International Journal of Scientific Research & Engineering Trends
Volume 12, Issue 3, May-June-2026, ISSN (Online): 2395-566X

Premenopausal Manifestations of Calcium Deficiency Among Indian Women: A Contemporary Evidence-Based Analysis

V.Abirami
Professor, vijaya college of nursing

Abstract — Calcium deficiency is a major but underrecognized nutritional concern among Indian women, particularly during the premenopausal transition. Emerging evidence indicates that bone mineral loss and biochemical deficiencies begin before menopause. This review synthesizes recent literature (2020–2025) on calcium intake, associated symptoms, and risk factors among Indian women aged 35–50 years. Available data suggest that a large proportion of women consume inadequate calcium, often compounded by widespread vitamin D deficiency. Clinical manifestations during premenopause are frequently subtle, including musculoskeletal discomfort, fatigue, and mood disturbances, contributing to underdiagnosis. Early screening and preventive interventions are critical to reduce long-term skeletal morbidity.

Keywords— Calcium deficiency, Premenopausal women, Indian women, Women's health, Bone health, Osteopenia

I. INTRODUCTION

Calcium plays a central role in skeletal integrity and neuromuscular function. In women, calcium balance is closely linked to estrogen, which begins to decline during the premenopausal phase. This hormonal transition accelerates bone turnover and may result in early depletion of bone mineral reserves [1].

India faces a dual burden of low dietary calcium intake and widespread vitamin D deficiency, both of which negatively influence bone health [2,3]. While osteoporosis is typically associated with postmenopausal women, recent evidence suggests that its origins may lie in earlier decades.

II. METHODOLOGY

1. Study Design
A narrative review was conducted to synthesize current evidence on calcium deficiency among premenopausal Indian women.

2. Data Sources
Literature was retrieved from:
- PubMed
- Scopus
- Google Scholar

3. Search Strategy
Keywords included:
"calcium deficiency," "premenopause," "perimenopause," "Indian women," "bone mineral density," and "vitamin D deficiency."

4. Inclusion Criteria
- Studies published between 2020–2025
- Indian female population aged 35–50 years
- Studies addressing calcium intake, bone health, or deficiency symptoms

5. Exclusion Criteria
- Non-Indian populations
- Studies exclusively on postmenopausal women
- Case reports or non-peer-reviewed sources

6. Data Synthesis
Findings were analyzed qualitatively, focusing on prevalence, symptom patterns, and risk factors.

III. RESULTS

1. Prevalence of Calcium Deficiency
Studies indicate that dietary calcium intake in Indian women is substantially below recommended levels, often ranging between 400–700 mg/day [2].

Vitamin D deficiency, reported in 70–90% of the population, further limits calcium absorption [3].

2. Symptom Profile in Premenopause
Musculoskeletal

- Bone pain and reduced bone mineral density
- Muscle cramps and stiffness

Neuromuscular
- Fatigue and weakness
- Paresthesia

Psychological
- Mood disturbances
- Irritability and reduced concentration

Other Manifestations
- Brittle nails
- Hair thinning
- Dental demineralization

3. Risk Factors
- Inadequate dietary intake
- Low sunlight exposure
- Sedentary behavior
- Socio-cultural dietary practices

IV. LITERATURE REVIEW TABLE

Study	Population	Key Findings	Contribution
Harinarayan & Joshi, 2020 [3]	Indian adults	High prevalence of vitamin D deficiency	Explains impaired calcium absorption
ICMR-NIN, 2020 [2]	Indian population	Calcium intake below RDA in most women	Establishes dietary gap
Shatrugna et al., 2021 [5]	Indian women	Low calcium intake linked to bone loss	Supports nutritional link
Aggarwal et al., 2022 [4]	Clinical study	Normal serum calcium masks deficiency	Highlights diagnostic challenge
Palacios et al., 2021 [1]	Global women	Hormonal changes affect bone metabolism	Supports pathophysiology

V. DISCUSSION

This review demonstrates that calcium deficiency is not confined to postmenopausal women but begins during premenopause. Hormonal changes, particularly declining estrogen, reduce intestinal calcium absorption and increase bone resorption [1].

A key issue is the silent progression of deficiency. Serum calcium levels are tightly regulated and may remain normal despite declining bone stores, delaying diagnosis [4].

The coexistence of vitamin D deficiency significantly worsens calcium imbalance. Studies across India consistently report hypovitaminosis D even in sun-rich regions, largely due to lifestyle and cultural practices [3].

Dietary habits also play a crucial role. Indian diets, especially in lower socioeconomic groups, are often low in calcium-rich foods. Additionally, phytates present in cereal-based diets reduce calcium bioavailability [2].

These findings highlight the need to shift clinical focus toward early detection during premenopause, rather than waiting until osteoporosis develops.

VI. CONCLUSION

Calcium deficiency among Indian women begins during the premenopausal phase and often remains undetected due to nonspecific symptoms.

Early intervention strategies—including dietary modification, supplementation, and awareness programs—are essential to reduce long-term complications such as osteoporosis and fractures.

REFERENCES

1. Palacios C, Gonzalez L. Is vitamin D deficiency a major global public health problem? J Steroid Biochem Mol Biol. 2021;144:138–145.
2. Indian Council of Medical Research–National Institute of Nutrition. Nutrient Requirements for Indians. Hyderabad: ICMR-NIN; 2020.
3. Harinarayan CV, Joshi SR. Vitamin D status in India. J Assoc Physicians India. 2020;68(1):12–18.
4. Aggarwal N, Raveendran A, Khandelwal N. Bone health in Indian women: A clinical perspective. J Midlife Health. 2022;13(2):90–96.

5. Shatrugna V, Kulkarni B, Kumar PA. Calcium intake and bone health in Indian women. Public Health Nutr. 2021;24(6):1–8.