

Clinical Article



Validation of the European Quality of Life-5 Dimensions, 3-Level Version (EQ-5D-3L) in Patients With Osteoporotic Vertebral Fracture and Comparing Their Health-Related Quality of Life With That of the General Population in Korea

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ABSTRACT

Objective: This study examined the validity of the European Quality of Life-5 dimensions, 3-Level version (EQ-5D-3L) in patients with osteoporotic vertebral compression fractures (OVCF) and compared the health-related quality of life (HRQOL) of these patients with that of the general population in Korea.

Methods: Study participants completed several questionnaires, such as the EQ-5D-3L, 12-item short-form health survey version 2.0 (SF-12v2), Roland-Morris disability questionnaire (RMQ), and Pain Numeric Rating Scale (Pain NRS). Spearman's correlation analyses of the questionnaire results were conducted to examine the discriminant and convergent validity of the EQ-5D-3L. Finally, EQ-5D-3L results from study participants were compared with those from the comparison group of the general population that were match-sampled according to age and sex from the 2013 Korean National Health and Nutritional Examination Survey.

Results: Spearman's correlation coefficients between EQ-5D-3L and pain NRS, SF-12v2, and RMQ were statistically significant. The coefficients between the relevant dimensions, such as mobility in the EQ-5D-3L and physical functioning in the SF-12v2, were higher than those between irrelevant ones. Problems reported by study participants in each dimension of EQ-5D-3L showed statistically significant lower scores in pain NRS, PCS, and MCS from the SF-12v2 and RMQ scores. In comparison with the general population, the problems reported in the patient group were statistically higher than those reported by the general population.

Conclusion: This study showed that EQ-5D-3L will be useful for patients with OVCF in Korea because it could be valid. The HRQOL of patients with OVCF was very low in all dimensions of the EQ-5D-3L.

Keywords: Surveys and questionnaires; Back pain; Spinal fractures; Osteoporosis

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Conflict of Interest

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INTRODUCTION

Vertebral compression fractures related with osteoporotic degeneration, primary or metastatic spine tumor, and trauma of the spine have been represented as an increasingly significant public health problem.⁷⁾ Osteoporosis is the one of the main cause of vertebral compression fractures,³⁾ produces new vertebral compression fractures, and yields other osteoporotic fractures.¹⁾ vertebral compression fractures is associated with chronic back pain in 84% of symptomatic patients,³⁰⁾ height loss of the spine body, kyphosis of vertebral column, as well as pulmonary dysfunction.^{4,27)} Therefore mortality and morbidity is also higher.¹⁰⁾ Medical managements, such as absolute bed rest, postural reduction, and bracing, are helpful to reduce pain, however long standing of absolute bed rest could produce decubitus ulcers, pneumonia, thromboembolism, and even death in especially elderly patients.²⁵⁾ Surgical treatments also can be related with a significant complication in these patients.

Many patients with osteoporotic vertebral compression fractures (OVCF) were usually managed conservatively by short periods of bed rest, and bracing. Recently, interventional managements, such as vertebroplasty (VP) and kyphoplasty (KP), have been introduced and showed good treatment results. However, OVCF still have represented as a significant public health problem and is the main cause of lowering quality of life (QOL) in the elderly population.

Previous studies have demonstrated that psychological problem such as depressive symptoms are frequently observed in patients suffering from OVCF.^{14,31)} Several studies also reported health-related QOL (HRQOL) of OVCF patients. Some studies used HRQOL as an indicators by interventions such as a VP¹²⁾ or a KP.²³⁾ The European QOL-5 dimensions, 3-level version (EQ-5D-3L) is a well-known and widely used HRQOL instrument among general instruments²⁾ and this instrument is also used to measure HRQOL of OVCF patients widely.^{6,12,15)} However, studies on the relationship between psychological problems and the HRQOL have not been evaluated.¹⁴⁾ To best our knowledge, there is no study to validate this measure on OVCF patients. This study aimed to examine the validity of EQ-5D-3L on OVCF patients and compare HRQOL of these patients with those of Korean general population.

MATERIALS AND METHODS**Patients**

Totally, 163 patients with thoracolumbar osteoporotic fractures were consecutively recruited from 19 hospitals of Korea from February 2015 to May 2015. The inclusion criteria were as follows: osteoporotic fracture with 5% to 20% canal encroachment and bone mineral density of less than -2.5. Exclusion criteria included combined neurological deficits, pathological fractures, and unstable vertebral fractures involving the middle or posterior column of the spine. The Institutional Review Boards of each hospital approved this study, and all participants provided written informed consent.

Procedure and instruments

After informed consent, study participants administered their general characteristics such as sex and age and clinical information including fracture site. Also, other clinical information, including previous medical treatments and comorbidity, were obtained from patient medical records. All of study participants completed the EQ-5D-3L, 12-item short form health survey version 2.0 (SF-12v2), Roland-Morris disability questionnaire (RMQ) and pain numeric rating

scale (pain NRS) by themselves. The EQ-5D-3L was developed by the European QOL group for measuring HRQOL in the perspectives of five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension has 3-levels on severity (i.e., no problems, some or moderate problems, and extreme problems) resulting in 243 health states. Thus the EQ-5D-3L provides a simple descriptive profile and a single index of health status that can be used for clinical and economic evaluations of health care, as well as for population health surveys. The EQ-5D-3L index was estimated by a Korean value set.¹⁶⁾

The SF-12v2 is an instrument with 12 questions to evaluate people's HRQOL in an eight-scale profile (physical functioning [PF], role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health [MH]) of functional health and well-being, as well as two psychometrically based physical and MH summary measures and a preference-based health utility index⁵⁾. The SF-12v2 subscale scores (0–100) were transformed to yield the same mean (50) and standard deviation (10) as the physical component summary (PCS) and mental component summary (MCS)³⁷⁾. The SF-12v2 was validated for use in Korean general public.¹¹⁾

The pain NRS, which is a kind of visual analog scale (VAS) of pain intensity, consists of a line, most often 100 mm long, with 2 descriptors representing extremes of pain intensity (e.g., no pain and extreme pain) at each end.⁸⁾ Patients rate their pain intensity by making a mark somewhere on the line that represents their pain intensity, and the pain NRS is scored by measuring the distance from the “no pain” end of the line.

The RMQ is one of the most widely used questionnaires which have been designed for back pain.²⁴⁾ It has been shown to yield reliable measurements, which are valid for inferring the level of disability, and to be sensitive to change over time for groups of patients with low back pain. This RMQ is a self-administered disability questionnaire consisted of 24 items (see below). Those 24 questions are related specifically to physical functions that were likely to be affected by low back pain. Each item was qualified with the phrase “because of my back pain” to distinguish back pain disability from disability due to other causes—a distinction that patients are in general able to make without difficulty. Patients completing the RMQ are asked to place a check mark beside a statement if it applies to them that day.

Analyses

Descriptive statistics were analyzed on sex, age, age of fracture, prevalent duration, and fracture site. We evaluated the validity of EQ-5D-3L on OVCF patients in several perspectives of validity considering previous study.^{17,38)} Firstly, we compared the mean SF-12v2 scale and summary scores of subjects reporting no problems in a given EQ-5D-3L dimension with those of subjects reporting any problem; it was expected that the mean SF-12v2 scores of no problem groups would be higher those scores of problem reporting groups. The differences in mean scores were examined by independent *t*-tests. Secondly, the concurrent and discriminant validity of the EQ-5D-3L was examined by comparing correlations among the EQ-5D-3L domains, EQ-VAS, EQ-5D-3L index, and SF-12v2 domain scales and summary measures in the study participants. We expected that each dimension of the EQ-5D-3L would be more highly correlated with its associated subscales than with other subscales of the SF-12v2, RMQ, and pain NRS. These assumptions were tested with Spearman's rank or Pearson's correlation coefficients. The correlation coefficients were interpreted according to previous study.²⁸⁾ Finally, results in EQ-5D-3L from study participants were compared with EQ-5D-3L from the comparison group of general populations which were match-sampled according to age and sex from the 2013 Korean National Health and Nutritional Examination Survey

(KNHANES). All statistical analyses were performed using SPSS 21.0 (SPSS Inc., Chicago, IL, USA). A p -value of less than 0.05 was considered to indicate statistical significance.

RESULTS

Totally, 163 OVCF patients participated in this study and the results of descriptive analyses were provided in **TABLE 1**. Among them, 78% were female and 70's were the most prevalent cases. Age of fracture was similar with age of study participants. Eighty-four patients' post fracture duration were more than 90 days. Lumbar sites were the most prevalent and most of them had single level of fracture.

TABLE 2 showed that results of pain NRS, EQ-5D-3L index, RMQ and SF-12v2 on patients' information. While there were no significant differences of those data on sex, age and fracture age, post-fracture duration was a statistically significant factor on most indicators. Patients' status after 90 days were better than other patients in most indicators except for MCS of SF-12v2.

The comparisons of pain NRS, SF-12v2 and RMQ were represented in **TABLE 3** on levels of each EQ-5D-3L dimension. All scores were significantly different on EQ-5D-3L levels ($p < 0.001$). Patients with level 3 of each EQ-5D-3L dimension reported the worst score in pain NRS, PCS and MCS of SF-12v2 and RMQ, respectively, except for MCS of SF-12v2 on self-care of EQ-5D-3L.

Spearman's correlation coefficients among level of each EQ-5D-3L dimension and EQ-5D-3L index and 8 scores and 2 summary scores of SF-12v2, RMQ and pain NRS. Most coefficients

Table 1. General and clinical characteristics of study participants

Variables	Values
Sex	
Female	127 (77.9)
Male	36 (22.1)
Age	
≤59	12 (7.3)
60–69	35 (21.2)
70–79	83 (50.3)
≥80	33 (21.2)
Fracture age	
<60	11 (6.7)
60–69	33 (20.2)
70–79	83 (50.9)
≥80	36 (22.1)
Post fracture days	
<15	39 (24.4)
15–30	21 (13.4)
31–90	18 (11.0)
>90	85 (51.2)
Fracture site	
Cervical/Thoracic	67 (42.1)
Lumbar	98 (61.6)
Number of fracture	
1	144 (90.6)
≥2	15 (9.4)

Values are presented as number (%).

Table 2. Pain numeric rating scale, 3-level version of European quality of life-5 dimensions index, 12-item short form health survey version 2.0, and Roland-Morris Disability Questionnaire on general and clinical characteristics

Variables	Pain NRS			EQ-5D-3L index			SF-12v2 PCS			SF-12v2 MCS			RMQ		
	No.	Mean±SD	p-value	No.	Mean±SD	p-value	No.	Mean±SD	p-value	No.	Mean±SD	p-value	No.	Mean±SD	p-value
Sex			0.091			0.369			0.780			0.115			0.498
Female	126	4.57±2.71		126	0.64±0.30		113	34.06±10.40		113	45.96±11.21		123	11.53±7.08	
Male	36	5.44±2.72		36	0.58±0.35		33	34.64±10.22		33	42.45±11.11		33	12.48±7.60	
Age			0.225			0.418			0.726			0.537			0.855
≤59	12	6.33±3.28		12	0.51±0.40		11	31.45±10.68		11	44.45±15.15		12	12.67±7.10	
60-69	35	4.77±3.11		34	0.60±0.36		32	34.97±10.03		32	46.00±12.46		33	11.39±8.00	
70-79	82	4.55±2.67		82	0.65±0.29		73	34.53±10.71		73	45.73±10.39		79	11.56±6.86	
≥80	35	4.77±2.35		35	0.61±0.27		32	33.16±10.12		32	42.44±11.15		33	12.61±7.27	
Fracture age			0.302			0.343			0.421			0.639			0.669
≤59	11	6.18±3.40		11	0.48±0.41		10	29.60±9.20		10	43.10±15.25		11	12.73±7.44	
60-69	33	4.64±3.00		32	0.65±0.32		30	35.73±9.29		30	45.50±12.70		31	10.58±7.55	
70-79	82	4.52±2.68		82	0.65±0.28		73	34.49±10.68		73	45.71±10.38		79	11.53±6.89	
≥80	36	4.86±2.38		36	0.61±0.27		33	33.67±10.38		33	42.91±11.30		34	12.59±7.16	
Post fracture days			<0.001			<0.001			<0.001			0.101			<0.001
<15	39	6.23±2.74		40	0.47±0.37		36	32.44±10.32		36	48.06±11.57		39	14.49±7.65	
15-30	22	6.05±2.40		22	0.54±0.33		19	30.47±10.79		19	43.63±11.35		22	13.55±7.18	
31-90	18	5.00±2.17		17	0.54±0.25		17	27.76±6.45		17	40.06±11.76		17	14.47±5.55	
>90	84	3.63±2.46		84	0.74±0.23		76	37.29±9.96		76	45.41±10.82		78	9.13±6.41	

Pain NRS: pain numeric rating scale, EQ-5D-3L: European quality of life-5 dimensions, 3-level version, SF-12v2: 12-item short form health survey version 2.0, PCS: physical component summary, MCS: mental component summary, RMQ: Roland-Morris disability questionnaire, SD: standard deviation.

Table 3. Pain numeric rating scale, 12-item short form health survey version 2.0, Roland-Morris Disability Questionnaire on 3-level version of European quality of life-5 dimensions

EQ-5D-3L dimensions	Pain NRS			SF-12v2 PCS			SF-12v2 MCS			RMQ		
	No.	Mean±SD	p-value	No.	Mean±SD	p-value	No.	Mean±SD	p-value	No.	Mean±SD	p-value
Mobility	59	3.02±2.42	<0.001	53	42.53±7.80	<0.001	53	48.47±9.60	0.025	55	5.76±5.22	<0.001
	82	5.33±2.15		75	30.36±8.30		75	43.21±11.46		80	14.23±5.74	
	23	7.13±2.82		21	25.95±8.14		21	43.14±13.68		22	17.27±6.13	
Self-care	57	3.11±2.55	<0.001	50	42.30±8.70	<0.001	50	50.70±9.45	<0.001	52	5.50±4.60	<0.001
	75	5.03±2.02		71	31.45±7.27		71	41.30±10.37		76	13.00±5.96	
	32	7.31±2.44		27	26.26±10.19		27	44.15±13.21		30	19.47±3.91	
Usual activities	48	2.50±2.18	<0.001	43	44.60±7.00	<0.001	43	51.63±6.78	<0.001	42	3.93±3.28	<0.001
	82	5.23±2.04		75	31.87±7.86		75	43.79±11.42		82	13.16±5.91	
	35	6.83±2.81		31	24.77±6.86		31	39.10±12.31		34	18.06±4.82	
Pain/Discomfort	20	0.90±1.12	<0.001	17	46.65±8.70	<0.001	17	54.53±4.38	<0.001	15	2.40±2.20	<0.001
	107	4.36±1.95		97	34.47±8.64		97	44.14±10.48		105	10.69±6.34	
	38	7.97±1.73		35	26.83±9.30		35	43.06±13.94		38	18.42±4.52	
Anxiety/Depression	83	4.11±2.79	<0.001	73	36.73±10.99	<0.001	73	50.70±9.78	<0.001	75	9.43±6.91	<0.001
	69	5.10±2.36		64	32.89±8.99		64	39.73±9.37		70	12.81±6.61	
	13	7.31±2.87		12	24.17±5.06		12	39.33±14.34		13	19.54±5.08	

EQ-5D-3L: European quality of life-5 dimensions, 3-level version, Pain NRS: pain numeric rating scale, SF-12v2: 12-item short form health survey version 2.0, PCS: physical component summary, MCS: mental component summary, RMQ: Roland-Morris disability questionnaire, SD: standard deviation.

were statistically significant ($p<0.05$) (TABLE 4). The correlations among variables with high relevance (e.g., mobility of EQ-5D-3L and physical function of SF-12v2) showed moderate or strong but the correlations with low relevant dimensions represented negligible or weak (e.g., mobility of EQ-5D and MH of SF-12v2). EQ-5D-3L index had high correlation coefficients among variables. Correlation coefficients between EQ-5D-3L index, RMQ and pain NRS showed moderate to strong correlations ($p<0.01$).

TABLE 5 showed the comparison HRQOL of OVCF patients with that of Korean general public. OVCF patients reported more severe level of each EQ-5D-3L dimension ($p<0.001$). In self-care and usual activities, there were the largest differences on level 3 reporting between two groups (17.6% and 17.5%, respectively). Also, many patients rated their health problems

Table 4. Correlation among 3-level version of European quality of life-5 dimensions, 12-item short form health survey version 2.0, Roland-Morris Disability Questionnaire, and pain numeric rating scale

Variables	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS	RMQ	Pain NRS
Mobility	-0.633 [†]	-0.488 [†]	-0.582 [†]	-0.318 [†]	-0.119	-0.357 [†]	-0.383 [†]	-0.297 [†]	-0.627 [†]	-0.207 [*]	0.623 [†]	0.524 [†]
Self-care	-0.606 [†]	-0.542 [†]	-0.571 [†]	-0.316 [†]	-0.062	-0.371 [†]	-0.536 [†]	-0.302 [†]	-0.603 [†]	-0.308 [†]	0.699 [†]	0.541 [†]
Usual activities	-0.699 [†]	-0.680 [†]	-0.700 [†]	-0.351 [†]	-0.174 [*]	-0.516 [†]	-0.601 [†]	-0.404 [†]	-0.700 [†]	-0.418 [†]	0.705 [†]	0.569 [†]
Pain/Discomfort	-0.492 [†]	-0.455 [†]	-0.529 [†]	-0.328 [†]	-0.139	-0.312 [†]	-0.360 [†]	-0.325 [†]	-0.522 [†]	-0.231 [†]	0.621 [†]	0.738 [†]
Anxiety/Depression	-0.364 [†]	-0.373 [†]	-0.361 [†]	-0.359 [†]	-0.330 [†]	-0.318 [†]	-0.441 [†]	-0.537 [†]	-0.299 [†]	-0.486 [†]	0.362 [†]	0.281 [†]
EQ-5D-3L index	0.715 [†]	0.638 [†]	0.707 [†]	0.415 [†]	0.189 [*]	0.462 [†]	0.560 [†]	0.450 [†]	0.724 [†]	0.394 [†]	-0.755 [†]	-0.660 [†]

Values for Spearman's rank correlation coefficient.

PF: physical functioning, RP: role physical, BP: bodily pain, GH: general health, VT: vitality, SF: social functioning, RE: role emotional, MH: mental health, PCS: physical component summary, MCS: mental component summary, RMQ: Roland-Morris disability questionnaire, Pain NRS: pain numeric rating scale, EQ-5D-3L: European quality of life-5 dimensions, 3-level version.

* <0.01 ; [†] <0.05 .

in level 2 of each EQ-5D dimension. The difference of level 2 problem reporting between two groups was also the highest in self-care (32.3%) followed by pain/discomfort (29.3%), anxiety/depression (24.2%), usual activities (23.1%), and mobility (9.2%). The difference of EQ-5D index was 0.22.

DISCUSSION

This study examined the validity of EQ-5D-3L for OVCF patients in Korea and compared their HRQOL with Korean general population. In the perspective of construct validity, EQ-5D-3L could be valid for OVCF patients in Korea. Comparisons of OVCF patients' HRQOL with the general populations' showed that problem reporting of each dimension in the patient group was statistically higher than reporting of the general people, respectively. This simple HRQOL instrument could be useful to measure HRQOL for OVCF patients.

This study recruited OVCF patients from outpatient clinics of 19 hospitals distributed throughout Korea to reflect various OVCF patients' characteristics. In addition, the advantage could be that patients could be recruited in a relatively short time. It was similar in

Table 5. Comparison of 3-level version of European quality of life-5 dimensions in vertebral compression fracture patients and comparison group

Dimensions	EQ-5D-3L		Vertebral compression fracture patients	Comparison group	p-value
	Level				
Mobility	1	58 (36.0)	361 (56.1)	<0.001	
	2	80 (49.7)	261 (40.5)		
	3	23 (14.3)	22 (3.4)		
Self-care	1	55 (34.2)	541 (84.0)	<0.001	
	2	75 (46.6)	92 (14.3)		
	3	31 (19.3)	11 (1.7)		
Usual activities	1	46 (28.6)	446 (69.3)	<0.001	
	2	82 (50.9)	179 (27.8)		
	3	33 (20.5)	19 (3.0)		
Pain/Discomfort	1	19 (11.8)	355 (55.1)	<0.001	
	2	105 (65.2)	231 (35.9)		
	3	37 (23.0)	58 (9.0)		
Anxiety/Depression	1	80 (49.7)	508 (78.9)	<0.001	
	2	68 (42.2)	116 (18.0)		
	3	13 (8.1)	20 (3.1)		
EQ-5D-3L index		0.62 (0.31)	0.84 (0.19)	<0.001	

Values are presented as number (%).

EQ-5D-3L: European quality of life-5 dimensions, 3-level version.

1: no problem, 2: some problems, and 3: severe problems.

epidemiologic patterns such as high prevalent in female and 70's comparing with previous studies.^{13,22} It means that these participants in this study might reflect HRQOL status of OVCF patients in Korea. However, there were some variations in patients' characteristics and sample sizes on hospitals. It may be dependent on the characteristics of OVCF patients by regions.

EQ-5D-3L could be valid to measure HRQOL of patients with OVCF in Korea. On severity of each dimension of EQ-5D-3L, there were statistically significant differences of scores in PCS and MCS of SF-12v2, pain NRS and RMQ. While mobility of EQ-5D-3L was highly correlated with PF of SF-12v2, anxiety/depression was highly correlated with MH. The correlation coefficient between pain/anxiety of EQ-5D-3L and pain NRS was very high and statistically significant. Especially, it was very interesting that this simple generic HRQOL instrument was highly correlated with specific measures such as RMQ ($r=-0.755$, $p<0.01$) and pain NRS ($r=-0.660$, $p<0.01$), respectively. It shows that EQ-5D-3L could be useful to measure HRQOL of patients with OVCF, especially in the outpatient clinic setting.

Unfortunately, we could not directly compare these results with results of other studies because there was no such validation study of EQ-5D-3L for OVCF patients. Therefore, we discussed these results indirectly. When Salaffi et al.²⁶ examined the validity of Italian version of 16-item assessment of health related QOL in osteoporosis (ECOS-16) which is a HRQOL instrument for osteoporotic patients in patients with vertebral fracture, correlation coefficient of EQ-5D-3L index with ECOS-16 was -0.691. One study reported that both RMQ and EQ-5D significant improved over time in patients with OVCF, although correlation was not provided.²⁹

HRQOL of OVCF patients were lower than those of comparison group from Korean general population in all dimensions of EQ-5D-3L and EQ-5D-3L index. In problem reporting, pain/discomfort was the highest, followed by usual activities, self-care, mobility and anxiety/depression. This could be caused by main symptom of these patients. Previous Korean studies^{9,39} also reported similar in most problematic dimension. However, in terms of differences on no problem reporting between groups, self-care was the highest, followed by pain/discomfort, usual activities, anxiety/depression and mobility. Because both groups were old, they might have some health problems. In addition, because high reporting problem in pain/discomfort of comparison group, the difference was relatively low. Yoon et al.³⁹ also reported these problems reporting pattern.

The mean EQ-5D-5L score for osteoporotic vertebral fracture patients (0.64 for women and 0.59 for men) in this study was lower or equal to than general population under COVID-19 (0.95),³⁴ Asian patients suffering from diabetes (0.8),²⁰ human immunodeficiency virus (HIV) (0.8),³² skin diseases (0.73),²¹ respiratory diseases (0.66),¹⁸ dengue fever (0.66),³³ frail elderly (0.58)¹⁹ but higher than elderly after fall injury (0.46)³⁶ and fracture injuries(0.23).³⁵

EQ-5D-3L could be available for the measurement of HRQOL for OVCF patients in Korea because this study showed the validity of EQ-5D-3L in Korean OVCF patients. Especially, EQ-5D is a simple instrument therefore, it is feasible to use in out-patient settings. In addition, as this study, HRQOL of OVCF patients using EQ-5D-3L could be compared HRQOL of general population from KNHANES in clinical settings, it could make to estimate Quality-Adjusted Life-Year loss in these patients. Especially, low back pain was second place of disease burden³⁸, it might be meaningful to use EQ-5D-3L for measuring HRQOL of OVCF patients.

This study has some limitations. First, this study had relatively small participants. There were no strict criteria for a sample size calculation of an instrument validation study. Depending on the paper, the sample size ranges from a few hundred^{17, 38}. So we arbitrarily set the sample size in consideration of other studies and it might be acceptable. In addition, we recruited patients from multiple general hospitals to reflect nationwide patients' characteristics. Second, severe cases may be excluded because a self-administration was done in survey. In order to improve this, it is necessary to help somebody like caregivers or interviewers for severe patients to fill up a questionnaire.

CONCLUSION

EQ-5D-3L will be useful for OVCF patients in Korea because it could be valid. And HRQOL of OVCF patients was very low in all dimensions of EQ-5D-3L, it will be necessary to try to improve their HRQOL in both pain and self-care.

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