

Factors Influencing Health-related Quality of Life in Korean Elderly with Rheumatoid Arthritis

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Abstract

Objectives: This study was conducted to identify factors that are associated with health-related quality of life (HRQoL) in elderly people with Rheumatoid Arthritis (RA). **Methods/Statistical Analysis:** A total of 184 subjects, aged 65 to 89 years old, who have RA were selected from the data of the Korea National Health and Nutrition Examination Survey (KNHANES 2010-2014). Socio-demographic, health related, lifestyle and disease related characteristics were measured through a questionnaire. HRQoL was evaluated using EuroQol 5-dimension (EQ-5D). Descriptive statistics, t-test, ANOVA and hierarchical multiple regression analysis were conducted with SPSS/WIN 22.0. **Findings:** The mean score of EQ-5D index of subjects was 0.77, indicating a moderate level of HRQoL. The results of multiple regression analysis showed that the knee joint stiffness, subjective health status, sleep duration, employment, and age significantly predicted HRQoL in the elderly people with RA, explaining 39.5% of the variance. **Improvements/Applications:** Health care providers should consider that interventions improving knee joint stiffness and sleep duration are required to enhance the HRQoL in the elderly people with RA.

Keywords: Elderly, Health-Related Quality of Life, Knee Joint Stiffness, Rheumatoid Arthritis, Subjective Health Status

1. Introduction

The population of Koreans aged 65 or older was 12.2% in 2013 and it is expected to rise to 24.3% in 2030. The medical expense paid for the elderly people aged 65 or older was 33.3% of the total medical expense in 2012 and the increase in chronic disease according to the increase in elderly population is becoming social and economic burden. The population aging in Korea is progressing at the fastest speed in the world and compared to the rising life expectancy due to the growing number of elderly population, health life expectancy increased comparatively moderately, indicating that elderly years spent in unhealthy state became longer¹.

Quality of Life (QoL) can be divided into Health-Related Quality of Life (HRQoL) and non health-related quality of life. The former is directly related to health and is the quality of life that a person feels, and it can be used as an indicator to evaluate the daily function, wellbeing, and the level of managing chronic disease of elderly people². So HRQoL of elderly people has significance not only in

personal aspect but in social aspect. Factors related to HRQoL of the elderly are socio-demographic factors such as gender³, age⁴ and level of education⁵, lifestyle⁵, and health related characteristics such as chronic disease⁵, subjective health status and depression^{5,6}. In addition, disease related characteristics⁷ such as back pain and knee stiffness are reported to be associated with the decrease in HRQoL in the elderly.

Among disorders of the elderly, arthritis is the most common, and the majority of them are osteoarthritis and the rest are Rheumatoid Arthritis (RA) and other muscular skeletal diseases. In⁸ reported that RA affects lowering of HRQoL along with hypertension and stroke, and in order to raise HRQoL among the elderly, there should be management of chronic diseases and health improvement programs and health policies on the local community level. So it is important to understand the factors related to HRQoL of elderly people and develop management and intervention program for risk factors. However, while there have been some studies on HRQoL of elderly people with diabetes⁹ and osteoarthritis¹⁰, there

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have been few studies on HRQoL of elderly with RA, which has low prevalence rate.

RA is an autoimmune disease that causes chronic inflammation in joints and various other body parts. This disease has 0.5-1.0% prevalence rate globally^{11,12} and prevalence rate in Korea is reported to be about 1.1-2.2%¹³. RA can occur in any ages but is common among people in their 40s and 50s, and the prevalence rate seems to increase with age¹⁴. As the disease progresses, it deforms joints, and restricts activities and has a negative influence on HRQoL¹⁵. Among RA patients, those aged 60 or older take about 30-40%^{12,15} so there should be measures to manage disease through multidisciplinary approach and they should be provided for these elderly people to improve HRQoL.

As for the proceeding studies^{15,16} on the HRQoL of RA clients, they targeted mainly RA patients of different ages who visited medical institutes, and such studies are restricted to certain areas so it is hard to generalize the findings. In Korea as well, there are insufficient studies on the influential factors on HRQoL with nationwide data of the elderly with RA aged 65 or older. Also there are rare studies that comprehensively and systematically analyzed the relationship with HRQoL with socio-demographic factors, lifestyle, health related characteristics and disease (RA) related characteristics. So this study has been conducted to identify the level of HRQoL and factors influencing the HRQoL in elderly people with RA in Korea using the National Health and Nutrition Examination Survey.

2. Methods

2.1 Participants

This study was based on the data of the fifth and sixth Korea National Health and Nutrition Examination Survey (KNHANES 2010-2014)¹⁷. The participants consisted of 184 people aged between 65-89 years old, all diagnosed with RA by a physician. We excluded subjects with a malignancy because the malignancies tend to have obvious deleterious effecting on the HRQoL.

2.2 Research Instruments

Data were collected through a self-administered questionnaire. Socio-demographic characteristics included gender, age, marital status, educational level, household income and employment. Education level

was classified as low, intermediate and high (elementary school or lower, middle school, high school or higher). Household income was classified by quartile as low, middle-low, middle-high and high levels. Health related characteristics included the number of comorbidities (hypertension, stroke, myocardial infarction, angina pectoris, tuberculosis, asthma, diabetes, thyroid disease, chronic renal disease and liver cirrhosis), obesity, subjective health status (good, common/poor), depression and perceived stress (low/high). Obesity was defined by Body Mass Index (BMI) greater than 25 kg/m². Lifestyle characteristics included smoking, alcohol drinking, sleep duration and walking participation. Smoking status was categorized into current smoker and no smoker including ex-smoker. Alcohol use was defined as drinking alcohol more often than once per month during the previous 1 year. Sleep duration was categorized into 2 categories (6-8 h/≤5 h or ≥9 h). Walking participation was categorized according to frequency (five days or more per week) and time (more than 30 minutes at a time). Diseases related characteristics included the duration of RA, pain and stiffness due to RA.

EuroQol 5-dimension (EQ-5D)¹⁸ was used to evaluate the level of HRQoL of the participants. EQ-5D developed by EuroQol Group in 1990, was commonly used for determining HRQoL in patients. Linde and colleagues¹⁹ evaluated the validity of EQ-5D in 200 patients with RA. They demonstrated that EQ-5D was valid measure for HRQoL in RA. EQ-5D records information about 5 dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression). For each dimension, subjects choose one of 3 levels of severity (1, no problem; 2, some/moderate problems; 3, severe/extreme problems). The dimensions were weighed and converted as EQ-5D index (utility score)²⁰. EQ-5D index was conducted by Korea Centers for Disease Control and Prevention in 2007.

2.3 Data Analysis

Descriptive statistics were conducted for characteristics of the participants. To evaluate the differences in HRQoL by characteristics of the subjects, t test or one way analysis of variance was computed. A hierarchical multiple regression analysis was conducted to determining the factors that predict HRQoL in elderly with RA. EQ-5D index score entered as a dependent variable and age, employment, number of comorbidities, subjective

health status, perceived stress, sleep duration, walking participation, knee joint pain, knee joint stiffness, hip joint pain and back pain were entered as independent variables in regression equation. These variables were identified in the univariate analyses as associated with EQ-5D. The statistical analyses were performed using SPSS version 22.0 (IBM SPSS Statistics, Chicago, IL, USA) for Windows.

3. Results

3.1 Differences in Health-Related Quality of Life According to Characteristics of Participants

Characteristics of participants are presented in Table 1. 83.7% (n=154) were female. 83.2% (n=153) of subjects had elementary school education or lower. To evaluate HRQoL differences according to characteristics of subjects, we analyzed data using the EQ-5D index score. The mean score of EQ-5D index was 0.77 (SD=.022). As

a result of examining the differences in HRQoL according to the socio-demographic characteristics, there were significant differences by age and employment ($p < .05$). HRQoL was statistically low in old aged (75 years or over) and no economic activity (Table 1). As for health-related characteristics, there were significant differences by number of comorbidities ($p < .05$), subjective health status ($p < .001$) and perceived stress ($p < .01$). Subjects who were not good in subjective health status, had more morbidities and had higher perceived stress had worse HRQoL as shown in Table 2. As for lifestyle characteristics, there were significant differences by sleep duration and walking participation ($p < .01$). HRQoL was lower when sleep time were inappropriate such as less than 5 hours or more than 9 hours, when the subjects were not participating in walking exercise as shown in Table 3. As for disease (RA) related characteristics, there were significant differences by knee joint pain, knee joint stiffness, hip joint pain and back pain ($p < .001$). In the subjects who experienced pain of knee joint, hip joint, back, and knee joint stiffness, HRQoL was lower as shown in Table 4.

Table 1. Health-related quality of life by socio-demographic characteristics (N=184)

Characteristics	Categories	n(%)	M±SD	t or F	p
Gender	Male	30(16.3)	0.78±0.25	0.53	.595
	Female	154(83.7)	0.76±0.21		
Age (year)	65-74	116(63.0)	0.80±0.17	2.61	.010
	≥75	68(37.0)	0.71±0.27		
Marital status	Married, lived with spouse	101(54.9)	0.77±0.23	0.64	.525
	Unmarried, divorced, widowed	83(45.1)	0.75±0.21		
Education	≤Elementary school	153(83.2)	0.75±0.22	2.12	.124
	Middle school	14(7.6)	0.78±0.25		
	≥High school	17(9.2)	0.87±0.14		
Household income	Quartile 1 (lowest)	120(65.2)	0.75±0.24	0.90	.442
	Quartile 2	36(19.6)	0.80±0.14		
	Quartile 3	17(9.2)	0.78±0.24		
	Quartile 4 (highest)	11(6.0)	0.83±0.17		
Employment	Unemployed	142(77.2)	0.74±0.23	2.45	.015
	Employed	42(22.8)	0.84±0.15		

Table 2. Health-related quality of life by health related characteristics (N=184)

Characteristics	Categories	n(%)	M±SD	t or F	p
Number of comorbidities	None	66(35.9)	0.80±0.17	2.82	.040
	1	69(37.5)	0.77±0.22		
	2	35(19.0)	0.73±0.27		
	≥3	14(7.6)	0.63±0.20		
Obesity (BMI≥25 kg/m ²)	No	124(67.4)	0.78±0.22	1.11	.267
	Yes	60(32.6)	0.74±0.22		
Subjective health status	Good	83(45.1)	0.87±0.12	6.66	<.001
	Common/poor	101(54.9)	0.68±0.25		
Present depression	No	168(91.3)	0.77±0.21	1.76	.080
	Yes	16(8.7)	0.64±0.28		
Perceived stress	Low	133(72.3)	0.80±0.19	3.16	.002
	High	51(27.7)	0.67±0.26		

Table 3. Health-related quality of life by lifestyle characteristics (N=184)

Characteristics	Categories	n(%)	M±SD	t or F	p
Smoking	No	168(91.3)	0.77±0.21	1.00	.320
	Yes	16(8.7)	0.71±0.30		
Alcohol drinking	No	145(78.8)	0.76±0.22	-0.48	.630
	Yes	39(21.2)	0.78±0.20		
Sleep duration (hour)	6-8	93(50.5)	0.81±0.15	2.73	.007
	≤5 or ≥9	91(49.5)	0.72±0.27		
Walking participation	No	121(65.8)	0.74±0.24	3.06	.003
	Yes	63(34.2)	0.82±0.15		

Table 4. Health-related quality of life by disease (RA) related characteristics (N=184)

Characteristics	Categories	n(%)	M±SD	t or F	p
Duration of rheumatoid arthritis disease (year)	<5	56(30.4)	0.77±0.22	0.45	.638
	5-9	31(16.8)	0.79±0.23		
	≥10	97(52.7)	0.75±0.22		
Knee joint pain	No	69(37.5)	0.85±0.20	4.36	<.001
	Yes	115(62.5)	0.71±0.21		
Knee joint stiffness	No	108(58.7)	0.85±0.14	6.54	<.001
	Yes	76(41.3)	0.65±0.26		
Hip joint pain	No	125(67.9)	0.82±0.17	4.44	<.001
	Yes	59(32.1)	0.65±0.26		
Back pain	No	84(45.7)	0.85±0.17	4.99	<.001
	Yes	100(54.3)	0.70±0.23		

3.2 Factors Affecting the Health-Related Quality of Life in Elderly People with Rheumatoid Arthritis

The factors influencing the HRQoL were analyzed by using a hierarchical multiple regression analysis. The results of Model 1 showed that the HRQoL was significantly influenced by the subjective health status ($\beta=-0.33$), sleep duration ($\beta=-0.17$), employment ($\beta=-0.17$), age ($\beta=-0.15$)

and perceived stress ($\beta=-0.14$). In Model 2, the knee joint stiffness ($\beta=-0.23$), subjective health status ($\beta=-0.21$), sleep duration ($\beta=-0.18$), employment ($\beta=-0.15$) and age ($\beta=-0.12$) were significant predictors of HRQoL. 39.5% of variance in the HRQoL was explained by these five variables, and overall F score of the multiple regression Model 2 was significant ($F=11.86, p<.001$) as shown in Table 5.

Table 5. Factors predicting health-related quality of life (N=184)

Variables	Model 1		Model 2	
	β	t(p)	β	t(p)
Age	-.15	-2.26(.025)	-.12	-2.03(.044)
Employment	-.17	-2.55(.012)	-.15	-2.49(.014)
Number of comorbidities	-.09	-1.34(.183)	-.10	-1.71(.089)
Subjective health status	-.33	-4.90(<.001)	-.21	-3.28(.001)
Perceived stress	-.14	-2.09(.038)	-.11	-1.81(.072)
Sleep duration	-.17	-2.63(.009)	-.18	-3.08(.002)
Walking participation	-.09	-1.43(.155)	-.05	-0.81(.421)
Knee joint pain			-.06	-0.93(.356)
Knee joint stiffness			-.23	-3.17(.002)
Hip joint pain			-.12	-1.87(.064)
Back pain			-.10	-1.46(.147)
	Adjusted R ² =.272 F=10.55, p<.001		Adjusted R ² =.395 F=11.86, p<.001	

Note. Dummy variables=age (year) (0: 65-74, 1: ≥75); employment (0: employed, 1: unemployed); number of comorbidities (0: none, 1: ≥1); subjective health status (0: good, 1: common/poor); perceived stress (0: low, 1: high); sleep duration (hour) (0: 6-8, 1: ≤5 or ≥9); walking participation (0: yes, 1: no); knee joint pain (0: no, 1: yes); knee joint stiffness (0: no, 1: yes); hip joint pain (0: no, 1: yes); back pain (0: no, 1: yes).

4. Discussion

This study started with the intention to find the HRQoL level of elderly people with RA and factors affecting HRQoL. The mean score of EQ-5D index of the participants in this study was 0.77, which represent a moderate level of HRQoL. Though different tool of evaluation was used, the studies of^{f21,22} that measured HRQoL using the Medical Outcomes Study Short Form 36 Health Survey (SF-36) showed that HRQoL of RA patients was lower than that of normal people. Such results were also found among Korean RA patients. In the study of^{f10} that studied HRQoL of elderly people with osteoarthritis, EQ-5D was 0.77, the same level as that of the subjects of this study, but in the study of²³, that studied EQ-5D of healthy elderly people aged 65 or older, the result was 0.86, which was higher than that of this study. So it is believed that multilateral measures and efforts should be made to improve HRQoL of elderly with RA.

HRQoL according to socio-demographic characteristics of the subjects showed significant differences depending on age and economic activities. HRQoL was lower in old-old people aged 75 or older than in young-old people aged 65-74, and the level was lower in the elderly who does not participate in economic activities than those who does. These results correspond to those of the study of^{f24}, which measured HRQoL using SF-36, targeting 207 Chinese RA patients. It seems to be because the older you are, the more the number of comorbid diseases you get, and the more it is believed that subjective health status is not good.

HRQoL according to health related characteristics of the subjects showed statistically significant differences in the number of comorbidity, subjective health status and perceived stress. In²⁵ measured comorbidity using Functional Comorbidities Index, targeting 159 American RA patients and reported that as the number was higher, HRQoL was lower. The study of²⁶, which evaluated HRQoL using EQ-5D and EQ-VAS, targeting Korean elderly aged 65 or older, supported the result as they found that women with more chronic diseases had lower quality of life. As²⁷ said multimorbidity not only had a negative effect on HRQoL of RA patients but increased mortality, so utmost care and attention is required for RA patients with multimorbidity. In the study of^{f15} that targeted 131 RA patients who are registered in university hospital reported that depression had a negative influence on physical and mental HRQoL. However, this study found

that doctor's diagnosis of depression was not related to HRQoL. As from 2014 KNHANES, the Patient Health Questionnaire-9 (PHQ-9) was used to find out the level of depression, so we suggest using this tool to analyze the relationship between depression and HRQoL.

HRQoL of subjects depending on their lifestyle showed significant differences in sleep duration and walking participation. HRQoL depending on disease (RA) related characteristics of the subjects was statistically lower in cases where patients had knee joint pain, knee joint stiffness, hip joint pain and back pain than when they did not. About half (49.5%) the subjects of this study were not sleeping enough and had lowered HRQoL. In²⁸ found that sleep problems had a negative relationship with QoL of RA patients, supporting the findings of this study. In^{29,30} found that strengthening leg muscles and Tai Chi exercise are effective in relieving pain in RA patients and³¹ reported that aromatherapy foot massage had an influence in easing chronic pain of elderly people and improving the quality of sleep. So by using various intervention methods, relieving pain and improving sleep, subjects should be able to maintain and improve their health. Also, only 34.2% of the subjects in this study were doing walking exercise, so there should be maintenance and support for the subjects to exercise regularly.

Hierarchical multiple regression analysis was used to estimate the effects of factors on HRQoL in this study. In univariate analysis, variables with significant relationship with HRQoL were entered in regression analysis. In Model 1 regression analysis that included socio-demographic characteristics, health related characteristics and lifestyle characteristics, subjective health status, sleep duration, employment, age and perceived stress were found to be factors affecting HRQoL. In the study of⁹, among the factors affecting HRQoL of elderly people with diabetes, the level of stress awareness and walking time were significant but sleep time showed no relationship, which was partly different from the result of multiple regression analysis conducted in this study. Unlike patients with diabetes, in terms of RA patients, it should be considered that physical factor such as chronic pain and psychological factor such as stress can worsen sleep disorder. In this study, subjective health status was a variable with relatively big influence among variables used in Model 1. Author in⁴ compared influential factors on HRQoL among the elderly using senior citizen centers in the city and the countryside, and in both groups, subjective health status was the main influential factor. In the study of³², which

analyzed the data of 1,598 male and female elderly people, influential factors on HRQoL differed depending on gender but in both genders, subjective health status had a strong influence, supporting the findings of this study.

In³³ conducted a study on predictors of HRQoL using EQ-5D targeting 108 visiting RA patients and reported that pain and depression were the main predictors. Unlike this, the result of regression analysis of Model 2, which added RA related characteristics to Model 1, pain was not statistically significant and knee joint stiffness was found to be related to HRQoL, and knee joint stiffness was found to be the most influential variable in lowering HRQoL. In¹⁰ found that subjective health status, perception of stress and knee joint stiffness were factors that have a negative influence on HRQoL of elderly people with osteoarthritis but pain was not an influential factor, a finding consistent to that of this study. The influence of pain on HRQoL was not found consistently. Some studies^{34,35} found pain has a significant influence on the quality of life related to physical and mental health, while another study³⁶ found it has a minor influence on the quality of physical life and has no influence on the quality of mental life. Still other¹⁵ found that pain has influence neither on physical nor on mental quality of life. As in this study, the level of pain was not considered in the analysis so in the following studies, multivariate analysis should be conducted considering the level of pain and the relationship between HRQoL and pain should be found. Also, in cases of lowered exercise capacity or problems in daily activity due to knee joint stiffness, active use of interventions that are effective in easing knee joint stiffness is expected to help improve HRQoL.

In conclusion, knee joint stiffness and inadequate sleep duration were the risk factors for the poor HRQoL among elderly people with RA. Therefore, more attention should be paid to provide interventions or care, in the physical aspect, to improve the HRQoL of elderly with RA.

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