

# Association between Vitamin D and Malondialdehyde in Premenopausal Women & Postmenopausal Women

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## Abstract

**Background:** In the menopausal women, the osteoporosis is characterized by low bone mass leading to enhanced bone fragility and consequent increase in bone fracture risk. These risks are due to calcium & vitamin D deficiency, which occur due to less amount of estrogen production during menopausal age. **Aim:** To find out the association between vitamin D and Malondialdehyde in Menopausal women. **Subjects and Methods:** Serum vitamin D and Malondialdehyde levels were measured in 155 postmenopausal women (46-60 years) by using standard methods. They have been compared with 155 premenopausal women (30-45 years) by using student t-test. **Results:** Serum vitamin D was significantly decreased in postmenopausal women ( $p < 0.0001$ ) as compared to premenopausal women; whereas the serum malondialdehyde level was found to be significantly increased in postmenopausal women ( $p < 0.0001$ ) as compared with premenopausal women. **Conclusion:** The present study findings indicate decreased levels of serum vitamin D and increased the level of serum malondialdehyde in postmenopausal women. These changes can be used as a good marker for identifying bone related disorders in postmenopausal women. Intimation with supplementation at an early stage may further prevent bone disorder in the later stage of menopause.

**Keywords:** Malondialdehyde, Postmenopausal women, Premenopausal women, Vitamin D.

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## Introduction

Vitamin D deficiency is now a day's widely discussed topic in medicine. The lipophilic vitamin D plays an important role in calcium homeostasis and bone metabolism and in addition seems to decrease the risk of important chronic illnesses such as cancer, infectious and cardiovascular disease. Beside vitamin D3 and vitamin D2 plays an important role in food supplementation.<sup>[1-4]</sup> However, Human obtains vitamin D mainly from exposure to sunlight, and from their diet and from dietary supplements. The impact of vitamin D supplementation in food to prevent osteoporosis and other illnesses therefore seems likely.<sup>[5]</sup>

Oxidative stress plays an integral role in the aging process and results from the overproduction of free radicals such as reactive oxygen species, which overwhelm the body's antioxidant defense mechanisms.<sup>[6,7]</sup> The marked reduction in the estrogen has been shown to increase levels of oxidative stress in the body, depending on the concentration and chemical structure of this hormone.<sup>[8]</sup> In the healthy, premenopausal women there is usually an appropriate balance between free radical species and antioxidant mechanisms. As such, the level of oxidative stress in these women is not sufficient enough to affect the ovaries until the onset of menopause. It has been noticed that the

menopause creates a pro-oxidant state in the body due to decline in natural antioxidant i.e. estrogen.<sup>[6,9]</sup>

## Subjects and Methods

This was a cross-sectional type of study, carried out in the Department of Biochemistry, Santosh Medical College & Hospital, Ghaziabad in collaboration with Department of Biochemistry at Major S. D. Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India. Total three hundred ten healthy women were included, out of which 155 were healthy pre-menopausal and 155 were postmenopausal women attending outpatient department of Obstetrics & Gynecology at Major S. D. Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India and fulfilling the defined criteria were included in the study till the desired sample size is reached. Ethical committee and written informed consent were obtained from study subjects.

### Inclusion criteria

The women were apparently healthy.

**Control Group:** - Women with the reproductive age group 30 – 45 years, with a normal menstrual cycle.

**Study Group:** - Post-menopausal women 46 – 60 years,

with one year of amenorrhea and were not receiving any hormonal replacement therapy.

**Exclusion criteria**

The women with some sort of menstrual disorders e.g. Irregular menses, menorrhagia, with any bone fracture in previous 1 year, on hormonal replacement therapy, oral contraceptives, smoker, alcoholic, under any estrogen therapy or any supportive treatment for menopausal symptoms for at least 6 months prior to study, supplementation with nutritional antioxidants, diabetes, hypertension, malabsorption and any bone diseases were excluded from this study.

**Biochemical Parameters:** - Venous blood (5ml) was drawn from all participants and serum was separated. Serum was analyzed for the measurement of Vitamin D [Electro-Chemiluminescence binding assay, <sup>[10-14]</sup> Serum Malondialdehyde [Thiobarbituric Acid Reactive Substances (TBARS) Method. <sup>[15]</sup>

**Statistical Analysis**

All data obtained from the estimations were expressed as the mean± standard deviation (SD) and student t-test was used for compare mean± SD between the groups.

**Results**

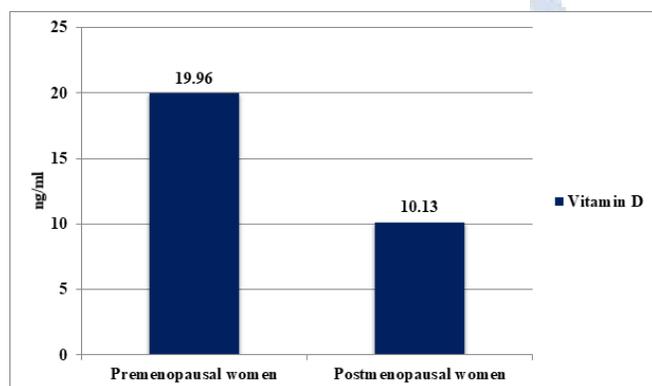


Figure 1: Mean & Standard deviation of Vitamin D level in Premenopausal women & Postmenopausal women.

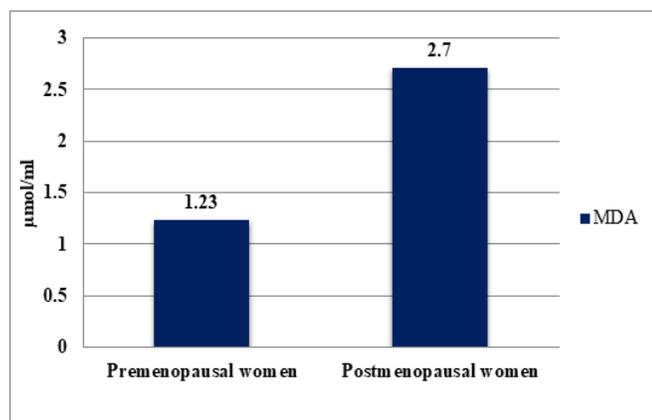


Figure 2: Mean & Standard deviation of Malondialdehyde level in Premenopausal women & Postmenopausal women.

Table 1: Bone marker levels of Premenopausal women & Postmenopausal women.

S. No.	Parameter	Premenopausal women	Postmenopausal women	p Value
1	Vitamin D (ng/ml)	19.96	10.13	< 0.0001
2	Malondialdehyde (µmol/ml)	1.23	2.7	< 0.0001

Table 2: Correlation of Oxidative stress marker (MDA) with Vitamin D in postmenopausal women.

S. No.	Parameter	MDA	
		r- Value	p Value
1.	Vitamin D (ng/ml)	- 0.89	<0.0001

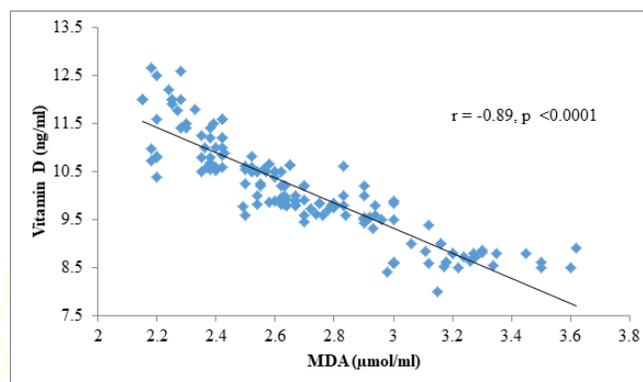


Figure 3: Correlation of Oxidative stress marker (MDA) with Vitamin D in Postmenopausal women.

Table 3: Correlation of Oxidative stress marker (MDA) with Vitamin D in premenopausal women.

S. No.	Parameter	MDA	
		r- Value	p Value
1.	Vitamin D (ng/ml)	- 0.87	<0.0001

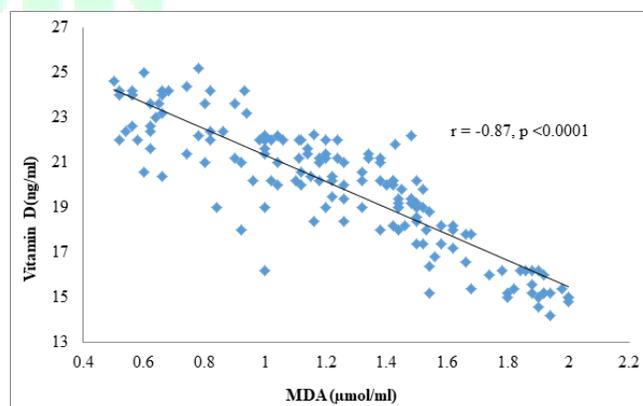


Figure 4: Correlation of Malondialdehyde (MDA) with Vitamin D in premenopausal women

**Discussion**

**Bone markers**

- **Vitamin D Changes:** - The present study was conducted on the level of Vitamin D in Premenopausal & Postmenopausal women and found out that the level of Vitamin D was higher in Premenopausal women than that of

Postmenopausal women. According to S.Gaugris et.al. (2005) who did a study on Vitamin D inadequacy among Post-menopausal women: a systematic review and concluded that the prevalence of inadequate vitamin D levels appeared to be high in postmenopausal women, especially in those with osteoporosis and history of fracture. Even some postmenopausal women without osteoporosis and/or musculoskeletal disorders had high levels of Vitamin D inadequacy. Gilberto Gonzalez (2013) did study on Vitamin D status among healthy postmenopausal women in South America and concluded that the population-based data shown a high prevalence of Vitamin D deficiency among healthy postmenopausal women in the South American region, this may be due to decrease in skin production of Vitamin D related to aging and the probable low Vitamin D intake.

- **Oxidative stress Marker (Malondialdehyde):-** The present study shown that the level of Oxidative stress marker i.e. MDA level was found to be significantly lower in Premenopausal women as compared with Postmenopausal women. The same study was done by Jyot Amrita et.al. On Oxidative stress: An effective prognostic tool for early detection of cardiovascular disease in Menopausal women and concluded that Malondialdehyde (MDA) which is the products of lipid peroxidation has been the most extensively studied marker. Its increased level marks the index of assessing oxidative stress. They also concluded that an increase in the levels of MDA in both hyperlipidemic and normolipidemic menopausal women which indicated the degree of oxidation in heart disease. Another study done by Banu Onvural et.al. (1996) on Lipid peroxidation & Lipid metabolism in Postmenopausal women and concluded that the Lipid profiles & Malondialdehyde (MDA), a marker of lipid peroxidation in a postmenopausal women where they found out that MDA was significantly higher ( $p < 0.001$ ) in the postmenopausal women group than the control group and age-matched male group.

## Conclusion

In the present study, Vitamin D was low and Malondialdehyde level was higher in Postmenopausal women as compared with Premenopausal women. Therefore increased awareness of the benefits of a vitamin D & Malondialdehyde rich diet and vitamin D &

Malondialdehyde supplementation, in the outdoor physical activity can prevent the chances of risk from developing bone turnover, osteoporosis, and fractures in menopausal women. The results of the study might help the clinician to develop more therapeutic strategies for the management of bone disorders of Postmenopausal women for the later stages.

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