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QUALITY OF LIFE IN OSTEOPOROTIC PATIENTS WITH HIP FRACTURE AND WITHOUT FRACTURE

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The aim of this study was to analyse the quality of life in osteoporotic patients with hip fracture and those without fractures. The study included postmenopausal women, 35 with hip fracture and 33 without fractures. The control group included 44 age–matched healthy women. Osteoporosis Quality of Life Questionnaire was used to assess the health–related quality of life (HRQL). Patients with hip fracture had significantly lower scores in symptoms, physical function and leisure ($P<0.05$), than patients without fractures. Both groups of patients had significantly lower scores than controls in all domains except Leisure. Analysing several health and social factors that could influence HRQL, we found that bone mass in spine and femoral neck significantly correlated with HRQL. Since patients with osteoporosis usually have no symptoms before fracture, early diagnosis and the treatment of the disease are of key importance to the quality of life in these patients.

KEY WORDS: *bone densitometry, emotional function, physical function, "silent disease", social factors, surgical treatment*

Osteoporosis is an important health care problem worldwide, and it has physical, mental and social implications on women's lives. The most serious consequence of osteoporosis is hip fracture, which usually adversely affects health–related quality of life (HRQL). Therefore, HRQL has become an important outcome for studies of osteoporotic and hip–fractured patients. Most have demonstrated impaired quality of life in those patients (1–10). Several generic instruments have been developed in order to assess HRQL (11–12), but they give a general estimate of health and are not specific for osteoporosis. Recently, a number of osteoporosis–targeted questionnaires have been designed for patients with hip or vertebral fracture (13–16). One of them is Osteoporosis Quality of Life Questionnaire, developed by National Osteoporosis Foundation (13).

In this study, we investigated the quality of life in osteoporotic patients with hip fractures and without fractures and compared them with healthy controls. The main purpose of this investigation was to assess whether osteoporosis, which is known as a "silent disease", could significantly impair the quality of life in patients who had not experienced fractures.

SUBJECTS AND METHODS

Subjects

The study included 35 women with hip fracture, 27 with pertrochanteric and 8 with subtrochanteric fractures. The mean age was 71.6±9.8 years. All fractures were caused by a fall while standing or walking. Hip metastatic fractures were excluded. All hip–fractured patients underwent a surgery (osteosynthesis or partial endoprothesis) between 1995 and 2000 and were successfully rehabilitated.

A group of 33 women with established osteoporosis of spine or femoral neck, but with no

history of fractures, was selected for comparison. The mean age was 69.5±7.0 years. These subjects were recruited from the osteoporosis outpatient's practice of the Institute for Medical Research and Occupational Health, Zagreb, Croatia.

Medical records were used to identify eligible patients for either group, who were then invited to participate in the study. The exclusion criteria was the history of major health problems which could seriously affect the patient's quality of life such as cognitive or emotional impairments or secondary causes of bone loss such as hyperparathyroidism, hyperthyroidism, Paget's disease and multiple myeloma.

The control group comprised 44 healthy women. They had no history of diseases which affected bone metabolism such as hyperthyroidism, hyperparathyroidism, chronic gastrointestinal diseases, prolonged immobilisation or prolonged corticosteroid therapy. The mean age of the controls was 68.6±6.7 years.

Testing and Measurement

Two physicians conducted the interviews. The instrument for testing HRQL was Osteoporosis Quality of Life Questionnaire (OQLQ). It was designed as a disease–specific questionnaire for postmenopausal women with osteoporosis (13). Thirty questions are grouped in five domains as follows:

- Symptoms (physical experiences associated with osteoporosis; 9 items);
- Emotional Function (affective components associated with osteoporosis; 4 items);
- Physical Function (difficulties with components of activities of daily living; 5 items);
- Activities of Daily Living (housework, self–care, shopping; 8 items);
- Leisure and Social Activities (recreational activities; 4 items).

Each item had a seven–point scale, with point 7 representing the best possible function and point 1 the worst possible function. We calculated the score for each of the five domains by summing up the points and dividing them with the number of items in each domain. The higher the score the better the function in each domain of quality of life. Besides the separate domain scores, HRQL is also reported as an aggregate score for all five domains.

All participants were measured bone density using the DXA system (GE Lunar Prodigy). Bone mineral density (BMD; g/cm^2) was measured at the lumbar spine (L2–L4) and left femoral neck or right femoral neck in those patients who underwent an operation of the left hip. Osteoporosis was diagnosed according to the WHO criteria (17), that is, T–score lower than –2.5 standard deviations was defined as osteoporosis. T score represents the number of standard deviations with respect to the mean BMD of control population between 20 and 40 years using the manufacturer's reference values.

Statistical Analysis

The results are expressed as means ± standard deviations. Differences in means were tested by the Student's *t*–test. The effect of age, duration of postmenopause, and several other health and social parameters on HRQL were tested using the multiple regression analysis. The value $P<0.05$ was considered significant in all statistical tests.

RESULTS

A total of 112 women completed the questionnaire. On average, each questionnaire took 35 minutes to complete. Table 1 shows the clinical and social profile of the subjects. Patients with hip fracture had a significantly lower BMD in the femoral neck ($P<0.05$) than those without fracture. Spinal osteoporosis was found in 15 fracture patients and 28 patients without fracture, while osteoporosis of the femoral neck was diagnosed in 18 patients with hip fracture and 9 without fracture. In the control group, T–score showed osteopoenia in 6 women, but their BMD, age–matched values were normal. Controls had a significantly higher BMD of the spine and femoral neck than patients with osteoporosis ($P<0.0001$). Patients without fracture were receiving significantly more bisphosphonates than the hip–fractured group ($P=0.05$) or controls ($P<0.0001$). All groups had similar education. Fracture patients were older and the group counted more widows, but those differences were not significant.

Figure 1 shows the differences in domain scores between the groups. Save for Leisure, healthy women showed significantly higher scores in all domains than osteoporotic patients ($P<0.0001$ for Symptoms, Physical Function; $P<0.05$ for Emotional Function and Activities of Daily Living) and patients with hip fracture ($P<0.05$ for Emotional Function; $P<0.0001$ for other domains). Osteoporotic patients without

Table 1 *Profile of study groups*

	Patients with osteoporosis		
	Hip fracture N=35	No fracture N=33	Healthy subjects N=44
Age (yrs)	71.6±9.8	69.5±7.0	68.6±6.7
Years since MP*	24.0±10.4	22.3±7.5	20.5±5.8
Years after fracture	3.8±0.6	/	/
Marital status:			
Married	14	18	34
Single	2	3	2
Widowed	16	9	7
Divorced	3	4	1
Education:			
Elementary	11	10	12
High school	17	14	23
University	7	9	9
Medications:			
Calcium	5	2	10
HRT**	1	4	7
Bisphosphonates	6[1]	15	1[3]
BMD(g/cm^2)***:			
Spine BMD***	0.921±0.144[2,3]	0.830±0.067	1.109±0.899[3]
Femoral neck BMD	0.646±0.175[3]	0.734±0.109	0.881±0.077[3]

* MP=menopause; **HRT= hormone replacement therapy; *** BMD=bone mineral density
[1]P<0.05 bisphosphonates therapy hip fractured vs. unfractured patients; [2]P=0.01 spine BMD hip fractured vs. unfractured patients; [3]P<0.0001 bisphosphonates therapy controls vs. unfractured patients; spine BMD controls vs. fractured and unfractured patients; femoral neck BMD controls vs. fractured and unfractured patients

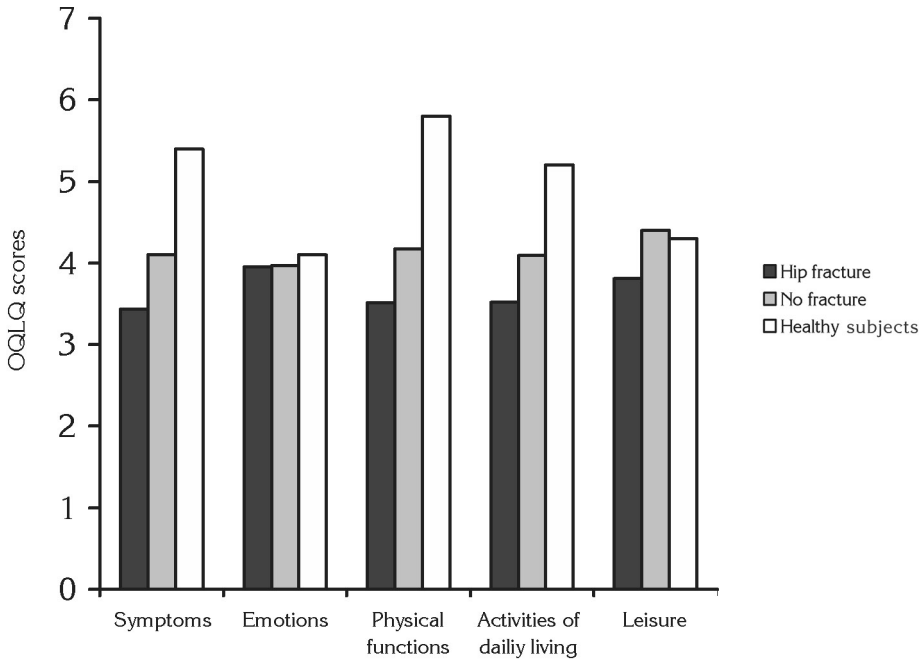

Figure 1 *Mean OQLQ scores through 5 domains in osteoporotic patients and controls*

Table 2 *Associations between HRQL and clinical profile of study groups*

	Patients with osteoporosis		Healthy subjects
	Hip fracture N=44	No fracture N=35	N=33
Age	0.072	0.374	–0.477
Duration of PM	–0.274	–0.254	–0.311
BMD spine	0.150	0.644	0.612[1]
BMD femoral neck	0.545[1]	0.231[1]	0.666[1]
Medications	0.148	0.397	0.151
Education	0.064	0.288	0.114
Marital status	0.052	0.426[1]	0.224

Results in the table are expressed as beta values.
[1]P<0.05 (multiple regression analysis)

fractures had significantly higher (better) scores for Symptoms (P<0.05), Physical Function (P<0.05) and Leisure and Social Activities (P<0.05) than patients with hip fracture. No significant differences were found in the domains of Emotional Function and Activities of Daily Living between the two groups of patients. Among fracture patients, no significant correlation was found between OQLQ scores and the time past since hip fracture.

We performed regression analysis with HLQL as an independent variable and a number of dependent variables (age, duration of postmenopause, BMD, medications, education and marital status) (Table 2). Bone mineral density of the femoral neck significantly correlated with HLQL in all groups (P<0.05). In the control group, spinal BMD also significantly correlated with HLQL (P<0.05).

DISCUSSION

This study has demonstrated that hip–fractured patients experience a significant deterioration in HRQL. In this group of patients, OQLQ has shown a departure in physical and emotional parameters from subjects who had osteoporosis without fracture or from controls. This stresses the importance of early diagnosis and prevention of osteoporosis. Being a "silent disease", it could go unnoticed for as long as there is no fracture.

The assessment of osteoporosis associated with hip fracture is important for developing effective treatment and rehabilitation of those patients. Several studies have assessed the effects of osteoporosis and fractures on HRQL. In a prospective case–control study, *Randell and co–workers* (1) demonstrated that quality of life was significantly lowered by hip fracture, and concluded that HRQL should make a part of the assessment of osteoporosis–associated morbidity and costs. In a sample of 194 elderly women who were at high risk of hip fracture, *Salkeld and co–workers* (4) found that quality of life was profoundly threatened by falls and hip fractures. *Tosteson and co–workers* (5) concluded that negative impact of hip and vertebral fractures on quality of life years must be accounted in the economic value of the interventions in osteoporosis. In a study of 105 osteoporotic elderly women (2), spinal fractures and several socio–demographic factors proved important for quality of life, while hip fracture and bone density were not significant.

However, HRQL questionnaires used were not uniform for all studies, particularly since osteoporosis–targeted questionnaires are of a quite recent date. Osteoporosis Quality of Life Questionnaire was designed as a disease–specific questionnaire for postmenopausal women suffering from chronic pain due to osteoporosis. While generic questionnaires allow better comparison between populations suffering from different diseases, OQLQ provides more detailed information about morbidity caused by osteoporosis. The OQLQ has proven repeatable, coherent and discriminating well between osteoporotic and healthy subjects (13).

In this study, hip–fractured patients showed lower quality of life in three domains with respect to non–fractured patients: emotions, physical functions and leisure. *Adachi and co–workers* also found that HRQL was lower for physical function in patients who had hip fracture (9). Activities of daily living did not significantly change, which suggests that postoperative rehabilitation in these patients was good. In a study of 50 patients with Colles' fracture, *Dolan and co–workers* (7) found a significant drop in HRQL after the fracture followed by a significant rise after treatment.

Osteoporosis and especially its most serious consequence, hip fracture, have a significant influence on health–related quality of life measured using the OQLQ. The lack of "objective" symptoms can often conceal the deteriorated quality of life in osteoporotic patients without fracture. Beside the comparison between osteoporotic and healthy people, we analysed the differences in quality of life between two groups of osteoporotic patients: those without fractures and those with hip fracture and found that the latter suffered even lower quality of life. Since osteoporosis is a widespread disease, an evaluation of fracture–associated morbidity, including social, emotional and physical functioning could help to develop more effective preventive and therapeutic measures for osteoporosis.

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Sažetak

KVALITETA ŽIVOTA U BOLESNICA S OSTEOPOROZOM S PRIJELOMOM KUKA I U ONIH BEZ PRIJELOMA

Osteoporoza je bolest visoke prevalencije i poznata je kao "tiha epidemija" jer ne uzrokuje značajnije simptome sve do pojave prijeloma kostiju. Budući da osteoporotski prijelomi, osobito prijelom kuka, imaju ozbiljne zdravstvene i socijalne posljedice, kvaliteta života bolesnika nakon prijeloma postala je predmetom mnogih istraživanja o osteoporozi. U ovome ispitivanju analizirana je razlika u kvaliteti života između bolesnika s osteoporotskim prijelomom kuka i bolesnika s osteoporozom ali bez prijeloma. Sudjelovalo je 35 žena s prijelomom kuka i 33 žene s utvrđenom osteoporozom ali bez prijeloma. Sve ispitanice bile su u postmenopauzi i svima je učinjena denzitometrija skeleta. Za procjenu kvalitete života rabljen je upitnik *Osteoporosis Quality of Life Questionnaire*, koji se sastoji od 30 pitanja podijeljenih u pet kategorija: Simptomi, Emotivne funkcije, Fizičke funkcije, Aktivnosti dnevnog života i Socijalne aktivnosti i dokolica. Ispitanice s prijelomom kuka imale su značajno lošije vrijednosti nego žene bez prijeloma u kategorijama: Simptomi, Fizičke funkcije i Socijalne aktivnosti i dokolica. Obje grupe bolesnica imale su značajno niže vrijednosti pokazatelja kvalitete života u odnosu na kontrolnu skupinu žena bez koštanih bolesti. Analizom zdravstvenih i socijalnih parametara utvrđeno je da mineralna gustoća (osteoporoza) kralježnice i kuka imaju statistički značajan utjecaj na kvalitetu života. Zaključujemo da su rana dijagnoza i liječenje osteoporoze prije pojave prijeloma važni za izbjegavanje zdravstvenih i socijalnih teškoća i pada kvalitete života u bolesnika s osteoporozom.

KLJUČNE RIJEČI: *denzitometrija skeleta, društveni čimbenici, emotivne funkcije, fizičke funkcije, operativno liječenje, tiha epidemija*

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