

Correlation of Leptin - Adiponectin Ratio with HDL and hsCRP in Obese Postmenopausal Women: Implications for Metabolic Health

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Abstract: ***Introduction:** Menopause is a significant issue for public health among women, since it is linked to an increase in both visceral and total body fat. Compared to premenopausal women, postmenopausal women are more likely to be obese. Adverse metabolic changes like insulin resistance, a propensity to develop type 2 diabetes, and dyslipidaemia, which is marked by high triglyceride levels, low HDL cholesterol levels. Adiponectin exhibits a strong potential to improve insulin sensitivity and prevent the onset of diabetes, whereas leptin is positively connected with obesity and insulin resistance. In present study, we are trying to find out correlation of serum leptin, adiponectin ratio with serum HDL, and hsCRP in obese nondiabetic and diabetic postmenopausal women. **Material and methods:** In this study, 150 obese nondiabetic (Group - I) and 150 obese diabetic (Group - II) postmenopausal women were recruited. Blood samples were collected and were processed for biochemical investigations by standard protocol using commercially available reagents and kits on fully automatic chemistry analyzer, ELISA and Chemiluminescence analyzer. **Results:** The mean age of Group - I and Group - II postmenopausal subjects was 52.7±3.39 years and 53.03±3.29 years respectively. Mean Serum Cholesterol of the Group - I postmenopausal and Group - II postmenopausal subjects was 210.96±15.13 and 251.8±19.62 mg/dL with statistically significant difference (p<0.0001). A highly significant decrease was observed in the serum HDL of Group - II postmenopausal subjects (p<0.0001). A non significant increase was observed in the serum hsCRP of Group - II postmenopausal subjects (p=0.019). We found negative correlation between L: A ratio and serum HDL, and positive correlation between L: A ratio and serum hsCRP. **Conclusion:** According to our study, diabetic women's adiponectin levels are lower than those of nondiabetic women. Our findings have clinical implications and point to the L/A ratio as a potential surrogate diagnostic for the metabolic syndrome.*

Keywords: Diabetes, Dyslipidemia, Insulin Resistance, Obesity, Postmenopausal Women.

1. Introduction

Menopause is a natural event in the aging process and signifies the end of reproductive years with cessation of cyclic ovarian functions as manifested by cyclic menstruation. Menopausal transition, a time when the endocrine, biochemical, and clinical signs of impending menopause start to emerge, signals its arrival. Low plasma levels of estrogen and a significant rise in luteinizing and follicle - stimulating hormone levels are the hormonal alterations related to menopause [1].

Menopause is a significant issue for public health since it is linked to an increase in both visceral and total body fat. Compared to premenopausal women, postmenopausal women are more likely to be obese [2]. Menopause alone does not cause weight gain, but it does cause a rise in total body fat and a redistribution of body fat from the extremities to the trunk, which causes visceral adiposity [2], [3]. Adverse metabolic changes like insulin resistance, a propensity to develop type 2 diabetes, and dyslipidemia, which is marked by high triglyceride levels, low HDL cholesterol levels, and an increased frequency of small, dense low - density lipoprotein (LDL) particles, are linked to abdominal obesity and menopausal oestrogen decline [3], [4].

C reactive protein (CRP) is a pentameric protein (pentaxin) that is produced by the liver in response to IL - 6 and IL - 1,

as well as to a lesser extent by smooth muscle cells, macrophages, endothelial cells, lymphocytes, and adipocytes. In reaction to both acute and, to a lesser extent, chronic inflammation, blood CRP levels are markedly raised. [5]. High - sensitivity C - reactive protein (hsCRP), a measure of chronic low - grade inflammation, may be a factor in the development of type 2 diabetes as well as its symptoms [6]. In North Indian adolescents and South Indian adults, studies have linked increased hsCRP levels to obesity and insulin resistance, respectively [7].

Adipocytokines are cytokines produced by adipocytes. Adiponectin and leptin are two examples. Although leptin or adiponectin were separately associated with the risk of MetS, T2DM, and CAD, the association of T2DM risk with the L/A ratio was stronger than with leptin or adiponectin alone. These results suggest that the L/A ratio may be a useful index for IR in clinical practice and a good indicator for assessing the effectiveness of antidiabetic therapy [8].

The goal of this study was to compare leptin and adiponectin ratio with serum levels of HDL and hsCRP between obese postmenopausal nondiabetic women (Group - I) with obese postmenopausal diabetic women (Group - II).

2. Material and Methods

The present study was cross sectional observational type. The study was conducted on obese post - menopausal

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women, attending the outpatient Department of Obstetrics and Gynecology and Department of Medicine, Dr. S. N. Medical College and its associated group of Hospitals, Jodhpur. All the investigation work was performed in the Department of Biochemistry, Dr. S. N. Medical College Jodhpur. The inclusion criteria was post - menopausal obese women who have stopped having menstrual bleeding one year ago. The subjects with chronic kidney disease, liver disease, hysterectomy, on medication for CVD, on Vitamin D supplementation and history of hormone replacement therapy were excluded. In this study 150 women from both group were recruited. Blood samples were collected and were processed for biochemical investigations by standard protocol using commercially available reagents and kits on fully automatic chemistry analyzer, ELISA and Chemiluminescence analyzer.

Statistical Analysis

Student's 't' test values were used to calculate the size of the between - group differences for each of the parameters. The significance of variance between the mean values of various parameters among the studied groups of subjects was ascertained using t - values and 'p' values (probability).

3. Results

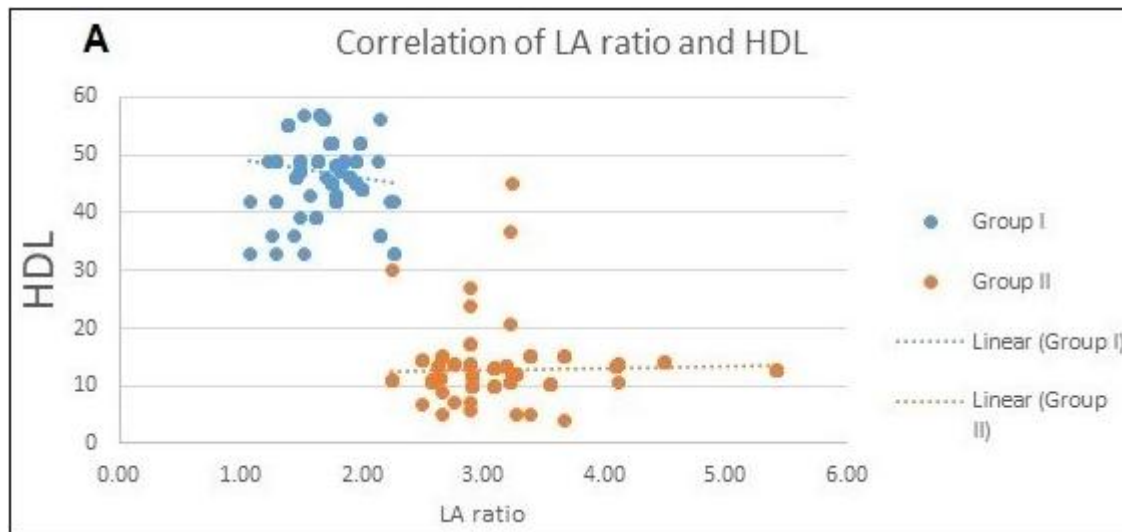
In present study, a total of 300 obese postmenopausal women were recruited. Out of 300, 150 were nondiabetic and 150 were type 2 diabetic.

Among Group - I and Group - II participants, L: A ratio was discovered to be inversely correlated HDL also demonstrated a negative correlation ($r = - 0.137$, $p = 0.093$), and ($r = - 0.171$, $p = 0.035$). A positive connection ($r = 0.021$) of L: A ratio in Group - I women was seen but the correlation was not significant ($p = 0.794$). Among Group - II participants the L: A ratio association with hsCRP was positively correlated with a significant association ($r = 0.021$, $p = 0.001$). [Table 1].

Figures 1 compares the L: A ratio with HDL, and hsCRP levels between women in Group - I and Group - II. The scatter diagram showed differences in the parameters and the trendline of association of L: A with HDL, and L: A with hsCRP. [Figure 1].

Table 1: Correlation of L: A ratio with HDL and hsCRP levels

Obese Non Diabetic Postmenopausal Women (L: A)			
S. No	Parameter	r - value	p - value
1.	HDL (mg/dL)	- 0.137	0.093 [NS]
2.	hsCRP (mg/L)	0.021	0.794 [NS]
Obese Diabetic Postmenopausal Women (L: A)			
1.	HDL (mg/dL)	- 0.171	0.035 [S]
2.	hsCRP (mg/L)	0.254	0.001 [S]



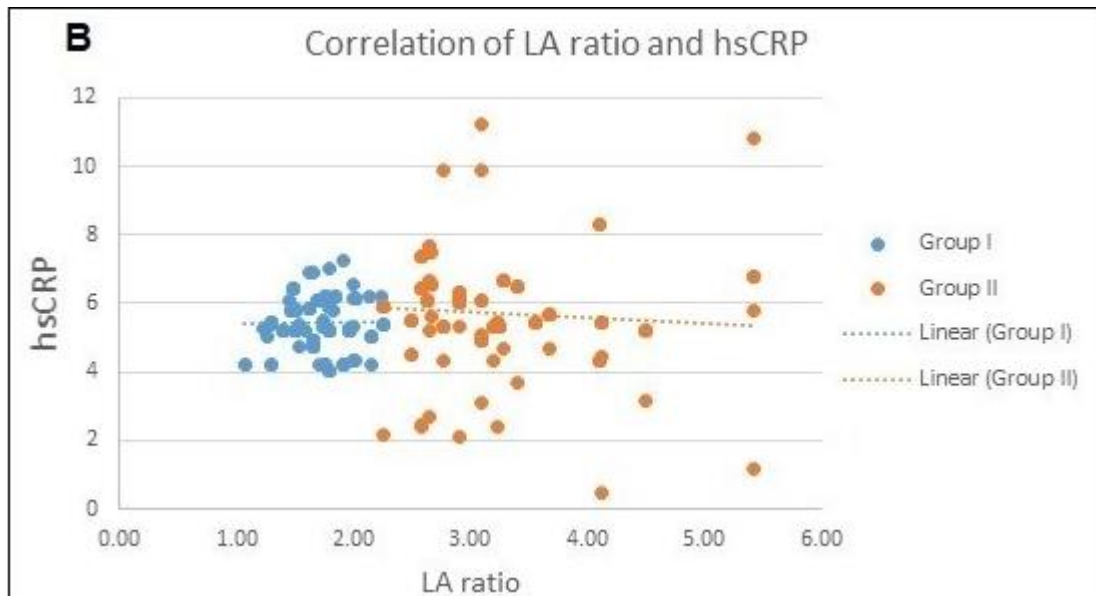


Figure 1: Correlation of L: A ratio vsHDL, and L: A ratio and hsCRP.

4. Discussion

This study suggests positive correlation between L: A ratio and serum hsCRP for group I and group II respectively, which is non - significant in group I postmenopausal subjects and significantly associated in group II postmenopausal subjects. **J. - H. Yoon et al.** [9] have also shown significantly higher levels of hsCRP among postmenopausal women with metabolic syndromes, in comparison to those without metabolic syndromes. ($p < 0.0001$).

The L: A correlation with HDL is also negative in group I and group II but its association is significant only with diabetic women. The correlation of hsCRP is also significant with diabetic women only. In line with our findings, study conducted by **F. Lwow and A. BohdanowiczPawlak** [10], also finds significant association between adiponectin and leptin with hsCRP levels.

Leptin - to - adiponectin ratio may be a potent diagnostic marker of postmenopausal women with metabolic syndrome, according to **V Gupta et al.** [11]. Additionally, the ratio of two adipokines, levels of which are vulnerable to metabolic perturbation, may be to blame for the severity of both insulin resistance and obesity. This, in turn, may lead to high levels of circulating leptin and an individual's increased risk for developing metabolic syndrome. Our study also demonstrates that elevated L: A ratios are significantly correlated hsCRP. In addition, this study reveals the intriguing finding that, in postmenopausal women with diabetes, L/A ratio has a significant correlation with disturbed lipid profile as well as metabolic risk marker. This study reveals that the leptin - to - adiponectin ratio may function as one of the potential diagnostic markers for the metabolic syndrome in postmenopausal women. Although adiponectin concentrations are low in insulin - resistant states like obesity and type 2 diabetes mellitus, high leptin concentrations have been observed in women [12]. The current study is consistent with other studies that have

shown a significant inverse correlation between the leptin/adiponectin ratio and insulin resistance [11], [13].

5. Conclusion

The significant connection between adiponectin and HDL in both groups suggests that adiponectin may act through HDL in overweight/obese postmenopausal women. The L/A ratio has a strong correlation with metabolic syndrome like diabetes mellitus. Our findings have clinical implications and point to the L/A ratio as a potential surrogate diagnostic for the metabolic syndrome.

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