

Comparison of Vitamin D status in postmenopausal women with and without hypothyroidism

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Abstract

Background: Menopause comes with a number of health challenges for women. In its postmenopausal phase woman is not only facing the deficiency of ovarian hormones, she is also at risk of developing hypothyroidism and hypovitaminosis D. **Objectives:** The present study was therefore planned with an aim to determine and compare the mean vitamin D levels among postmenopausal women with and without hypothyroidism to evaluate if hypothyroidism in post-menopausal women affects the vitamin D levels. **Material & Methods:** The present study was conducted in Department of Biochemistry, Dr. S. N. Medical College, Jodhpur, Rajasthan, India after obtaining the Ethical approval from the Institutional Ethics Committee. Post-menopausal women above 50 years of age attending the medical OPD with the symptoms suggestive of hypothyroidism were included. Those currently on medication for thyroid disorders and on Vitamin D supplementation for past six months were excluded. The subjects were divided into two groups based on their thyroid levels into Case group (S.TSH >5.60µIU/ml) and Control group (S.TSH: 0.34-5.60 µIU/ml) **Results:** Mean serum Vitamin D level was significantly lower in Case Group (17.33±16.67 ng/ml) as compared to Control Group (27.55±15.82 ng/ml). More number of hypothyroid subjects were Vitamin D deficient (Case Group-36%) as compared to Control Group (12%). Pearson correlation coefficient was also assessed between Vitamin D and TSH level (r value -22.52) and no association was observed among the two parameters in Case Group. **Conclusions:** Patients with hypothyroidism also suffers from hypovitaminosis D. Screening of postmenopausal women for hypothyroidism and Vitamin D levels is recommended.

Key words: Menopause, Hypothyroidism, Vitamin D, Osteoporosis

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Introduction

Vitamin D deficiency is approaching the world as a silent epidemic. There are more than billion people worldwide having Vitamin D deficiency or insufficiency.[1] The change in lifestyle leading to lack of sun exposure and dietary deficiency are considered to be the major factors responsible for this current scenario. Many studies from different region of India had reported prevalence of vitamin D deficiency ranging from 50 to 90 % despite the presence of abundant sunshine.[2-4] Women are more prone to the develop vitamin D deficiency as compared to males and the situation further worsens in the postmenopausal women. Menopause is the time in life of women when menstrual cycle ceases caused by reduced secretions of ovarian hormones estrogen and progesterone and is confirmed after 12 months of amenorrhoea.[5-6] The onset of menopause comes with a number of health challenges for women including increased risk of osteoporosis.[3,6] Estrogen enhance the activity of the enzyme responsible for activity of vitamin D. End organ response to Vitamin D is impaired in post menopause, resulting in vitamin D resistance. This can be attributed to decrease in number of vitamin D receptors and its activity due to decline in estrogen level. Hypothyroidism is one of the most commonly occurring endocrinopathy. It affects women 7-10 times more frequently than men, and its rate increases with age. According to the Wickham survey, the incidence of elevated TSH is about 7.6% in the general female population but rises to 17% in women over 70 years of age.[7] Vitamin D exerts its metabolic effects through binding to vitamin D receptors (VDR) and activation of VDR responsive genes present in

more than 36 different cell types including thyroid gland apart from bone and intestines. So, a lower level of Vitamin D is likely to aggravate the systemic abnormalities associated with hypothyroidism.[8-9] Thus, woman in its postmenopausal phase is not only facing the deficiency of ovarian hormones, she is also at increased risk of developing hypothyroidism, and vitamin D deficiency. The present study was therefore planned to determine and compare the vitamin D levels among postmenopausal women with and without hypothyroidism and further to evaluate if post-menopausal women are more prone of developing vitamin D deficiency due to hypothyroidism.

Material and Methods

The present study was conducted in Department of Biochemistry, Dr. S. N. Medical College, Jodhpur, of Western Rajasthan, India. Ethical approval was obtained from the Institutional Ethics Committee. The study is in accordance with the Helsinki Declaration of 1975, as revised in 2000. The nature of study was explained to the participants and written informed consent was obtained.

Post-menopausal women above 50 years of age who presented to the medical OPD with the symptoms suggestive of hypothyroidism and were advised for serum T₃, T₄ and TSH and Vitamin D levels measurement by the physician were included in the study.

Those currently on medication for chronic medical conditions, thyroid disorders, diabetes mellitus and on Vitamin D supplementation for past six months were excluded from the study. Postmenopausal women with known hepatic or renal diseases, malabsorption syndromes or gastric banding surgeries, on drugs like anticonvulsants, thiazide diuretics, steroids, bisphosphonates, estrogen or progesterone or selective estrogen receptor modulator, which are known to cause Vitamin D deficiency were also excluded.

Total 100 post-menopausal women participated in the study. On the basis of thyroid levels subjects were divided into two groups as follows:

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- Case Group: Comprised of total 50 post-menopausal women with Hypothyroidism (serum TSH >5.60 μ IU/ml and lower than normal levels of serum T₃ and T₄).
- Control Group: Comprised of 50 post-menopausal women without hypothyroidism (S.TSH: 0.34-5.60 μ IU/ml and normal levels of serum T₃, T₄)

After the consent of the patient, 5ml of blood sample was withdrawn and serum was separated by centrifugation. Serum sample was analysed for serum T₃, T₄ and TSH and 25-OH vitamin D level using commercially available kits on fully automated clinical chemistry Beckman Access-2 analyser based on principle of Chemiluminescence Immunoassay (CIA) method.

Reference values:

- Serum T₃(1.34-2.73 nmol/L), T₄ (70.53-183.81 nmol/L) and TSH (0.34-5.60 μ IU/ml)
- Serum 25-OH Vitamin D levels were categorised into: Deficient (<10 ng/ml), Insufficient (10-30 ng/ml), Sufficient (30-100 ng/ml)

Statistical Analysis

Data was maintained on excel spreadsheet. Descriptive data were expressed as mean and standard deviation. Quantitative data was assessed using independent sample student's t-test. Chi Square test was used to compare the difference in proportion between the two groups. An association between study variables was assessed using Pearson's correlation analysis. Difference was considered statistically significant at p<0.05. The data was analysed using Epi info version 7.2.1.0 statistical software.

Results

A total of hundred postmenopausal women were included in the study. Mean age of Control Group and Case Group was 60.98 \pm 9.48 years and 61.68 \pm 10.25 years respectively. Participants were categorised to have deficient, insufficient and sufficient levels of Vitamin D based on the reference range given. Of the total participants included in the study 24% were deficient, 55% had insufficient and only 21% had sufficient Vitamin D levels. More number of hypothyroid subjects were Vitamin D deficient (Case Group-36%) as compared to Control Group (12%), whereas greater number of subjects in Control Group (28%) had sufficient Vitamin D levels as compared to Case Group (14%), however the difference was statistically insignificant. (Figure:1)

Mean serum Vitamin D level was significantly lower in Case Group (17.33 \pm 16.67 ng/ml) as compared to Control Group (27.55 \pm 15.82 ng/ml). Correlation was also assessed between serum Vitamin D and

TSH level by using Pearson correlation coefficient (r value -22.52) and no association was observed among the two parameters in Case Group.

Discussion

More than 25 million women had reached the menopause worldwide in the 1990 and this number get doubled by the year 2020.[10] Vitamin D deficiency was reported in an epidemic proportion all over the Indian subcontinent with a prevalence of 70% in postmenopausal women. [11] It is the most under diagnosed and undertreated nutritional deficiency in the world. [12] Both Vitamin D deficiency and hypothyroidism prevails in higher proportion in post-menopausal women. In current study Vitamin D levels were compared among post-menopausal women with and without hypothyroidism and significant difference was observed in the mean values of Vitamin D among the two groups. In a similar case control study from a tertiary care hospital of Indore, Vitamin D levels in the hypothyroid patients were compared with the controls. Vitamin D levels were significantly lower in hypothyroid patients (19.2 \pm 1.40 ng/ml) compared to controls (28.4 \pm 1.36 ng/ml), p<0.001. A negative and significant correlation was also observed between 25(OH) Vitamin D and TSH levels (r=-0.45, p<0.001). [13] Comparable results were also reported by Mackawy et al, they examined the association of Vitamin D with thyroid disease. Serum Vitamin D level was significantly lower in hypothyroid patients (14.79 \pm 2.11 ng/ml) than in controls (44.53 \pm 14.91ng/ml), p=0.000 and a negative significant correlation was reported between vitamin D and TSH. [14] However, no association between vitamin D and hypothyroidism was reported by Musa et al in a case control study from Saudi Arabia. [15]

Vitamin D status was evaluated among post-menopausal women attending the Gynaecology outpatient department by Jayakumar NP. A total of 11% were found to be Vitamin D deficient and 38% had insufficient levels. However, in women with 5-10 years of menopause Vitamin D deficiency was reported in 45.5%. [3]

These results indicates that patients with hypothyroidism also suffers from hypovitaminosis D. Thyroid hormones exert important effect on the skin causing epidermal thinning and hyperkeratosis. Hanley et al suggested that epidermal barrier function is probably impaired due to hypothyroidism which may lead to reduced synthesis of vitamin D. [16]. The picture further worsens in post-menopausal women. Thus, steps must be taken to improve the quality of life of post-menopausal women. Thyroid Profile and Vitamin D level estimation must be added in routine screening panel. They must be counselled regarding vitamin D supplementation and sun exposure.

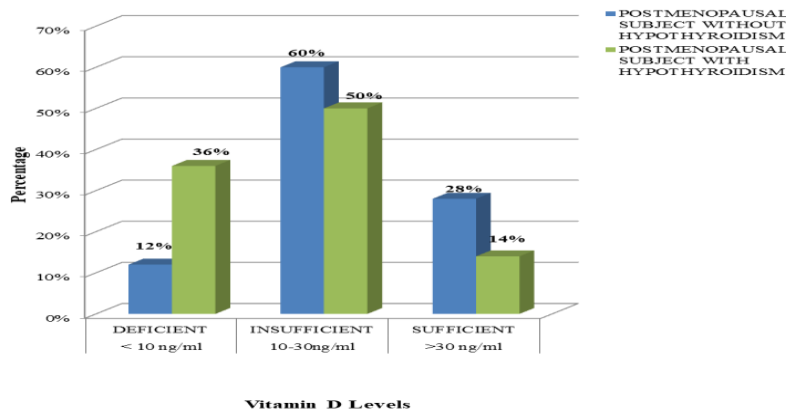


Fig 1: VITAMIN D status among postmenopausal subjects with (case group) and without hypothyroidism (control group).

Conclusion

Menopausal health demands priority in India due to extension in the life expectancy and growing population of menopausal women. Role of Vitamin D is evolving from the time of its discovery from being a vitamin to steroid prohormone. Deficiency of Vitamin D has been shown to be associated with many diseases. Thus, further studies must be conducted to determine whether vitamin D deficiency plays a role

in pathogenesis of hypothyroidism or rather it is consequence of hypothyroidism.

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