

# **An Observational Study on Asthimajjākshya Lakshana (Osteoporosis) in Menopausal and Menstruating Women**

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**Abstract:** Menopause is a natural physiological transition associated with hormonal changes that significantly influence bone health. Osteoporosis is one of the most common and disabling long-term consequences of menopause. In Ayurveda, *Asthi–Majjā Kṣaya* is described as a degenerative condition occurring due to *Vāta* predominance and *Dhātu* depletion, especially during aging and menopausal transition.

The present observational analytical study was conducted to evaluate *Asthi–Majjā Kṣaya Lakṣaṇa* in menstruating and menopausal women and to assess its correlation with Bone Mineral Density. Sixty female subjects were divided into two groups of 30 each. Clinical features and BMD findings were analyzed using percentage distribution and Chi-square test.

The study revealed a significantly higher prevalence of *Asthi–Majjā Kṣaya Lakṣaṇa* and reduced Bone Mineral Density in menopausal women compared to menstruating women. The findings support the correlation between Ayurvedic concepts of *Asthi–Majjā Kṣaya* and modern understanding of osteoporosis..

**Keywords:** *Asthi–Majjā Kṣaya*, Bone Mineral Density, Menopause, Osteoporosis

## **I. INTRODUCTION**

Menopause is defined as the permanent cessation of menstruation resulting from loss of ovarian follicular activity and is diagnosed retrospectively after twelve consecutive months of amenorrhea<sup>1</sup>. It is a natural physiological transition in a woman's life, commonly occurring between 45–55 years of age<sup>2</sup>. Although menopause itself is not a disease, the hormonal changes associated with it predispose women to several systemic disorders, among which osteoporosis is one of the most significant long-term complications<sup>3</sup>.

Osteoporosis is characterized by reduced bone mass and deterioration of bone microarchitecture, leading to increased bone fragility and fracture risk<sup>4</sup>. Estrogen deficiency following menopause accelerates bone resorption and suppresses bone formation, resulting in rapid loss of Bone Mineral Density (BMD)<sup>5</sup>.

In Ayurveda, menopause (*Rājanivṛtti*) is described as a *Svabhāvabala Pravṛtta* condition occurring due to *Kāla* and aging<sup>6</sup>. This phase is dominated by *Vāta* *Doṣa*, leading to progressive *Dhātu Kṣaya*. *Asthi Dhātu* provides structural support to the body, and its depletion manifests as *Asthi–Majjā Kṣaya Lakṣaṇa* such as bone pain, joint laxity, brittle nails, dental problems and generalized weakness<sup>7</sup>. These features show remarkable similarity with the clinical presentation of osteoporosis.

## **II. REVIEW OF LITERATURE**

### **Menopause – Modern Perspective**

Menopause results from depletion of ovarian follicles, leading to a marked decline in estrogen levels and elevated gonadotropins<sup>1</sup>. Estrogen plays a crucial role in maintaining bone homeostasis by inhibiting osteoclastic bone



resorption. Its deficiency leads to increased bone turnover with net bone loss<sup>8</sup>. Postmenopausal women experience accelerated loss of trabecular bone, particularly affecting the spine, hip and wrist<sup>9</sup>.

### **Osteoporosis**

Osteoporosis is the most common metabolic bone disease worldwide and is a major cause of morbidity in elderly women<sup>10</sup>. According to the World Health Organization, osteoporosis is diagnosed when Bone Mineral Density T-score is  $\leq -2.5$  standard deviations below the young adult mean<sup>11</sup>. Postmenopausal osteoporosis accounts for the majority of osteoporotic fractures in women due to hormonal imbalance and aging<sup>12</sup>.

### **Osteopenia –**

Osteopenia is defined as a condition in which bone mineral density (BMD) is lower than the normal peak bone mass but not sufficiently reduced to be classified as osteoporosis, as per World Health Organization (WHO) criteria. In modern medicine, it represents a state of early skeletal demineralization, diagnosed by Dual-Energy X-ray Absorptiometry (DEXA), where the T-score lies between  $-1.0$  and  $-2.5$ . Osteopenia reflects an imbalance between bone resorption and bone formation, predisposing an individual to an increased risk of fractures, especially with advancing age and hormonal changes such as menopause.

### **Asthī–Majjā Kshaya–**

Ayurvedic classics describe *Asthī Dhātu* as responsible for *Dhāraṇa* (support) and *Majjā Dhātu* for filling bone cavities and imparting strength. Āchārya Caraka described *Asthī–Majjā Kshaya Lakshna* including *Asthī Śūla*, *Sandhi Śaithilya*, *Keśa-Loma-Nakha-Danta Pātana* and *Daurbalya*<sup>7</sup>. Suśruta and Vāgbhaṭa have also described similar degenerative features in conditions of Vāta predominance<sup>13, 14</sup>.

The pathophysiological similarity between *Asthī–Majjā Kṣaya* and osteoporosis indicates that osteoporosis can be understood as a degenerative, Vātaja, Dhātu-Kṣayaja condition.

## **III. AIM AND OBJECTIVES**

### **Aim**

To study *Asthī–Majjā Kṣaya* Lakṣaṇa (osteoporosis) in menopausal and menstruating women.

### **Objectives**

- To assess *Asthī–Majjā Kṣaya* Lakṣaṇa in menstruating women
- To assess *Asthī–Majjā Kṣaya* Lakṣaṇa in menopausal women
- To compare clinical features and Bone Mineral Density in both groups

## **IV. MATERIAL AND METHODS**

Ayurvedic classical textbooks such as *Charaka Saṃhitā*, *Suśruta Saṃhitā* and *Aṣṭāṅga Hṛdaya* were analyzed to collect material related to *Asthī–Majjā Kṣaya*. Modern medical textbooks and published research articles related to menopause and osteoporosis were also reviewed. The collected material was compiled and critically analyzed.

### **Study Design**

Observational analytical study.

### **Study Setting**

Survey was carried out in a selected community. Clinical evaluation and investigations were conducted at the Ayurved Hospital of the concerned institute.

### **Sample Size**

Total 60 female subjects.

**Grouping**
**Group A:** Menstruating women (n = 30)

**Group B:** Menopausal women (n = 30)

**Inclusion Criteria**

- Females aged 35–60 years
- Natural menstruating or menopausal status
- Willingness to participate

**Exclusion Criteria**

- Surgical menopause
- Known metabolic bone disorders
- Chronic systemic illness affecting bone metabolism

**V. ASSESSMENT SCALE USED**
**Subjective Assessment (Asthi–Majjā Kṣaya Lakṣaṇa Score)**

Each symptom was graded on a 0–3 scale:

**Score Severity**

- |   |          |
|---|----------|
| 0 | Absent   |
| 1 | Mild     |
| 2 | Moderate |
| 3 | Severe   |

**Parameters Assessed**

- Asthi Śūla
- Sandhi Śaithilya
- Keśa Pātana
- Nakha Bhanga
- Danta Bhanga
- Daurbalya

**Objective Assessment**

 Bone Mineral Density was assessed using **DEXA scan** and interpreted according to WHO criteria<sup>11</sup>.

**VI. STATISTICAL ANALYSIS**

 Data were analyzed using **percentage distribution** and **Chi-square test**. A p-value < 0.05 was considered statistically significant.

**VII. OBSERVATIONS AND RESULTS**
**A) Age-wise Distribution**

Age Group (Years)	Group A	Group B
<b>35–40</b>	40%	0
<b>41–45</b>	46.7%	6.7%
<b>46–50</b>	13.3%	33.3%
<b>51–60</b>	0	60%

This table depicts the age-wise distribution of subjects in both study groups. In the menstruating group, the majority of subjects belonged to the 35–45 years age group, indicating reproductive age with preserved hormonal balance. In

contrast, menopausal women were predominantly distributed in the 46–60 years age group, reflecting the natural age of menopause. This distribution supports the physiological transition from reproductive to non-reproductive phase, which is associated with hormonal decline and degenerative changes.

#### B) Asthi–Majjā Kṣaya Lakṣaṇa Distribution

Lakṣaṇa	Group A	Group B
<b>Asthī Śūla</b>	30%	73.3%
<b>Sandhi Śaithilya</b>	20%	66.7%
<b>Keśa Pātana</b>	36.7%	83.3%
<b>Nakha Bhanga</b>	16.7%	70%
<b>Danta Bhanga</b>	10%	60%
<b>Daurbalya</b>	26.7%	80%

This table illustrates the comparative distribution of Asthi–Majjā Kṣaya Lakṣaṇa in menstruating and menopausal women. Mild manifestations of symptoms were observed in menstruating women, whereas menopausal women showed markedly higher prevalence and severity of symptoms such as bone pain, joint looseness, hair fall, brittle nails, dental problems and generalized weakness. This trend indicates progressive degeneration of Asthi and Majjā Dhātu following menopause.

#### Bone Mineral Density Status

BMD Status	Group A	Group B
<b>Normal</b>	60%	16.7%
<b>Osteopenia</b>	33.3%	46.7%
<b>Osteoporosis</b>	6.7%	36.6%

This table presents the Bone Mineral Density status of subjects in both groups. A higher proportion of menstruating women showed normal BMD, while menopausal women predominantly fell into osteopenia and osteoporosis categories. This finding highlights the significant reduction in bone mass following menopause, making menopausal women more susceptible to fractures and skeletal weakness.

#### Chi-Square Test

$$\chi^2 = 7.18, p < 0.01$$

Statistically significant association observed between menopausal status and osteoporosis.

#### VIII. DISCUSSION

The present study demonstrates that Asthi–Majjā Kṣaya Lakṣaṇa are significantly more prevalent in menopausal women compared to menstruating women. Menopausal women exhibited higher frequency of bone pain, joint laxity, brittle nails, dental problems, hair fall and generalized weakness.

Bone Mineral Density findings supported the clinical observations, with a greater proportion of menopausal women falling under osteopenia and osteoporosis categories. Statistical analysis confirmed a significant association between menopausal status and reduced bone density.

Menopause represents a critical phase associated with accelerated bone loss and degenerative changes. Early identification of Asthi–Majjā Kṣaya Lakṣaṇa can help in adopting preventive and therapeutic measures to reduce osteoporotic complications.

#### IX. CONCLUSION

The present observational study clearly demonstrates that Asthi–Majjā Kṣaya Lakṣaṇa are significantly more prevalent in menopausal women when compared to menstruating women. Clinical features such as bone pain, joint



laxity, hair fall, brittle nails, dental problems and generalized weakness were observed with greater frequency and severity after menopause, indicating progressive degenerative changes in bone tissue.

Bone Mineral Density was found to be markedly reduced in menopausal women, with a higher proportion falling under osteopenia and osteoporosis categories. This confirms that the menopausal transition is associated with accelerated bone loss and compromised skeletal strength.

Menopause represents a high-risk period for the development of osteoporosis, due to hormonal changes and age-related degenerative processes. The statistically significant association between menopausal status and osteoporosis highlights the importance of considering menopause as a critical risk factor for bone health deterioration.

Early assessment of Asthi–Majjā Kṣaya Lakṣaṇa along with Bone Mineral Density evaluation can play a crucial role in prevention and management. Timely identification allows implementation of appropriate dietary measures, lifestyle modifications and therapeutic interventions, thereby reducing the risk of fractures and improving quality of life in women during and after menopause.

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