SEQ-VAS and EQ-5D_{index} by Heath Status in the Community Dwelling Elders with Osteoarthritis

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Abstract

Objectives: The purpose of this study was to identify the health-related quality of life (HRQoL) using EuroQol-visual analogue scale (EQ-VAS) and EuroQol-5 dimension (EQ-5D) $_{index}$ by health status in the community dwelling elders with osteoarthritis. **Methods:** Data were extracted from the 5 th Korea National Health and Nutrition Examination Survey (KNHANES) 2011. Participants of the study included 369 elders over the age of 65 with osteoarthritis. Data was analysed by using SPSS/Win 18.0. **Results:** The means HRQoL using EQ-VAS and EQ-5D $_{index}$ of participants were 59.92(\pm 22.07) and .76(\pm 0.22), respectively. The factors affecting the EQ-VAS were perceived health status, stress, knee stiffness and suicidal ideation (R² = 0.29). The predictors of the EQ-5D $_{index}$ were perceived health status, knee stiffness, activity limitation, low back pain, suicidal ideation and asthma (R² = 0.44). **Conclusion:** The findings suggest that the health care program for the elder patients with osteoarthritis should be carefully designed by physical and emotional health status to improve HRQoL. It is necessary to use both the EQ-5D $_{index}$ and EQ-VAS to control factors affecting HRQoL.

Keywords: Elders, EQ-**5D**_{index.} EQ-VAS, Osteoarthritis, Quality of Life

1. Introduction

Osteoarthritis is very common in degenerative diseases and a major contributor to the health-related quality of life (HRQoL)¹. The prevalence of arthritis has been steadily increasing in Korea². In particular, arthritis has high prevalence rates - 201.2 out of 1,000 persons aged 40 to 64 and 472.6 for those aged 65 or older - in South Korea³ and approximately 27 million U.S. people suffer from pain and physical disorder caused by this condition⁴. Osteoarthritis is late-onset degenerative articular cartilage disease and is becoming a typical cause of joint disorder among many elderly people with the constant increase in the average life span since its prevalence rate increases gradually with the increase of age⁵. In particular, osteoarthritis of the knee is a principal factor that causes long-term kinetic

and physical dysfunction among the aged. Osteoarthritis, once it has generated, causes persistent pain, reduces personal mobility, becomes an obstacle to usual activities, and lowers the quality of life considerably⁶. In this context, it can be claimed that the research on osteoarthritis is very important in the gerontological perspective as well as in the medical perspective. The goal of arthritis control is to minimize complications, improve the quality of life for patients, and reinforce the foundation and competence for arthritis control⁷.

The quality of life can be divided into two categories: 1) the Health-Related Quality of Life (HRQoL) by which individuals subjectively evaluate physical, psychological, and social aspects of living that are affected by disease or treatment, 2) the Non-Health-Related Quality of Life (NHRQoL), which can indirectly affect health, including

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the living standard, the climate, and the environment. Concerns about HRQoL are on the gradual increase because of prolonged life span due to the development of medical techniques, social development, and higher economic levels. HRQoL assessment can provide basic data and an objective basis for a long-term goal to improve the quality of life related to chronic diseases, such as osteoarthritis, and can also be used to evaluate the effectiveness of intervention.

The tools to assess HRQoL include Medical Outcome Study Short Form-36 (SF-36), EuroQol-5 Dimension (EQ-5D), and Health Utility Index Mark 3 (HUI-3)8. Of these, EuroQuality of Life Questionnaire 5-Dimensional Classification (EQ-5D) is a quality of life scale that has been translated into 170 languages around the globe as of 2013 since its development in 1990. EQ-5D is differentiated from the existing quality of life scales in that it can estimate an integrated index of health levels the EQ-5D_{index} - and is widely used around the globe⁹. The greatest benefit of this scale is that respondents can easily give a response since it has only a few items, which are very simple. The HRQoL evaluation study using EQ-5D has been reported for several chronic diseases, including arthritis10.

It is known that the factors associated with HRQoL include the demographic factors, such as gender, age, and income, and chronic mental and physical diseases11. Of chronic diseases, in particular, the prevalence of osteoarthritis is found to lower the quality of life considerably.

Therefore, the aim of this study was to identify the health-related quality of life (HRQoL) using EuroQolvisual analogue scale (EQ-VAS) and EuroQol-5 dimension (EQ-5D)_{index} according to physical and emotional health status in the community dwelling elders with osteoarthritis.

2. Method

2.1 Research Design and Sampling

The current study used a cross-sectional descriptive design. This study was based on data obtained from the 5th Korea National Health and Nutrition Examination Survey (KNHANES) 2011. Participants of the study were 369 older adults over 65 years of age with degenerative osteoarthritis.

2.2 Research Instruments

2.2.1 EQ-5D_{index} and EQ-VAS

The Health-Related Quality of Life (HRQoL) is measured using EuroQol-5 dimension (EQ-5D) developed by EuroQol group¹². The EQ-5D is a five-question asking about mobility, self-care, restrictions of usual activities, pain/discomfort and anxiety/depression, each of which can be rated at one of three levels (no problem 1, some problems 2, severe problem 3). In five domains of EQ-5D, three-level responses given by subjects can be described as '23113,' for example; in this way, there are a total of 243 options (= 3^5). The EQ-5D $_{index}$ is a quantitative single value of the health status, which is obtained by giving weight to each level of the five areas. Its possible value ranges from -1 for serious problems with all of the five areas (mobility, self-care, usual activities, pain/discomfort, anxiety / depression) to 1 for no problem with the areas. In this study, estimation was made by using the index calculated by the following equation employing quality weight of the Korea Centers for Disease Control and Prevention¹³.

 $EQ-5D_{index} =$

1-(0.050+0.096×M2+0.418×M3+0.046×SC2+0.136×SC3 +0.051×UA2+0.208×UA3+0.037×PD2+0.151×PD3+0.04 $3 \times AD2 + 0.158 \times AD3 + 0.050 \times N3$

(M: Morbidity, SC: Self-care, UA: Usual activity, PD: Pain/ Discomfort, AD: Anxiety/ Depression)

EQ-VAS records the respondent's self-rated health on a vertical, visual analogue scale where the endpoints are labeled 'best imaginable health state (score 100)' and 'worst imaginable health state (score 0)'14.

2.2.2 Health Status

The variables related to health status were measured by physical and emotional condition as follow; 1) physical condition- knee pain, hip joint pain, low back pain, knee stiffness, other disease, and activity limitation, 2) emotional condition- perceived health status, stress feeling, depression feeling, and suicidal ideation.

2.3 Data Analysis

Data was analysed by using SPSS/Win 20.0 using descriptive analysis, ANOVA, t-test and stepwise multiple regression.

3. Result

3.1 General Characteristics of Participants

The mean age of the participants was 72.8 years (range 65 to 89 years), and 82.1% of the participants were women. Among the participants, 98.9% were married and 24.9% lived alone. Regarding educational levels, the rate of elementary school graduates or below was 76.7%, for middle school it was 11.9%, and for high school or higher it was 11.4% (Table 1).

Table 1 General characteristics of the participants

	characteristics of the pa	N=369
Variables		n(%)
Gender	Male	66(17.9)
	Female	303(82.1)
Age	65-74	245(66.4)
	≥ 75	124(33.6)
	Mean 72.8(SD 5.29)	
Education	≤Elementary school	283(76.7)
	Middle school	44(11.9)
	≥High school	42(11.4)
Marital status	Yes	365(98.9)
	No	4(1.1)
Family members	1	92(24.9)
	2	152(41.2)
	3	61(16.5)
	≥4	64(17.3)
Economic status	Quartile 1(lowest)	203(55.0)
	Quartile 2	77(20.9)
	Quartile 3	45(12.2)
	Quartile 4 (highest)	38(10.3)
	Missing	6(1.6)
Employment status	Yes	120(32.5)
	No	249(67.5)

3.2 EQ-VAS and EQ-5D_{index} of Participants

Among EQ-5D domain, respondents of 'Moderate or Severe' problem were as follow: Mobility 69.9%, Pain/ Discomfort 66.7%, Usual Activity 46.9%, Self-care 25.2%, and Anxiety/Depression 23.0% (Table 2).

The mean HRQoL using EQ-VAS and EQ-5D and EQ-5D index scores of participants were $59.92(\pm 22.07)$ and $.76(\pm 0.22)$, respectively (Table 3).

Table 2. Health-related quality of life according to EQ-5D domain N = 369

Domain	Variables	n(%) 111(30.1)		
Mobility	No problem			
	Moderate or Severe	258(69.9)		
Self-care	No problem	276(74.8)		
	Moderate or Severe	93(25.2)		
Usual Activity	No problem	196(53.1)		
	Moderate or Severe	173(46.9)		
Pain/Discom- fort	No problem	123(33.3)		
	Moderate or Severe	246(66.7)		
Anxiety/	No problem	284(77.0)		
Depression	Moderate or Severe	85(23.0)		
Total		369(100)		

Table 3. EQ-VAS and EQ-5D $_{index}$ in the subjects

N = 369

HRQoL	Mean(SD)	Min. ~ Max.
EQ-VAS	59.92(22.07)	0 ~ 100
$EQ-5D_{index}$.76(.20)	-1 ~ 1

HRQoL: health-related quality of life, EQ-VAS: EuroQol-visual analogue scale, EQ-5D: EuroQol-5 dimension index, EQ-5D_{index}=1-(0.050+0.096×M 2+0.418×M3+0.046×SC2+0.136×SC3+0.051×UA2+0.208×UA3+0.037×P-D2+0.151×PD3+0.043×AD2+0.158×AD3+0.050×N3)(M: Morbidity, SC: Self-care, UA: Usual activity, PD: Pain/Discomfort, AD: Anxiety/ Depression)

3.3 EQ-VAS and EQ-5D_{index} by health status in the subjects with osteoarthritis

EQ-VAS was statistically significant difference in knee pain (t=-2.73, p=.007), knee stiffness (t=-5.69, p<.001), hip joint pain (t=-3.72, p<.001), low back pain (t=-4.95, p<.001), activity limitation (t=-3.42. p=.001), stress feeling(t=-6.38, p<.001), depression(t=-3.16, p=.002), and suicidal ideation(t=-5.25, p<.001). EQ-5D_{index} was statistically significant difference in knee pain (t=-6.29, p<.001), hip joint pain (t=-5.43, p<.001), low back pain (t=-8.56, p<.001), activity limitation (t=-9.39). p<.001), asthma (t=-2.30, p=.022), stress feeling(t=-4.59, p<.001), depression(t=-4.36, p<.001), and suicidal ideation(t=-6.31, p<.001) (Table 4).

EQ-VAS and EQ-5D_{index} correlated negatively with degree of knee pain(r=-.122, p=.019; r=-.296, p<.001), degree of hip joint pain(r=-.187, p<.001; r=-.268, p<.001) and perceived health status (r=-.443, p<.001; r=-.440, p<.001), respectively (Table 5).

N=369

Variables		n	EQ-VAS	t or F(p)	EQ-5D _{index}	t or F(p)
			M(SD)	· · · · · (r)	M(SD)	- (F)
Physical Health Status						
Knee pain	Yes	280	58.17(22.09)	-2.73	.73(.21)	-6.29
	No	89	65.44(21.17)	(.007)	.88(.14)	(<.001)
Knee stiffness	Yes	165	52.95(21.71)	-5.69	.67(.21)	-8.47
	No	204	65.56(20.75)	(<.001)	.84(.16)	(<.001)
Duration of knee stiff-	< 30	131	54.11(20.52)	1.78	.69(.21)	2.490
ness(minute)	30~60	25	45.56(27.81)	(.173)	.58(.24)	(.086)
,	> 60	9	56.56(17.14)	,	.68(.12)	, ,
	Not applicable	204	,		,	
Hip joint pain	Yes	104	53.21(23.49)	-3.72	.67(.21)	-5.43
1 / 1	No	265	62.55(20.95)	(<.001)	.80(.19)	(<.001)
Low back pain	Yes	192	54.62(22.08)	-4.95	.68(.21)	-8.56
1	No	177	65.67(20.62)	(<.001)	.85(.14)	(<.001)
Activity limitation	Yes	148	55.18(21.09)	-3.42	.65(.22)	-9.39
	No	221	63.10(22.18)	(.001)	.84(.15)	(<.001)
Other Disease			()	(111)	()	() ,
Hypertension	Yes	225	59.59(22.27)	54	.76(.18)	71
Trypertension	No	143	60.87(21.29)	(.585)	.77(.22)	(.474)
Stroke	Yes	21	50.50(24.09)	-2.02	.70(.23)	-1.47
Stroke	No	348	60.64(21.65)	(.08)	.77(.20)	(.140)
Myocardial Infarction	Yes	8	53.50(16.23)	86	.81(.16)	.68
Myocardiai iiiiaictioii	No	361	60.23(21.98)	(.390)	.76(.20)	(.495)
Tuberculosis of lung	Yes	41	59.34(21.04)	17	.73(.25)	-1.01
Tuberculosis of fullg	No	328	59.99(22.22)	(.859)	.77(.19)	(.311)
Rheumatoid arthritis	Yes	23	60.74(19.49)	.14	.77(.19)	09
Kileumatoid ai tiiritis	No	349	60.04(22.05)	(.882)	.76 .76	(.92)
Asthma	Yes	35	59.86(20.71)	02	.69(.23)	-2.30
Astillia	No	334	59.93(22.23)	(.986)	.77(.19)	(.022)
Diabetes Mellitus	Yes	62	61.85(23.04)	.75	.77(.19)	.44
Diabetes Mellitus	No	307	59.53(21.88)	(.450)	.76(.21)	(.658)
Thyroidism	Yes	33	53.58(25.69)	-1.73	.70(.24)	(.638) -1.84
Higiolaisiii	No	336	60.54(21.62)	(.083)	.77(.19)	(.066)
Emotional Health Statu		330	00.54(21.02)	(.083)	.//(.19)	(.000)
			10 (0(00 70)		(2/24)	. = 0
Stress feeling	Severe	112	49.63(22.58)	-6.38	.69(.21)	-4.59
D	Moderate	256	64.66(19.94)	(<.001)	.80(.18)	(<.001)
Depression feeling (>	Yes	67	52.54(21.32)	-3.16	.67(.22)	-4.36
2weeks)	No	301	61.76(21.68)	(.002)	.79(.19)	(<.001)
Suicidal ideation	Yes	108	51.11(23.61)	-5.25	.67(.24)	-6.31
	No	261	63.81(20.01)	(<.001)	.80(.16)	(<.001)

Table 5. Correlations among the perceived health status, pain, EQ-VAS and EQ-5D_{index}

	muca	
	EQ-VAS	$EQ-5D_{index}$
	r(p)	r(p)
Degree of knee pain	122(.019)	296(<.001)
Degree of hip joint pain	187(<.001))	268(<.001)
Perceived health status*	443(<.001)	440(<.001)

^{*5-}point likert scale (1=very good to 5=very bad)

3.4 The Factors Affecting the EQ-VAS and $EQ-5D_{index}$

The multiple regression analyses were used to identify determinants of HRQoL (Table 6, 7) After controlling for the effects of sex, age, income, education level, marital status and occupation, the EQ-VAS was significantly explained by perceived health status, stress, knee stiffness and suicidal ideation ($R^2 = 0.29$). The EQ-5D_{index} was significantly explained by perceived health status, knee stiffness, activity limitation, low back pain, suicidal ideation and asthma ($R^2 = 0.44$).

Table 6. Predictors of EQ-VAS in the subjects with N = 369osteoarthritis

Variables	EQ-VAS				
	В	β	t	p	
Perceived health status	-7.81	-3.59	-7.57	<.001	
Stress feeling(ref=yes)	-9.06	19	-3.97	<.001	
Knee stiffness (ref=no)	6.92	.15	3.37	.001	
Suicidal ideation	-4.54	09	-1.96	.050	
(ref=yes)					
constant	81.07		14.92	<.001	
$R^2 = 0.29, F(p) = 38.04 (<.001)$					

^{*}Adjusted for sex, age, income, education level, marital status and occupation

Table 7. Predictors of EQ- $5D_{index}$ in the subjects with osteoarthritis N = 369

Variables	EQ-5D _{index}			
	В	β	t	р
Perceived health status	04	20	-4.34	<.001
Knee stiffness (ref=no)	.10	.25	5.99	<.001
Activity limitation (ref=yes)	08	18	-4.11	<.001
Low back pain (ref=no)	.08	.19	4.20	<.001
Suicidal ideation (ref=yes)	06	13	-3.16	.002
Asthma (ref=yes)	06	09	-2.26	.024
constant	.85		6.19	<.001

 $R^2 = 0.44$, F(p) = 32.23 (<.001)

4. Disscussion

Health problems in EQ-5D of the participants in this study were most frequently found in mobility (69.9%), followed by pain/discomfort (66.7%), usual activity (46.9%), self-care (25.2%), and anxiety/depression (23.0%), with mobility and pain indicated by the previous research^{4,6}. The subjects in this study had EQ-5D_{index} of 0.76±0.20, which was very close to the level in the 2010 Korea National Health and Nutrition Examination Survey (KNHANES), 0.76±0.02. The index was lower in the group with chronic disease (osteoarthritis, hypertension, diabetes, hypercholesterolemia, bilateral hearing loss) than in the group without chronic disease; in particular, it was lowest in the group with osteoarthritis¹³. In comparison with domestic and overseas research, it was lower than the level for arthritis patients aged 65 or older, 0.80±0.01, in Khanna¹⁰ and for women aged 50 or older with arthritis, 0.89±0.13, in Park and Lee¹. Their EQ-VAS score was 59.92±22.07, close to 60.26±22.28 in Kim^{15,16}. These results suggest the need to improve the quality of life for arthritis patients since the existing domestic and overseas research on the HRQoL lowered by chronic disease with arthritis as comorbidity among those aged 65 or older reported that arthritis patients had significantly lower HRQoL than those with no disease^{10,15}.

When the effects of the health status on the quality of life were measured, with the demographic characteristics controlled, the principal predictors of EQ-VAS were found to include perceived health status, stress, knee stiffness, and suicidal ideation, with 29% explanation power. The principal predictors of the EQ-5D_{index} included perceived health status, knee stiffness, activity limitation, low back pain, suicidal ideation, and asthma, with 44% explanation power, showing a slight difference. In particular, the existing research reported that arthritis patients with other chronic diseases had even lower HRQoL¹⁶; asthma was found to be a relevant factor among comorbidities. Common predictors of their quality of life included perceived health status, suicidal ideation, and knee stiffness; therefore, public health professionals need to make efforts to improve the quality of life through an intensive control programs for these factors. Stress feeling, which was not predicted for EQ-5D_{index}, was found to be a predictor of the quality of life for EQ-VAS; contrary to EQ-VAS, activity limitation, low back pain, and asthma contributed to $EQ-5D_{index}$. This result shows that a more influential variable is an emotional condition for EQ-VAS and a physical condition for EQ-5D_{index}. Estimations with the EQ-5D_{index}, which is a utility score of EQ-5D designed in a three-point scale for five specific areas of health, and EQ-VAS for marking individuals' subjective health status in general on the day of the survey are to assess different sub-areas of the very abstract concept of the healthrelated quality of life. For this reason, it is necessary to use both the EQ-5D_{index} and EQ-VAS to determine and control the health-related quality of life and the factors affecting them.

5. Conclusion

The scores of HRQoL using EQ-VAS and EQ-5D and EQ-5D index among the participants with osteoarthritis were $59.92(\pm 22.07)$ and $.76(\pm 0.22)$, respectively. The order of frequency of 5 domains in EQ-5D of participants was mobility (69.9%), pain/discomfort (66.7%), usual activity (46.9%), self-care (25.2%), and anxiety/depression (23.0%). The factors affecting the HRQoL by using both EQ-VAS and EQ-5D_{index} were perceived health status, stress, knee stiffness, suicidal ideation, activity limitation, low back pain, and asthma. Our findings suggest that the health care program for the elder patients with osteoarthritis should be developed by physical and emotional health status to improve HRQoL.

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