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Health-related quality of life and its associated factors among outpatients with osteoporosis

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Abstract

Objective The study aim was to evaluate health-related quality of life (HRQoL) and to explore factors associated with poor HRQoL in patients with osteoporosis in Jordan.
Methods The validated EQ-5D questionnaire was used to assess HRQoL in outpatients with osteoporosis at the Royal Medical Services Hospital in Jordan. The EQ-5D is a standardised instrument that has been widely used in clinical studies for evaluating generic health status. Sociodemographic and medical data were collected using custom-designed questionnaire and hospital medical files. Multiple logistic regression analysis was performed to build a model with variables associated with poor HRQoL.
Key findings The mean score of the total EQ-5D index of the 296 participants was 0.620. Most of the participants reported 'some problems' through the five dimensions, with the highest percentage (72.3%) related to pain/discomfort domain. Regression analysis identified serum vitamin D level (OR = 0.942; CI = 0.891–0.996), number of current medications (OR = 1.273; CI = 1.015–1.597), having movement restriction (OR = 2.525; CI = 1.131–5.638), having spine kyphosis (OR = 5.746; CI = 1.796–18.386) and the presence of friend or family member to remind the patient to take the medications (OR = 3.364; CI = 1.394–8.114) as being significantly associated with poor HRQoL.
Conclusion The HRQoL has considerable scope for improvement in patients with osteoporosis in the present study. Future osteoporosis management programmes should focus on improving HRQoL with specific attention to be given for patients with low serum vitamin D level, patients receiving multiple medications, patients having movement restriction, patients having spine kyphosis and those who have no friend or family member to remind them to take the medication.
Keywords EQ-5D; health-related quality of life; Jordan; medications; osteoporosis

Introduction

Osteoporosis is recognised as a serious public health problem, with approximately 200 million people being affected worldwide.[1] Osteoporosis is a condition of the skeletal system which has been defined as 'a disease characterised by low bone mass and microarchitectural deterioration of bone tissue, leading to enhanced bone fragility and consequent increase in fracture risk'.[2] While there is no cure for osteoporosis, the weakening of bones can be decelerated using pharmacological and non-pharmacological treatments.[3]

Osteoporotic fractures generally result in significant reductions in quality of life, disability, morbidity and mortality, which translate into considerable costs to healthcare systems.[4] An earlier study reported that the prevalence of depressive symptoms was significantly elevated in patients with osteoporosis.[5] Hip fractures are the worst consequence of osteoporosis, as patients' 1-year mortality after a hip fracture is nearly 30%, accompanied by major morbidity, significant functional loss and worsening of quality of life.[6]

Quality of life can be defined as 'an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns'.[7] The concept of health-related quality of life (HRQoL) is frequently used in clinical research as a humanistic outcome of pharmaceutical care intervention programmes for patients with chronic diseases including

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osteoporosis. Nevertheless, little is known about HRQoL in patients with osteoporosis in Jordan. Evaluation of HRQoL and exploring predictors of poor HRQoL has become an important issue in health service research and in clinical trials involving patients with osteoporosis. Identifying the factors associated with poor HRQOL could help tailoring future clinical pharmacy service programmes aim at improving physical and psychosocial health and hence HRQoL among patients with osteoporosis.

Aims of the study

The aim of the present study was to evaluate HRQoL and to explore variables associated with poor HRQoL in patients with osteoporosis in Jordan.

Methods

Study design and settings

The current cross-sectional study was conducted to explore variables associated with poor HRQoL among patients with osteoporosis attending the Royal Rehabilitation Centre (RRC) at the Royal Medical Services (RMS) in Amman/Jordan. The RRC is the only centre dedicated to total rehabilitation for improving the physical and psychological impacts of disability. The orthotic, orthopaedic, rehabilitation medicine, plastic and reconstructive, burn unit and speech therapy services are impressive and provide services for a total of more than 1000 patients.

Sampling

During the RRC outpatient clinic visit, each participant was approached in person and invited to participate in the study using a convenience sampling technique. Patients were included in the study if they were 18 years old or more and if they were receiving at least one prescribed medication for osteoporosis. Patients who did not complete the questionnaire and those who prescribed glucocorticoid therapy, which results in a rapid loss of bone mineral density (BMD), were excluded from the study. Participation in this study was voluntary, and the participants were informed that they have the right to withdraw from this study at any time, and their medical care at the RRC will not be affected by their participation in or withdrawal from this study. The collected data were kept saved at the major investigator's office to ensure confidentiality. After being met by the orthopaedic consultant, eligible patients were interviewed by the researcher AJ in a separate room at the RRC clinic and were asked to read the study information sheet carefully. A sealed questionnaire was distributed to the patients who met the inclusion criteria and agreed to participate in the study after signing the informed consent. To assure having a high response rate, the researcher revisited the RRC several times to allow give the chance for the participants to return the questionnaires at their own convenience with an average time of 25 min for each patient interview. Patients were recruited from January through April 2019.

Study instruments

A custom-designed questionnaire was used to collect information on sociodemographic variables including age, gender, marital status, educational status, occupation and monthly income in addition to information on different patients' disease-related characteristics such as duration of osteoporosis, presence of osteoporosis complications and reading of BMD test. Another questionnaire was used to assess different non-pharmacological approaches of osteoporosis care including meal plan, physical activity and cigarette smoking. The validated EuroQol[8] was used to evaluate HRQoL in the present study. It consists of two parts: the EQ-5D and the visual analogue score (VAS). The EQ-5D assesses HRQoL in five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression.

In this part, patients select the most appropriate statement that best describes their health status for each of the five dimensions of the EQ-5D: 'no problem', 'some problem' and 'extreme problem'.[9,10] Responses to the five dimensions were collectively expressed in the standard way using the value set, which ranges from 1 for full health (no problem in any dimension) to −0.111 for severe problems in all five dimensions. The Arabic version of the EQ-5D appears to be valid and reliable and has been used in measuring HRQoL in Jordanian people.[11] The other part is the visual analogue scale (VAS), on which patients do self-rate their current health status on a 100-point scale. The best imaginable health state carries a score of 100 at the top of the scale, and the worst imaginable health state with a score of zero at the bottom of the scale. The respondent rates his/her current health state on the EQ-VAS by drawing a line from the box marked 'your own health state today' to the appropriate point on the EQ-VAS.

Ethical approval

The study received ethical approval from the Scientific Research and Ethics Committee of the Jordan University of Science and Technology and the Royal Medical Services.

Data analysis

The Statistical Package for the Social Sciences SPSS software (version 22; IBM SPSS, Armonk, NY, USA) was used to run descriptive and inferential statistics. Descriptive analysis was used to describe the continuous variables in terms of the mean (SD) and the categorical variables in term of frequency (percentages). For the purpose of the present analysis, the outcome variable (EQ-5D) was dichotomised as follows: low (<0.62) or high (≥ 0.62). Group differences with regard to HRQoL were examined using the independent sample *t*-test and the Mann–Whitney *U*-test for normally and non-normally distributed continuous variables respectively. The chi-square test was conducted to explore the association between the categorical predictors and HRQoL. Variables with *P* value of >0.2 at the univariate analysis were considered for inclusion in the multiple logistic regression for exploring significant and independent predictors of poor HRQoL.

Results

A total of 400 questionnaires were distributed to eligible patients, from which 296 questionnaires were filled in and returned. As shown in Table 1, the study participants age ranged from 53 to 68 years with a mean ± SD of 60.0 ± 13.202. The majority of the participants were female (85.1%), married (67.6%), live with family or others (87.8%), had low level of education (69.6%), had non-medical career (88.9%), had low level of monthly income (86.1%) and were non-smokers (78.4%).

The lifestyle behaviour of the study sample is presented in Table 1. Most of the participants (72.3%) had no specific meal plan described by the dietitian of the clinic, and 14.5% had not been committed to a specific meal plan. Moreover, 77% of the participants had not practiced in a regular physical activity.

Disease and medication characteristics of the study participants are presented in Table 2. Most of the participants (61.5%) received information about osteoporosis symptoms and complications, and (41.6%) performed a bone mineral density test every 2 years, and however, 90.5% of the

Table 1 Sociodemographic characteristics of the study participants (n = 296)

Variable	*N* (%)	Mean ± SD
Age (years)	ND	60.00 ± 7.2
Gender		
Male	44 (14.9)	ND
Female	252 (85.1)	ND
Marital status		
Married	200 (67.6)	ND
Single	26 (8.8)	ND
Other	70 (23.6)	ND
Living condition		
Live with family or others	260 (87.8)	ND
Live alone	36 (12.2)	ND
Place of residence[†]		
Amman	172 (58.1)	ND
Out Amman	123 (41.6)	ND
Educational level[‡]		
High level	90 (30.4)	ND
Low level	206 (69.6)	ND
Career		
Medical	33 (11.1)	ND
Non-medical	263 (88.9)	ND
Average monthly income (Jordanian Dinar)[§]		
Low	255 (86.1)	ND
High	38 (12.8)	ND
Smoking[†]		
Yes	63 (21.3)	ND
No	232 (78.4)	ND
Mean number of cigarettes/days	ND	15.00 ± 2.8
Receiving meal plan[†]		
Yes	81 (27.4)	ND
No	214 (72.3)	ND
Following a specific meal plan[†]		
Yes	36 (12.2)	ND
No	43 (14.5)	ND
Regular physical activity[†]		
Yes	67 (22.6)	ND
No	228 (77.0)	ND
Physical activity frequency	ND	3.00 ± −0.88

[†]Variables with missing data.
[‡]High educational level = University or higher, Low educational level = primary, secondary, high school.
[§]High = 1000 and more, Low = <1000. ND, no data.

Table 2 Disease and medication characteristics of the study participants (n = 296)

Variable	*N* (%)	
Medications for osteoporosis		
Calcium	4 (1.35)	ND
Calcium carbonate + vitamin D	94 (31.75)	ND
Bisphosphonates + calcium carbonate + vitamin D_3	198 (67.0)	ND
Duration of taking medications		
<6 months	26 (8.8)	ND
6 months or more	270 (91.2)	ND
Frequency of medication administration		
Once daily	59 (19.9)	ND
Twice	214 (72.3)	ND
Three or more times	23 (7.8)	ND
Remind from other family members to take medication		
Yes	167 (56.4)	ND
No	129 (43.6)	ND
Vitamin D level (ng/ml) (Mean ± SD)	16.84 ± 7.71	ND
Suffering from osteoporosis complications	Yes 268 (90.5)	No 28 (9.5)
Type of complication		
Having back pain[†]	251 (84.8)	28 (9.5)
Having fractures[†]	60 (20.3)	219 (74)
Having reduction in movement[†]	114 (38.5)	165 (55.7)
Having spine kyphosis[†]	57 (19.3)	222 (75.0)
Presence of anxiety[†]	119 (40.2)	160 (54.1)
	Median (25–75 quartile)	
Number of chronic diseases other than osteoporosis	1.00 (0.00–2.00)	ND
Number of current total medications	5.00 (3.00–7.00)	ND
Number of osteoporosis medications	3.00 (2.00–3.00)	ND
Duration of osteoporosis diagnosis	5.00 (3.00–8.00)	ND
Calcium level (mg/dl)	9.0000 (8.500–9.500)	ND
Latest bone mineral density result	3.000 (2.600–3.300)	ND
Do you receive any information about osteoporosis symptoms and complications[†]		
Yes	182 (61.5)	ND
No	113 (38.2)	ND
Frequency of performing a bone mineral density test		
Every year	60 (20.3)	ND
Every 2 years	123 (41.6)	ND
Every 5 years	10 (3.4)	ND
Irregularly	103 (34.2)	ND

[†]Variables with missing data. ND, no data.

participants were suffering from osteoporosis complications with the majority suffered from back pain.

The osteoporosis medications prescribed for the study participants are also presented in Table 2. Most of the participants (91.2%) were prescribed osteoporosis medications for 6 months or more. Approximately two-third of the study participants (66.9%) were prescribed bisphosphonate therapy, calcium carbonate and vitamin D_3. Results revealed that 56.4% of the study participants were reminded by another person to take the medications. The mean of vitamin D_3 level in blood was 16.84 ng/ml, followed by calcium with a mean of 9.0 ng/ml. The mean of osteoporosis medications number was 3.

The mean total EQ-5D score was 0.62. As shown in Figure 1, most of the study participants had some problem in walking (59.8%), no problem in self-care (65.5%), some

Table 3 Logistic regression analysis of variables associated with poor HRQoL

Variable	B	OR (95% CI)	*P*-value
Age (years)	0.004	1.004 (0.961–1.049)	0.862
Serum vitamin D level (ng/ml)	0.060	0.942 (0.891–0.996)	0.035*
Latest result of bone density examination	0.083	1.086 (0.502–2.349)	0.833
Number of chronic diseases other than osteoporosis	0.003	1.003 (0.499–2.017)	0.994
Number of current medications	−0.241	1.273 (1.015–1.597)	0.037*
Number of current osteoporosis medications	−0.534	0.586 (0.024–14.570)	0.745
Marital status			
Married	Reference		
Other	0.118	1.126 (0.449–2.823)	0.801
Living conditions			
Living with	Reference		
Living alone	−0.003	0.997 (0.256–3.879)	0.996
Educational level†			
High	Reference		
Low	0.496	1.642 (0.503–5.353)	0.411
Career			
Medical	Reference		
Non-medical	0.669	1.953 (.348–10.955)	0.447
Income (JD)‡			
High	Reference		
Low	0.887	2.428 (.517–11.396)	0.261
Having or receiving information about osteoporosis symptoms and complications			
Yes	Reference		
No	−0.318	0.728 (0.305–1.735)	0.473
Coexistence of chronic diseases			
No	Reference		
Yes	−0.214	0.808 (0.205–3.184)	0.760
Performing physical activities			
Yes	Reference		
No	0.545	1.724 (0.603–4.926)	0.309
Place of residence			
Amman	Reference		
Out of Amman	0.212	1.236 (0.542–2.816)	0.615
Having restrictions in movement			
No	Reference		
Yes	0.926	2.525 (1.131–5.638)	0.024*
Having spine kyphosis			
No	Reference		
Yes	1.749	5.746 (1.796–18.386)	0.003*
Type of medications for osteoporosis			
Calcium carbonate	Reference		
Calcium carbonate + vitamin D	−0.498	0.608 (.001–646.089)	0.889
Bisphosphonate + calcium carbonate + vitamin D	−1.213	0.297 (.013–6.657)	0.444
Presence of friend or family member to remind of taking medication			
Yes	Reference		
No	1.213	3.364 (1.394–8.114)	0.007*

HRQoL, health-related quality of life; JD, Jordanian Dinar

†High educational level = university or higher, Low educational level = primary, secondary, high school.

‡High = 1000 and more, Low = <1000.

*Significant at 0.05 level.

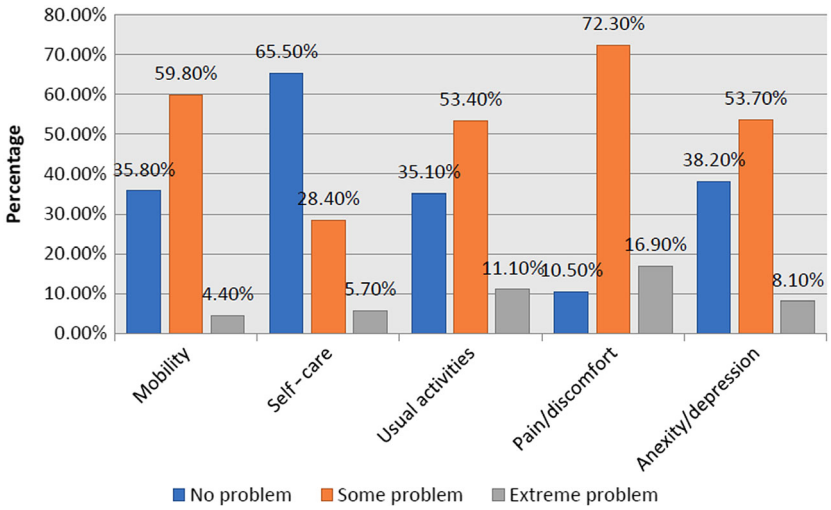

Figure 1 Distribution of the study participants according to the EQ-5D response.

problem in usual activities (53.4%), had mild pain or discomfort (72.3%) and mild anxiety or depression (53.7%). On the other hand, the mean VAS score was 60.0 which indicates moderate pain among the study participants.

Variables with *P* value <0.2 at the univariate analysis were considered for inclusion in the multiple logistic regression analysis. This included age, marital status, living condition, place of residence, educational level, career, performing physical activity, having or receiving information about osteoporosis symptoms and complications, having reduction in movement, having spine kyphosis, having chronic disease, type of medications for osteoporosis, presence of friend or family member to remind of taking medication, income, number of chronic disease, bone mineral density test, number of prescribed medications, number of osteoporosis medications and vitamin D level.

Results of logistic regression analysis shown in Table 3 indicated that the odds ratio related to HRQoL is 0.942 times higher with the participants who had higher value of serum vitamin D than those who had lower value. Participants had the odd of 1.273 of having lower HRQoL scores with each unit increase in the number of prescribed medications. Patients who were not affected by restrictions in movement had an odd ratio of 2.525 of having higher HRQoL compared with those who had movement limitations. Participants who had no spine kyphosis as a complication were found to have the odd of 5.746 of having higher HRQoL compared with those who reported spine kyphosis. Lastly, patients who had one person to remind them to take their medication were found to have 3.364 the odd of having better HRQoL than those who did not have a person to remind them to take the medication.

Discussion

The current study is the first one to assess HRQoL and to provide baseline data of factors associated with poor HRQoL in patients with osteoporosis in Jordan. The current study findings can be used to improve current practices of osteoporosis patients' care via developing tailored intervention programmes with the aim of improving HRQoL in patients with osteoporosis.

The current study used the EQ-5D to assess HRQoL in the study participants. The EQ-5D is a validated instrument that has been used in earlier studies to assess HRQoL in patients with other chronic diseases. A study conducted by Jarab *et al.*[12] reported a moderately reduced HRQoL among patients with type 2 diabetes in Jordan. In this study, the total mean EQ-5D score of osteoporosis is 0.62, which is lower than other medical conditions such as diabetes (total mean EQ-5D score = 0.8),[13] human immunodeficiency viruses (HIV) infection (total mean EQ-5D score = 0.8),[14] skin disease (total mean EQ-5D = 0.73),[15] respiratory disease (total mean EQ-5D = 0.66)[16] and dengue fever (EQ-5D = 0.66).[17]

Earlier studies which have investigated the effect of vitamin D on daily activities and HRQoL have found controversial finding. Some of these studies reported that vitamin D had positive effect on HRQoL,[18] while others reported no effect.[19] The current study results showed that participants who were found to have lower level of serum Vitamin D were found to have poor HRQoL. Consistent with the current study finding, Korkmaz *et al.*[20] revealed in a randomised controlled trial that HRQoL was significantly lower in postmenopausal women who had low serum vitamin D than those who had normal vitamin D level. A study conducted by Mastaglia *et al.*[21] showed that vitamin D levels should be ≥20 ng/ml to achieve optimal muscle strength and function. They found that hip abductor and knee extensor muscle strengths were significantly higher in a group with high vitamin D levels than in a group with low vitamin D levels.[21] Suzuki *et al.*[22] demonstrated that a vitamin D level <20 ng/ml was associated with decreased physical performance and an increased risk of falling, which in turn could negatively influence HRQoL. All these studies findings could help in

explaining how vitamin D deficiency could lead to poor HRQoL.

Consistent with the current study findings, earlier studies have also demonstrated an association between the increased number of prescribed medications and HRQoL.[23,24] An earlier retrospective cohort study aimed to determine the association between polypharmacy and HRQoL among US adults with arthritis using the mental component summary (MCS) and physical component summary (PCS) scores found that adults with arthritis taking six or more medications concurrently were found to have significantly lower MCS and PCS scores than adults who were prescribed less than six medications.[25] Another cross-sectional descriptive study used the EQ-5D to describe the association between medication-related factors and HRQoL in patients older than 65 years found that patients who were using more than ten medicines were found to have poor HRQoL.[26] The increased number of prescribed medications may lead to an increased risk of inappropriate medication use, under-use of effective treatments, medication errors, poor adherence, drug–drug and drug–disease interactions and most importantly increase the potential of medication side effects which could have a negative impact on HRQoL.[27] Furthermore, patients who are prescribed increased number of medications tend usually to have multiple comorbid diseases and the possible associated complications which could have a negative influence on HRQoL of the affected patients.

The current study revealed that patients who were not affected by restrictions in movement were significantly better in terms of HRQoL than others with movement limitations. A research conducted by Horst-Sikorska *et al.*[28] showed that osteoporosis causes limitations in patients' mobility, pain development, depressed mood, fatigue and insomnia which in turn could negatively influence HRQoL.

The presence of spine kyphosis was negatively associated with HRQoL in the present study. Similar to the present study finding, an earlier study aimed to investigate the relationships between HRQoL and possible spinal factors in 174 postmenopausal women with osteoporosis revealed that spinal kyphosis was significant contributor to poor HRQoL.[29] Abnormal posture and spinal mobility cause significant functional impairments in daily activities for patients with osteoporosis.[30] Another study was conducted to evaluate the impact of postural deformities and spinal mobility on HRQoL in patients with spinal osteoporosis found that HRQoL in patients with osteoporosis was impaired by postural deformities, especially by whole kyphosis, and that spinal mobility has a strong effect on HRQoL in these patients.[31]

The last variable which was positively influencing HRQoL was the presence of family member who reminds and supports the patient to take the medications. Better social support has been reported to be associated with improved HRQoL.[32–34] The HRQoL in elderly with osteoporosis might be increased if they are encouraged to spend more time with family and friends, actively participate in collective activities, and actively talk to family members or friends when encountering troubles or are confused with something.[35]

Study limitations

The self-reported questionnaire used for adherence assessment in this study could have overestimated patients' responses due to potential recall bias and the patients' desire to please the interviewer. The study was conducted in only one hospital site, which may limit the generalizability of the findings. Finally, the researchers have not conducted a pilot study which utilises the patients' feedback to refine and enhance the validity of the study instruments.

Conclusion

The current study reveals low HRQoL with a considerable scope for improvement among patients with osteoporosis in Jordan. Factors including vitamin D level, number of current medications, having movement restriction, having spine kyphosis and the presence of friend or family support were significantly associated with HRQoL in the present study. Future osteoporosis management programmes should consider improving HRQoL, with specific attention to be given for patients who have low serum vitamin D level and those who have movement restriction or spine kyphosis. Healthcare providers including clinical pharmacists need to consider prescribing the least possible number of medications in addition to providing continuous encouragement and support to enhance HRQoL improvement for patients with osteoporosis.

Declarations

Conflict of interest

The Author(s) declare(s) that they have no conflicts of interest to disclose.

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Authors' contributions

The study idea and design were performed by Jarab with the assistance of Mukattash. The data were collected by Hilan and interpreted by Jarab and Bsoul. The manuscript was written by Jarab with the assistance of Hilan and checked and finalised by Mukattash.

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