

Exploring Knowledge, Awareness, and Prevailing Misconceptions Surrounding Osteoporosis Prevention among Community Health Workers

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Abstract

Objective: To assess the knowledge, awareness level, and prevailing misconceptions regarding osteoporosis prevention and to identify gaps in understanding among community health workers of Pakistan.

Methods: A cross-sectional study was done from October 2023 through January 2024. All Lady Health Workers of Lahore enrolled with the National Programme for Family Planning & Primary Health Care were considered relevant populations. An Osteoporosis Prevention and Awareness Tool (OPAAT) that had been validated was adopted from a previous study. The exposure of interest was knowledge regarding the prevention of osteoporosis presented through the OPAAT Score, and the outcome of interest was attitude, practice, and misconception regarding osteoporosis. Data was entered online on Google Forms and analyzed using SPSS version 27.0. The data was presented in frequency and percentage. The association of socio-demographic variables with the prevention of osteoporosis, awareness, and misconception was shown using the Multinomial logistic regression analysis.

Results: The data was collected from 300 community health workers, and their awareness of osteoporosis prevention was evaluated using the OPAAT score tool. The findings indicated 56 (18.67%) community health workers demonstrated low knowledge, and 157 (52.33%) exhibited average knowledge regarding osteoporosis prevention and awareness. Multinomial logistic regression analysis showed that higher education (AOR for Master's degree: 1.65, 95% CI: 1.05-2.60) and post-menopausal status (AOR: 1.80, 95% CI: 1.20-2.70) significantly increased osteoporosis prevention knowledge among community health workers in Pakistan.

Conclusion: Lady health workers are the cornerstone of Pakistan's community health workforce and essential in delivering healthcare services. The study found that most participants had average knowledge regarding osteoporosis prevention and held false beliefs about it. Findings recommended a dire need for educational interventions for community health workers.

Keywords: Osteoporosis Prevention, Community Health Workers, OPAAT Score.

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Introduction

Osteoporosis is a bone disease that weakens bones, leading to a high risk of fractures. As the

world's population ages, understanding and implementing effective prevention strategies becomes even more critical¹⁻³.

Among various aspects of osteoporosis pathophysiology, a key factor is the imbalance between the resorption and formation of bone. At the same time, post-menopausal women are particularly vulnerable because of their condition caused by the steep decline in estrogen levels. Recent developments at the molecular biological level have identified some key pathways involved in fracture healing. For example, the RANK/RANKL/OPG pathway is highly involved in osteoclastic genesis, which promotes resorption of bone. Conversely, WNT (Wnt/ β -catenin) signaling has been implicated in keeping osteoblasts active and inducing the formation of bone^{4,5}.

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Studies reported a significant gap between knowledge and practice regarding the prevention of osteoporosis. The ability to recognize the level of risk is crucial. The population exposed to significant risk includes small, thin, white, or Asian women who enter into early menopause.^{3,5} Risk factors for this complication include advancing age, female gender, ethnicity, menopause, lifestyle issues, medications taken, and genetics. Prevention involves teaching individuals about dietary calcium and weight-bearing exercise, and healthcare professionals should prepare methods of screening persons at risk⁶⁻⁸. Treatment must, therefore, be focused on those at the highest risk of fracture, particularly those who have sustained a fragile fracture. Prevention of osteoporotic fractures in older persons presents a particular challenge, especially regarding nonvertebral fractures, and involves both pharmacological and nonpharmacological strategies^{1,8,9}.

The principle of preventive measures includes lifestyle changes, such as dietary interventions with high intakes of calcium and vitamin D; the promotion of physical activity aimed at improving musculoskeletal health; the institution of smoking cessation programs in view of its adverse effect on bone density; and reduction in alcohol intake because of its association with increased risk of fracture through direct skeletal effects and increased falling¹⁰.

Community intervention programs leveraging experiences from well-being conviction models can essentially impact behaviors related to dietary improvements (such as calcium-rich diets) and participation in regular weight-bearing exercises—both essential components for maintaining optimal peak bone mass into older age^{4,9}.

Risk evaluation tools that include indicators beyond basic bone mineral density (BMD) measurements such as genetic predispositions and specific comorbidities are advancing towards more personalized approaches, thereby supporting targeted preventive efforts within communities.⁸

Given the paucity of health resources and the increasing burden of non-communicable diseases, understanding public awareness and misconceptions about osteoporosis prevention becomes imperative for formulating targeted interventional strategies in Pakistan. A social media-based survey evaluating osteoporosis knowledge among adult women indicated that only 34% of participants had good knowledge about osteoporosis, with several misconceptions about its prevention and risk factors¹. Few studies in Pakistan have assessed the knowledge and misconception surrounding osteoporosis in different settings. However, this is the first study to understand and address the knowledge gaps regarding osteoporosis prevention among community health workers. A standard Osteoporosis Prevention and Awareness Tool (OPAAT) was adopted. The research will provide a roadmap for the development of targeted educational interventions, thereby enhancing the effectiveness of community health workers in promoting bone health within the diverse landscape of Punjab, Pakistan.

Methodology

A cross-sectional examination was conducted to comprehensively assess the level of knowledge, awareness, and prevailing misconceptions about osteoporosis prevention among community health workers and identify gaps in understanding, likely areas for improvement, and strategies for improving education on the prevention of osteoporosis among this critical workforce in health. A simple random sampling technique was employed to enroll the lady health workers (LHWs). All the LHWs working in Lahore with the National Programme for Family Planning & Primary Health Care were considered relevant populations. Selection would include those LHWs with three years of field experience without discrimination regarding age, educational qualification, and marital status. The project would be executed after obtaining ethical approval from the IRB of RLKU Medical College, Lahore. Based on the formula for sample size estimation, $n = [DEFFNp(1-p)] / [(d^2/Z^2(1-\alpha)/2(N-1)+p^*(1-p))]$, the level of knowledge or awareness of osteoporosis was 14.0%; thus, this study estimated a sample size of 300 at a

95% confidence interval and a margin of error at 5%, as described in Figure 1 below. For this study, a standard questionnaire titled “Osteoporosis Prevention and Awareness Tool (OPAAT)” was adopted from a previous study.

The questionnaire was comprised of four sections, namely, the following: 1). Section one obtained information about socio-demographic characteristics such as age, marital status, education level, working status, menopausal status, etc. 2). Section 2 obtained the OPAAT Score while section 3 concerns Knowledge, Attitude, and Practice of Osteoporosis. Section 4 sought information concerning misconceptions regarding osteoporosis prevention and awareness. The OPAAT tool consists of 30 items and is implemented in the English language and assesses knowledge of osteoporosis pathogenesis, prevention, and the consequences of disease not being treated. Questionnaires scored one point for a correct answer and 0 for incorrect answers or for marking the “don’t know” option. A knowledge score of about 24 out of 30, 19–23, and less than 19 on OPAAT is considered adequate, moderate, and low. In the present study project, the exposure of interest was knowledge regarding the prevention of osteoporosis presented through the OPAAT Score. In contrast, attitude, practice, and misconception about osteoporosis were the outcomes of interest.

Analysis was stratified to control for confounders that included but were not limited to age, marital status, educational level, menopausal status, and OPAAT score. Electronic, written consent to participate was requested on the first page of the survey. Participation in the survey was considered to be completely voluntary. Respondents were at liberty to withdraw at any stage of the process by not submitting responses. No identified information is included in this study. However, the data collected was maintained in a password-protected electronic format. The online data entry was made on Google Forms, and analysis was done through SPSS version 27.0. The data has been presented as frequency and percentage. To find the association of the sociodemographic variables with the pre-

vention and awareness of misconceptions about osteoporosis, the Chi-square test was applied by keeping p value <0.05 as statistically significant.

Results

The current study achieved a 100% response rate. Figure 1 illustrates the catchment area coverage of officially recognized community health workers, recognized by the Health Department as Lady Health Workers (LHWs).

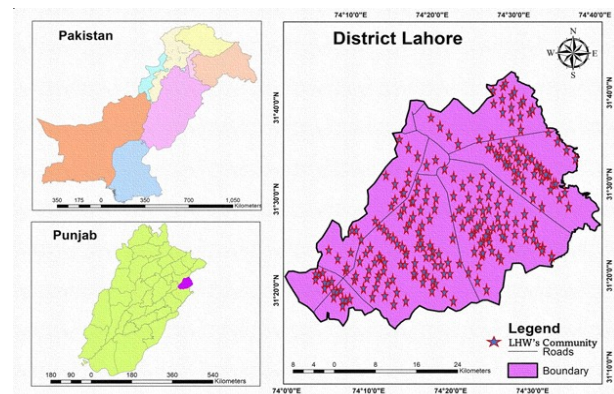


Fig 1. Lady Health Workers (Community Workers) Catchment Area

The understanding of osteoporosis prevention and awareness among community health workers was assessed using the OPAAT Tool. The results revealed that 56 (18.67%) LHWs had low knowledge, 157 (52.33%) had average knowledge, and 87 (29.0%) demonstrated a good level of knowledge regarding osteoporosis prevention and awareness.

The socio-demographic profile of the community workers indicated that the majority belonged to the age group of 46-60 years (38.0%), followed by 32-45 years (36.3%), and 18-31 years (15.7%). The mean age of respondents was 40.71 ± 9.66 years. Regarding marital status, 68% were married and 22% were single. Regarding educational qualifications, 31.2% of the health workers had completed middle school, and 42.6% held a secondary school certificate. Additionally, 57.0% of the participants were within the childbearing age bracket (Table 1)

Table 1. Socio-Demographic Characteristics of the Study Participants

Characteristics	Frequency	Percentage (%)
Age (years)	Mean ± S.D.	40.71 ± 9.66
	18–31	47
	32–45	109
	46–60	114
Educational Level	Middle School	94
	Secondary	125
	Bachelor	49
	Masters and above	32
Marital Status	Single	65
	Married	206
	Separated / Divorced	15
	Widowed	14
Post Menopausal Status	Yes	129
	No	171
OPAAT Score¹⁶	Low Knowledge	56
	Average Knowledge	157
	Good Knowledge	87

The OPAAT Score instrument consists of 30 questions. In the knowledge section, the highest percentage of female health workers (86.67%) correctly identified that a bone mineral density test is used to diagnose osteoporosis. In comparison, 77.67% knew that post-menopausal women are more at risk for osteoporosis. In the second section, 64% of the respondents recognized that osteoporosis causes backaches, while 60.33% knew it leads to loss of mobility, making it difficult to move without assistance. The third section revealed that 56.67% of the participants correctly answered the questions regarding the daily recommended vitamin D intake through sunlight exposure. An equal number were aware of women’s recommended daily calcium intake and that increased tea or coffee consumption can prevent osteoporosis, as shown in Table 2.

Table 2. Community Workers’ knowledge attitude and practice regarding Osteoporosis

Knowledge regarding Osteoporosis (Correct Answers)	Score (n=300)	
	f	%
1. Osteoporosis is more likely to break bones, making bone weaker and more brittle (fracture)	229	76.33
2 Bone is removed faster than it is formed because of Osteoporosis	170	56.67
3. Osteoporosis as it is part of aging, and everybody will get	105	35.00

Osteoporosis is a potentially irreversible disorder.	179	59.67
5. Osteoarthritis and Osteoporosis are two different terms used to define the same disease	190	63.33
6. In general, osteoporosis is without symptoms.	103	34.33
7. The radiation level of a bone mineral density test is high.	109	36.33
8. I don’t require a bone mineral density test unless I break my bones.	170	56.67
9. a monthly bone mineral density test should be carried out to monitor bone loss.	210	70.00
10. Osteoporosis is detected with a bone mineral density test.	260	86.67
11. Women who experienced menopause are not prone to osteoporosis	233	77.67

Attitude Regarding Osteoporosis

	f	%
12. Osteoporosis results in tooth loss	143	47.67
13. Osteoporosis results in hunchback or loss of height	147	49.00
14. Joint pain or swelling of fingers are main presentation of osteoporosis	77	25.67
15. Osteoporosis results in back pain	191	63.67
16. Osteoporosis results in loss of mobility (unable to move around by myself)	181	60.33

Practice and Misconceptions Regarding Osteoporosis Prevention

17. Foods high in calcium comprise spinach, yellow dhal, milk, yogurt, and cheese.	130	43.33
18. Weight-bearing activity (such as walking quickly and line dancing) helps minimize bone loss.	96	32.00
19. Exposing your skin to sunlight for 15 minutes daily to get your required vitamin D intake.	169	56.33
20. Consuming more coffee and tea may help prevent osteoporosis.	148	49.33
21. The suggested daily intake of calcium for women is 1,000 mg.	148	49.33
22. Glucosamine could potentially prevent osteoporosis.	96	32.00
23. Calcium supplements may help prevent osteoporosis.	136	45.33
24. To prevent falls, choose comfortable shoes with solid grip.	142	47.33
25. It is too late to increase calcium consumption significantly beyond the age of 18.	144	48.00
26. Exercise wears down bones.	78	26.00
27. Poor vision can lead to falls.	135	45.00
28. Certain medications (such as sleeping tablets or high blood pressure medications) can reduce the possibility of falling.	105	35.00
29. Being underweight helps prevent osteoporosis	123	41.00
30. The daily consumption of calcium supplements may result in kidney stones	112	37.33

Table 3. Multinomial Logistic Regression Analysis of Socio-demographic Characteristics and Knowledge Levels on Osteoporosis Prevention Among Community Health Workers

Characteristics	Adjusted Odds Ratios	95% Confidence Interval	p-value
Age (years)			0.065
18–31	1.00 (Ref)	-	-
32–45	1.20	0.85–1.70	
46–60	1.10	0.75–1.55	
Marital Status			0.299
Single	1.00 (Ref)	-	-
Married	1.15	0.80–1.65	
Separated / Divorced	1.05	0.75–1.45	
Widowed	1.25	0.85–1.80	
Education Level			0.013
Middle School	1.00 (Ref)	-	-
Secondary	1.30	0.90–1.90	
Bachelors	1.45	0.95–2.20	
Masters	1.65	1.05–2.60	
Post Menopausal Status			0.023
Yes	1.80	1.20–2.70	
No	1.00 (Ref)	-	-

The multinomial logistic regression analysis showed a statistically significant association between socio-demographic characteristics and knowledge levels with regards to osteoporosis prevention. However, Age was marginally significant ($p=0.065$), with older age groups having higher odds of average or high knowledge compared to the 18–28 age group (AOR for 29–38 years: 1.20, 95% CI: 0.85–1.70). Marital status had no significant impact on knowledge levels ($p=0.299$). Additionally, the education level emerged as a strong predictor ($p=0.013$), indicating that higher education correlates with increased knowledge. Specifically, individuals with a Master’s degree had significantly higher odds of high knowledge (AOR: 1.65, 95% CI: 1.05–2.60) compared to those with middle school education. Additionally, post-menopausal women were significantly more likely to have average or high knowledge (AOR: 1.80, 95% CI: 1.20–2.70, $p=0.0234$). These findings highlight the need to tailor education and awareness programs to specific demographic groups to improve osteoporosis prevention knowledge among community health workers (Table 3).

Discussion

Our study investigated the complexities surrounding the knowledge of osteoporosis prevention, awareness, and prevailing misconceptions among the Lady Health Workers who work under the National Programme for Family Planning & Primary Health Care in Punjab, Pakistan. The present study gives insight into the existing understanding of the community health workforce. There is limited information regarding community workers’ knowledge, awareness, and understanding of osteoporosis. Our results showed that more than half of the participants had average knowledge, while a considerable percentage, 29.0%, depicted excellent knowledge of awareness related to osteoporosis prevention. Identifying points of strength in specifics, for example, knowledge of bone mineral density testing and the susceptibility of post-menopausal women to osteoporosis, underlines the knowledge assets of the LHW community^{11–15}. As done previously, we used OPAAT tool¹⁶ to assess LHWs in terms of their knowledge about the prevention of osteoporosis and showed variation in awareness.

The socio-demographic profile of the LHWs offers valuable context for our findings. The majority were in the 39–48 age bracket, followed by those in the 29–38 age group, indicating the need for targeted educational interventions tailored to these age groups in the workplace. Additionally, marital status and educational qualifications emerged as significant factors influencing the effectiveness of targeted training programs^{17–18}.

Surprisingly, there was a low awareness of the key factors that predict bone health, including dietary calcium intake and physical activity’s role in maintaining bone density. Moreover, the majority of workers have incorrect information regarding menopause accelerating bone loss.^{10–19} These various misconceptions may be one of the reasons for the poor preventive measures related to osteoporosis among Pakistani women, consistent with previous studies^{1,15}. This study identified multimodal educational programs that must be planned and executed to address wrong cultural beliefs and practices related to osteoporosis prevention in Pakistan. It also

underlines the use of digital platforms as powerful tools for spreading authentic information to a broader audience due to their effectiveness in reaching different demographic groups²⁰. Our study results showed that improvements in education and health could be the main interventions toward reducing the risk of osteoporosis. The study pointed out a statistically significant relationship between higher educational achievement and higher levels of expertise among LHWs²¹⁻²³. This underlines the critical importance of outreach programs that foster awareness of osteoporosis prevention. Although there was no significant association with post-menopausal status, it highlighted the importance of developing educational content for particular problems associated with distinct life stages^{2,9,14}.

To prevent osteoporosis, a multidimensional approach should include health education activities emphasizing local modifiable lifestyle attributes and tailored medication associated with the person's risk profile²⁴⁻²⁵. Our findings suggest targeted educational interventions to bridge knowledge gaps by addressing widespread misconceptions among LHWs. Furthermore, planning the strategies according to age, marital status, and academic achievement will ensure the educational activities' maximum effectiveness, enabling the LHWs to successfully perform their roles in their respective communities to prevent osteoporosis. The study will be important in understanding the gravity of the situation and addressing the knowledge gaps about osteoporosis prevention among LHWs. These findings suggest a way forward to develop targeted educational interventions to improve the success rate of community health workers and bone health throughout Punjab and the rest of Pakistan.

There were a few limitations to our study. First, we used a cross-sectional study design, which doesn't measure the temporal relationship between exposure of interest (knowledge score regarding the prevention of osteoporosis) and the outcome of interest (attitude, practice, and misconception regarding osteoporosis); hence, longitudinal studies are required for establishing robust evidence. Second, the study population representing

LHWs of Lahore city might not allow for generalized results in the rest of the province and country due to better exposure and access of community workers to the training and educational environment compared to the rest of the country. Last, this survey can be a starting point for further in-depth studies.

Conclusion

The knowledge regarding the prevention of osteoporosis among the LHWs working in the National Programme for Family Planning and Primary Health Care Punjab was limited; moreover, various misconceptions about osteoporosis were identified among many participants. These findings further recommend that targeted educational interventions be directed toward specific sociodemographics within the LHW population. These may fill the existing knowledge gaps and strengthen Community Health Workers' role regarding osteoporosis prevention.

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