

Health-related quality of life among home-dwelling people with arthritis in Korea: Comparative study of osteoarthritis and rheumatoid arthritis

Kyoung Hwa Joung¹ · Sung Suk Chung²

¹Department of Nursing, Honam University

²Department of Statistics, Chonbuk National University

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Abstract

Osteoarthritis (OA) and rheumatoid arthritis (RA) are most popular types of arthritis in Korea. This study compared health-related quality of life (HRQoL) of home-dwelling people with OA and RA in Korea. Data were drawn from the Korean nationwide representative survey. Subjects were 3,352 people with arthritis over 19 years of age (2,953 OA respondents and 399 RA respondents). Good HRQoL in OA respondents was differentiated with limitation of mobility, perceived health status, age, economic status, presence of arthralgia, gender, medical coverage, and educational level. Good HRQoL in RA respondents was differentiated with limitation of mobility, perceived health status, economic status, educational status, and presence of arthralgia. In conclusion, HRQoL and predictors of good HRQoL among people with arthritis differs for OA or RA. These results can be of use in development of health programs and clinical interventions for community-dwelling people with arthritis.

Keywords: Osteoarthritis, quality of life, rheumatoid arthritis, risk factors.

1. Introduction

Health care expenditures have been rapidly increasing. Korean arthritic patients are the second greatest users of health care services due to the duration and related symptoms (Ministry of Health and Welfare, 2007). In Korea, osteoarthritis (OA) and rheumatoid arthritis (RA) are highly prevalent (2.54 and 0.94 per 1000, respectively) and chronic forms of arthritis (Ministry of Health and Welfare, 2006).

Patients with OA and RA suffer from functional limitations and disability. These types of illness show the similar or unique symptoms (Stebbins *et al.*, 2010). The impairments

¹ Assistant professor, Department of Nursing, Honam University, 59-1, Seobong-dong, Gwangsan-gu, Gwangju 506-714, Korea.

² Corresponding author: Professor, Department of Statistics, Institute of Applied Statistics, Chonbuk National University, 664-14, 1ga, Deokjin-dong, Deokjin-gu, Jeonju 561-756, Korea.
E-mail: sschung@jbnu.ac.kr

of physical, psychological and social capacity require changes in many aspects of daily living in addition to deterioration in health-related quality of life (HRQoL) (Alishiri *et al.*, 2008; Ethgen *et al.*, 2002). However, comparative studies of HRQoL in different pathologic conditions among arthritic patients have rarely been investigated.

HRQoL has become important in decisions regarding resource allocation, intervention design, treatment of individuals with chronic condition (Currey *et al.*, 2003; Suarez-Almazor *et al.*, 2000), prediction of future health care consumption (Ethgen *et al.*, 2002), morbidity and mortality (Currey *et al.*, 2003). EuroQoL-5D (EQ-5D), one of the well-known HRQoL indicators, is widely-used in many countries (EuroQoL, 2009). It is useful to compare the value of HRQoL and evaluate the efficacy of health care services from other countries. Therefore, the Ministry of Health and Welfare in Korea used EQ-5D to assess HRQoL in the third Korean National Health and Nutrition Examination Survey 2005 (Ministry of Health and Welfare, 2006).

Recently, assessing HRQoL has become an integral part of care for arthritic patients globally (Mathew *et al.*, 2009). Many studies investigating HRQoL of arthritic patients have been conducted (Alishiri *et al.*, 2008; Bansback *et al.*, 2007; Currey *et al.*, 2003; Ethgen *et al.*, 2002). However, little attention has been given to the type of arthritis (Currey *et al.*, 2003) and the utilization of health care resource (Ethgen *et al.*, 2002). Especially, only a few studies on HRQoL in Korean arthritic patients have been executed (Kim *et al.*, 2005; Seong *et al.*, 2004). Therefore, understanding the issues that influence HRQoL of those with OA and RA in Korea may offer a more clear expectation for the outcome for patients, families, healthcare professionals, and policy makers.

The objectives of this study were to compare the value of HRQoL among home-dwelling people with OA or RA, and to identify the related factors that predict HRQoL of those with OA or RA. These predictors would be potential targets for intervention to improve HRQoL in this large population in Korea.

2. Materials and methods

2.1. Participants

The data was obtained from the third Korean National Health and Nutrition Examination Survey (Ministry of Health and Welfare, 2007), the latest complete nationwide data by the Korean Ministry of Health and Welfare. Korean National Health and Nutrition Examination Survey has been assessed non-institutional residents in Korea every 3 years since 1998, who were selected by stratified clustering systematic random sampling (Ministry of Health and Welfare, 2007). In preparing this study, the authors forwarded the research proposal to Ministry of Health and Welfare. Access to the all datasets was granted, with the condition that the data identifier was signed code numbers; no subject names or any private information were announced. In this study, the subjects were selected from the 2005 survey and people diagnosed with both OA and RA were excluded. The final group of subjects consisted of 3,352 home-dwelling people ≥ 19 years of age who self-reported being diagnosed as arthritic by medical doctors (2,953 OA respondents and 399 RA respondents). The study was reviewed and approved by the Research Ethics Committee of Chonbuk National University Hospital.

2.2. Measures

2.2.1. Characteristics

Items were assessed the two categories of demographics and health-related characteristics. Demographics consisted of age, gender, marital status, educational level, employment status, household income, region (rural or urban), and medical coverage (medical insurance or Medicaid). Health-related characteristics consisted of presence of arthralgia (within the previous year), limitation of mobility, limited duration of time, and perceived health status. Concerning health status, subjects were asked to rate their health based on a 5-point scale ranging from “very poor” to “excellent”.

2.2.2. HRQoL

HRQoL was measured with the Korean version EQ-5D index developed by EuroQoL at 1987 (EuroQoL, 2009) and translated into Korean by Kim *et al.* (2005). The EQ-5D index captures five health dimensions (mobility, self-care, usual activity, pain/discomfort, and anxiety/depression), with three response categories within each of these dimensions (no problems, some/moderate problems, and extreme problems). The EQ-5D encompasses 243 different health states. HRQoL scores were calculated by applying the Korean Value Sets (Korean Centers for Disease Control and Prevention, 2007). If any dimension was rated as an extreme problem, the HRQoL score was <1 , while if all of dimensions were stated as no problems, the score was 1. In this case, HRQoL scores ranged from -0.171 to 1. The internal consistency reliability (Cronbach's $\alpha=0.820$) and content validity have been established in Korean adults with RA (Kim *et al.*, 2005). Defining poor versus good HRQoL was categorized by using the first (≤ 25 th percentile) and fourth quartile (≥ 75 th percentile) of EQ-5D scores according to the EQ-5D manual (EuroQoL, 2009).

2.3. Data analysis

SPSS version 15.0 was used for data analysis. Using the cutoff value calculated in the previous step, the EQ-5D scores of respondents in the derivation set were converted to a binominal outcome variable (poor/good HRQoL). Chi-square (χ^2) test and independent sample t-test were used to compare HRQoL scores between the poor HRQoL group and the good HRQoL group among respondents with OA and RA. Logistic regression analysis (forward selection using the likelihood ratio) was performed to quantify associations between the assumed predictor variables and this binominal outcome variable (Kahng *et al.*, 2010). The input variables to the analysis (assumed predictors of HRQoL) included age, gender (women vs. men), marital status (spouse no vs. spouse yes), educational level (below vs. above high-school diploma), employment status (unemployed vs. employed), economic status (lower income, lower middle income, upper middle income, and upper income stratified by Ministry of Health and Welfare according to the household income) (Ministry of Health and Welfare, 2007), region (rural vs. urban), medical coverage (Medicaid vs. medical insurance), presence of arthralgia (no pain vs. pain), limitation of mobility (limitless vs. limited), limited duration of time, and perceived health status. In addition, the rate of classification accuracy was calculated to assure the validity of models (Cho *et al.*, 2009; Lee, 2001).

3. Results

3.1. Characteristics of subjects

The 3,352 subjects were 825 males and 2,527 females (Table 3.1). The mean age of the subjects was 62.0 ± 12.8 years (range: 19 ~ 107 years). The mean age of OA and RA respondents was 63.1 years and 53.7 years, respectively. There were significant differences between OA and RA respondents in terms of age ($p < 0.001$), educational level ($p < 0.001$), employment status ($p = 0.022$), household income ($p < 0.001$), region ($p < 0.001$), presence of arthralgia ($p < 0.001$), limitation of mobility ($p = 0.002$), and perceived health status ($p = 0.006$).

Table 3.1 Characteristics of subjects (N=3,352)

Variable	Category	OA (n=2,953)		RA (n=399)		Total (n=3,352)	t , χ^2	p
		n (%)	or M \pm SD	n (%)	or M \pm SD	n (%) or M \pm SD		
Age(year)		63.1 ± 12.0 (19-107)		53.7 ± 14.9 (19-94)		62.0 ± 12.8 (19-107)	14.166	<0.001
Gender	Male	716	(24.2)	109	(27.3)	825	(24.6)	1.788 0.181
	Female	2237	(75.8)	290	(72.7)	2527	(75.4)	
Marital status	Spouse yes	1865	(63.2)	268	(67.2)	2133	(63.6)	2.445 0.118
	Spouse no	1088	(36.8)	131	(32.8)	1219	(36.4)	
Educational level	≤ Elementary school	1927	(66.8)	176	(46.2)	2103	(64.4)	84.230 <0.001
	Middle school	390	(13.5)	54	(14.2)	444	(13.6)	
	High school	421	(14.6)	106	(27.8)	527	(16.1)	
	> College	148	(5.1)	45	(11.8)	193	(5.9)	
Employment status	Employed	1228	(41.6)	190	(47.6)	1418	(42.3)	5.244 0.022
	Unemployed	1725	(58.4)	209	(52.4)	1934	(57.7)	
Household income (1000won)		1137 ± 1193 (0-9980)		1614 ± 1583 (0-8000)		1191 ± 1252 (0-9980)	-4.697	<0.001
Region	Rural	990	(33.5)	95	(23.8)	1085	(32.4)	15.157 <0.00
	Urban	1963	(66.5)	304	(76.2)	2267	(67.6)	
Medical coverage	Medical insurance	2655	(89.9)	361	(90.5)	3016	(90.0)	0.126 0.723
	Medicaid	298	(10.1)	38	(9.5)	336	(10.0)	
Presence of arthralgia	Yes	2800	(95.0)	350	(87.7)	3150	(94.1)	33.442 <0.001
	No	148	(5.0)	49	(12.3)	197	(5.9)	
Limitation of mobility	Yes	902	(30.5)	92	(23.1)	994	(29.7)	9.447 0.002
	No	2051	(69.5)	307	(76.9)	2358	(70.3)	
Limited duration of time (year)		2.7 ± 6.4 (0-77)		2.7 ± 7.1 (0-77)		2.7 ± 6.5 (0-77)	0.095	0.924
Perceived health status (score)		2.5 ± 0.8 (1-5)		2.6 ± 0.9 (1-5)		2.5 ± 0.8 (1-5)	-2.725	0.006

3.2. Comparison of HRQoL between OA and RA patients

Mean HRQoL scores were 0.807 ± 0.155 in OA respondents and 0.829 ± 0.161 in RA respondents (Table 3.2). The HRQoL between the OA and the RA subjects were statistically different in the dimensions of mobility, usual activity and pain/discomfort. Moderate or severe problems in mobility were evident in 49.4% of OA respondents and 34.6% of RA respondents. Moderate or severe problems in usual activity were evident in 35.2% of OA respondents and 27.6% of RA respondents. Moderate or severe pain/discomfort were evident in 78.1% of OA respondents and 72.4% of RA respondents.

Table 3.2 HRQoL of subjects (N=3,352)

Dimension		OA (n=2,953)		RA (n=399)		t , χ^2	p
		n (%)	or M \pm SD	n (%)	or M \pm SD		
Mobility	No problem	1489	(50.6)	259	(65.4)	31.528	<0.001
	Moderate	1405	(47.7)	130	(32.8)		
	Severe	49	(1.7)	7	(1.8)		
Self-care	No problem	2688	(91.3)	364	(91.9)	0.707	0.702
	Moderate	220	(7.5)	26	(6.6)		
	Severe	35	(1.2)	6	(1.5)		
Usual activities	No problem	1909	(64.9)	287	(72.5)	9.016	0.011
	Moderate	973	(33.1)	102	(25.8)		
	Severe	61	(2.1)	7	(1.8)		
Pain/discomfort	No problem	643	(21.9)	109	(27.7)	6.685	0.035
	Moderate	2063	(70.3)	258	(65.5)		
	Severe	230	(7.8)	27	(6.9)		
Anxiety/depression	No problem	1740	(59.6)	240	(61.2)	0.506	0.776
	Moderate	1058	(36.3)	135	(34.4)		
	Severe	120	(4.1)	17	(4.3)		
HRQoL		0.807 ± 0.155 (-0.171 ~ 0.950)		0.829 ± 0.161 (-0.171 ~ 0.950)		-2.589	0.010

3.3. Differentiation of HRQoL subgroups between OA and RA patients

The HRQoL scores differentiated two distinct HRQoL subgroups: poor or good (Table 3.3). Both subgroups in OA and RA respondents were defined as being below the 25th percentile (OA, ≤ 0.766 ; RA, ≤ 0.774) or above the 75th percentile (OA, ≥ 0.913 ; RA, ≥ 0.913) of the HRQoL scores.

In OA respondents, statistical differences were evident between poor and good HRQoL subgroups according to age ($p < 0.001$), gender ($p < 0.001$), marital status ($p < 0.001$), educational level ($p < 0.001$), employment status ($p < 0.001$), household income ($p < 0.001$), region ($p < 0.001$), medical coverage ($p < 0.001$), presence of arthralgia ($p < 0.001$), limitation of mobility ($p < 0.001$), limited duration of time ($p < 0.001$), and perceived health status ($p < 0.001$).

In RA respondents, there were statistical differences between poor and good HRQoL subgroups in age ($p < 0.001$), gender ($p = 0.004$), marital status ($p = 0.023$), educational level ($p < 0.001$), employment status ($p = 0.001$), household income ($p < 0.001$), medical coverage ($p = 0.001$), presence of arthralgia ($p < 0.001$), limitation of mobility ($p < 0.001$), limited duration of time ($p < 0.001$), and perceived health status ($p < 0.001$).

Table 3.3 Difference of HRQoL of subjects according to characteristics

Variable	Category	OA (n=1,966)				RA (n=286)			
		Poor (n=978)		Good (n=988)		Poor (n=116)		Good (n=170)	
		≤ 25 percentile n (%) or M±SD	≥ 75 percentile n (%) or M±SD	t , χ^2	p	≤ 25 percentile n (%) or M±SD	≥ 75 percentile n (%) or M±SD	t , χ^2	p
Age (year)		68.2±10.7	58.5±11.8	19.060	<0.001	61.9±13.8	48.7±13.7	7.937	<0.001
Gender	Male	192 (19.6)	303 (30.7)	31.776	<0.001	21 (18.1)	57 (33.5)	8.272	0.004
	Female	786 (80.4)	685 (69.3)			95 (81.9)	113 (66.5)		
Marital status	Spouse yes	521 (53.3)	730 (73.9)	90.254	<0.001	89 (59.5)	123 (72.4)	5.176	0.023
	Spouse no	457 (46.7)	258 (26.1)			47 (40.5)	47 (27.6)		
Educational level	≤Middle school	883 (92.1)	660 (68.4)	169.852	<0.001	90 (82.6)	76 (45.8)	7.213	<0.001
	>High school	76 (7.9)	305 (31.6)			19 (17.4)	90 (54.2)		
Employment status	Employed	314 (32.1)	514 (52.0)	79.983	<0.001	41 (35.3)	94 (55.3)	1.011	0.001
	Unemployed	664 (67.9)	474 (48.0)			75 (64.7)	76 (44.7)		
Household income (1000won)		706±725	1592±1463	-11.377	<0.001	911±1079	2250±1706	-4.866	<0.001
Region	Rural	379 (38.8)	299 (30.3)	15.678	<0.001	32 (27.6)	38 (22.4)	1.022	0.312
	Urban	599 (61.2)	689 (69.7)			84 (72.4)	132 (77.6)		
Medical coverage	Medical insurance	821 (83.9)	949 (96.1)	80.249	<0.001	95 (81.9)	161 (94.7)	12.049	0.001
	Medicaid	157 (16.1)	39 (3.9)			21 (18.1)	9 (5.3)		
Presence of arthralgia	Yes	960 (98.3)	883 (89.5)	65.722	<0.001	113 (97.4)	131 (77.1)	22.802	<0.001*
	No	17 (1.7)	104 (10.5)			3 (2.6)	39 (22.9)		
Limitation of mobility	Yes	633 (64.7)	62 (6.3)	734.679	<0.001	60 (51.7)	10 (5.9)	78.387	<0.001
	No	345 (35.3)	926 (93.7)			56 (48.3)	160 (94.1)		
Limited duration of time (year)		5.2±8.5	0.8±2.1	15.868	<0.001	6.0±10.9	0.9±1.8	6.056	<0.001
Perceived health status (score)		2.1±0.8	2.9±0.8	-22.570	<0.001	2.0±0.7	3.0±0.8	-9.892	<0.001

* Fisher's exact test

3.4. Comparison of predictors of HRQoL between OA and RA patients

Logistic regression analysis was conducted separately for OA and RA respondents (Table 3.4). The predictors of good HRQoL consisted of eight variables in OA respondents and five variables in RA respondents.

Good HRQoL among OA respondents was associated with no limitation of mobility (odds ratio: 0.055, $p < 0.001$), perceived health status as good (odds ratio: 2.653, $p < 0.001$), younger age (odds ratio: 0.974, $p < 0.001$), higher economic status (odds ratio: 1.256, $p = 0.001$), no arthralgia (odds ratio: 0.207, $p < 0.001$), male (odds ratio: 1.671, $p = 0.001$), medical insurance (odds ratio: 2.021, $p = 0.006$), and higher educational level (odds ratio: 1.708, $p = 0.009$). In this model, the rate of classification accuracy was 82.0%.

On the other hand, good HRQoL among RA respondents was associated with no limitation of mobility (odds ratio: 0.103, $p < 0.001$), perceived health status as good (odds ratio: 2.330, $p < 0.001$), higher economic status (odds ratio: 1.802, $p = 0.001$), higher educational level

(odds ratio: 2.714, $p=0.012$), and no arthralgia (odds ratio: 0.158, $p=0.014$). In this model, the rate of classification accuracy was 81.2%.

Table 3.4 Logistic regression analysis of associated factors of HRQoL of the study subjects

Table 5.71 Logistic regression analysis of associated factors of HbA1c of the study subjects							
	Parameter estimate	Standard error	Wald χ^2	Sig.	Odds ratio	95% Confidence interval	
						Lower	Upper
OA (n=1,899)							
Constant	0.354	0.668	0.280	0.597	1.424		
Limitation of mobility	-2.902	0.171	289.544	<0.001	0.055	0.039	0.077
Perceived health status	0.976	0.088	123.745	<0.001	2.653	2.234	3.151
Age	-0.027	0.007	16.365	<0.001	0.974	0.961	0.986
Economic status	0.228	0.068	11.289	0.001	1.256	1.100	1.434
Presence of arthralgia	-1.577	0.387	16.615	<0.001	0.207	0.097	0.441
Gender	0.513	0.159	10.367	0.001	1.671	1.222	2.283
Medical coverage	0.703	0.255	7.614	0.006	2.021	1.226	3.330
Educational level	0.535	0.204	6.905	0.009	1.708	1.146	2.546
RA (n=286)							
Constant	-1.084	1.067	1.033	0.309	0.338		
Limitation of mobility	-2.270	0.479	22.421	<0.001	0.103	0.040	0.264
Perceived health status	0.846	0.242	12.228	<0.001	2.330	1.450	3.744
Economic status	0.589	0.172	11.740	0.001	1.802	1.287	2.525
Educational level	0.998	0.395	6.381	0.012	2.714	1.251	5.890
Presence of arthralgia	-1.847	0.751	6.040	0.014	0.158	0.036	0.688

4. Discussion

This study is the first nationwide representative study in Korea calculating HRQoL of people with arthritis considering socio-demographic factors and the main types of arthritis: OA and RA. Mean HRQoL score of the OA respondents (0.807 ± 0.155) was lower than mean HRQoL score of RA respondents (0.829 ± 0.161). Both scores were lower than HRQoL scores of healthy, arthritis-free people (0.91) by the EQ-5D, and higher than the HRQoL scores of people with arthritis (0.57) without considering the type of arthritis in Korea (Seong *et al.*, 2004). The present HRQoL scores of community-dwelling people with arthritis are comparable to previous findings with patients at one clinic in Korea, where the mean score of patients with OA (0.62) was marginally lower than the mean score of patients with RA (0.63) (Kim *et al.*, 2005). Lower HRQoL scores predicted increased consumption of health care resources (Ethgen *et al.*, 2002). Further research is needed to clarify the relationship between HRQoL and medical service fee among arthritic patients.

In this study, the HRQoL score of RA respondents can be compared to that value from other countries measured by the EQ-5D. Although these results were weighted differently based on the country of origin, HRQoL scores of RA respondents in this study (0.829 ± 0.161) were higher than scores from the United Kingdom (0.51 ± 0.31) and Canada (0.63 ± 0.25) (Bansback *et al.*, 2007). This meaningfully comparative study has helped compare Korea's medical service status with other countries, and maybe explained on the basis health inequality in Korea. Future study is needed to clarify this mechanism including HRQoL, and health inequality among arthritic patients in those countries.

Presently, OA respondents experience more problems with usual activity and pain/discomfort than RA respondents. The occurrence of OA is growing due to prolonged life expectancy and an increasing number of elderly individuals in the population (Slatkowsky-Christensen *et al.*, 2009). Problems with activities can influence employment, corresponding to obligatory and some committed activities, and thus ignore a great deal of daily life (Katz *et al.*, 2006). Appropriately, community-based healthcare programs for people with OA would be focused on assistances of usual activity and pain managements.

The predictors of good HRQoL of respondents differ with the type of arthritis. However, there are five common predictors of HRQoL among arthritic patients: limitation of mobility,

perceived health status, economic status, educational level, and presence of arthralgia. Education level, which can be considered a proxy for income level, is a predictor of good HRQoL of respondents with OA and RA. This result partially supports results of a previous study that the influential socio-demographic factors of good HRQoL are male gender, urban area residence, high level of education, and employment (Seong *et al.*, 2004). Community-based healthcare programs for arthritic patients would be planned to encourage the continuous education and job opportunities.

In this study, limitation of mobility, perceived health status, and presence of arthralgia are introduced as new predictors of HRQoL in OA and RA respondents. Particularly, limitation of mobility was the main predictor of good HRQoL in OA and RA respondents. Limitation of mobility also influences the depressive mood of arthritic patients (An and Tak, 2009). The US National Arthritis Foundation recommends exercise programs for arthritic individuals to improve self-efficacy and to decrease joint pain and stiffness (National Arthritis Foundation, 2010). Therefore, home visiting nurses and community-based healthcare programs for people with arthritis would focus on promoting the range of motion exercise.

Perceived health status, which is the second predictor of good HRQoL in OA and RA patients, also affects depression (An and Tak, 2009) and mortality (Alishiri *et al.*, 2008). Thus, it is necessary that patients have the opportunity to check their health status regularly and manage their own health problems.

Economic status was another predictor of HRQoL in the OA and RA respondents. The mean household income of OA respondents was lower than RA respondents. Adults with arthritis can experience poor economic status because of their frequent uses for health resources. Community-based healthcare service for needy arthritic patients should be planned.

Arthralgia is the main symptom of arthritis and is a predictor of respondents with OA and RA. Use of appropriate pain killers can be influential in increasing the HRQoL of those with arthritis (Seong *et al.*, 2004). Additionally, symptoms and effects of treatment are different to the types of arthritis (Ma *et al.*, 2009; Stebbings *et al.*, 2010; Yasuda, 2010). Therefore, our results can be the useful standpoint to evaluate the pain management for people with OA or RA.

Age, gender, and medical coverage are more recently known predictors of HRQoL in people with OA. Until now, there has not been a comprehensive study undertaken concerning HRQoL of OA patients in Korea, although the incidence rate of OA is higher than that of RA. This result partially supports the results reported previously from another country that female gender and age are associated with poorer HRQoL among OA patients (Hopman *et al.*, 2009). Therefore, community-based health programs for arthritic patients should prudently focus on pain relief.

The condition of the medical coverage between respondents with OA and RA was very similar, but medical coverage is only a predictor of good HRQoL among OA respondents. Further studies are suggested in this area. It is especially necessary to identify the specific factors that improve HRQoL in people with different types of arthritis. As a first step, community health care service and health care programs should be planned to fulfill the unmet needs of arthritic patients.

This study has several limitations. First, while the study focused on only home-dwelling people with two main types of arthritis, the comorbidity of musculoskeletal disorders is common. Under such circumstances, a study of HRQoL scores would be different from the HRQoL of arthritic patients in clinics. Attempts should be made to expand to more diverse

populations in future studies. Second, Korean National Health and Nutrition Examination Survey has been conducted every 3 years. Future studies using all datasets from these surveys could illuminate trends of HRQoL of arthritic patients in Korea.

Overall, this study provides a useful standpoint for people with arthritis in order to evaluate the HRQoL. The findings could be valuable in decision making to help achieve good HRQoL, identify high-risk patients, establish condition-specific health-care services or programs, and start interventional programs to prevent a poor HRQoL.

References

- Alishiri, G. H., Bayat, N., Ashtiani, A. F., Tavallaii, S. A., Assari, S. and Moharamzad, Y. (2008). Logistic regression models for predicting physical and mental health-related quality of life in rheumatoid arthritis patients. *Modern Rheumatology*, **18**, 601-608.
- An, J. Y. and Tak, Y. R. (2009). Depressive symptoms and related risk factors in old and oldest-old elderly people with arthritis. *Journal of Korean Academy of Nursing*, **39**, 72-83.
- Bansback, N., Marra, C., Tsuchiya, A., Anis, A., Guh, D., Hammond, T. and Brazier, J. (2007). Using the health assessment questionnaire to estimate preference-based single indices in patients with rheumatoid arthritis. *Arthritis and Rheumatism*, **57**, 963-971.
- Cho, D. H., Kim, B. S., Seok, K. H., Lee, J. U., Kim, J. S. and Kim, S. H. (2009). A study on the behavior of cosmetic customers. *Journal of the Korean Data & Information Science Society*, **20**, 615-627.
- Currey, S. S., Rao, J. K., Winfield, J. B. and Callahan, L. F. (2003). Performance of a generic health-related quality of life measure in a clinic population with rheumatic disease. *Arthritis and Rheumatism*, **49**, 658-664.
- Ethgen, O., Kahler, K. H., Kong, S. X., Reginster, J. Y. and Wolfe, F. (2002). The effect of health related quality of life on reported use of health care resources in patients with osteoarthritis and rheumatoid arthritis: A longitudinal analysis. *The Journal of Rheumatology*, **29**, 1147-1155.
- EuroQoL. (2009). *EQ-5D & EuroQoL group*. Available: <http://www.euroqol.org/> Accessed: 2008.10.09.
- Hopman, W. M., Harrison, M. B., Coo, H., Friedberg, E., Buchanan, M. and Van Denkerkhof, E. G. (2009). Associations between chronic disease, age and physical and mental health status. *Chronic Diseases in Canada*, **29**, 108-116.
- Kahng, M. W., Kim, B. Y. and Hong, J. H. (2010). Graphic regression and model assessment in logistic model. *Journal of the Korean Data & Information Science Society*, **21**, 21-32.
- Katz, P. P., Morris, A. and Yelin, E. H. (2006). Prevalence and predictors of disability in valued life activities among individuals with rheumatoid arthritis. *Annals of the Rheumatic Diseases*, **65**, 763-769.
- Kim, M. H., Cho, Y. S., Uhm, W. S., Kim, S. and Bae, S. C. (2005). Cross-cultural adaptation and validation of the Korean version of the EQ-5D in patients with rheumatic diseases. *Quality of Life Research*, **14**, 1401-1406.
- Korean Centers for Disease Control and Prevention. (2007). *EQ-5D Korean valuation study using time trade off method*. Available: <http://www.cdc.go.kr> Accessed: 2008.08.09.
- Lee, S. B. (2001). Evaluations of predicted models fitted for data mining. *Journal of the Korean Data & Information Science Society*, **12**, 113-124.
- Ma, S. Y., Gong, W. T. and Cho, G. Y. (2009). The effects of motorized flexion-distraction treatment on the lumbosacral region angle in patients with chronic low back pain. *Journal of the Korean Data & Information Science Society*, **20**, 339-348.
- Mathew, A. J., Antony, J., Eremenco, S., Paul, B. V., Jayakumar, B. and Philip, J. (2009). Health-related quality of life in rheumatoid arthritis patients in South India. *Singapore Medical Journal*, **50**, 800-803.
- Ministry of Health and Welfare. (2006). *The Third Korean National Health and Nutrition Examination Survey 2005*. Available: <http://www.mw.go.kr> Accessed: 2007.10.09.
- Ministry of Health and Welfare. (2007). *Medical service use conditions and policies of chronic patients*. Available: <http://www.mw.go.kr> Accessed: 2009.11.09.
- National Arthritis Foundation. (2010). *About the arthritis foundation*. Available: <http://www.arthritis.org> Accessed: 2008.01.10.
- Seong, S. S., Choi, C. B., Sung, Y. K., Park, Y. W., Lee, H. S., Uhm, W. S., Kim, T. W., Jun, J. B., Yoo, D. H., Lee, O. Y. and Bae, S. C. (2004). Health-related quality of life using EQ-5D in Koreans. *The Journal of Korean Rheumatism Association*, **11**, 254-262.

- Slatkowsky-Christensen, B., Mowinckel, P. and Kvien, T. K. (2009). Health status and perception of pain: A comparative study between female patients with hand osteoarthritis and rheumatoid arthritis. *Scandinavian Journal of Rheumatology*, **38**, 342-348.
- Stebbing, S., Herbison, P., Dolye, T. C., Treharne, G. J. and Highton, J. (2010). A comparison of fatigue correlates in rheumatoid arthritis and osteoarthritis: Disparity in associations with disability, anxiety and sleep disturbance. *Rheumatology*, **49**, 361-367.
- Suarez-Almazor, M. E., Kendall, C., Johnson, J. A., Skeith, K. and Vincent, D. (2000). Use of health status measures in patients with low back pain in clinical settings: Comparison of specific, generic and preference-based instruments. *Rheumatology*, **39**, 783-790.
- Yasuda, T. (2010). Comparison of hyaluronan effects among normal, osteoarthritis, and rheumatoid arthritis cartilages stimulated with fibronectin fragment. *Biomedical Research*, **31**, 63 -69.