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TO DEDUCE THE CHANGES IN LIPID PROFILE AND BMI, THAT LEADS TO CARDIOVASCULAR DISEASES IN POSTMENOPAUSAL WOMEN

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Abstract

Aim: The present observation, case report study was conducted during the period of one year in Hyderabad to observe the changes in the lipid profile of postmenopausal women that make them vulnerable to cardiovascular diseases.

Materials and Methods: Venous blood samples of 320 postmenopausal women were taken to see changes in lipid profile. Lifestyle and food habits were noted by filling out the questionnaire. Women with diagnosed cardiovascular diseases, on hormone replacement therapy or lipid-lowering drugs, were excluded from the study.

Results: Weight, BMI, and stature ranged greatly between groups. Body changes after menopause; overweight women had higher weight, BMI, and height than normal women. Both normal-weight and overweight postmenopausal women had considerable lipid changes. Postmenopausal women of normal weight had lower HDL cholesterol, higher LDL cholesterol, and increased total cholesterol and triglycerides. VLDL levels did not decrease ($p > 0.05$), but other lipid fractions did, suggesting cardiovascular risk in this cohort.

Conclusion: Studies show that unfavorable lipid alterations at this age increase cardiovascular disease risk. Postmenopausal women must regulate lipids to reduce risk and improve cardiovascular health.

Keywords: Cardiovascular diseases, menopause, risk factor, women.

Introduction:

Cardiovascular diseases are the leading cause of death worldwide. According to a report released by WHO in 2021 cardiovascular diseases are responsible for taking 17.9 million lives each year which accounts for 32% of deaths globally (1). Data obtained from Our World in Data shows a progressive

increase in number of deaths from cardiovascular diseases in Pakistan, being 299,073 in 2000, 376,304 in 2010, and jumping to 449,904 in 2019 (2). CVDs are a group of disorders involving the heart and the blood vessels. Its primary etiologies usually are due to an increased accumulation of fatty deposits inside the vessels and an increased risk of developing clots. There are a plethora of risk factors, including genetics and age, diet, smoking, etc., that have their fair share in the development of CVDs.

Although generally men are seen to be more prone to cardiovascular diseases than women, one group of women that is at risk of developing cardiovascular diseases is "Postmenopausal women". Speakers at the 2nd Annual Cardiovascular Conference Pulse 2021 held at Aga Khan University said that women are at higher risk of dying from heart-related diseases due to underdiagnosis and undertreatment (3).

The female body from the intrauterine life undergoes various changes under the influence of sex hormones which include estrogen, FSH, LH & progesterone. The cardioprotective effect on premenopausal women is believed to be imposed by the adequacy of endogenous estrogen levels produced during the menstrual cycle (4) but the situation changes as a female reaches menopause. Menopause Is the permanent cessation of menstrual bleeding and insignificant endogenous production of estrogen. At this stage, a woman passes from a reproductive to a non-reproductive stage. For many women, the transition from their reproductive stage to menopause already proves challenging secondary to their various female sex- hormone coupled variations in the body, i.e., hot flashes, night sweats, decreased libido, weight gain, slow metabolism, sleep problems, and mood swings.

Estrogen deficiency is related to a rapid increase in CVD in women (5). The fact that such a state could advocate and promote the development of CVDs, primarily due to a drop in cardio-protective estrogen levels, not only adds to the challenge but also demands our attention. The fact that throughout their reproductive age, women are generally much safer from such occurrences than their male counterparts, and once after bypassing menopause, the incidence rises to strikingly significant levels. Until recently, most of our understanding of the pathophysiology of CVD in women, and subsequently management guidelines, were based on studies conducted primarily on men. In contrast, similar mechanisms are in motion to induce CVD in men and women. There is progressively increasing evidence suggesting gender-related differences in the anatomy and physiology of the myocardium and that female sex hormones could modify and alter the course of CVD. In our study, we focused on the changes that are seen in the female body once she reaches menopause which could aid in increased heart-related diseases in women at this stage.

Materials and methods:

An observational, case report study was conducted over a period of one year. In this study, a group of 320 postmenopausal women was randomly selected in the civil hospital Hyderabad. The postmenopausal women in this study were of natural menopause, with cessation of menstrual cycle within the last 1-5 years to exclude age as a risk factor. These women previously had a regular menstrual cycle. Postmenopausal women with a history of cardiovascular diseases, hypertension, and hepatic or renal diseases were excluded from the study. Women who were on hormone replacement therapy or lipid-lowering drugs also were not a part of this study.

The study was approved by the institutional ethical committee. After taking informed consent from the subject the data was collected by filling out the questionnaire. Through the questionnaire filling the lifestyle and food habits of subjects were noted. The venous blood sample of these subjects was taken in a fasting state and was carefully delivered to the laboratory for the analysis of the lipid profile. To get the BMI of subjects the height and weight were noted by using inch tape and a weight measuring machine. Carefully calculated values were analyzed using arithmetic means, standard

deviation, students 't-test, and Pearson's test correlation. A P-value of less than 0.05 was considered statistically significant.

Results:

Participating in the study were 320 women who had gone through menopause. The study's findings are detailed below. Every single woman in the research groups tested normal on systemic and general exams. The average age of postmenopausal women is 44.25 years, with a range of 45 to 55 years.

Table 1: Physical characteristics of the research participants in the study group.

Parameter	**Post-menopausal women (Mean ±SD)**		
Participants	Normal weight N=160 BMI 19.8-25.8	Overweight N=160 BMI 26-30.8.	P value
Height	154.12±4.45	158.41±3.20	p>0.05**
Weight	53.56±4.24	64.27±5.29	p<0.05*
BMI	23.86±3.78	29.21±1.23	p<0.05*

*p<0.05 statistically significant, p>0.05** statistically not significant, SD= standard deviation

Our study revealed the following observations. Table -1 displays the physical attributes of postmenopausal women, broken down by height (in cm), body mass index (BMI), and weight (in kg). We found that the normal and overweight groups varied significantly in terms of weight and body mass index (p<0.05).

Table 2: Lipid profile comparison in normal-weight postmenopausal women

Parameter	**Postmenopausal women BMI 18.9-24.9**	**P value**
TC (Total cholesterol)	261.12±26.21	p<0.05*
TG (Serum Triglycerides)	145.12±14.63	p<0.05*
HDL-C	51.21±3.43	p<0.001**
LDL-C	241.43±27.58	p<0.001**
VLDL	29.21±2.46	p>0.05***

Statistical significance is indicated by *p<0.05, **p<0.001 as very significant, and ***p>0.05 as not very significant. Body Mass Index [BMI] Total cholesterol, triglycerides, high-density lipoprotein (HDL-C), low-density lipoprotein (LDL-C), very low-density lipoprotein (VLDL), and so on.

After menopause, women of a normal weight compared different lipid fractions in Table -2. After menopause, a woman's blood lipid profile changes dramatically, with elevated levels of triglycerides and total cholesterol. Postmenopausal women in this study group had considerably lower HDL cholesterol than premenopausal women (p<0.001). The postmenopausal group also had substantially greater levels of LDL cholesterol. With a p-value more than 0.05, the postmenopausal group had somewhat greater VLDL levels.

Table 3: Analyzing the lipid profile characteristics in overweight women after menopause

Parameter	Postmenopausal women BMI 25-29.9	p-value
TC (Total cholesterol)	281.31±22.45	P<0.001**
TG (Serum Triglycerides)	180.34±13.43	p<0.001**
HDL-C	24.35±7.89	p<0.001**
LDL-C	246.12±26.67	p<0.001**
VLDL	28.42±4.32	p>0.05***

The following values indicate statistical significance: *p<0.05, **p<0.001, ***p>0.05, which is not very significant. The abbreviations "BMI," "HDL-C," "LDL-C," "VLDL," "TC," and "TG" stand for "body mass index," "total cholesterol," "very low density lipoprotein," and "triglycerides," respectively.

We found that the postmenopausal group had significantly higher levels of total cholesterol, LDL, and triglycerides (p<0.001) in Table 3, which shows lipid fractions compared to the overweight group with a high body mass index (25-29.9). The postmenopausal group had considerably lower HDL levels (p<0.001).

Discussion:

Menopause, whether occurring naturally or induced surgically is the major cause of cardiovascular diseases. A female at menopause is seen as relatively at higher risk of cardiovascular diseases whereas heart-related diseases are rare in young women. The incidence of coronary heart disease in women increases dramatically in middle age, which has led to the speculation that menopause marks the end of a protective effect of ovarian hormones on cardiovascular functions. But as women experience menopause what changes in their lipid levels are seen that make them prone to heart diseases? We examined the blood lipid profile of the population of Hyderabad and surrounding towns. Other risk factors like smoking and considered. The mean age of menopause in this population was 47.9. It was also seen that (38 %) of females had raised BMI, (10%) women were current smokers & (52%) were passive smokers.

Our study recorded symptoms in postmenopausal women like fatigue, sleep disturbances, weight gain, irritability, and anxiety. Stress levels recorded were 30.1 using PCL-C scoring thus they had moderate to moderately high severity of PTSD symptoms. These findings were similar to the findings of a study conducted by Vishal R. Tandon (6).

LIPID PROFILE: Menopause is associated with an adverse effect on lipids and lipoprotein, independent of any effect of aging(7). The statistical analysis of the data shows that lipid levels were higher in postmenopausal women when compared to normal. Experimental and clinical data provide evidence that lipid accumulation exacerbates heart dysfunction(8) thus causing heart diseases. Total cholesterol and LDL were significantly higher in post-menopausal women. This agrees with the findings of C.A.O. Usoro(9) and Pardhe, B (4). Raised cholesterol is one of the major risk factors for cardiovascular diseases (10)(11). In blood cholesterol is carried in the form of lipoproteins (12). LDL also called bad cholesterol is one of the major risk factors for cardiovascular diseases and due to this knowledge treating LDL levels is one of the strategies to prevent heart diseases(12). Increased LDL in the blood gets deposited onto the walls of blood vessels thus obstructing the flow of blood to the major organs of the body, especially the heart, and leading to cardiovascular diseases. We found significantly higher levels of LDL in our study sample. This increase in LDL can be partly due to the increase in age and menopause being the major reason since previous work suggests that LDL levels significantly improved with hormone replacement therapy(13).

Our study shows that HDL levels were lower in postmenopausal women, agreeing with the results of C.A.O Usoro (9). Elevated HDL level is related to a decreased risk of coronary diseases(14) so this decrease in HDL levels in postmenopausal women can be related to an increased risk of cardiovascular diseases. We found raised triglyceride levels in postmenopausal women. C.A.O Usoro while studying the difference in lipid profile in pre- and post-menopausal women found no difference in triglyceride levels (9). This decrease in HDL and increase in triglycerides in postmenopausal women was also seen in the population studied by Vishal R. Tandon (6). Triglyceride levels of less than 150 mg/dl are considered normal (15), and the levels in our population were seen to be higher showing triglycerides may be a risk factor for CVD or they might be raised due to diet and age since we saw a difference of result from the above-mentioned study.

BMI: Our population had unhealthy food habits with a moderately active lifestyle. (80%) of our sample size had increased BMI and obesity is seen to be a major risk factor for heart-related diseases(16). A study by Sadiya S. Khan (17) shows that adults who are overweight have an increased risk of developing cardiovascular diseases and they have shorter survival than normal individual. While there are many studies(18,19) conducted on cardiovascular diseases and their prevalence in Pakistan, we still lack behind when it comes to heart diseases affecting women at menopause and what changes menopause brings in a female body that makes her vulnerable to cardiovascular diseases.

Conclusion:

The researchers divided 320 postmenopausal women into normal (19.8–25.8) and overweight (26–30.8) BMI groups. Weight, BMI, and stature ranged greatly between groups. Body changes after menopause; overweight women had higher weight, BMI, and height than normal women. Both normal-weight and overweight postmenopausal women had considerable lipid changes. Postmenopausal women of normal weight had lower HDL cholesterol, higher LDL cholesterol, and increased total cholesterol and triglycerides. VLDL levels did not decrease ($p > 0.05$), but other lipid fractions did, suggesting cardiovascular risk in this cohort. Conversely, overweight postmenopausal women had worse lipids. Total cholesterol, triglycerides, and low-density lipoprotein cholesterol were much greater than in the normal-weight group, increasing cardiovascular risk. This group had considerably lower HDL cholesterol, indicating cardiovascular disease risk. Women of any weight experience severe lipid changes following menopause. Studies show that unfavorable lipid alterations at this age increase cardiovascular disease risk. Postmenopausal women must regulate lipids to reduce risk and improve cardiovascular health.

References:

1. https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds). Available from: https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)
2. https://ourworldindata.org/grapher/cardiovascular-disease-death-rates?tab=chart&country=PAK. Available from: https://ourworldindata.org/grapher/cardiovascular-disease-death-rates?tab=chart&country=PAK
3. https://www.aku.edu/news/Pages/News_Details.aspx?nid=NEWS-002437. Available from: https://www.aku.edu/news/Pages/News_Details.aspx?nid=NEWS-002437
4. Pardhe BD, Ghimire S, Shakya J, Pathak S, Shakya S, Bhetwal A, et al. Elevated Cardiovascular Risks among Postmenopausal Women: A Community Based Case Control Study from Nepal. Biochem Res Int [Internet]. 2017;2017:1–5. Available from: https://www.hindawi.com/journals/bri/2017/3824903/
5. Harrison-Bernard LM, Raij L. Postmenopausal hypertension. Curr Hypertens Rep. 2000 Mar;2(2):202–7.
6. Tandon VR, Mahajan A, Sharma S, Sharma A. Prevalence of cardiovascular risk factors in postmenopausal women: A rural study. J Midlife Health. 2010 Jan;1(1):26–9.
7. Kumar S, Shah C, Oommen ER. Study of cardiovascular risk factors In pre and postmenopausal women. Int J Pharma Sci Res. 2012;3(12):560–70.
8. Schulze PC, Drosatos K, Goldberg IJ. Lipid Use and Misuse by the Heart. Circ Res [Internet]. 2016 May 27;118(11):1736–51. Available from: https://www.ahajournals.org/doi/10.1161/CIRCRESAHA.116.306842
9. . CAOU, . CCA, . INU, . ACN. Lipid Profile of Postmenopausal Women in Calabar, Nigeria. Pakistan Journal of Nutrition [Internet]. 2005 Dec 15;5(1):79–82. Available from: https://www.scialert.net/abstract/?doi=pjn.2006.79.82
10. Lippi G, Plebani M. Statins for Primary Prevention of Cardiovascular Disease. Trends Pharmacol Sci [Internet]. 2017 Feb;38(2):111–2. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0165614716301821

11. Currie H, Williams C. Menopause, Cholesterol and Cardiovascular Disease. US Cardiology Review [Internet]. 2008 May 1;5(1):12–4. Available from: https://www.uscjournal.com/articles/Menopause-cholesterol-cardiovascular-disease
12. Wadhera RK, Steen DL, Khan I, Giugliano RP, Foody JM. A review of low-density lipoprotein cholesterol, treatment strategies, and its impact on cardiovascular disease morbidity and mortality. J Clin Lipidol [Internet]. 2016 May;10(3):472–89. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1933287415004493
13. Godsland IF. Effects of postmenopausal hormone replacement therapy on lipid, lipoprotein, and apolipoprotein (a) concentrations: analysis of studies published from 1974-2000. Fertil Steril. 2001 May;75(5):898–915.
14. Saleheen D, Scott R, Javad S, Zhao W, Rodrigues A, Picataggi A, et al. Association of HDL cholesterol efflux capacity with incident coronary heart disease events: a prospective case-control study. Lancet Diabetes Endocrinol [Internet]. 2015 Jul;3(7):507–13. Available from: https://linkinghub.elsevier.com/retrieve/pii/S2213858715001266
15. Mayoclinic. Triglycerides level [Internet]. Available from: https://www.mayoclinic.org/diseases-conditions/high-blood-cholesterol/in-depth/triglycerides/art-20048186#:~:text=Normal — Less than 150 milligrams,5.7 mmol%2FL or above)
16. Rabkin SW, Mathewson FAL, Hsu PH. Relation of body weight to development of ischemic heart disease in a cohort of young north American men after a 26 year observation period: The manitoba study. Am J Cardiol [Internet]. 1977;39(3):452–8. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0002914977801045
17. Khan SS, Ning H, Wilkins JT, Allen N, Carnethon M, Berry JD, et al. Association of Body Mass Index With Lifetime Risk of Cardiovascular Disease and Compression of Morbidity. JAMA Cardiol [Internet]. 2018 Apr 1;3(4):280. Available from: http://cardiology.jamanetwork.com/article.aspx?doi=10.1001/jamacardio.2018.0022
18. Zubair F, Nawaz SK, Nawaz A, Nangyal H, Amjad N, Khan MS. Prevalence of cardiovascular diseases in Punjab, Pakistan: a cross-sectional study. J Public Health (Bangkok) [Internet]. 2018 Oct 31;26(5):523–9. Available from: http://link.springer.com/10.1007/s10389-018-0898-4
19. Jafar TH, Jafary FH, Jessani S, Chaturvedi N. Heart disease epidemic in Pakistan: Women and men at equal risk. Am Heart J [Internet]. 2005 Aug;150(2):221–6. Available from: https://linkinghub.elsevier.com/retrieve/pii/S000287030400657X