

**ORIGINAL RESEARCH**

**A PROSPECTIVE STUDY OF VITAMIN D LEVELS IN  
POSTMENOPAUSAL WOMEN**

**Dr.Borra Dharmendhar<sup>1</sup>, Dr.Ketham Veera Sudhakar<sup>2</sup>, Dr.Laxmi Chapidi<sup>3</sup>,  
Dr.Kankata Jhansi Rani<sup>4\*</sup>**

<sup>1</sup>Associate Professor, Department of Biochemistry, Government Medical College and Hospital, Ramagundam.

<sup>2</sup>Associate Professor, Department of Biochemistry, Government Medical College and hospital, Wanaparthy.

<sup>3</sup>Assistant Professor, Department of Obstetrics and Gynecology, Government Medical College and Hospital, Ramagundam.

<sup>4\*</sup>Associate Professor, Department of Obstetrics and Gynecology, Kakatiya Medical College and MGM hospital, Warangal.

**Corresponding Author: Dr.Kankata Jhansi Rani**

**Associate Professor, Department of Obstetrics and Gynecology Kakatiya Medical College and MGM hospital (Mahatma Gandhi Memorial Hospital), Warangal.**

**E Mail: [jhansi.kankata@gmail.com](mailto:jhansi.kankata@gmail.com)**

**Abstract**

**Introduction:** Vitamin D belongs to a group of fat-soluble secosteroids which helps in increasing intestinal absorption of calcium, iron, magnesium, phosphate, and zinc. In humans, vitamin D3 (also known as cholecalciferol) and vitamin D2 (ergocalciferol) are important compounds. Cholecalciferol and ergocalciferol can be ingested from the diet and from supplements.

**Materials and Methods:** This was a prospective observational study of postmenopausal women attending gynaec OPD department of Obstetrics and Gynecology, Kakatiya Medical College and MGM hospital, Warangal from 1<sup>st</sup> October 2021 to 30<sup>th</sup> September 2022 (1 year). Apparently healthy postmenopausal women without any prolonged medical illness like diabetes, thyroid, hepato-renal disease, malignancy, or without any surgical illness were selected. Besides patients on HRT, steroids, bisphosphonates or any drugs affecting bone metabolism, smokers and alcoholics were excluded.

**Results:** Out of total 206 postmenopausal women attending gynaec OPD during the study period, only 122 women were found eligible for study after satisfying inclusion-exclusion criteria. We divided these postmenopausal women according to their age into five years age-groups, starting from 50 years to 70 years of age. Most common age-group was 55-60 years accounting for 49% followed by 50-55 years age-group making 41%, thus together adding up to 90% of study population. This shows the authenticity of study population. Mean age of study group was 56.9 years.

**Conclusion:** There is high prevalence of vitamin D deficiency among Indian postmenopausal women, but our study shows no correlation between hypovitaminosis D and fasting blood sugar. Besides, the cut-off level for vitamin D deficiency should be reviewed in Indian population looking at the scenario of adequate sunlight exposure, to prevent it from overtreatment and also for dietary modification. The role of bioavailable 25(OH) vitamin D should be ascertained.

**Key Words:** Vitamin D, diabetes, thyroid, postmenopausal women.

## INTRODUCTION

Vitamin D belongs to a group of fat-soluble secosteroids which helps in increasing intestinal absorption of calcium, iron, magnesium, phosphate, and zinc. In humans, vitamin D<sub>3</sub> (also known as cholecalciferol) and vitamin D<sub>2</sub> (ergocalciferol) are important compounds. Cholecalciferol and ergocalciferol can be ingested from the diet and from supplements.

Synthesis of vitamin D (specifically cholecalciferol) in the skin is dependent on sun exposure (specifically UVB radiation) which is an important major natural source.

Vitamin D otherwise known as ‘Sunshine Vitamin’, is essential for humans. Vitamin D plays an important role in calcium homeostasis and bone metabolism.

Vitamin D<sub>3</sub> is synthesized in human skin after photo conversion of 7-dehydrocholesterol to pre-vitamin D<sub>3</sub>, which then isomerizes to vitamin D<sub>3</sub> under the influence of UVB radiation from sunlight. Foods that naturally contain vitamin D are oily fishes (salmon, mackerel, and cod liver oil), egg, milk, and margarine.

Vitamin D deficiency prevails in epidemic proportions all over the Indian subcontinent, with a prevalence of 70 to 100% in the general population.

The onset of menopause comes with a number of health challenges for women. These include increased risk of osteoporosis, muscle weakness, cardiovascular disease, colorectal and breast cancer, diabetes, infections, and neurologic diseases.

## MATERIALS AND METHODS

**Study design:** A prospective observational study.

**Study duration:** 1<sup>st</sup> October 2021 to 30<sup>th</sup> September 2022 (1 year).

**Study Location:** department of Obstetrics and Gynecology, Kakatiya Medical College and MGM hospital, Warangal from 1<sup>st</sup> October 2021 to 30<sup>th</sup> September 2022 (1 year).

**Sample Size:** 122 patients.

This was a prospective observational study of postmenopausal women attending gynaec OPD from 1<sup>st</sup> October 2021 to 30<sup>th</sup> September 2022 (1 year). Apparently healthy postmenopausal women without any prolonged medical illness like diabetes, thyroid, hepato-renal disease, malignancy, or without any surgical illness were selected. Besides patients on HRT, steroids, bisphosphonates or any drugs affecting bone metabolism, smokers and alcoholics were excluded.

Total number of postmenopausal women attending gynaec OPD were 206 out of which 84 were excluded due to chronic medical illness, pre-malignant lesions and age more than 70 years, thus the final study population was 122 postmenopausal women. After complete history-taking and clinical examination they were subjected to fasting blood sugar and serum 25-hydroxy vitamin D [25(OH)D] estimation. They were classified as vitamin D-deficient, insufficient or sufficient on the basis of 25 (OH) D concentrations of < 20 ng/mL, 20-30 ng/mL or >30 ng/mL respectively. Regarding fasting blood sugar, normal reference range was selected as 70-110 mg/dl.

**Statistical analysis:** Statistical analysis was done with Chi-square test to see the association between fasting blood sugar and vitamin D deficiency and insufficiency.

## RESULTS

Out of total 206 postmenopausal women attending gynaec OPD during the study period, only 122 women were found eligible for study after satisfying inclusion-exclusion criteria. We divided these postmenopausal women according to their age into five years age-groups, starting from 50 years to 70 years of age. Most common age-group was 55-60 years accounting for 49% followed by 50-55 years age-group making 41%, thus together adding up to 90% of study population. This shows the authenticity of study population. Mean age of study group was 56.9 years.

Their average age of attainment of menopause was 50.3 years. Majority were multiparas with second and third parity being most common thus together making up to 60% of study population. This rule out any bias on result due to infertility or its treatment, if nulliparous women would have added. All were having spontaneous conception.

S.No	Age group	N (%)
1	50-55 years	(41%)
2	55-60 years	(49%)
3	60-65 years	(7%)
4	65-70 years	(3%)

**Table 1: Age distribution**

S.No	Body Mass Index	N (%)
1	Normal	(61%)
2	Over weight	(34%)
3	Obese	(5%)

**Table 2: BMI Distribution**

BMI/Vitamin D deficiency ( + Insufficiency )	Present (< 30 ng/ml)	Absent (>30 ng/ml)	Total
Normal ( 18.9 - 24.9 kg/m <sup>2</sup> )	52	22	74
Increased ( ≥ 25 kg/m <sup>2</sup> )	34	14	48
Total	86	36	122

**Table 3: Association between BMI and vitamin D deficiency**

Vitamin-D level / FBS(Diabetes)	$\geq 110$ mg/dl (Present)	$< 110$ mg/dl (Absent)	Total
Normal / Sufficient ( $>30$ ng/ml)	6	30	36
Insufficient (20-30ng/ml)	2	14	16
Deficient ( $<20$ ng/ml)	12	58	70
Total	20	102	122

**Table 4: Association between serum vitamin D level and fasting blood sugar in postmenopausal women**

## DISCUSSION

The prevalence of vitamin D deficiency in our study group was 70.4% which is comparable to other studies stating its high prevalence. This finding is in concordance with another Indian study which says that high prevalence of vitamin D deficiency exists among apparently healthy Indian postmenopausal women. However, they failed to show any statistical correlation between vitamin D deficiency and existence of diabetes.

Though our study was limited to postmenopausal women, many studies done on general female population i.e. females of reproductive age-group without any reference to menopausal status, state high prevalence (up to 98%) of vitamin D deficiency in our country despite adequate sunlight exposure; concluding that cut-off level should be revised according to the need of Indian people and ICMR should also revise the recommended daily allowance to prevent from over treatment.

Regarding association between vitamin D deficiency and fasting blood sugar in postmenopausal women, studies are limited to diabetic postmenopausal women to see its relation with hypovitaminosis D, but not to apparent healthy postmenopausal women making it a confounding factor. Like a study from Ghana reported high prevalence of hypovitaminosis D in postmenopausal diabetic women as compared to premenopausal diabetic women and hypovitaminosis D in the postmenopausal diabetic women was related to poorer glucose control. But this study was not epidemiological being restricted to diabetic women only.

Similarly, one study reported lower vitamin D levels being associated with higher blood glucose values in Asian Indian women with pre-diabetes. Again here, the study population was females of reproductive age-group and not post-menopausal women.

## CONCLUSION

There is high prevalence of vitamin D deficiency among Indian postmenopausal women, but our study shows no correlation between hypovitaminosis D and fasting blood sugar. Besides, the cut-off level for vitamin D deficiency should be reviewed in Indian population looking at the scenario of adequate sunlight exposure, to prevent it from overtreatment and also for dietary modification. The role of bioavailable 25(OH) vitamin D should be ascertained.

**REFERENCES**

1. Bell TD, Demay MB B-BSDB-B. "The biology and pathology of vitamin D control in bone." *J Cell Biochem.* 111((1)):7-13.
2. Jones G. Pharmacokinetics of vitamin D toxicity. *Am J Clin Nutr.* 2008;88(2):582-586.
3. Joergensen C, Gall M-A, Schmedes A, Tarnow L, Parving H-H, Rossing P. Vitamin D levels and mortality in type 2 diabetes. *Diabetes Care.* 2010 Oct;33(10):2238-2243.
4. Liu E, Meigs JB, Pittas AG, Economos CD, McKeown NM, Booth SL, et al. Predicted 25-hydroxyvitamin D score and incident type 2 diabetes in the Framingham Offspring Study. *Am J Clin Nutr.* 2010 Jun;91(6):1627.
5. Benetos A, Rudnichi A, Safar M, Guize L. Pulse pressure and cardiovascular mortality in normotensive and hypertensive subjects. *Hypertension [Internet].* 1998;32(3):560-564.
6. Hyun Yoon, Gwang Seok Kim, Sung Gil Kim and Ae Eun Moon. The effect of Vitamin D on Pulse pressure in Korean Adults. *J Clin Biochem Nutr.* vol. 57 |(no. 1):2735-2742.
7. Shin MY K. IS. Vitamin D: is it a vitamin or a hormone? *J Clin Biochem Nutr.* 2012;17:1–6.
8. Kim YE. The association between vitamin D deficiency and frailty syndrome. *J Korean Life Insur Med Assoc.* 26:3-12.
9. Ballard KD, Kuh DJ, Wadsworth MEJ. The role of the menopause in women's experiences of the 'change of life'. *Sociol Health Illn.* 2001;23(4):397-424.
10. *Clinical Chemistry, Molecular Diagnostics, and Laboratory Medicine.* 2016;2016.