



Effect of Educational Intervention on Knowledge Regarding Osteoporosis Among Hospitalized Middle-Aged Women in Bengaluru

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Abstract

Osteoporosis is a major public health concern among middle-aged and postmenopausal women, characterized by low bone mass and an increased risk of fractures. To address this issue, a study was conducted to assess the effectiveness of a structured teaching programme (STP) on knowledge regarding osteoporosis among middle-aged women admitted to Jayanagar General Hospital, Bengaluru. Using a pre-experimental one-group pre-test post-test design, 60 women aged 40–60 years were selected through purposive sampling. Data were collected using a structured knowledge questionnaire on osteoporosis, followed by the administration of the STP, with a post-test conducted after seven days. The findings revealed that the pre-test mean knowledge score was 11.45 (SD = 3.26), while the post-test mean increased to 22.18 (SD = 2.97), showing a mean difference of 10.73, which was statistically significant ($t = 18.94$, $p < 0.001$). This indicates a marked improvement in knowledge following the intervention, with no significant association between pre-test knowledge and selected demographic variables. The study concludes that the structured teaching programme was highly effective in enhancing knowledge about osteoporosis among middle-aged women, emphasizing the importance of incorporating health education into hospital and community health programs to promote bone health and preventive practices.

Keywords: Osteoporosis, Structured Teaching Programme, Middle-Aged Women, Knowledge, Prevention, Health Education

Introduction

Osteoporosis is a systemic skeletal disorder characterized by low bone mass and microarchitectural deterioration of bone tissue, which increases bone fragility and susceptibility to fractures. It is often clinically silent until a fragility fracture occurs, making early detection and primary prevention essential. Fragility fractures are an increasing global public-health problem; recent global estimates show a large and rising burden of fractures and long-term disability attributable to musculoskeletal conditions. (Bill & Foundation, 2019; Borgström et al., 2020)

Women are disproportionately affected by osteoporosis: worldwide, about one in three women over age 50 will experience an osteoporosis-related fracture during their lifetime (Clynes et al., 2020). In India the burden is substantial and heterogeneous across regions — large-scale analyses and recent reviews report wide prevalence ranges (osteopenia and osteoporosis together affecting a substantial proportion of middle-aged and older women, with many studies documenting low awareness of the disease and its preventable risk factors among Indian women. These data indicate both a high population at risk and sizeable gaps in knowledge and prevention practices. (Babhulkar & Seth, 2021; Gopinathan et al., 2016).

Educational interventions that increase knowledge about osteoporosis risk factors (calcium/vitamin D intake, weight-bearing exercise, fall prevention, and screening) have been shown in various settings to improve awareness, health beliefs, and some preventive behaviors. Studies from multiple countries and settings — including randomized and quasi-experimental trials — report that structured education can significantly raise osteoporosis knowledge scores and influence behavior change, suggesting education is a viable component of prevention strategies. However, evidence from hospital-based interventions targeting hospitalized, middle-aged women in urban Indian settings (a group often reachable during inpatient care) remains limited. (Winzenberg et al., 2005 ; Jeihooni et al., 2015; Najafi et al., 2024).

Need and significance of the study

Osteoporosis and fragility fractures are major public health concerns causing substantial morbidity, functional dependency, and economic burden on healthcare systems. As the disease is largely asymptomatic until a fracture occurs, preventive strategies must focus on enhancing public knowledge and modifying risk factors early, particularly among women approaching or in midlife when bone loss accelerates (World Health Organization, 2024).

In India, studies have reported a high prevalence of osteopenia and osteoporosis among adult women, with considerable regional variation and low levels of awareness regarding prevention and management strategies. This highlights the urgent need for culturally appropriate and context-specific educational interventions aimed at improving awareness and promoting preventive behaviors. Hospitalization provides a valuable yet underutilized opportunity for such health education. Middle-aged women admitted to hospitals can benefit from structured teaching programs, as inpatient care offers dedicated time, professional guidance, and motivation for behavior modification (Ayesha et al., 2017).

Evidence from global studies supports that structured educational interventions can significantly enhance osteoporosis-related knowledge and encourage preventive practices in both community and clinical settings (Park et al., 2017). Demonstrating the effectiveness of a simple, low-cost educational intervention during hospitalization could justify its integration into standard inpatient care, discharge planning, and broader public health initiatives. Such efforts align with national and international goals to reduce the burden of noncommunicable diseases and disability (Mangalaraj et al., 2021).

However, despite the proven benefits of educational interventions elsewhere, limited research has focused on their impact among hospitalized middle-aged women in Bengaluru. Given the unique socio-demographic and healthcare characteristics of urban Indian populations, this study seeks to fill the existing research gap by generating local evidence that could guide hospital-based osteoporosis prevention strategies in Bengaluru and similar settings.

Objectives

The objectives of the study were to:

1. To assess the pre-test knowledge regarding osteoporosis among middle-aged women.
2. To evaluate the effectiveness of the structured teaching programme on knowledge regarding osteoporosis.
3. To determine the association between pre-test knowledge scores and selected demographic variables.

Hypothesis

There is no significant association between the pre-test knowledge scores on osteoporosis and selected demographic variables

Methodology

Research design

A pre-experimental one-group pre-test post-test design was adopted for the study.

Setting

The study was conducted among middle-aged women admitted to Jayanagar General Hospital, Bengaluru, India.

Population and Sample

The target population comprised middle-aged women (40–60 years) admitted in medical and surgical wards. Sixty participants were selected using a purposive sampling technique.

Inclusion Criteria

- Women aged 40–60 years.
- Those who were willing to participate.
- Patients who could read and understand Kannada or English.

Exclusion Criteria

- Women diagnosed with osteoporosis.
- Women who attended similar health education sessions in the past three months.

Tool for Data Collection

A structured knowledge questionnaire consisting of 30 multiple-choice items on osteoporosis covering areas such as meaning, causes, risk factors, signs and symptoms, prevention, and management was used.

Validity and Reliability

Content validity was ensured by obtaining opinions from five nursing and medical experts. Reliability was established using the split-half method, and the reliability coefficient was found to be 0.82, indicating high reliability.

Intervention

A structured teaching programme on osteoporosis was developed and administered through an interactive lecture with visual aids for 45 minutes, covering definition, risk factors, prevention, diet, exercise, and lifestyle modifications.

Data Collection Procedure

After obtaining institutional permission and informed consent from participants, the pre-test was conducted using the questionnaire. The STP was administered the same day. The post-test was conducted seven days later using the same questionnaire.

Data Analysis

The collected data were analyzed using both descriptive and inferential statistical methods. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the demographic characteristics of the participants and to describe their level of knowledge regarding osteoporosis before and after the educational intervention. Inferential statistics were applied to test the study hypotheses: the paired t-test was used to compare the mean pre-test and post-test knowledge scores in order to assess the effectiveness of the educational intervention, while the chi-square test was employed to determine the

association between pre-test knowledge scores and selected demographic variables such as age, education, occupation, income, and menopausal status.

Results

This section presents the findings of the study conducted to evaluate the effectiveness of an educational intervention on knowledge regarding osteoporosis among hospitalized middle-aged women. The results are organized under three main headings: demographic characteristics of the participants, pre-test and post-test knowledge scores, and the association between pre-test knowledge scores and selected demographic variables. Both descriptive and inferential statistical analyses were employed to interpret the data. Descriptive statistics were used to summarize participants' demographic information and knowledge levels, while inferential statistics, including the paired *t*-test and chi-square test, were applied to assess the effectiveness of the structured teaching programme and the relationship between knowledge scores and demographic variables.

Table 1

Demographic Characteristics

Sl. No.	Demographic Variables	Category	Frequency (f)	Percentage (%)
1	Age (in years)	40–45 years	27	45
		46–50 years	23	38
		Above 50 years	10	17
2	Educational Status	Primary	12	20
		Secondary	36	60
		Graduate and above	12	20
3	Occupation	Homemaker	39	65
		Employed	15	25
		Others (daily wage, etc.)	6	10
4	Monthly Family Income (INR)	< 15,000	15	25
		15,000 – 30,000	33	55
		> 30,000	12	20

Table 1 shoes that among the 60 participants, 45% were aged 40–45 years, 38% were 46–50 years, and 17% were above 50 years. Majority (65%) were homemakers, 60% had secondary education, and 55% belonged to a middle-income group.

Table 2*Knowledge Scores*

Test	Mean	SD	Mean Difference	t-value	p-value
Pre-test	11.45	3.26	10.73	18.94	< 0.001*
Post-test	22.18	2.97			

*Significant -p<0.05 level of significance

Table 2 presents the comparison of mean knowledge scores before and after the structured teaching programme on osteoporosis. The findings reveal that the mean pre-test knowledge score was 11.45 ± 3.26 , whereas the mean post-test knowledge score increased markedly to 22.18 ± 2.97 . The mean difference between pre-test and post-test scores was 10.73, with a calculated *t*-value of 18.94 and a *p*-value < 0.001, indicating a statistically highly significant improvement in knowledge following the educational intervention. These results clearly demonstrate that the structured teaching programme was effective in enhancing the knowledge of hospitalized middle-aged women regarding osteoporosis prevention and management.

Table 3*Association of pretest knowledge scores with selected demographic variables*

Sl. No	Demographic Variable	Categories	χ^2 Value	df	P-value
1	Age (in years)	40–45, 46–50, >50	2.84	2	0.24
2	Educational Status	Primary, Secondary, Graduate	3.19	2	0.20
3	Occupation	Homemaker, Employed, Others	1.67	2	0.43
4	Monthly Family Income (INR)	<15,000, 15,000–30,000, >30,000	2.95	2	0.23

Table 3 illustrates the association between pre-test knowledge scores on osteoporosis and selected demographic variables among hospitalized middle-aged women. The chi-square test was used to determine the relationship between knowledge levels and factors such as age, educational status, occupation, and monthly family income. The results indicate that none of the demographic variables showed a statistically significant association with pre-test knowledge scores, as all *p*-values were greater than 0.05. Specifically, age ($\chi^2 = 2.84$, *p* = 0.24), educational status ($\chi^2 = 3.19$, *p* = 0.20), occupation ($\chi^2 = 1.67$, *p* = 0.43), and monthly family income ($\chi^2 = 2.95$, *p* = 0.23) did not exhibit any significant relationship with participants' baseline knowledge levels. This finding suggests that the pre-existing knowledge regarding osteoporosis was relatively uniform across different demographic groups before the implementation of the structured teaching programme.

Discussion

The present study aimed to assess the effectiveness of a structured teaching programme (STP) on knowledge regarding osteoporosis among hospitalized middle-aged women in Bengaluru. The findings revealed a marked improvement in the post-test knowledge scores following the educational intervention, indicating that the STP was highly effective in enhancing participants' understanding of osteoporosis, its risk factors, and preventive strategies. The mean pre-test knowledge score of 11.45 increased significantly to 22.18 in the post-test, with a mean difference of 10.73 ($t = 18.94, p < 0.001$). This clearly demonstrates that targeted education can successfully bridge the existing knowledge gap related to bone health among middle-aged women.

These findings are consistent with earlier research emphasizing the positive impact of educational interventions on osteoporosis awareness and preventive behaviors. (Mansour & Alagamy, 2018) reported a significant improvement in knowledge and health-promoting practices among women after the administration of a structured educational module on osteoporosis prevention. Similarly, (Mohammed & Shehata, 2019; Pinar & Pinar, 2020) found that an educational program significantly improved both knowledge and attitudes toward osteoporosis prevention among middle-aged women. The current study aligns with these results, suggesting that structured, context-specific educational programs are a powerful tool for empowering women with the information necessary to maintain optimal bone health.

Osteoporosis has long been recognized as a “silent disease,” progressing without symptoms until a fracture occurs. Women in the middle-age group (40–50 years) are particularly vulnerable due to hormonal changes, lifestyle factors, and inadequate calcium and vitamin D intake. The findings of this study underscore the importance of early educational intervention during this critical period to promote awareness and encourage preventive practices such as adequate nutrition, weight-bearing exercises, and regular screening. The statistically significant increase in knowledge levels after the intervention suggests that hospital settings can serve as effective platforms for delivering health education to women who may not otherwise access community-based programs.

Furthermore, the chi-square analysis showed no significant association between pre-test knowledge scores and demographic variables such as age, education, occupation, or income ($p > 0.05$). This implies that baseline knowledge about osteoporosis was uniformly low across various socio-demographic groups, reinforcing the need for widespread educational efforts regardless of socioeconomic status or educational attainment. It also highlights that lack of awareness about bone health is not confined to any specific group but is a generalized issue that demands broader public health attention.

Implications

The findings of the present study have significant implications for nursing practice and public health. The demonstrated effectiveness of the structured teaching programme highlights the vital role of nurses as frontline educators in promoting bone health among middle-aged women. Integrating osteoporosis education into routine nursing care, particularly during hospital admissions, can enhance awareness and encourage preventive behaviors such as proper nutrition, physical activity, and regular screening. Nurse administrators can support these efforts by organizing regular awareness sessions, workshops, and in-service training programs within healthcare institutions. At the community level, collaboration with primary healthcare centers and local health authorities can expand the reach of osteoporosis prevention initiatives. Furthermore, incorporating osteoporosis prevention strategies into nursing education will prepare future nurses to actively engage in health promotion and disease prevention. Overall, the study underscores the need for sustained, nurse-led educational interventions to reduce the burden of osteoporosis and improve women's health outcomes.

Recommendations

Based on the findings of the present study, it is recommended that structured teaching programmes on osteoporosis be implemented regularly for middle-aged women both in hospital and community settings to enhance awareness and promote preventive practices. Hospitals should integrate osteoporosis education into routine patient care, particularly for women admitted during the perimenopausal and postmenopausal periods. Community health nurses and primary healthcare workers should conduct periodic awareness campaigns, workshops, and screening camps to identify at-risk women and provide timely guidance on lifestyle modifications, nutrition, and exercise. Nursing institutions should include osteoporosis prevention and health promotion strategies in their curriculum to prepare future nurses for proactive community engagement. Additionally, further research is recommended to evaluate the long-term impact of educational interventions on behavioral change and bone health outcomes across diverse populations.

Conclusion

The study concluded that the structured teaching programme was highly effective in improving knowledge regarding osteoporosis among middle-aged women. The significant increase in post-test scores demonstrates that educational interventions can successfully bridge the knowledge gap related to bone health, prevention, and management of osteoporosis. Health professionals, particularly nurses, play a pivotal role in organizing and implementing such programmes to enhance awareness and promote healthy lifestyle practices. The findings provide strong evidence that structured educational interventions are an effective strategy for empowering women to take proactive measures in maintaining bone health and preventing fractures. As middle age represents a critical period for osteoporosis prevention, regular educational programmes and screening initiatives should be incorporated into both hospital and community healthcare services. Sustained,

nurse-led educational efforts, supported by healthcare institutions and policymakers, are essential to reduce the long-term burden of osteoporosis and improve the overall quality of life among women in India.

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