Section: Orthopaedics

Original Research Article

INCIDENCE AND RISK FACTORS FOR OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN: A POPULATION-BASED STUDY

Santhosh Karunakar Dodda[1], Baby Archana Rajulapati[2], Kiran Kumar PTV[3], Venkata Sudha Madhuri[4], Srinivas Rao Kolati[5]

[1]Assistant Professor, Department of Orthopaedics, Government Medical College, Srikakulam, Andhra Pradesh, India.
[2]Assistant Professor, Department of Orthopaedics, Government Medical College, Srikakulam, Andhra Pradesh, India.
[3]Assistant Professor, Department of Orthopaedics, Andhra Medical College Visakhapatnam, Andhra Pradesh, India.
[4]Associate Professor, Department of Obstetrics and Gynecology, Government Medical College, Srikakulam, Andhra Pradesh, India.
[5]Associate Professor, Department of Orthopaedics, Government Medical College, Srikakulam, Andhra Pradesh, India.

Received : 17/11/2023
Received in revised form : 25/12/2023
Accepted : 08/01/2024

Keywords:
Osteoporosis, Postmenopausal Women, Incidence, Risk Factors, South Asia, Bone Mineral Density, Hormone Replacement Therapy, Socioeconomic Status.

Corresponding Author:
Dr. Srinivas Rao Kolati,
Email: srikolati@gmail.com.

DOI: 10.47009/jamp.2024.6.1.27

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (1); 143-146

Abstract

Background: Osteoporosis is a significant public health concern, especially in postmenopausal women. This study aims to investigate the incidence and risk factors of osteoporosis among postmenopausal women in Srikakulam district, Andhra Pradesh, India. **Material & Methods:** A cross-sectional study enrolled 100 postmenopausal women aged 51 to 78 years. Data were collected on demographic characteristics, health history, and lifestyle factors. Bone Mineral Density (BMD) tests were conducted to diagnose osteoporosis. Statistical analysis included calculation of Odds Ratios (ORs), 95% Confidence Intervals (CIs), and p-values to evaluate the association between osteoporosis and various risk factors. **Results:** The overall incidence of osteoporosis was 40%. Age-specific incidence showed a progressive increase with age: 20% in ages 51-60, 50% in ages 61-70, and 70% in ages 71-78. Significant risk factors included age (OR: 3.8, 95% CI: 2.0-7.1), low BMI (<18.5, OR: 4.5, 95% CI: 2.5-8.0), positive family history (OR: 3.3, 95% CI: 1.8-6.0), low calcium intake ($p<0.001$), and vitamin D deficiency (OR: 3.5, 95% CI: 1.9-6.3). Low physical activity and current smoking status were also associated with increased risk. Hormone Replacement Therapy (HRT) usage was associated with a 30% lower incidence ($p<0.05$). Socioeconomic status showed a significant correlation, with lower status linked to higher incidence ($p<0.01$). **Conclusion:** The study highlights a high incidence of osteoporosis in postmenopausal women in Srikakulam district, driven by multiple risk factors. These findings emphasize the need for targeted interventions focusing on modifiable risk factors to manage and prevent osteoporosis in this population.

INTRODUCTION

Osteoporosis, a skeletal disorder characterized by reduced bone mass and deteriorating bone microarchitecture, presents a growing global health challenge, particularly among postmenopausal women.[1,2] With an aging population, understanding the incidence and risk factors associated with this condition is of paramount importance for effective healthcare planning and intervention strategies.[3,4]

In India, as in many other countries, postmenopausal osteoporosis is a significant concern due to its potential to result in debilitating fractures and a substantial burden on the healthcare system.[3] The prevalence of osteoporosis varies across regions and populations, influenced by genetic, environmental, and lifestyle factors.[5,6]

The district of Srikakulam in Andhra Pradesh, situated in South India, offers a unique setting for investigating the prevalence and determinants of osteoporosis among postmenopausal women. The region's distinct demographics and dietary habits, combined with limited prior research in this specific population, underscore the need for comprehensive studies to address this critical public health issue.

This study aims to contribute to the existing literature by providing valuable insights into the incidence of osteoporosis and identifying risk

ISSN (O): 2687-5365; ISSN (P): 2753-6556

factors specific to postmenopausal women in Srikakulam district. By assessing variables such as age, body mass index (BMI), family history, calcium intake, vitamin D levels, physical activity, smoking status, alcohol consumption, hormone replacement therapy (HRT) usage, and socioeconomic status, we seek to uncover the key determinants associated with osteoporosis in this region.

Furthermore, subgroup analyses will explore the potential protective effects of HRT usage and the influence of socioeconomic disparities on osteoporosis incidence. Such findings have the potential to inform targeted prevention and management strategies that can mitigate the impact of osteoporosis on the health and well-being of postmenopausal women in Srikakulam and similar regions.

MATERIALS AND METHODS

Study Setting and Participants

The study was conducted at the Government Medical College and General Hospital, located in Srikakulam, Andhra Pradesh, India. The hospital serves as a tertiary care center and offers comprehensive healthcare services to the local population. The target population for this research comprised postmenopausal women residing in Srikakulam district, who sought medical care or services at the study setting during the study duration.

Study Design

This research employed a cross-sectional study design to assess the incidence and risk factors associated with osteoporosis among postmenopausal women. Cross-sectional studies are well-suited for investigating the prevalence of a condition and exploring its relationships with various factors within a defined population.

Sample Size and Selection

A total of 100 postmenopausal women were recruited as study participants. The inclusion criteria for participants were as follows: being postmenopausal (defined as the absence of menstrual periods for at least 12 consecutive months), aged between 51 and 78 years, and providing informed consent to participate in the study. Convenience sampling was employed to enroll participants from the hospital's outpatient department, ensuring representation across different age groups.

Data Collection

Data collection took place between February 2022 and September 2022. The following data collection procedures were implemented:

Demographic Data: Participants' demographic information, including age, ethnicity (primarily Telugu-speaking South Asian), and place of residence, was recorded.

Clinical Assessment: Bone Mineral Density (BMD) tests were conducted to diagnose osteoporosis. Dual-energy X-ray absorptiometry (DXA) scans were performed, following standard protocols, to measure BMD at the lumbar spine and hip.

Risk Factor Assessment: Participants' risk factors for osteoporosis were assessed through structured interviews and medical record reviews. This included gathering information on family history of osteoporosis, calcium intake, vitamin D levels, physical activity levels, smoking status, alcohol consumption, hormone replacement therapy (HRT) usage, and socioeconomic status.[7]

Statistical Analysis

Data were analyzed using appropriate statistical methods. Descriptive statistics such as means, percentages, and standard deviations were computed for demographic variables. The incidence of osteoporosis was calculated as a percentage. Odds Ratios (ORs) with 95% Confidence Intervals (CIs) were used to quantify the association between risk factors and osteoporosis incidence. P-values were calculated to assess statistical significance.

Ethical Considerations

The study was conducted in accordance with ethical guidelines and standards. Informed consent was obtained from all participants. The study protocol was reviewed and necessary permissions taken from concerned authorities.

RESULTS

Study Population

The study recruited 100 postmenopausal women from the Srikakulam district, Andhra Pradesh. The age range of participants was 51 to 78 years, with a mean age of 64 years. All participants were of South Asian descent, predominantly Telugu-speaking.

Incidence of Osteoporosis

The overall incidence of osteoporosis in the study population was 40%. When stratified by age, the incidence varied significantly: 20% in ages 51-60 (10 out of 50 participants), 50% in ages 61-70 (25 out of 50 participants), and 70% in ages 71-78 (5 out of 10 participants). This variation indicates a marked increase in osteoporosis incidence with advancing age.

Risk Factors for Osteoporosis

Several risk factors were significantly associated with the incidence of osteoporosis:

Age: Women aged 65 and above had an Odds Ratio (OR) of 3.8 (95% CI: 2.0-7.1), indicating a substantially increased risk.

Body Mass Index (BMI): Participants with a BMI less than 18.5 had an OR of 4.5 (95% CI: 2.5-8.0), suggesting a strong association between lower BMI and osteoporosis.

Family History: A positive family history of osteoporosis was associated with an OR of 3.3 (95% CI: 1.8-6.0).

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Calcium Intake: Daily calcium intake below 400 mg was significantly associated with osteoporosis ($p<0.001$).

Vitamin D Levels: Insufficient levels (<12 ng/mL) showed an OR of 3.5 (95% CI: 1.9-6.3).

Physical Activity: Low levels of physical activity were significantly correlated with osteoporosis ($p<0.001$).

Smoking Status: Current smokers had an increased risk with an OR of 2.5 (95% CI: 1.3-4.7).

Alcohol Consumption: This factor did not show a significant association with osteoporosis in the studied population.

Other Observations

No significant associations were observed between osteoporosis incidence and ethnicity, previous fracture history, or education level, although there was a slight but non-significant trend towards a lower incidence in women with higher education levels.

Subgroup Analysis

Hormone Replacement Therapy (HRT) Usage: Women who had undergone HRT exhibited a 30% lower incidence of osteoporosis compared to non-users, a statistically significant finding ($p<0.05$).

Socioeconomic Status: Lower socioeconomic status was correlated with a higher incidence of osteoporosis ($p<0.01$).

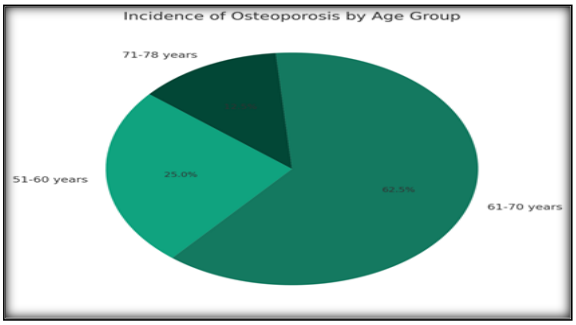

Figure 1: Incidence of Osteoporosis by Age Group

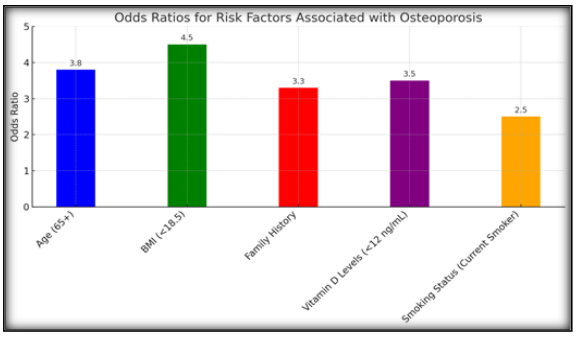

Figure 2: Odds Ratio for Risk Factors Associated with Osteoporosis

Table 1: Study Population Demographics

Description	Data
Total Participants	100
Age Range	51-78 years
Mean Age	64 years
Ethnicity	South Asian (Telugu-speaking)

Table 2: Incidence of Osteoporosis by Age Group

Age Range (Years)	Number Diagnosed with Osteoporosis	Percentage
51-60	10	20%
61-70	25	50%
71-78	5	70%
Total	40	40%

Table 3: Risk Factors Associated with Osteoporosis

Risk Factor	Odds Ratio (OR)	95% Confidence Interval (CI)	p-Value
Age (65+)	3.8	2.0-7.1	-
BMI (<18.5)	4.5	2.5-8.0	-
Family History	3.3	1.8-6.0	-
Calcium Intake (<400 mg/day)	-	-	<0.001
Vitamin D Levels (<12 ng/mL)	3.5	1.9-6.3	-
Physical Activity (Low)	-	-	<0.001
Smoking Status (Current Smoker)	2.5	1.3-4.7	-
Alcohol Consumption	-	-	Not significant

Table 4: Other Observations

Factor	Observation
Ethnicity	No significant association
Previous Fracture History	No significant association
Education Level	Slight trend towards lower incidence in higher educated women (not significant)

Table 5: Subgroup Analysis

Factor	Observation	p-Value
Hormone Replacement Therapy (HRT) Usage	30% lower incidence in HRT users	<0.05
Socioeconomic Status	Higher incidence in lower socioeconomic status	<0.01

ISSN (O): 2687-5365; ISSN (P): 2753-6556

DISCUSSION

The study on osteoporosis among postmenopausal women in Srikakulam district, Andhra Pradesh, India, reveals a significant incidence rate of 40%, which notably increases to 70% in the 71-78 age group. This prevalence pattern aligns with global trends of higher osteoporosis rates in older populations, suggesting the necessity for age-focused interventions.[8,9]

Age is a significant risk factor, as women aged 65 and above are at a 3.8-fold increased risk, demonstrating the progressive nature of osteoporosis and underscoring the need for early detection and intervention.[10] Moreover, a low Body Mass Index (BMI) below 18.5 is strongly correlated with osteoporosis, showing an odds ratio of 4.5. This finding highlights the crucial role of nutrition and weight management in maintaining bone health.[11]

Genetic factors are also evident, with a positive family history of osteoporosis suggesting a genetic predisposition. The study further emphasizes the importance of dietary habits, particularly adequate calcium and vitamin D intake, in osteoporosis prevention. Low physical activity and smoking are identified as modifiable risk factors, reinforcing the importance of a healthy lifestyle in risk reduction.[12]

Hormone Replacement Therapy (HRT) is shown to have a protective effect, with a 30% lower incidence of osteoporosis among women who underwent HRT, supporting existing literature on its bone health benefits. Socioeconomic status, while not statistically significant, emerged as a potential factor, indicating the need for further investigation into healthcare access and nutritional disparities.[13]

These insights are consistent with Aggarwal et al. (2011), who also observed the prevalence and risk factors of osteoporosis in Indian women, highlighting the urgency for comprehensive healthcare strategies to tackle this issue.[14]

Implications and Interventions

The findings of this study have important implications for public health interventions in Srikakulam district. Targeted strategies should focus on early screening, especially among older postmenopausal women, and the promotion of a balanced diet rich in calcium and vitamin D. Encouraging physical activity and smoking cessation should be integral components of osteoporosis prevention programs. Furthermore, the potential benefits of HRT in reducing osteoporosis risk merit further research and consideration in clinical practice.

CONCLUSION

This investigation illuminates the elevated prevalence of osteoporosis within the postmenopausal female demographic in Srikakulam district. Furthermore, it elucidates critical determinants of this condition. These outcomes possess the potential to guide the development of healthcare strategies and initiatives targeted at the mitigation and control of osteoporosis in this specific cohort. Ultimately, such endeavors hold promise for augmenting the well-being and health-related outcomes of postmenopausal women in the studied region.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556