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Biochemistry

NEWER LIPID INDICES AS A BETTER PREDICTOR FOR CVD IN OBESE POSTMENOPAUSAL WOMEN.

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ABSTRACT **Introduction:** Obesity is a common nutritional disorder with a higher prevalence among postmenopausal women The lipid profile, which includes cholesterol, triglycerides, and lipoprotein markers, is commonly used to predict cardiovascular disease (CVD). Newer lipid indices such as Castelli Risk Index-I (CRI-I), Castelli Risk Index-II (CRI-II), and non-HDL cholesterol have emerged as potential predictors for CVD. This study was aimed to evaluate lipid indices in relation to obesity and their utility in assessing CVD risk in postmenopausal women. **Material And Method:** The study was conducted on 300 postmenopausal women, divided into non-obese and obese groups. Blood samples were collected after overnight fasting, and lipid profile parameters were measured and from these results newer indices were calculated. Statistical analyses were performed to compare the lipid profile parameters and lipid indices between the non-obese and obese groups. **Result And Discussion:** The results showed that obese postmenopausal women had higher levels of TC, LDL cholesterol, and TG, while their HDL cholesterol levels were lower compared to non-obese postmenopausal women. These differences were statistically significant, indicating that obesity contributes to unfavorable changes in the lipid profile, increasing the risk of CVD. Similarly, the newer lipid indices CRI-I, CRI-II, and non-HDL cholesterol were significantly higher in obese postmenopausal women, while the HDL/LDL ratio was significantly lower. These findings further support the association between obesity, lipid indices, and CVD risk in postmenopausal women. **Conclusion:** Obesity negatively affects lipid profile parameters and newer atherogenic lipid indices in postmenopausal women, increasing the risk of CVD. The findings emphasize the importance of early screening and management of dyslipidemia in this population, especially among those who are obese.

KEYWORDS : Castelli Risk Index-I, Castelli Risk Index-II, non-HDL Cholesterol, Obesity, Postmenopausal women.

INTRODUCTION

Obesity is a common nutritional disorder where there is excessive storage of energy in the form of fat in relation to height, weight, race, and gender. Unfortunately, the prevalence of obesity is higher among women, and this is particularly true for postmenopausal women. During menopause, there is a decrease in estrogen levels, which can lead to several health concerns such as heart disease, osteoporosis, diabetes, hypertension, and obesity.

Menopause is a recognized and universal occurrence that takes place in the life of a woman. The World Health Organization has provided a definition of a post-menopausal woman as one who has not had menstrual bleeding for a year or has stopped having periods due to medical or surgical intervention.

The decline in estrogen levels during and after menopause leads to structural, physiological, and biochemical changes that affect the overall health of women. Before menopause, estrogen has an anti-atherogenic effect and helps to protect women from coronary artery diseases (1). However, studies have shown that postmenopausal women tend to have less cardiovascular-friendly lipid profiles compared to their premenopausal state (2).

The lipid profile is a set of biochemical tests that are commonly used to predict, diagnose, and treat lipid-related disorders such as atherosclerosis (3). These tests measure various types of lipids, including cholesterol and triglycerides, as well as other markers such as high-density lipoprotein (HDL) & low-density lipoprotein (LDL) cholesterol. Now a days various newer atherogenic lipid indices like Castelli Risk Index-I, Castelli Risk Index-II and Non-HDL-C are also used to predict the risk of CVD.

CRI-I, also known as Cardiac risk ratio (CRR), reflects the formation of coronary plaques and is as good as the determination of total cholesterol in terms of diagnostic value (5, 6). On the other hand, the Castelli risk index-II (CRI-II) is an excellent predictor of cardiovascular risk and has been correlated with insulin resistance and the prediction of acute myocardial infarction (4).

Non-HDL cholesterol, which includes all atherogenic lipoprotein particles and may be superior to LDL cholesterol for predicting heart disease. This is because non-HDL cholesterol is not dependent on triglyceride values and can be calculated regardless of fasting or feeding status. Many lipid experts have acknowledged the potential superiority of non-HDL cholesterol as a diagnostic marker for CVD (7, 8).

Thus the present was planned to estimate HDL/LDL Ratio, Castelli Risk Index-I, Castelli Risk Index-II and Non-HDL-C level in non-obese and obese postmenopausal women with an aim to find out utility of these parameters in better accessing the risk of CVD in postmenopausal women.

MATERIAL AND METHODS

The present study was conducted on 300 postmenopausal women in Department of Biochemistry, Dr. S. N. Medical College, Jodhpur (Rajasthan). The age of the patients ranged from 45-60 years of age.

After getting informed consents from the subjects, 5 mL of blood was collected after overnight fasting of 12 to 14 hours. Samples were centrifuged at 3,000 rpm to separate serum within 1 hour and the following lipid profile parameters were estimated:

1. Serum total cholesterol (TC) by enzymatic Cholesterol oxidase-Phenol and 4 Aminoantipyrine method.
2. Serum TG by enzymatic Glycerol phosphate oxidase- 4 chlorophenol and 4-Aminophenazone method.
3. Serum HDL cholesterol by direct method.
4. Serum LDL cholesterol by Friedwald's formula: [(TC HDL) TG/5].
5. Lipid indices were calculated using the following formulas:

- CRI-I = TC/HDL (9-11)
- CRI-II = LDL/HDL (9-11)
- NHDL-C = TC – HDL (12)

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented as mean ± standard deviation (SD). Student's t-test (two-tailed, independent) has been used to find the significance of study parameters on continuous scale between the two groups.

OBSERVATION TABLE

Table: 01 Mean values of conventional Lipid Profile parameters among the group studied

S.No.	Parameter compared	Non-obese postmenopausal women	Obese postmenopausal women

1.	TC	251.96±14.27	257.20±16.81
2.	TG	136.06±10.18	165.23±14.67
3.	HDL	46.33±3.33	33.83±5.25
4.	LDL	178.84±14.29	201.20±16.98

Table: 02 Statistical analysis of conventional Lipid Profile parameters among the group studied

S.No.	Parameter compared	Non-obese postmenopausal women vs Obese postmenopausal women	
		t-value	p-value
1.	TC	2.910	0.0038(S)
2.	TG	20.007	P<0.0001(HS)
3.	HDL	24.60	P<0.0001(HS)
4.	LDL	12.33	P<0.0001(HS)

Table: 03 Mean values of newer Atherogenic Lipid Indices among the group studied

S.No.	Parameter compared	Non-obese postmenopausal women	Obese postmenopausal women
1.	HDL/LDL	0.261±0.031	0.169±0.03
2.	CRI-I	5.459±0.502	7.8±1.301
3.	CRI-II	3.881±0.468	6.267±1.067
4.	NHDL-C	205.63±14.58	223.53±10.96

Table: 04 Statistical analysis of newer Atherogenic Lipid Indices among the group studied

S.No.	Parameter compared	Non-obese postmenopausal women vs Obese postmenopausal women	
		t-value	p-value
1.	HDL/LDL	26.119	P<0.0001(HS)
2.	CRI-I	20.56	P<0.0001(HS)
3.	CRI-II	25.081	P<0.0001(HS)
4.	NHDL-C	12.016	P<0.0001(HS)

RESULT AND DISCUSSSION

Obese postmenopausal women have higher levels of total cholesterol (TC), low-density lipoprotein (LDL) cholesterol, and triglycerides (TG), while their high-density lipoprotein (HDL) cholesterol levels are lower than those of non-obese postmenopausal women (Table: 01).

According to Table 02, these differences between obese and non-obese postmenopausal women are statistically significant. The data suggest that obesity may contribute to unfavourable changes in lipid profile parameters, which could increase the risk of cardiovascular disease.

Table 03 depicts newer atherogenic lipid indices, which are calculated using different lipid profile parameters. Obese postmenopausal women have higher values of CRI-I, CRI-II, and non-HDL cholesterol (NHDL-C), and lower HDL/LDL ratio than non-obese postmenopausal women. These differences are statistically significant (Table 04).

The findings of our study are consistent with other studies on lipid profile changes in postmenopausal women. The study by Kalavathi et al (13) and Igweh et al (14) also reported increased levels of TC, TG, and LDL, and decreased levels of HDL in obese postmenopausal women compared to non-obese postmenopausal women.

Additionally, the studies by Varu et al (15) and Shinde et al (16) reported that mean levels of TC, TG, and LDL were significantly higher in postmenopausal women and increased with an increase in the duration of menopause. These studies also found that HDL levels were significantly lower in postmenopausal women and decreased with an increase in the duration of menopause.

The findings of our study are consistent with other studies on newer atherogenic lipid indices changes in postmenopausal women. The study by Olamoyegun et al (17) reported similar results to your study, showing increased levels of CRI-I and decreased levels of CRI-II in obese postmenopausal women compared to non-obese postmenopausal women.

Koleva et al (18) also found that mean levels of CRI-I and CRI-II were significantly higher in postmenopausal women compared to non-obese postmenopausal women. Additionally, Alvim et al (19) and Holewijn et al (20) reported that mean levels of NHDL-C were significantly higher in obese postmenopausal women compared to non-obese postmenopausal women, which is consistent with the findings of our study.

These consistent findings across different studies suggest that the conventional lipid profile parameters and newer atherogenic lipid indices such as CRI-I, CRI-II, and NHDL-C are also affected by obesity and menopause-related changes in lipid metabolism. This further highlights the importance of early screening and management of dyslipidemia in postmenopausal women, particularly in those who are obese.

CONCLUSION

Obesity may have a negative impact on lipid profile parameters and atherogenic lipid indices in postmenopausal women. These changes could increase the risk of cardiovascular disease in this population. Thus it can suggested that newer lipid indices can served as promising novel biomarkers and can be used to access the early risk of various cardiovascular complications requiring timely therapeutic interventions.

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