



## ORIGINAL RESEARCH ARTICLE

## SERUM HDL CHOLESTROL AND GLYCEMIC STATUS ASSESSMENT IN POST- MENOPAUSAL WOMEN

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## ABSTRACT

Menopause is the consequence of the exhaustion of ovarian follicles which results in decreased production of estradiol and other hormones. Menopause is associated with a significant increase in cardiovascular diseases (CVD). Postmenopausal women have higher blood sugar values as compared to the control group because the estrogen hormone which makes the body cells more receptive or sensitive to insulin is either not secreted at all or is in limited supply. The estrogen hormone in females is protective for developing diabetes. Estrogen seems to contribute to glucose homeostasis in women. Significant negative correlation between fasting blood sugar and HDL with ( $r=-0.130$ ,  $p=0.369$ ), suggesting that the fasting blood glucose levels were elevated whereas HDL levels were low normal in postmenopausal women thus associate with high risk of CVD in postmenopausal women.

**Keywords:** HDL, Glucose, Post-menopause

## INTRODUCTION

Menopause is the permanent cessation of menses resulting from reduced ovarian hormone secretion that occurs naturally or is induced by surgery, chemotherapy, or radiation.<sup>1</sup> The years surrounding menopause constitute an entire stage of a woman's life, lasting anywhere from six to thirteen years. It is a natural biologic process occurring in the body due to changing hormone levels.<sup>2</sup> The average age of menopause is 51, but for some women it happens in their 40s or later in their 50s.<sup>3</sup> The medical illness common to postmenopausal women are related to endogenous/exogenous hormones e.g. osteoporosis, coronary heart disease, endometrial cancer, Alzheimer's disease and mood symptoms.<sup>4</sup> Diabetes mellitus is a complex metabolic disorder characterised by persistent hyperglycaemia resulting from defects in insulin secretion, insulin action or both. The two main types of diabetes mellitus are type I (formerly known as insulin-dependent diabetes), and type II (formerly known as non-insulin-

dependent diabetes). Type I diabetes is caused by the autoimmune destruction of the  $\beta$ -cells of the pancreatic islets, whereas type II diabetes results from both impaired insulin secretion and resistance to the action of insulin.<sup>5</sup>

It is reported that postmenopausal women have higher blood sugar values because the estrogen hormone which makes the body cells more receptive or sensitive to insulin is either not secreted at all or is in limited supply. The estrogen hormone in females is protective for developing diabetes.<sup>6</sup> Early management of the disease along with lifestyle change can increase quality of life and limit the level of debilitation of the disease.<sup>7</sup> Menopause is associated with adverse effects on blood lipids including an increase in total cholesterol, LDL cholesterol, and triglycerides, and a decrease in HDL cholesterol. Reduced estrogen levels after menopause can also lead to adverse changes in blood pressure, obesity,

body fat distribution, blood clotting factors, glucose metabolism and diabetes, all of which increase the risk of coronary heart disease. <sup>8</sup>According to some studies Post-menopausal women having a glycemic load and overall dietary glycemic index were inversely related to plasma HDL concentration independent of body mass index (BMI), weight change, total energy intake and other known cardiovascular disease risk factors.<sup>9</sup>Earlier epidemiological studies have shown that diabetic postmenopausal have 2-4 times higher risk of developing cardiovascular disease. Abnormal lipid profile is more common in diabetic postmenopausal women and get aggravated with poor glycemic control. Thus there are studies correlating HDL and LDL cholesterol in diabetic postmenopausal women.<sup>10</sup>

## MATERIALS AND METHODS

This is a non experimental type of comparative and correlative study with Purposive sampling (Non randomized sampling) which was carried out at Padmashree Diagnostic Centre, Bangalore, Karnataka, India for duration of 6 months.

- Experimental group consists of 50 subjects: Post-menopausal women.
- Control group consists of 50 subjects: Pre-menopausal women.

A total 50 post-menopausal subjects of age > 45 years were enrolled in the study as experimental group. Exclusion criteria were smokers, renal failure, male, alcoholics as well as history of cardiac problems. A total 50 pre-menopausal subjects of age 12-40 years were recruited in the study as control group. Exclusion criteria were pregnancy, smokers, alcoholics, women taking oral contraceptives pills, renal failure, cardiac patients as well as male. Medial cubital venous blood sample was collected from the patients in vacutainer without any anticoagulant. Sample was centrifuged to obtain serum for the determination of fasting blood sugar and serum HDL cholesterol by using BS 300 fully automated Chemistry analyzer and the values were documented for statistical analysis.

## RESULT

In our study, fasting blood sugar and serum HDL cholesterol were estimated in premenopausal and

postmenopausal women, and then compared and correlated. This was carried in 100 subjects having normal fasting blood sugar level below 110 mg/dl., which were divided into two groups- premenopausal group consisting of 50 subjects and postmenopausal consisting of 50 subjects.

Descriptive statistics for different parameters of post-menopausal and pre-menopausal (Table 1):

Category	Parameters	Mean	SD	Range
Post Menopausal Group	Age (years)	55.42	6.85	46-67
	FBS (mg/dl)	145.66	47.59	94-295
	HDL (mg/dl)	37.82	7.63	21-54
Pre Menopausal Group	Age (years)	33.40	4.71	17-39
	FBS (mg/dl)	92.16	6.55	75-102
	HDL(mg/dl)	40.74	5.56	31-56

Comparison between the mean levels of FBS and HCL among the post-menopause and pre-menopause (Table 2):

Mean level	Post Menopausal group	Pre Menopausal group	Student's t value	p
FBS (mg/dl)	145.66	92.16	7.87**	0.001
HDL (mg/dl)	37.82	40.74	2.19*	0.031

Table 2 shows that fasting blood sugar was significantly higher in postmenopause group with mean 145.66±47.59 mg/dl, compared to the premenopause group mean 92.16±6.55 mg/dl which was highly significant. Whereas serum HDL cholesterol levels had a slightly less in postmenopause group ( mean 37.82±7.63 mg/dl), compared to the premenopause group (mean 40.47±5.56 mg/dl) which was not statistically significant.

Correlation between FBS and HDL (Table 3)

Correlation coefficient between FBS and HDL	Post menopausal	Pre menopausal
	r= - 0.130 <sup>ns</sup>	r= - 0.304 <sup>ns</sup>
	P = 0.369	P = 0.032

It shows non significant negative correlation

between fasting blood sugar (FBS) and HDL with  $r = -0.130$  and  $p = 0.369$  in postmenopausal group, thus signifies that when there is high FBS, it has resulted low normal HDL Cholesterol levels.

## DISCUSSION

Stark et al, showed menopause associated with a significant increase in cardiovascular diseases (CVD). The lower rate of coronary heart diseases (CHD) in pre-menopausal women due to decreased level of LDL cholesterol and increase level of HDL cholesterol that are associated with estrogens levels which provides protection against CVD.<sup>11</sup> In another study by Liu S, Manson JE, Stampfer MJ, et al. stated that glycemic load is an important independent predictor of HDL cholesterol, accounting for more than 20% of its variation.<sup>12</sup>

Liu et al showed that the quality (as measured by glycemic index) and quantity of carbohydrate were directly related to HDL cholesterol and triacylglycerol in 280 healthy postmenopausal women and that glycemic load best captured the limits of carbohydrate intake.<sup>13</sup> Ushiroyama et al had reported that the plasma total HDL concentration decreases gradually with age in women but was unsure regarding decrease in total HDL level is responsible for increased risk of coronary heart disease.<sup>14</sup> Women in menopause have lower concentration of HDL in relation to women with regular menstruation. The concentration of Apolipoprotein B is higher in women in menopause. The concentration of estrogen shows negative correlation with VLDL and triglycerides concentration in women in menopause, while the correlation with HDL concentration is positive. Progesterone concentration shows no known correlation with the lipids and lipoproteins concentrations in either women in menopause or those with regular period.<sup>15</sup>

It has been observed that in postmenopausal women, both the quantity and quality (as measured by overall dietary glycemic index) of carbohydrate intake were directly related to plasma HDL and fasting plasma triacylglycerol concentrations. Dietary glycemic load appeared to best capture the combined effects of the quantity and quality of the carbohydrate consumed. In a comparison of the 2 extreme quintiles of intake, the adjusted geometric mean plasma HDL concentration decreased 10%

with increasing dietary glycemic load, 11% with increasing overall dietary glycemic index, and 4% with increasing carbohydrate intake; fasting triacylglycerol increased 76% with increasing dietary glycemic load, 17% with increasing overall dietary glycemic index, and 44% with increasing carbohydrate intake. When both dietary glycemic load and carbohydrate were considered simultaneously, glycemic load remained a significant predictor of fasting triacylglycerol concentrations, illustrating the value of carbohydrate quality in addition to quantity.<sup>16</sup> The results of some studies had suggested that when making medical intervention to restore physiological plasma levels in women with postmenopausal hypertriglyceridemia, attention needs to be paid not only to a decrease in plasma total HDL cholesterol concentration but also to changes in HDL particle size.<sup>14</sup> In this present study, fasting blood sugar were increased in postmenopause group compared to the premenopause group and it also shows that serum HDL cholesterol levels were on the lower side and minimum value being 21 mg/dl in postmenopause group when compared to the premenopause group. Our finding is matched with previous studies<sup>15, 16</sup> This said that the fasting blood sugar is increased whereas serum HDL cholesterol levels had lowered in postmenopause group compared to the premenopause group.

## CONCLUSION

The comparative study revealed that fasting blood sugar is increased in postmenopause group compared to the premenopause group. It also showed that serum HDL cholesterol levels were on the lower side in postmenopause group compared to the premenopause group. It also shown a significant negative correlation between fasting blood sugar and HDL with ( $r = -0.130$ ,  $p = 0.369$ ), suggesting that the fasting blood glucose levels were elevated whereas HDL levels were low normal in postmenopausal women thus associate with high risk of CVD in postmenopausal women.

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