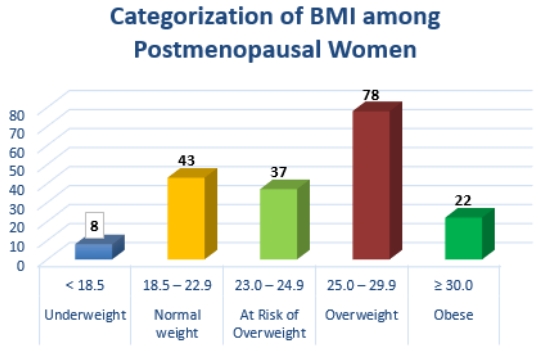

Figure 1. Categorization of BMI among Postmenopausal Women

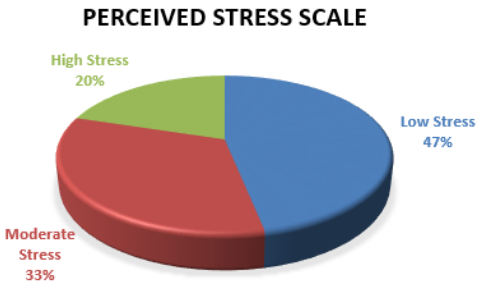

Figure 2. Participants Stress Level Based on Perceived Stress Scale (PSS)

Table 4 presents the knowledge of cardiovascular risk factors among participants. The majority (88.3%) correctly identified smoking as a preventable cause of disease and death, while 94.1% recognized smoking as a contributing factor to heart disease. Awareness regarding dietary habits varied; 66.0% acknowledged the harmful effects of excessive red meat consumption, whereas only 42.0% correctly identified that fats solid at room temperature are unhealthy. A strong understanding of the impact of stress and hypertension on heart disease was observed, with over 95% correctly linking high blood pressure and stress to cardiovascular risk. However, knowledge gaps existed regarding cholesterol-related factors—only 49.5% correctly identified that high LDL cholesterol increases heart disease risk. Similarly, awareness of high blood sugar as a contributing factor was moderate, with 77.7% recognizing its association with cardiovascular disease.

Table 5 presents the participants' knowledge regarding the outcomes of changes in cardiovascular risk behaviour. A vast majority (92.6%, n=174) correctly recognized that quitting smoking reduces the risk of developing heart disease, while 7.4% were unsure or incorrect. Similarly, 96.8% correctly identified that consuming 2-3 portions of fruits and 2 portions of vegetables daily is beneficial for health, whereas only 3.2% were uncertain or incorrect.

Regarding dietary habits, 82.4% correctly acknowledged that a low-carbohydrate and low-fat diet is good for heart health, while 17.6% were unsure. Additionally, 94.1% correctly recognized that regular exercise reduces the risk of heart disease, whereas 5.9% were unaware or incorrect. However, a significant proportion (73.9%, n=139) incorrectly believed that exercising in a gym is the only way to reduce cardiovascular risk, with only 26.1% answering correctly. Similarly, 37.8% were uncertain about whether slow walking and wandering could be considered as forms of exercise, while 62.2% correctly identified them as beneficial.

In terms of blood pressure management, 93.1% acknowledged that controlling blood pressure reduces heart disease risk, whereas 6.9% were unsure. However, 44.7% were uncertain about the lifelong need for hypertension medication, while 55.3% correctly recognized this requirement. Lastly, 12.2% were unsure whether medication is prescribed to every person with high cholesterol, whereas 87.8% correctly understood that it is not universally required.

Table 4. Cardiovascular Risk Factor Knowledge of Participants				
Questions	**Responses**	**f**	**%**	**Mean ± SD**
Smoking is a preventable factor contributing to death and disease in our country.	Correct	166	88.3	0.88 ± 0.32
	Incorrect/Not Sure	22	11.7	
Smoking is a contributing factor to heart disease.	Correct	177	94.1	0.94 ± 0.23
	Incorrect/Not Sure	11	5.9	
Consuming red meat more than three times a week can be harmful.	Correct	124	66.0	0.65 ± 0.47
	Incorrect/Not Sure	64	34.0	
Eating too much salt can lead to increase in blood pressure.	Correct	179	95.2	0.95 ± 0.21
	Incorrect/Not Sure	9	4.8	
Fatty meals do not necessarily lead to an increase in blood cholesterol levels.	Correct	61	32.4	0.67 ± 0.46
	Incorrect/Not Sure	127	67.6	
Fats that are hard at room temperature are good for heart health.	Correct	79	42.0	0.57 ± 0.49
	Incorrect/Not Sure	109	58.0	
Obese individuals have greater risk of heart disease.	Correct	179	95.2	0.95 ± 0.21
	Incorrect/Not Sure	9	4.8	
Danger of a heart disease increases in stress, sorrow and burden.	Correct	179	95.2	0.95 ± 0.21
	Incorrect/Not Sure	9	4.8	
Blood pressure tends to rise in response to stressful condition.	Correct	180	95.7	0.95 ± 0.20
	Incorrect/Not Sure	8	4.3	
High blood pressure increases the risk of developing heart disease.	Correct	177	94.1	0.94 ± 0.23
	Incorrect/Not Sure	11	5.9	
High cholesterol is a contributing factor to heart diseases.	Correct	147	78.2	0.78 ± 0.41
	Incorrect/Not Sure	41	21.8	
A high level of good (HDL) cholesterol is linked with a low risk of heart disease.	Correct	148	78.7	0.79 ± 0.41
	Incorrect/Not Sure	40	21.3	
High level of bad cholesterol (LDL) increases the risk of heart disease.	Correct	93	49.5	0.49 ± 0.50
	Incorrect/Not Sure	95	50.5	
High sugar level is a causing factor of heart disease.	Correct	146	77.7	0.77 ± 0.41
	Incorrect/Not Sure	42	22.3	
In diabetic patients, risk can be reduced with sugar control.	Correct	147	78.2	0.78 ± 0.41
	Incorrect/Not Sure	41	21.8	

Table 5. Frequency of participant's knowledge regarding outcome of changes in Cardio vascular risk behavior				
Questions	**Responses**	**F**	**%**	**Mean ± SD**
Quitting smoking reduces the risk of developing heart disease.	Incorrect/Not sure	14	7.4	0.92± 0.26
	Correct	174	92.6	
Consuming 2-3 portions of fruits and 2 portions of vegetables daily is beneficial for health.	Incorrect/Not sure	6	3.2	0.96± 0.17
	Correct	181	96.8	
Eating low carbohydrate and low-fat diet is good for heart health.	Incorrect/Not sure	33	17.6	0.82± 0.38
	Correct	155	82.4	
Heart disease risk can be reduced by regular exercise.	Incorrect/Not sure	11	5.9	0.94± 0.23
	Correct	177	94.1	
Exercising in gym is the only way to reduce the risk	Incorrect/Not sure	139	73.9	0.73± 0.44
	Correct	49	26.1	
Slow walking and wandering are also considered as form of exercises.	Incorrect/Not sure	71	37.8	0.62± 0.48
	Correct	117	62.2	
Risk of heart disease can be reduced by controlling BP.	Incorrect/Not sure	13	6.9	0.93± 0.25
	Correct	175	93.1	
Hypertension medication is typically required for lifelong use.	Incorrect/Not sure	84	44.7	0.55± 0.49
	Correct	104	55.3	
Medicine is prescribed to every person with high cholesterol.	Incorrect/Not sure	23	12.2	0.68± 0.32
		165	87.8	

188 participants responded to 28 items of CARRF-KL questionnaire minimum score achieved is 11 and maximum value achieved is 27 out of 28, mean obtained is 20.84 and standard deviation is 3.77 as shown in table 6.

Table 6. Descriptive Statistics Of CARRF-KL Questionnaire				
Number of participants	**Minimum**	**Maximum**	***Mean***	***Standard deviation***
188	11.00	27.00	20.84	3.77

Discussion

In 2022, a cross-sectional study conducted by Tawfik MY et al. assessed the accuracy of self-perceived CVD risk among perimenopausal and postmenopausal women. The study found that while 44.3% of participants had a predicted moderate/high CVD risk, only 27.7% perceived themselves at risk, with an accuracy rate of 68.2%. Notably, 93.3% of high-risk women underestimated their risk, with key predictors of underestimation including being married (aOR 14.5), old age (aOR 1.46), high BMI (aOR 4.78), hypertension (aOR 3.5), and low income (aOR 2.32). [26] Similarly, in the present study, 65.4% of participants recognized that a genetic history of cardiovascular disease increases the risk of heart disease, while 77.7% identified diabetes as a major coronary artery disease risk factor. Additionally, 74.4% acknowledged an increased CVD risk post-menopause. These findings highlight persistent gaps in risk perception, emphasizing the need for targeted educational interventions to enhance awareness among postmenopausal women.

In 2025, a study assessed awareness and perception of CVD risk among women. The study found that while 47.5% of participants had ECG abnormalities requiring further assessment, only 1 in 3 women recognized CVD as a major health concern. Instead, most participants were more concerned about breast cancer and osteoporosis. The most prevalent cardiovascular risk factors identified were sedentary lifestyle (57.9%), overweight/obesity (44.3%), hypercholesterolemia (37.9%), hypertension (31.3%), family history of early CVD (28.7%), smoking (20.6%), and diabetes (5%). The findings underscore a significant gap in awareness, despite the presence of multiple risk factors. Similarly, in the present study, 94.1% of participants identified hypertension, 78.2% recognized high cholesterol, 77.7% acknowledged impaired glucose tolerance, and 94.1% indicated smoking as a major risk factor for CVD. However, this study assessed awareness of these risk factors rather than their actual prevalence.

In the year 2022, Maffei S et al. conducted a multicenter cross-sectional survey of 4,454 women (44.3 ± 14.1 years), revealed a low perception of cardiovascular risk among Italian women. While 70% recognized CVD as the leading cause of death, 60% still considered it a predominantly male condition. Despite good knowledge of major risk factors, personal risk perception remained low, with less than 10% viewing themselves at high risk. Factors like aging, existing risk factors, and poor self-rated health increased risk awareness.[28] In contrast, the current study found that 36.7% of participants were aged between 45 and 60 years. According to the findings of this study, 94.1% were aware that hypertension increases risk of heart disease, 78.2% were aware about risks of high cholesterol, and 77.7% were aware that high blood sugar level is a causing factor for coronary artery disease. Additionally, 80.9% of participants in the study were aware that heart diseases can be prevented.

In the year 2023 a single time point study was carried out by Uchechukwu Martha Chukwuemeka et al. The result showed that a significant proportion of the participants experienced moderate to high stress (48%), followed by a lack of physical activity (18.9%), being overweight or obese (62.48%), having abdominal obesity (21.4%), hypertension (both systolic and diastolic) (27.2%), high blood sugar levels (7.2%), and being smokers (7.2%).[25] However, the current study revealed that percentage of participants that experience moderate level of stress were 28.2%, those who experience high level of stress were 17.6%, participants who did no physical activity at all were 41%, and those who did moderate physical activity were 59% and percentage of those who reported hypertension, diabetes and smoking as risk factor for heart disease were 94.1%, 77.7% and 94.1% respectively.

A 2024 review by Bisma Jan et al. highlighted the growing burden of cardiovascular diseases (CVDs) among Indian older adults, identifying hypertension, diabetes, dyslipidemia, obesity, smoking, sedentary lifestyle, poor diet, stress, and genetic predisposition as key risk factors. The study emphasized the importance of lifestyle modifications and public health initiatives in reducing CVD prevalence. [29] Similarly, in the present study, 64% of participants believed that a person always knows if they have a cardiac disease, while 80.9% stated that cardiac illness can be prevented. A majority demonstrated moderate awareness of CVD risk factors, with 94.1% recognizing tobacco smoking, 95.2% identifying overweight as a risk factor, and 67.6% acknowledging that eating fatty meals increases heart disease risk. Additionally, 94.1% reported that regular

physical activity reduces cardiac disease risk. Notably, the current study had a smaller sample size compared to the reviewed literature.

In the year 2016 a single time point study was carried out by Kim, Kyung Ae et al. The study revealed that 72.8% of participants reported hypertension, 19.1% reported diabetes, 33.8% reported hypercholesterolemia, 24.2% reported angina pectoris. This study also found that 73.9%, of participants lacked awareness regarding prevention of cardiovascular diseases (CVD). Additionally, only 26.1% of the women reported engaging in regular exercise.[30] However, current study in contrast to above discussed article, it assesses level of awareness that was 94.1%, 77.7% and 78.2% were aware that hypertension, diabetes and hypercholesterolemia is a causing factor for cardiac illness and 80.9% reported that coronary heart diseases can be prevented.

A recent cross-sectional study by Lou et al. (2023) found that postmenopausal women who had been menopausal for ≥6 years had significantly lower levels of high-density lipoprotein cholesterol (HDL-C) and higher low-density lipoprotein cholesterol (LDL-C), increasing their risk for cardiovascular disease. [31] In contrast, the current study, which focused on postmenopausal women's awareness, found that 78.7% incorrectly believed high HDL-C posed a risk for heart disease, and 50.5% were unsure or incorrect about LDL-C being a risk factor. This highlights the gap in awareness regarding lipid profiles and their impact on cardiovascular health.

In the year 2023, a postmenopausal period stratified analysis was conducted by Jui Kim and Hyoungshim Choi. The study finding revealed that 43% of women aged 44-45 years were in menopausal period <5 years and 46% of women aged 55-59 years were in menopausal period > 5years and < 10 years. 31.9% participants of first group had high HDL-C and second group mainly had slightly lower HDL-C levels making up 31.6%. Almost 70.6% were reported fat, 52.9 had normal health status, 81.4% did no exercise.[19] However, in current study postmenopausal women aged between 45-60 years were taken and were not divided into any groups, their awareness level regarding HDL was low as if 78.7% considered high HDL as a risk factor for heart disease. 20.2% were with fat body shape, 50.5% had normal health status, and 41% did no exercise at all.

Limitations & Recommendations: One of the main limitations is reliance on self-reported data, which may subject to recall bias. Cultural and societal factors affecting awareness of cardiovascular risk were not fully explored, which could provide additional context for the findings. Additionally, the study lacked objective health measures, such as blood pressure or cholesterol levels, and its cross-sectional design limits the ability to assess changes in awareness over time. Future studies should aim for larger sample sizes and better methodologies. It would be beneficial to conduct studies that cover all provinces of Pakistan. Awareness regarding the study can be disseminated to engage the public and together participants who are willing to provide data.

Conclusion

This study reveals a moderate level of awareness among postmenopausal women regarding modifiable cardiovascular disease (CVD) risk factors. While participants demonstrated a general understanding, variability in knowledge underscores the need for targeted educational interventions. Given the crucial role of physical therapists in preventive healthcare, integrating structured exercise programs and lifestyle counseling into routine care can enhance cardiovascular health in this population. These findings emphasize the importance of tailored health education initiatives to bridge existing knowledge gaps and promote heart-healthy behaviors.

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