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Original Article

Nursing Section

Quality of Life among Postmenopausal Women with Osteoporosis in Southern India: A Cross-sectional Study

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ABSTRACT

Introduction: Osteoporosis is characterised by reduced bone mass and structural destruction of bone tissue which increases the brittleness of bone that leads to increased fracture risk. It is very common among postmenopausal women. Since osteoporosis is closely related to oestrogen deficiency, postmenopausal women are predisposed to it. The decrease in oestrogen during the menopausal transition period causes more bone resorption than formation, resulting in osteoporosis.

Aim: To assess the quality of life of among the postmenopausal osteoporotic women without fracture and to find out the association of quality of life with selected demographic variables.

Materials and Methods: The present cross-sectional survey was conducted at the Osteoporosis Clinic of Orthopaedic Outpatient Department of Kasturba Medical College Hospital, Manipal, India, between June 2019 and September 2021, after obtaining the permission from concerned authorities. The sample was 120 postmenopausal osteoporotic women who belong to the age group 45-65 years. Postmenopausal women with uncomplicated osteoporosis without fractures were included in the study. The independent variable was of quality of life of the postmenopausal women and the dependent variables were the age, religion, education, occupation, and Bone Mineral Density (BMD). After obtaining the informed consent, the participants were interviewed using Short Form-36 (SF-36) quality of life questionnaire. The questionnaire consisted of 36 items and eight subscales which are summarised in two domains: Physical Component Summary (PCS) and Mental Component Summary (MCS). The statistical analysis was carried out using Statistical Package for the Social Sciences (SPSS) software version 22.0. The collected data was analysed using descriptive and inferential statistical measures. One way Analysis of Variance (ANOVA) and the Pearson correlation coefficient test was used to find out the association.

Results: The mean±Standard Deviation (SD) age of the participants was 56.8±2.5 years, 99 (82.5%) participants were Hindus and n=52 (43.34) belonged to general category. Higher proportions of the women were housewives i.e., n=85 (70.83%). Higher scores show a better quality of life. The results of this study showed that participants scored less (29.99±9.56) in role limitations due to emotional problems. Also, the participants scored less (43.39±4.57) in the domain of MCS in comparison to PCS (47.78±4.53). Further, association of PCS and MCS scores of quality of life were tested (p-value <0.05) with selected demographic variables such as age, religion, education, occupation and BMD. The results showed that there was no significant association found between PCS scores and age (p-value=0.84), religion (p-value=0.94), occupation (p-value=0.805) and BMD (r=-0.058, p-value >0.05). Also, there was no significant association between MCS scores and age (p-value=0.69), religion (p-value=0.86), occupation (p-value=0.70) and BMD (r-value=-0.0604, p-value >0.05).

Conclusion: The participants scored less in the subscale of role limitations due to emotional problems of the SF-36 questionnaire. The quality of life was less in the mental component subscore. This indicated that osteoporosis make the postmenopausal women anxious and affects their daily activities.

Keywords: Bone density, Bone resorption, Menopause, Short form-36 questionnaire

INTRODUCTION

Osteoporosis is characterised by reduced bone mass and structural destruction of bone tissue which increases the brittleness of bone that leads to increased fracture risk [1]. It is a common problem among postmenopausal women. The fragility fractures are the most common complications of osteoporosis [2]. Often, the disease will be undiagnosed as the symptoms don't affect severely and it will only become apparent after the fracture has occurred [3]. Menopause in women, hypovitaminosis D, inadequate peak bone mass, gradual bone loss owing to aging processes, and a range of behavioural, dietary, and environmental variables that impact bone mass in some people are the most significant causes of osteoporosis [4,5].

As per the statistics, more than 200 million individuals suffer from osteoporosis. According to the International Osteoporosis Foundation, one in every three women over the age of 50 and one in every five males may develop osteoporotic fractures throughout their lifetime [6].

Furthermore, osteoporosis reduces the quality of life, increases disability adjusted life duration, and places a significant financial burden on the healthcare systems of nations that handle such individuals' treatment [7,8].

Postmenopausal women are more likely to develop osteoporosis because their bone mineral density decreases owing to a reduction in oestrogen levels. Other physiological, emotional, and psychological changes endanger the health and quality of life of these vulnerable females [9]. As the serious complication of osteoporosis is the fracture many researchers carried out research on the impact of osteoporotic fracture on quality of life. There was less focus on the impact of primary osteoporosis on the quality of life of the people. However, there was a study that emphasised that even in the absence of the fracture, osteoporosis affects the quality of life of the affected one [10]. As per the results of above mentioned study 41% of the postmenopausal women with osteoporosis reported a worse quality of life in contrast to just 11% of those in the control group [10]. Hence, it is especially important to understand the level of quality of life before beginning the treatment started to plan for the proper intervention strategies includes care, support and treatment. In osteoporosis patients, bone loss could be reversed, and risk of fracture could be prevented with proper lifestyle modification under thorough supervision. Simultaneously, equal importance to be given on improving the quality of life of the patients.

Therefore, this study is aimed to assess the levels of quality of life exclusively among postmenopausal women without fracture and to understand the quality-of-life scores in the physical and mental health aspect of the participants. The secondary objective of the study was to find out the association of quality of life with selected demographic variables.

MATERIALS AND METHODS

This cross-sectional survey was conducted at the Osteoporosis Clinic of Orthopaedic Outpatient Department of Kasturba Medical College and Hospital, Manipal, India, between June 2019 and September 2021 after obtaining the permission from concerned authorities. The present tertiary hospital runs a free osteoporosis clinic every second Saturday of the month. Bone mineral density was measured by portable ultrasound bone densitometer (Sunlight Mini Omni Bone Sonometer) at the wrist region. The study was conducted after obtaining the ethical permission from the Institutional Ethics Committee (IEC: 30/2019). The sample size was decided by complete enumeration. A total of 120 postmenopausal women, who attended the osteoporosis clinic during the study period with osteoporosis were included in this study.

Inclusion criteria: Postmenopausal osteoporotic women, who attended the osteoporosis clinic during the study period, who belong to the age group of 45-65 years and whose bone mineral density score (T score) was between -1 and -3 were included in the study [8].

Exclusion criteria: The postmenopausal women with complicated fractures and those who were admitted to the hospital were excluded from the study.

Study Procedure

After obtaining the informed consent, the participants were interviewed, and baseline information on age, caste, religion, education and occupation was collected [11,12]. Clinical measurements included height and weight. Height was measured in centimetres by stadiometer and weight was measured using the digital weighing scale in Kilograms. Bone Mineral Density (BMD) was measured by a bone mineral density test [13]. A technician who had received specialised training from the company for measuring BMD performed a bone mineral density test to determine each patient's BMD. A "T" or a "Z" score is used to express the results of a bone density test. T-scores analysis [14]:

- Normal bone density range: +1 to -1
- Ostopaenia range: -1.1 to -2.4
- Osteoporosis range: ≤2.5

The quality of life was measured by using the SF-36 quality of life questionnaire which is a standardised tool and its reliability is reported domain-wise [15]. However, the tool was translated into Kannada, the native language, by a professional translator. The translated questionnaire was evaluated by a team of experts. It had 36 questions with the below subscales of health,

- Physical Function (PF) (10 items),
- Role limitations due to Physical problems (RP) (4 items),
- Bodily Pain (BP) (2 items),
- General Health (GH) (5 items),
- Energy (E) (4 items),
- Social Functioning (2 items),
- Role limitations due to Emotional problems (RE) (3 items)
- Emotional Wellbeing (EW) (5 items)
- Health change (1 item)

The eight subscales are further summarised into Physical Component Summary (PCS) and Mental Component Summary (MCS) which depict the physical well-being and emotional well-being of the participants [16]. The scoring of this tool involves two process. First step includes the recording the precoded numeric values as per the scoring key given by the questionnaire. The scoring of each item was done in a range of 0-100 range so that the lowest and highest possible scores are 0 and 100, respectively. And highest score represents the most favourable health state. Scores represent the percentage of total possible score achieved. In the second step items in the same scale were averaged together to create the eight scale scores as per the instructions of the tool.

Further, the association of quality of life with selected demographic variables was assessed. The independent variable was of quality of life of the postmenopausal women and the dependent variables were the age, religion education occupation and BMD.

STATISTICAL ANALYSIS

Data was analysed using the Statistical Package for the Social Sciences (SPSS) software version 22.0 (IBM SPSS Inc., Chicago, IL, United States of America). Descriptive and inferential statistical measures were used to analyse the data. Furthermore, the analysed data was summarised and presented in appropriate tables. For the association one-way Analysis of Variance (ANOVA) and the Pearson correlation coefficient test was used. The level of significance was set at p-value <0.05.

RESULTS

The mean±Standard Deviation (SD) age of the participants was 56.8±2.5 years. Majority {n=99 (82.5%)} were Hindus and, belonged to general category and other backward classes i.e., n=52 (43.34%). Of total, 46 (38.33%) of the participants has preuniversity education and higher proportions {85 (70.83%)} of the women were stay-at-home homemakers. In the clinical characteristics the mean height score was 155.30 (5.18), the mean±SD height score was 155.30 (5.18) cm, the mean weight score was 65.82 (9.07) kgs and the mean BMD score of the participants was -2.164 (0.519) [Table/Fig-1].

Demographic details	n (%)
Religion*	
Hindu	99 (82.5)
Christian	13 (10.83)
Muslim	8 (6.67)
Caste	
Schedule tribe	6 (5)
Schedule caste	10 (8.32)
Other backward classes	52 (43.34)
General	52 (43.34)
Education	
Lower primary	3 (2.5)
Higher primary	19 (15.83)
High school/Secondary	31 (25.83)
Preuniversity/Higher secondary	46 (38.33)
Degree and above	21 (17.5)
Occupation*	
Daily labour	3 (2.5)
Housewife	85 (70.83)
Others	32 (26.66)
Clinical characteristics (Mean±SD)	
Height (in cm)	115.30 (5.18)
Weight (in kg)	65.82 (9.07)
Bone mineral density	-2.164 (0.519)

[Table/Fig-1]: Demographic characteristics of the study participants (N=120). *Religion and occupation were kept open; After the data collection these were categorised based on the participant's response; Others under the occupation includes, clerical staffs and office work (State Govt. offices, post office, bank and railway department)-12, nurses-11, teaching and non teaching at schools -5, lecturer-3, principal-1

Description of quality of life among postmenopausal osteoporotic women: The quality of life was measured with the SF36 quality of life questionnaire. The final transformed score for each item in every domain ranged from 0-100. Higher scores show a better quality of life. The results of this study showed that participants scored less in role limitations due to emotional problems (29.99±9.56) [Table/Fig-2]. Also, the participants scored less in the domain of MCS (43.39±4.57) in comparison to PCS (47.78±4.53). The data is presented in [Table/Fig-3].

SF-36 subdomains	Mean±SD
Physical function	50.56±9.37
Role limitations due to physical health	50.00±9.16
Role limitations due to emotional problems	29.99±9.56
Energy/fatigue	45.15±8.56
Emotional well-being	50.55±7.27
Social functioning	47.93±9.61
Pain	39.06±6.96
General health	50.00±8.57
Health change	49.00±7.65

[Table/Fig-2]: Mean and Standard Deviation (SD) scores of eight subscales of SF-36 quality of life questionnaire among postmenopausal osteoporotic women (N=120).
*The items under each domain were averaged and then mean and SD were calculated

SF-36 subdomains	Mean±SD
Physical component summary Physical functioning (PF), Role Functioning (RF), Bodily Pain (BP), General Health (GH), Health Change (HC)	47.78±4.53
Mental component summary Energy, Social Functioning, Role Emotional (RE), Emotional Wellbeing (EW)	(43.39±4.57)

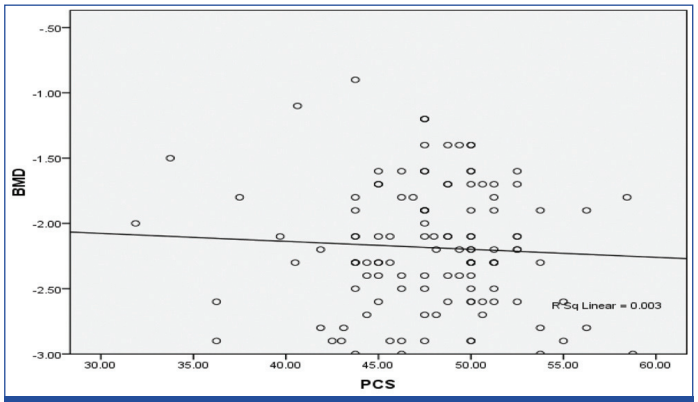
[Table/Fig-3]: Mean and Standard Deviation (SD) of physical component and mental component summary of SF-36 Quality of life questionnaire.

Association of Socio-Demographic Variables with the Quality of Life Score: Association of PCS and MCS scores of quality of life were tested with selected demographic variables such as age, religion education, occupation and BMD. The results showed that there was no significant association found between PCS and MCS scores with selected socio-demographic variables [Table/Fig-4].

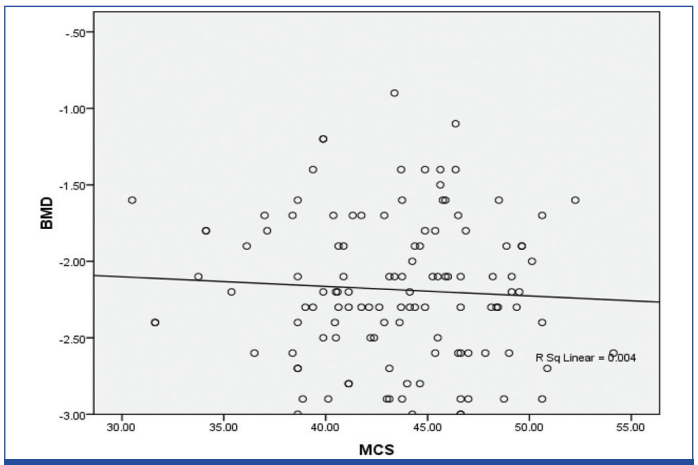
Socio-demographic characteristics	n	SF-36 QoL PCS# (Mean±SD)	p-value	SF-36 QoL MCS## (Mean±SD)	p-value (ANOVA test)
Age (years)					
45-50	29	47.90±4.44	0.84	43.68±3.87	0.693
51-55	35	49.15±3.46		43.94±4.51	
56-60	27	46.12±5.47		43.17±4.99	
61-65	29	47.57±4.50		42.63±4.97	
Religion					
Hindu	99	47.73±4.75	0.94	43.29±4.69	0.868
Muslim	13	48.00±3.30		43.94±4.61	
Christian	8	48.12±3.79		43.75±3.09	
Educational status					
Primary	3	47.39±6.79	0.805	49.65±3.95	0.70
Secondary	19	47.59±5.50		44.10±354	
High school	31	48.42±3.26		43.84±4.19	
Preuniversity	46	47.90±4.45		42.39±5.14	
Degree and above	21	46.8±5.30		43.36±4.06	
Occupation					
Daily labour	3	43.33±6.88	0.154	42.75±6.41	0.152
Homemaker	85	47.67±4.23		43.90±4.48	
Others	32	48.50±4.97		42.08±4.51	

[Table/Fig-4]: Comparison of socio-demographic variables with the PCS and MCS of SF-36 quality of life questionnaire.
PCS: Physical component summary; MCS: Mental component summary

Further, from [Table/Fig-5,6] there was no correlation between PCS (r-value=-0.058, p-value >0.05) and MCS (r-value=-0.0604, p-value >0.05) scores of quality of life with the BMD values of the postmenopausal women. This indicates that there was no significant relationship between PCS and MCS scores of quality of life and the BMD values of the postmenopausal osteoporotic women. Over time, neither of the variables has an influence on the quality of life.



[Table/Fig-5]: Scatter diagram showing the correlation between physical component summary of SF-36 quality of life with bone mineral density values.
p-value >0.05; r-value=-0.058



[Table/Fig-6]: Scatter diagram showing the correlation between MCS of SF-36 quality of life with BMD values.
p-value >0.05; r=-0.0604

DISCUSSION

Any chronic disease may make the individual perceive their quality of life negatively. Particularly in case of osteoporosis if it is associated with complications like fracture it adversely affect the quality of life. The research findings also prove that the Health Related Quality of Life (HRQoL) is generally affected among osteoporotic patients without fracture [17]. Currently, postmenopausal osteoporosis is much prevalent and it is a major public health concern [18]. The results of this study revealed that the quality of life of the postmenopausal women was less in role limitations due to emotional problems (29.99±9.56). Also, the participants scored less in the domain of MCS (43.39±4.57) in comparison to PCS (47.78±4.53). Though, the participants did not have a any fracture or severe pain, the presence of osteoporosis affected their mental health. Also, participants scored less in role limitations due to emotional problems (29.99±9.56) on the SF-36 quality of life questionnaire.

The results of this study are compared with some of the national and international studies and similar results were seen. The comparative analysis of quality of life among postmenopausal women is shown in [Table/Fig-7]. Singh N et al., Bianchi M et al., Ciubean A et al., Cortet B et al., and Baczyk G et al., are the studies that were considered for the comparative analysis [9,10,19,20,21]. Two studies compared the quality of life of postmenopausal

Study	Place of the study	Sample size	Age of the study group	Sample	Tools used	Quality of Life (QoL)
Singh N et al., [9]	India	111 (Ostopaenic 44, Osteoporosis 51, normal BMD 16)	62.5±3.4, 64.2±4, and 66.2±4.1 years, respectively among postmenopausal women with normal BMD, ostopaenia, and osteoporosis	Postmenopausal women with normal bone mineral density, ostopaenia, and osteoporosis.	QUALEFFO-41	QoL among osteoporotic and ostopaenic women was significantly lower with regard to QUALEFFO-41 domains such as pain, physical function, and social function when compared to the QoL among women with normal BMD.
Bianchi M et al., [10]	Italy	100 (38 osteoporosis with fractures, 62 osteoporosis without fracture 35 controls)	66±8.7 years	Postmenopausal women affected by osteoporosis with or without fractures.	QUALEFFO-41	Overall, 41% of the women showed a reduced quality of life. On the contrary, in the control group only 11% reported a reduced quality of life.
Ciubean A et al., [19]	Romania	364 (osteoporosis-228) and (healthy controls-136)	The mean (±SD) age of the osteoporosis and control groups was 65.5 years (±7.39 years) and 63.45 years (±8.16 years)	Postmenopausal women with primary osteoporosis	SF-36 and QUALEFFO-41 questionnaires	Postmenopausal women with osteoporosis had significantly lower scores in the SF-36 domains (p-value <0.001), except for the energy/fatigue domain. The QUALEFFO-41 total score was significantly lower in the osteoporosis patients associated with fracture
Cortet B et al., [20]	France	1306 (1,117 had been evaluated by densitometry within the previous six months and 554 had experienced a fracture)	66.2±8.9	Postmenopausal osteoporotic women	SF-12	Quality of life was poorer in women with recent fractures than in unfractured women
Baczyk G et al., [21]	Poland	304 (Osteoporotic-85, Ostopaenic-122, Normal-97)	The mean ages (in years) of the osteoporotic, ostopaenic and normal women were 59.90±5.20, 57.67±4.54 and 55.68±5.71 years, respectively.	Postmenopausal Women with Osteoporosis, ostopaenia and normal BMD	QUALEFFO-41 scale	QoL values were lower for osteoporotic and ostopaenic women than for the normal BMD group with regard to pain (p-value=0.006), social function (p-value=0.001), health perception (p-value=0.001), and mental function (p-value=0.001).

[Table/Fig-7: Comparative analysis of quality of life among postmenopausal osteoporotic women in various countries [9,10,19,20,21].
BMD: Body mass index; SD: Standard deviation; QUALEFFO: Questionnaire of the European foundation for osteoporosis; QoL: Quality of life

women with osteoporotic, ostopaenic and normal BMD and revealed that quality of life was significantly lower in osteoporotic and ostopaenic women [9,21]. However, both the studies used Questionnaire of the European Foundation for Osteoporosis (QUALEFFO)-41 questionnaire for measuring the quality of life. Two studies compared quality of life of osteoporotic women with and without fracture and showed that quality of life was poorer among the patients who had experienced the fracture [10,20]. Where as, one study used SF-12 questionnaire and another study used the QUALEFFO-41 questionnaire [20,10]. Additionally, another study used both SF-36 and QUALEFFO-41 questionnaires to assess the quality of life of postmenopausal women in comparison to healthy controls and also demonstrated a lower quality of life among postmenopausal osteoporotic women [19]. Results from the same study showed that, with the exception of the energy/fatigue domain, postmenopausal women with osteoporosis had significantly lower scores on the SF-36 domains than non osteoporotic postmenopausal women.

In addition, there was no significant association was found between PCS and MCS scores with selected demographic variables in the current study. Contrary to it, a study showed significant association between age and level of education with the health-related quality of life of osteoporotic patients after fracture [22].

Preventing fractures is the main objective of therapy for osteoporosis. Consequently, improving bone density is just one of many therapy goals. Other goals include reducing pain, decreasing falls, and boosting functional ability. However, the therapy should also be directed towards enhancing the quality of life. Chronic discomfort, worsening kyphosis, height loss, and functional restrictions start to substantially impact the patients' quality of life in terms of their health. Therefore, assessment of the quality of life among postmenopausal osteoporosis women is very important. In addition, it is essential to develop tailored preventive, therapeutic, and rehabilitative programmes for the postmenopausal women with osteoporosis. These preventive programmes ought to incorporate education and encourage for regular exercise in order to maintain a healthy weight and the strength of the muscles and bones, which will lower the risk of fractures and enhance the quality of life of the postmenopausal osteoporotic women.

Limitation(s)

This study was conducted in a single setting and quality of life was measured as reported by the participants. Also, due to the Coronavirus Disease-2019 (COVID-19) pandemic and lockdown the patient flow was less in the osteoporosis clinic, hence the authors included only 120 sample for this study. Furthermore, as the actual sample size was not calculated, the study findings might not elicited the proper association of quality of life with demographic variables.

CONCLUSION(S)

It may be concluded that quality of life of most postmenopausal women who are living with osteoporosis is generally affected. However, there was no significant association found with the selected demographic variables and the quality of life. Also there was no significant correlation found between BMD scores and the quality of life. The quality of life of osteoporotic patients should be examined before fractures in order to render a care, support and treatment includes counselling, psychosocial support, and therapeutic interventions to assist patients in developing self-reliant efficient methods for accepting and dealing with the condition. Customised preventative, therapeutic and rehabilitative programmes for postmenopausal women are essential. These programmes should involve information and incentive to engage in regular exercise to maintain a healthy weight as well as muscle and bone strength, lowering the risk of fractures and increasing general health.

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