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Original Article

Knowledge, Awareness, and Practices Regarding Vitamin D Deficiency among Postmenopausal Women: A Cross-Sectional Study

Hamid Ismail Hamid Edris*, Moghal Habiba Maheen, Mukesh Kumar, Diwakar Kumar Sarraf, Rabin Das

Department of Pharmacy Practice, AU College of Pharmaceutical Sciences, Andhra University, Chinna Waltair, Visakhapatnam, Andhra Pradesh, INDIA.

ABSTRACT

Background: Vitamin D deficiency is a well-documented yet frequently overlooked public health concern among postmenopausal women, particularly in low- and middle-income countries where diagnostic resources and health literacy remain limited. **Objectives:** This study sought to assess the level of knowledge, degree of awareness, and prevailing lifestyle practices concerning Vitamin D deficiency among postmenopausal women attending a tertiary-care setting in Visakhapatnam, India. **Materials and Methods:** A descriptive cross-sectional study was conducted among 500 postmenopausal women recruited through purposive sampling. A structured, pre-validated questionnaire was administered to collect data on demographic characteristics, awareness of Vitamin D, dietary habits, sunlight exposure, supplementation practices, and self-reported clinical symptoms. Data were summarized using descriptive statistics and expressed as frequencies and percentages. **Results:** Three-quarters of the participants (75.6%) had heard of Vitamin D, yet fewer than one in four (25.4%) were aware that supplementation is a valid source. Daily sunlight exposure was reported by 48.8% of women, though regular consumption of Vitamin D-rich foods was noted in only 32.8%. Nearly half (47.2%) were not taking any supplement, and 63% had never been screened for Vitamin D deficiency. Fatigue (55.4%) and joint pain (45.6%) were the most frequently reported symptoms, while awareness of potential complications remained low, at 33.2%. **Conclusion:** Awareness of Vitamin D among postmenopausal women in this population exists at a surface level but does not translate into adequate screening, dietary modification, or supplementation. Health-system interventions should target this gap through structured community education and systematic screening programs.

Keywords: Awareness, Postmenopausal Women, Public Health, Supplementation, Vitamin D Deficiency.

Correspondence:
Hamid Ismail Hamid Edris
Department of Pharmacy Practice, AU College of Pharmaceutical Sciences, Andhra University, Chinna Waltair, Visakhapatnam-530003, Andhra Pradesh, INDIA.
Email: hamidismailtw275@gmail.com

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INTRODUCTION

Vitamin D occupies a uniquely complex position in human physiology. It is simultaneously a nutrient and a hormone precursor, and its adequacy underpins not only skeletal integrity but also immune function, cardiovascular health, and neuromuscular performance. For women who have passed through menopause, the stakes are particularly high. The sharp decline in circulating estrogen that marks this transition disrupts the delicate interplay between Vitamin D metabolism and bone remodeling, leaving the skeleton progressively more vulnerable to demineralization (World Health Organization, 2020).

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The epidemiological picture in South Asia is sobering. Despite abundant year-round sunlight, Vitamin D deficiency is paradoxically widespread in India and neighboring countries, driven by a combination of dietary patterns, skin-coverage practices, high melanin concentration, and limited access to fortified foods (Palacios and Gonzalez, 2018). Older women bear a disproportionate share of this burden. Household confinement, reduced physical activity, and inadequate calcium–Vitamin D dietary pairing each compound the risk (Ghosh *et al*., 2019).

What makes the problem clinically challenging is the absence of a distinctive symptom profile. Fatigue, generalized aching, and muscle weakness all common complaints in the postmenopausal period for unrelated reasons-are also the classic, non-specific presentations of Vitamin D insufficiency. Deficiency therefore tends to go unrecognized until it has progressed to frank osteomalacia or until a fragility fracture occurs (Islam *et al*., 2021). Even when the diagnosis is considered, routine serum

25-hydroxyvitamin D testing remains infrequent in primary-care settings across the region.

Against this background, understanding what postmenopausal women actually know about Vitamin D and whether that knowledge shapes their behaviour has direct implications for health servic design. The present study was conducted to assess knowledge, awareness, and lifestyle practices related to Vitamin D deficiency in a sample of postmenopausal women attending a tertiary-care institution in Visakhapatnam, India.

MATERIALS AND METHODS

Study Design

A descriptive cross-sectional study was carried out between January and June 2025 at AU College of Pharmaceutical Sciences, Andhra University, Visakhapatnam, India.

Study Population and Sampling

Five hundred postmenopausal women were enrolled through purposive sampling from the outpatient departments of the affiliated hospital. Menopause was defined as the cessation of menstruation for at least 12 consecutive months in the absence of any pathological or surgical cause.

Inclusion and Exclusion Criteria

Women aged 45 years and older who had attained natural menopause and who provided written informed consent were eligible for inclusion. Women with a confirmed diagnosis of primary hyperparathyroidism, chronic kidney disease, or hepatic failure conditions that independently affect Vitamin D metabolism were excluded, as were those unable to respond due to cognitive impairment or severe acute illness.

Data Collection Instrument

A structured, pre-validated questionnaire was developed by the research team and pilot-tested on 30 women outside the main study sample before use. The instrument comprised five domains: (1) sociodemographic information, including age, marital status, and educational attainment; (2) awareness of Vitamin D and its functions; (3) dietary habits and sun-exposure practices; (4) supplementation history; and (5) self-reported clinical symptoms. Interviewer-administered data collection was used to minimize literacy-related non-response.

Statistical Analysis

All data were entered and analyzed using IBM SPSS Statistics version 26.0. Descriptive statistics were applied throughout; categorical variables are presented as frequencies and percentages. No inferential comparisons were planned, as the study objective was descriptive in nature (Rizzoli *et al.*, 2019).

ETHICAL APPROVAL

The study protocol was approved by the Institutional Ethics Committee of Andhra University prior to data collection (Reference No. AUC-IEC/2024-25/012). All participants provided written informed consent before enrolment. Personal identifiers were replaced with study codes from the point of data entry, and no participant data were shared with third parties.

RESULTS

Data were collected from all 500 enrolled participants without any attrition. The demographic profile of the sample is shown in Table 1. The majority of women were married (70.6%), and a sizeable minority were widowed (22.2%). Educational attainment was fairly evenly distributed: roughly one-quarter each had no formal schooling (28.4%), primary education (24.8%), secondary education (25.2%), or higher education (23.6%).

Awareness data are presented in Table 2. Three-quarters of women (75.6%) reported having heard of Vitamin D, while the remaining 24.4% had no prior awareness of the nutrient. Of those who were aware, a much smaller proportion only 25.4% recognized supplementation as a means of obtaining Vitamin D, suggesting that general familiarity with the term does not equate to understanding of its sources or therapeutic use.

Lifestyle practices relevant to Vitamin D synthesis and intake are summarized in Table 3. Just under half the sample (48.8%) reported going outdoors daily for sunlight exposure. Regular consumption of Vitamin D-rich foods such as eggs, fish, or fortified dairy was described by only 32.8%, and weekly fish consumption a practical proxy for dietary Vitamin D intake was reported by 36.6%.

Clinical and supplementation findings appear in Table 4. Nearly half the women (47.2%) were not taking any Vitamin D supplement at the time of interview, and a striking 63.0% reported never having had their Vitamin D levels measured. The most commonly reported symptoms were fatigue (55.4%) and

Table 1: Demographic Characteristics of Postmenopausal Women Participating in the Study (*n*=500).

Variable	*n*	Percentage (%)
Marital status: Married	353	70.6
Marital status: Widowed	111	22.2
Marital status: Other	36	7.2
Education: No formal schooling	142	28.4
Education: Primary	124	24.8
Education: Secondary	126	25.2
Education: Higher	118	23.6

Note. Percentages for marital status and education level are calculated independently and do not share a common denominator. AU = Andhra University; *n*=total sample size.

Table 2: Awareness of Vitamin D among Study Participants (*n*=500).

Awareness Parameter	*n*	Percentage (%)
Had heard of Vitamin D	378	75.6
Had not heard of Vitamin D	122	24.4
Recognized supplementation as a source	127	25.4

Note. Responses to the supplementation-awareness item are drawn from the full sample (*n*=500), not restricted to those who had previously heard of Vitamin D.

Table 3: Self-Reported Lifestyle Practices Related to Vitamin D Among Study Participants (*n*=500).

Practice	*n*	Percentage (%)
Daily outdoor sunlight exposure	244	48.8
Regular consumption of Vitamin D-rich foods	164	32.8
Weekly fish consumption	183	36.6

Note. Responses reflect self-report and were not corroborated by dietary recall or objective measurement. Vitamin D-rich foods include oily fish, eggs, and fortified dairy products.

Table 4: Clinical Symptoms and Supplementation Status Among Study Participants (*n*=500).

Parameter	*n*	Percentage (%)
Not currently taking Vitamin D supplements	236	47.2
Never tested for Vitamin D deficiency	315	63.0
Self-reported fatigue	277	55.4
Self-reported joint pain	228	45.6
Awareness of Vitamin D deficiency complications	166	33.2

Note. Symptom data are based on self-report and have not been clinically verified. Awareness of complications was assessed by a direct question asking participants to name at least one recognized consequence of Vitamin D deficiency.

joint pain (45.6%), both of which are consistent with though not specific to Vitamin D insufficiency.

DISCUSSION

This study adds to a growing body of evidence documenting the persistent gap between nominal awareness and meaningful health practice in populations at elevated risk for Vitamin D deficiency. The overall rate of awareness three in four women had heard of Vitamin D may initially appear reassuring, but the supplementary data tell a different story. Fewer than one in four participants understood that supplementation is an accessible corrective option, and the rate of ever having been tested was barely above one-third (World Health Organization, 2020).

The sunlight exposure data deserve scrutiny. While 48.8% of women reported daily outdoor activity, the time and duration of such exposure was not captured in the present instrument. Existing research from the Indian subcontinent consistently shows that early-morning sun exposure-the most culturally common pattern among older women yields negligible cutaneous Vitamin D synthesis, as the relevant UVB wavelengths are effectively filtered at low solar zenith angles (Palacios and Gonzalez, 2018). The apparent adequacy of sun exposure reported here may therefore be misleading in terms of physiological effect.

Dietary intake findings were similarly concerning. Only 32.8% of participants consumed Vitamin D-rich foods with any regularity, and weekly fish intake a relatively modest target was achieved by just over one-third of the sample Table 3. These Figures are consistent with nationally reported dietary surveys in India, which identify Vitamin D as one of the most pervasively deficient micronutrients in the country's older female population (Ghosh *et al.*, 2019). The interplay between low dietary intake and suboptimal sun exposure creates a compounding deficit that cannot be corrected by either route alone (Figure 1).

The finding that 47.2% of women were not taking supplements is particularly striking given that Vitamin D supplementation is inexpensive, widely available, and carries a well-established safety profile at standard doses (Rizzoli *et al.*, 2019). The barriers are likely to be more attitudinal and informational than financial: if fewer than a quarter of women know that supplementation is an option, the expectation that they would seek it out is unrealistic. This points to a role for healthcare providers, particularly pharmacists working in community settings, in proactively counselling postmenopausal women about supplementation during routine encounters.

The virtual absence of screening with 63% never having had a serum 25-hydroxyvitamin D measurement is a systemic problem that individual education alone cannot solve. Serum testing is cheap relative to the cost of treating osteoporotic fractures, and targeted screening of postmenopausal women aligns with several international clinical guidelines. The present data suggest that such guidelines are not being implemented at the primary-care level in this region (Islam *et al.*, 2021).

The symptom burden observed here fatigue in 55.4% and joint pain in 45.6% is clinically important. These symptoms may well be multifactorial in older women, but their high prevalence in a cohort with the risk profile described raises the possibility that undiagnosed Vitamin D deficiency is contributing meaningfully to reduced quality of life. Without screening, this contribution will remain unquantified and, critically, untreated.

Several limitations should be acknowledged. The cross-sectional design precludes causal inference. Vitamin D status was not confirmed biochemically, meaning the symptom prevalence reported cannot be directly attributed to deficiency. Sampling was restricted to a single urban tertiary-care institution, which may not represent the broader postmenopausal population in rural Andhra Pradesh or in other parts of India. Finally, self-report bias may have inflated some awareness and practice estimates.

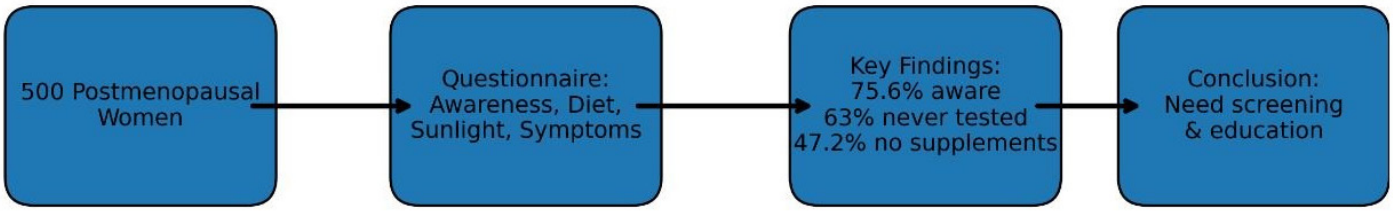

Figure 1: Graphical abstract summarizing participant recruitment, questionnaire domains, major findings, and study conclusion.

CONCLUSION

Postmenopausal women in this study carry a surface-level familiarity with Vitamin D that has not translated into protective behavior. Screening rates are very low, supplementation uptake is inadequate, and dietary and sunlight-exposure practices fall short of what would be needed to maintain sufficiency. The combination of these deficits in a population already physiologically predisposed to Vitamin D insufficiency represents a preventable public health burden. Community pharmacists, gynecologists, and primary-care physicians have a shared responsibility to integrate Vitamin D counselling and routine screening into standard postmenopausal care. Larger, multi-Centre studies incorporating biochemical confirmation of Vitamin D status are needed to quantify the true burden and to evaluate the impact of targeted interventions.

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ABBREVIATIONS

AU: Andhra University; **IEC:** Institutional Ethics Committee; **N:** Total Number of Participants in the Study Sample; **SPSS:** Statistical Package for the Social Sciences; **UVB:** Ultraviolet B Radiation; **WHO:** World Health Organization; **25(OH)D:** 25-Hydroxyvitamin D (Primary Circulating Form of Vitamin D).

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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AUTHOR CONTRIBUTIONS

A – Research concept and design; B – Collection and/or assembly of data; C – Data analysis and interpretation; D – Writing the article; E – Critical revision of the article; F – Final approval of the article. Hamid Ismail Hamid Edris: [A, B, C, D, E, F]. Moghal Habiba Maheen: [B, C, D, F]. Mukesh Kumar: [B, C, D, F]. Diwakar Kumar Sarraf: B, C, D, F. Rabin Das: [B, C, D, F].

KEY MESSAGES

- Although three-quarters of postmenopausal women in this sample were aware of Vitamin D, most lacked actionable knowledge about supplementation and dietary sources.
- Nearly two-thirds of participants had never been tested for Vitamin D deficiency, pointing to a critical gap in routine screening practice.
- The high prevalence of fatigue and joint pain in this cohort suggests that undiagnosed deficiency may be carrying a real but unquantified clinical burden.
- Targeted health education and low-cost screening programs tailored to postmenopausal women in similar settings are both justified and urgently needed.

REFERENCES

Ghosh, A., Kapoor, R., Singh, P., & Tiwari, S. (2019). Micronutrient deficiencies among older women in South Asia. *Nutrients*, *11*(12), 2995. https://doi.org/10.3390/nu11122995

Islam, M. Z., Shamim, A. A., Khatun, F., & Khair, Z. (2021). Vitamin D deficiency in South Asian women: Prevalence and associated factors. *BMC Public Health*, *21*, 1123. https://doi.org/10.1186/s12889-021-11167-7

Palacios, C., & Gonzalez, L. (2018). Is vitamin D deficiency a major global public health problem? *Journal of Steroid Biochemistry and Molecular Biology*, *175*, 138–145. https://doi.org/10.1016/j.jsbmb.2013.11.003

Rizzoli, R., Stevenson, J. C., Bauer, J. M., van Loon, L. J. C., Walrand, S., Kanis, J. A., Cooper, C., Brandi, M. L., Diez-Perez, A., & Reginster, J.-Y. (2019). The role of dietary protein and vitamin D in maintaining musculoskeletal health in postmenopausal women: A consensus statement from the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO). *Maturitas*, *76*(3), 245–255. https://doi.org/10.1016/j.maturitas.2013.07.008

World Health Organization. (2020). Decade of healthy ageing: Plan 2020–2030. WHO Press. https://www.who.int/ageing/decade-of-healthy-ageing

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