SIR Publishers
CENTER FOR INTERNATIONAL SCIENTIFIC PUBLICATIONS
JOURNAL OF NURSING AND WOMEN'S HEALTH
ISSN(Online): 2984-8083
Volume-9, Issue-02, Published |09-04-2026|

THE IMPACT OF VITAMIN D DEFICIENCY ON THE SKELETAL AND REPRODUCTIVE SYSTEMS IN WOMEN

Tillayeva Zarina Zafarbekovna
zarina_tillyayeva@tues.uz
https://orcid.org/0009-0000-9394-5326
Tursunov Asomiddin Nuriddinovich
Jorayev Shoberdi Zafar òğli
Odiljonov Ozodbek Odiljonovich
Odiljonnorkulov0@gmail.com
https://orcid.org/0009-0000-4932-4354
Termez University of Economics and Service
Faculty of Medicine

ABSTRACT

Vitamin D deficiency is a widespread global health problem, particularly among women of reproductive age. It plays a critical role not only in calcium homeostasis and bone metabolism but also in reproductive health through its influence on hormonal regulation, ovarian function, and immune modulation. Deficiency of vitamin D has been associated with osteoporosis, increased fracture risk, menstrual irregularities, infertility, and conditions such as polycystic ovary syndrome (PCOS) and endometriosis. This article aims to evaluate the effects of vitamin D deficiency on the skeletal and reproductive systems in women, highlighting underlying mechanisms, clinical implications, and management strategies. The findings emphasize the importance of early screening and adequate supplementation.

Keywords: vitamin D deficiency, osteoporosis, reproductive health, infertility, PCOS, calcium metabolism

INTRODUCTION

Vitamin D is a fat-soluble vitamin essential for maintaining calcium and phosphorus balance and ensuring proper bone mineralization. Beyond its classical role in bone health, vitamin D is now recognized as a hormone-like substance that influences multiple physiological systems.

According to the World Health Organization, vitamin D deficiency affects more than one billion people worldwide, with women being particularly vulnerable due to lifestyle, cultural, and physiological factors.

Vitamin D deficiency is commonly defined as:

- Serum 25(OH)D < 20 ng/mL

In women, deficiency impacts both:

- Skeletal system (bone density, fractures)
- Reproductive system (hormonal balance, fertility)

Understanding these effects is essential for improving women’s health outcomes.

MATERIALS AND METHODS

This article is based on a narrative review of scientific literature from PubMed, Scopus, and Web of Science.

Inclusion Criteria:

- Studies published between 2010 and 2024
- Women of reproductive and postmenopausal age
- Studies focusing on vitamin D and bone/reproductive health

Diagnostic Methods:

- Serum 25-hydroxyvitamin D levels

SIR Publishers
CENTER FOR INTERNATIONAL SCIENTIFIC PUBLICATIONS
JOURNAL OF NURSING AND WOMEN'S HEALTH
ISSN(Online): 2984-8083
Volume-9, Issue-02, Published |09-04-2026|

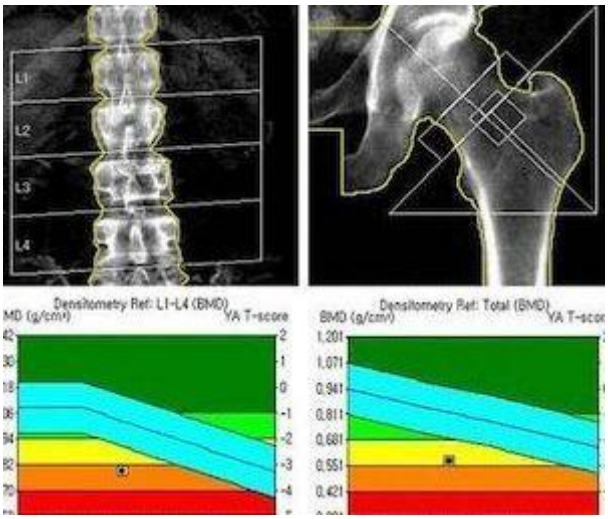
- Bone mineral density (DEXA scan)
- Hormonal profile

RESULTS

1. Epidemiology of Vitamin D Deficiency

Vitamin D deficiency is highly prevalent globally:

- Up to 50–80% in some populations
- Higher rates in women due to limited sun exposure



2. Effects on the Skeletal System

a. Calcium and Bone Metabolism

Vitamin D enhances intestinal absorption of calcium and phosphorus. Deficiency leads to:

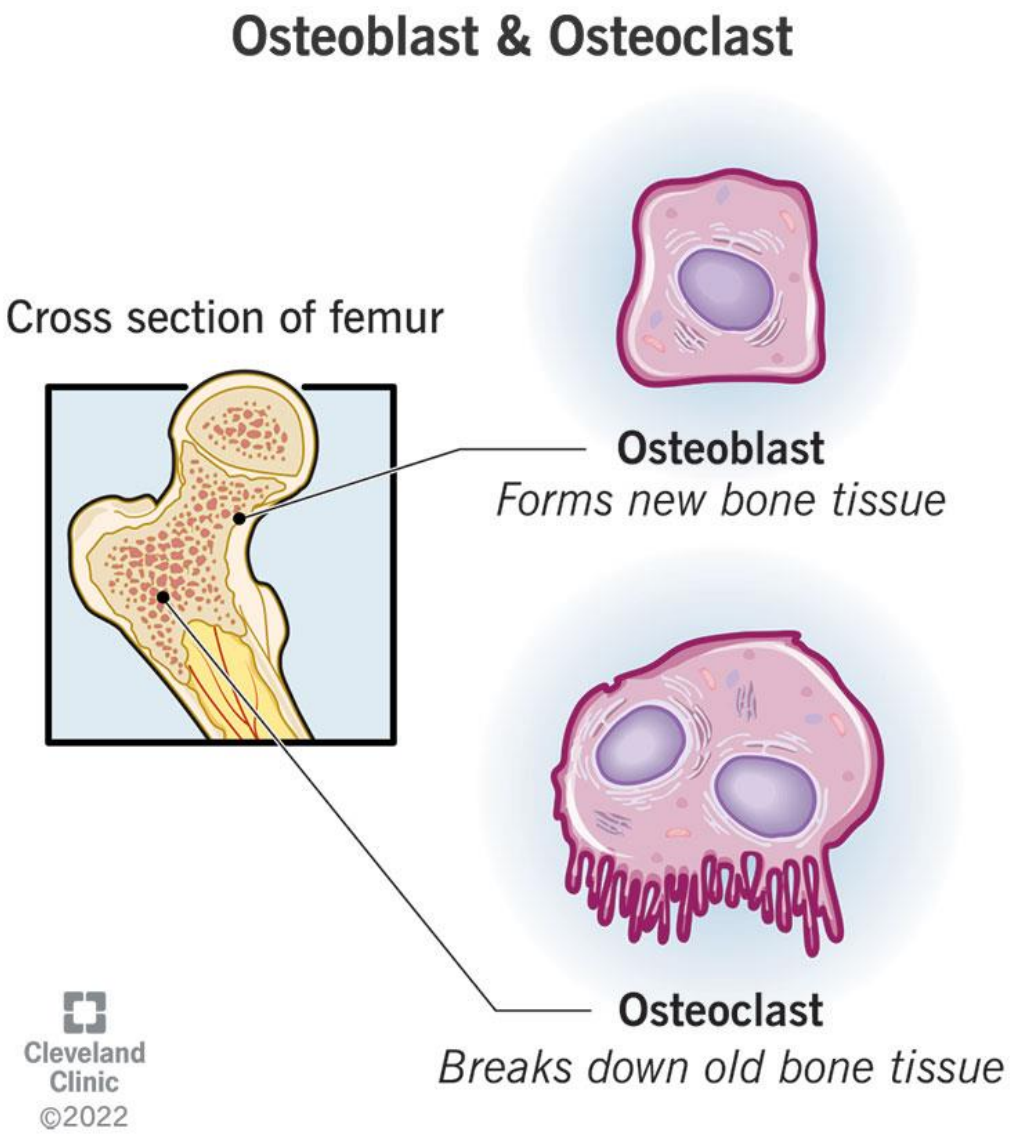
- Hypocalcemia
- Secondary hyperparathyroidism
- Bone demineralization

b. Osteoporosis and Fractures

Chronic deficiency contributes to:

- Reduced bone mineral density
- Increased risk of Osteoporosis
- Fragility fractures

JOURNAL OF NURSING AND WOMEN'S HEALTH
ISSN(Online): 2984-8083
Volume-9, Issue-02, Published |09-04-2026|



3. Effects on the Reproductive System

a. Hormonal Regulation

Vitamin D receptors are present in reproductive tissues (ovaries, uterus, placenta). Deficiency affects:

- Estrogen production
- Follicular development
- Ovulation

b. Polycystic Ovary Syndrome (PCOS)

Vitamin D deficiency is commonly observed in women with Polycystic Ovary Syndrome and is associated with:

- Insulin resistance
- Hyperandrogenism
- Menstrual irregularities

c. Infertility

Low vitamin D levels are linked to:

- Poor oocyte quality

SIR Publishers
CENTER FOR INTERNATIONAL SCIENTIFIC PUBLICATIONS
JOURNAL OF NURSING AND WOMEN'S HEALTH
ISSN(Online): 2984-8083
Volume-9, Issue-02, Published |09-04-2026|

- Implantation failure
- Reduced success of assisted reproductive techniques

d. Pregnancy Outcomes

Vitamin D deficiency during pregnancy is associated with:

- Preeclampsia
- Gestational diabetes
- Low birth weight

4. Pathophysiological Mechanisms

a. Immune Modulation

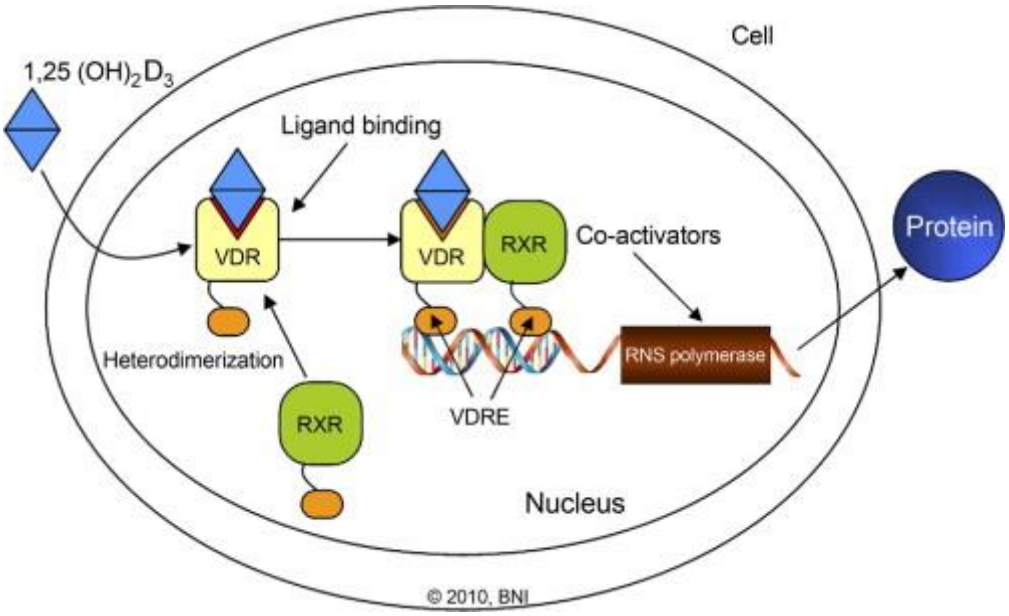
Vitamin D regulates immune responses and reduces inflammation.

b. Insulin Sensitivity

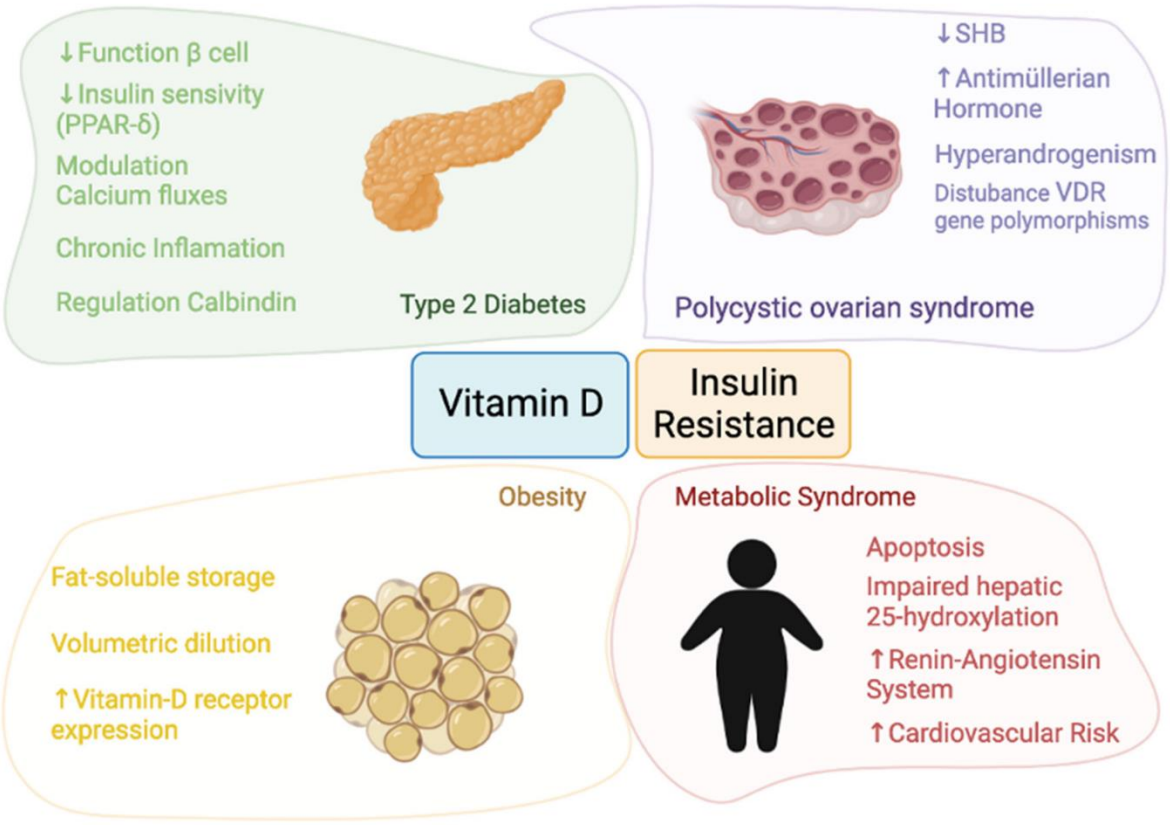
Deficiency contributes to insulin resistance, affecting reproductive hormones.

c. Gene Regulation

Vitamin D influences gene expression involved in cell growth and differentiation.



SIR Publishers
CENTER FOR INTERNATIONAL SCIENTIFIC PUBLICATIONS
JOURNAL OF NURSING AND WOMEN'S HEALTH
ISSN(Online): 2984-8083
Volume-9, Issue-02, Published |09-04-2026|



5. Clinical Manifestations

Skeletal Symptoms:

- Bone pain
- Muscle weakness
- Fractures

Reproductive Symptoms:

- Irregular menstruation
- Infertility
- PCOS features

6. Diagnosis and Management

Diagnosis:

- Serum 25(OH)D levels
- DEXA scan (bone density)

Management:

- Vitamin D supplementation
- Calcium intake
- Sun exposure

Recommended Intake:

- 800–2000 IU/day (depending on deficiency severity)

DISCUSSION

Vitamin D deficiency has a dual impact on skeletal and reproductive health. It contributes to bone loss and fractures while also impairing reproductive function through hormonal and metabolic pathways.

Early screening, especially in high-risk women, is crucial. Supplementation has been shown to improve bone density and reproductive outcomes.

JOURNAL OF NURSING AND WOMEN'S HEALTH
ISSN(Online): 2984-8083
Volume-9, Issue-02, Published |09-04-2026|

CONCLUSION

Vitamin D plays a vital role in maintaining both skeletal integrity and reproductive health in women. Its deficiency leads to significant clinical consequences, including osteoporosis and infertility. Early diagnosis and appropriate supplementation are essential to improve health outcomes.

REFERENCES

1. World Health Organization (2022). *Vitamin D deficiency report*.
2. Holick MF. (2007). Vitamin D deficiency. *New England Journal of Medicine*.
3. Rosen CJ et al. (2012). Vitamin D and bone health.
4. Lerchbaum E, Obermayer-Pietsch B. (2012). Vitamin D and fertility. *European Journal of Endocrinology*
5. Muscogiuri G et al. (2017). Vitamin D and PCOS.
6. Palacios C, Gonzalez L. (2014). Vitamin D worldwide status.
7. Bischoff-Ferrari HA. (2005). Vitamin D and fractures.
8. Aghajafari F et al. (2013). Vitamin D and pregnancy.
9. NIH (2021). Vitamin D guidelines
10. Endocrine Society (2011). Clinical practice guideline