e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(9); 361-365

Original Research Article

Correlation of HDL with Vitamin D and Vitamin B_{12} in Middle Aged Women

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Received: 01-06-2025 Revised: 15-07-2025 / Accepted: 21-08-2025
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Conflict of interest: Nil

Abstract

Introduction: Obesity is more in urban middle-aged women than in men due to socioeconomic transition. The prevalence of dyslipidemia especially in middle aged and elderly individuals has increased significantly. Vitamin D & Vitamin B12 is associated with adverse lipid profile and cardiovascular diseases. But higher levels of HDL cholesterol is linked to a lower risk of heart disease. So the purpose of the study to find correlation of HDL with vitamin D and vitamin B12 in middle aged women

Material & Methods: This study was an observational cross-sectional study. 300 women including pre, peri and postmenopausal women were considered as the sample size for the present study. Waist circumference was assessed in all the groups to find central obesity. Plasma levels of vitamin B_{12}, vitamin D3 and plasma HDL were assessed. All the results were age adjusted. p value of less than 0.05 was considered as significant difference.

Results: It was observed that, central obesity was significantly higher in peri & postmenopausal women compared to premenopausal women. Lower HDL levels were found in all the participants. Also, HDL did not show any correlation with vitamin B12 and vitamin D in any of the group.

Conclusion: Study concludes that, HDL levels are not correlated with vitamin B12 and Vitamin D. It emphasizes the need for further study to establish clinical significance of vitamin B12 and vitamin D with HDL levels.

Keywords: HDL, Vitamin B12, Vitamin D.

Introduction

Obesity is more in urban middle aged women than in men due to socioeconomic transition causing significant shifts in dietary and physical activity patterns. In addition middle aged women includes postmenopausal women who have deficiency of estrogen that triggers central obesity. Central obesity leads to abdominal adiposity, dyslipidemia and insulin resistance in middle aged women. [1]

The recent data shows that one fourth to one third of urban population of India has metabolic syndrome. Furthermore, the prevalence is 1.5–2 times higher in women compared with men at middle age **[**2**]** as they are more prone to obesity, impaired fasting glucose, low high density lipoprotein (HDL) and high triglycerides (TGs). [3]

Micronutrient deficiencies of vitamin D & vitamin B12 contribute to the development of many metabolic chronic diseases. The prevalence of dyslipidemia especially in middle aged individuals has increased significantly in recent decades and is now reaching epidemic proportions, which is associated with increased mortality, concomitant complications and reduced quality of life.

Vitamin D is associated with lipid profiles, and prevalence of obesity. Low circulating 25-hydroxyvitamin D concentration has been linked to a high prevalence of cardiovascular disease. Elevated serum concentration of total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C) and triglycerides (TG) and low concentration of high-density lipoprotein cholesterol (HDL-C) which are known to be major risk factors for developing CVD. [4,5]

Vitamin B12, also known as cobalamin, is a water-soluble vitamin that plays an important role in many cellular functions, such as erythropoiesis,

DNA synthesis, and lipid and carbohydrate metabolism Globally, the prevalence of vitamin B12 deficiency ranges between 2.5% and 40% [6], Observational studies have show inverse association between vitamin B12 intake with adverse lipid profile and cardiovascular diseases (CVDs). [7,8]

High-density lipoprotein (HDL) cholesterol is known as the "good" cholesterol because it helps remove other forms of cholesterol from the bloodstream. A higher level of HDL cholesterol is linked to a lower risk of heart disease. So the purpose of the study to find correlation of HDL with vitamin D and vitamin B12 in middle aged women.

Material & Methods

This study was an observational cross-sectional study. The study was conducted in Department of Physiology, Department of Obstetrics and Gynecology & Interactive Research School for Health Affairs, Bharati Vidyapeeth University Medical College and Hospital, 300 women volunteers between 35 - 64 yr were included in this period of the study. Participants were divided in pre, peri and postmenopausal group of 100 each. Volunteers were classified as premenopausal if they had regular menstrual periods, perimenopausal women were those who had irregular interval menstrual periods i.e more than 2 - 3 months & postmenopausal in case of absence of menstrual periods for 12 consecutive months and thereafter irrespective of surgical or natural menopause. [9]

Women were enrolled in the study on the basis of inclusion & exclusion criteria.

Inclusion Criteria: All non-pregnant women volunteers between age group of 35 to 64 yrs were included in the study

Exclusion Criteria: Consists of subjects with morbid conditions like diabetes, hypertension, ischemic heart disease, cancer, thyroid disease or any other acute or chronic liver or kidney disease or subject who underwent hysterectomy surgery or any current infectious condition. Those taking treatment of anemia or taking hormonal supplementation or phytoestrogens were also excluded from the study.

A written informed consent was taken after explaining all the information of the research project.

Study Parameters: Waist circumference (WC): Waist circumference (WC) was obtained as the minimum value between the iliac crest and the lateral costal margin. [10]

All these women were asked to come to the hospital for blood sample collection 10-ml of fasting venous blood sample was taken in the morning (7:00–8:00 A.M.) after 12 to 14 hrs of overnight fast.

Plasma levels of vitamin B_{12}, vitamin D3 were assessed by Chemiluminescence method .The estimation of plasma HDL and TG was carried out using enzymatic kit method (Siemens, Dimension RXL Max Integrated Chemistry System). Levels of HDL were expressed as mg/dL.

Data is represented as mean (standard deviation). SPSS version 17.0 for Windows (SPSS Inc, Chicago) was used for the statistical analysis. All the results were age adjusted. p value of less than 0.05 was considered as significant difference.

The procedure described in the study were approved by institutional ethics committee (BVDU/MC/42).

Results:

Table 1: Waist circumference and HDL cholesterol in participants

	Group I (Premenopausal)	**Group II (Perimenopausal)**	**Group III (Postmenopausal)**
	N=100 Mean (SD)	N=100 Mean (SD)	N=100 Mean (SD)
Waist (cm) Obese (>=80)	80.1 (9.8) 45	82.6 (8.4) 65[a]	84.0 (13.2) 72[a]
HDL cholesterol (mg%) < 50	44 (2.5) 100	44 (2.5) 100	44 (2.5) 100

[a] : Different from group I p <0.05

In Table 1 shows that central obesity was significantly higher in peri & postmenopausal women compared to premenopausal women but HDL does not show significant difference in any group, thought HDL levels are low in all the groups.

Table 2: Correlation of HDL (mg %) with vitamin B12 and Vitamin D

Micronutrient	**Pre**	**Peri**	**Post**
Vitamin B12 (pg/mL)	-0.03 0.78	0.05 0.63	-0.04 0.70
Vitamin D (ng/mL)	-0.07 0.47	-0.04 0.66	0.02 0.84

In Table 2 shows HDL did not show any correlation with vitamin B12 and vitamin D in any of the group.

Discussion

Table 1 shows the comparison of HDL levels in Middle aged women. In our study we found that obesity was significantly higher in peri & postmenopausal women compared to premenopausal women but HDL does not show significant difference with waist circumference in any group.

In a study by Ainy E et al in 2007 [11] assessed the prevalence of metabolic syndrome (MetS) in Tehranian women during menopausal transition where they found waist circumference was significantly higher in postmenopausal women in comparison to pre-menopausal women. Maharlouei N et al in [12] 2013 found that waist circumference was higher in postmenopausal women compared to premenopausal women but Shefali Pandey et al [13] in 2010 found no statistical significance was found in waist circumference in baseline value also after adjusting for age .

In our study we found HDL cholesterol levels were similar & lower than normal in all three pre, peri & post-menopausal groups. Middleberg RP et al [14] 2002 found that Asian Indian women had higher frequency of low HDL-C than Asian Indian men, even when not obese or overweight. These results are independent of age, BMI, smoking, and menopause status. HDL cholesterol level decreases with menopause. However, not all studies eg CarrMC et al [15] 2003, UshiroyamaT et al [16] 2005, KIM et al [17] 2007 agree with this conclusion where mean HDL cholesterol levels were similar in premenopausal and postmenopausal women.

Studies reported [18,19] that Asian Indians have higher total body fat content for the same BMI of whites. Although possible differences in total and regional body fat for a given BMI may explain differences in HDL-C in Asian Indian women in Dallas compared with white women

The higher prevalence of CHD in Asian Indians has been postulated to be mediated by dyslipidemia associated with excessive body fat and insulin resistance, particularly lower plasma HDL-C concentrations. [19]

Higher prevalence of low plasma HDL-C concentrations in Asian Indian women compared with the men could contribute to decreased sex protection for CHD previously reported in the Asian Indian population. [19] Our study has limitation because mechanisms of low HDL-C in South Asian women are not evaluated. We do not have detailed dietary or physical activity profile, estrogen use in postmenopausal women and evaluation of other potential mechanisms such as insulin resistance or inflammation. However, lower HDL-C observed in Asian Indian women seems to be only partially dependent on environmental factors such as living in urban areas westernized lifestyle. It was also found that increased prevalence of low HDL-C independently of obesity or hypertriglyceridemia is observed in women but not in men of Asian Indian origin. Ethnic difference in sex gap in HDL-C observed in Asian Indians compared with whites could contribute to increased prevalence of CHD in Asian Indian women.

Kamath SK et al [20] studied variability in HDL cholesterol concentrations in Indian and Pakistani compared with American premenopausal women in the United States. They found HDL-cholesterol values were lower (P = 0.011) in Indians and Pakistanis than in Americans (1.21 ± 0.27 mmol /lit in Indians & 1.37 ± 0.29 mmol /lit in Americans

According to Executive Summary of the Third Report of The National Cholesterol Education Program (NCEP) [21] Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) modification of the HDL-cholesterol cut point may be required in women in some populations.

In a study by Manisha Chandalia et al [19] Increased prevalence of low HDL-C independently of obesity or hypertriglyceridemia is observed in women but not in men of Asian Indian origin.

A small study by Smith J [22] comparing lipid profiles in Asian Indians and whites in Canada showed that Asian Indians had higher body fat content and lower HDL-C than whites.

Table 2 showed no correlation of HDL with vitamin B 12 and vitamin D in pre, peri and post-menopausal groups.

In all three groups the levels being low did not show any association. Similar results were reported by Semmler et al [23] for vitamin B 12, Tavakoli F [24] for vitamin D. Manisha Chandalia et al [19] in found that Asian Indian women had higher frequency of low HDL-C than Asian Indian men.

Birken et al [25] reported non-significant associations between 25(OH)D, LDL, and HDL. In this study, 25(OH)D concentrations showed an inverse association with circulating lipids in early childhood, suggesting that vitamin D exposure in early life may be an early modifiable risk factor for cardiovascular disease. A reconfirmation of these results in different study populations with a well-defined status of health, diet and medication may help to clarify whether the lipoprotein & vitamin B12 status coincide due to nutritional reasons or

due to a biochemical link between vitamin B 12 and lipoprotein metabolism.

Conclusion

Study concludes that, HDL levels are low and similar in pre. Peri and postmenopausal women. Also, HDL levels are not correlated with vitamin B12 and Vitamin D. It emphasizes the need for further study to establish clinical significance of vitamin B12 and vitamin D with HDL levels.

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