



Original Article

A Study on the Physical Activities, Mental Health, and Health-Related Quality of Life of Osteoarthritis Patients



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ABSTRACT

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Objectives: The purpose of this study was to investigate the physical activities, mental health, and health-related quality of life (HRQOL) of osteoarthritis patients.

Methods: This study was conducted using data from the first year of the 7th Korea National Health and Nutritional Examination Survey. There were 8,150 participants included in the survey, and 665 participants had been diagnosed with osteoarthritis. This study analyzed the measurements of physical activities, depression, and HRQOL in participants with osteoarthritis.

Results: The mean age of the participants was 67 ± 9.9 years and 83.1% were female. Participants rarely engaged in work-related physical activity, and engaged in leisure-related physical activities infrequently. Most of the participants (85.9%) did not do regular exercise, but 1/3 of the participants walked for over 10 minutes a day. "Pain/discomfort" had the least impact upon HRQOL, and among the depression subcategories, "difficult to sleep and tiredness" had the most impact. Multiple logistic regression analysis showed that an adverse HRQOL score was statistically significantly associated with "location changes/physical activities" ($p < 0.01$), "depression" ($p < 0.001$) and "age" ($p < 0.001$).

Conclusion: Exercise programs should be in place which are manageable in everyday life for the elderly (> 65 years). Changes in daily routine so that patients become more active, should be supported by the family and community, together with assistance in managing psychological problems such as depression.

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Introduction

The elderly population (≥ 65 years) in Korea is rapidly increasing and becoming an ageing society. In 2000 the elderly accounted for 7.2% of the population, which increased to 14.3% in 2018 [1]. When there is an increase in the ageing population, there is a corresponding increase in chronic geriatric diseases such as osteoarthritis, which causes a great economic loss [2]. Osteoarthritis causes extreme pain that can lead to physical and functional disabilities [3]. It typically occurs in the synovial joints, and is a major chronic degenerative disease that causes pathological changes in the articular cartilage. This leads to

the formation of osteophytes, inflammation of the synovium, and narrowing of the joint space which causes pain, stiffness, and articular crepitus which limits activity [4]. Elderly people suffering with osteoarthritis face limitations in functional activities due to chronic joint pain and stiffness [5]. Although osteoarthritis is not a life-or-death condition there is no cure and as such symptoms need to be kept under control. There are many instances where the elderly do not receive early management of osteoarthritis and the appropriate medical treatment because osteoarthritis is considered to be a normal process of ageing [4]. Therefore, most elderly people with osteoarthritis face physical and mental health problems as well

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as low health-related quality of life (HRQOL) due to the disease [6].

Elderly people with osteoarthritis are more likely to experience depression compared to healthy elderly people because they are limited in movement and daily life activities, and are likely to be exposed to the risk of having a fall [7]. Depression is a common serious illness which negatively affects human emotion and can range from mild to severe depression [8]. People who are depressed have a negative self-image, and negative thoughts about their future [9]. The more intense the feelings of depression, the more likely the symptoms of lack of sleep, fatigue, sense of nonconformity, decrease in self-esteem, shortened attention span, and anxiety becomes, and those with severe depression may commit suicide due to repeated thoughts of death or suicide [8]. In particular, depression in those with chronic diseases such as osteoarthritis, further exacerbates their general health, and is a major risk factor that may lead to suicide [10]. Active interventions should be implemented to address depression in osteoarthritis patients.

Regular exercise is one of the major management methods for osteoarthritis patients. Exercise supplies nutrition to the articular cartilages and may aid repair to damaged joints. In addition, it improves the mobility of the joints and strengthens the muscles around the joints to provide support and reduce pain [11]. Although clinical therapists introduce various physical activities to osteoarthritis patients, most elderly people rely solely on drugs and do not receive information on physical activity programmes. Considering most osteoarthritis patients are elderly, it is important to provide physical activities and appropriate coping methods.

As shown above, despite the high prevalence rate of osteoarthritis in the elderly and the high levels of socioeconomic loss and health-related burdens, few studies have investigated the effects of physical activities and mental health, on the quality of life of osteoarthritis patients in Korea. Therefore, the purpose of this study was to investigate these factors using data from the first year of the 7th Korea National Health and Nutritional Examination Survey (KNHANES). The results from this study aims to provide basic data to assist with the development of guidelines for the future health management of osteoarthritis patients .

Materials and Methods

1. Participants

This study used the data from the first year of the 7th KNHANES. These data were reviewed and approved by the Research Ethics Review Committee of the Disease Control Division, and weight was given to the regions to select the

same level of participants to ensure that the total population of Korea was represented. Out of the 8,150 participants, this study selected 665 patients with osteoarthritis for the analysis.

2. Measurements

2.1. Osteoarthritis

The subjects selected in this study were patients diagnosed with osteoarthritis, excluding patients with rheumatoid arthritis and osteoporosis from the KNHANES data.

2.2. Physical activities

The study examined data on participants' various physical activities and the duration of the activities during the week. The measurements included work-related high- or mid-intensity physical activities, location changes for high- or mid-intensity physical activities, , leisure-related high- or mid-intensity physical activities, walking, and leisure-related physical activity sessions, and evaluated the number of days each of these activities were performed in the week. "High-intensity physical activities" are concentrated physical activities that result in people being out of breath or having an elevated heart rate, and "mid-intensity physical activities" are physical activities conducted at a medium level that result in people being slightly out of breath or having slightly elevated heart rate.

These activities have been investigated using self-reporting assessments, to determine the intensity of what they are doing in daily life, including jobs, studies, household work, and voluntary work.

2.3. HRQOL

This study used the EQ-5D-3L Index to measure participants' HRQOL. The tool has validity and reliability in evaluating HRQOL and is useful as the results may be represented using a simple health profile or by utility scores [12,13]. The EQ-5D-3L consists of items that assess the current health status in 5 categories: exercise abilities, self-management, daily life activities, pain/discomfort, and anxiety/depression. Each item is scored out of 3, with 1 being "no problem at all," 2 as having "some problems," and 3 with "serious problems." This study used calculations from weighted values of Koreans provided by the Korean Centers for Disease Control and Prevention. The calculated measurements can comprehensively indicate the participants' HRQOL, with lower scores showing higher HRQOL.

2.4. Depression

This study used scores from the PHQ-9 (Validation of the Patient Health Questionnaire-9) for depression. This is a self-reporting tool that measures the degree of depression using 9 sub-categories, with scores of 0 to 4 considered normal, 5 to

9 considered slightly depressed, and 10 and above considered severely depressed. The test-retest reliability was relatively high, with a Cronbach's alpha of 0.89 [14].

3. Statistical analysis

The collected data were analyzed using SPSS Version 21.0 programme (IBM Corp., Armonk, NY, USA). The demographic characteristics, physical activities, HRQOL, and depression assessment results of the osteoarthritis patients were analyzed using descriptive statistics. The association of physical activities and depression on the HRQOL were analyzed using multiple regression analysis. The dependent variable was the EQ-5D-3L score, and independent variables were general characteristics (age, gender), the physical activity level, PHQ-9 score, and nominal scale (gender), which was analyzed using a dummy variable. Statistical significance was reached when $p < 0.05$.

Results

1. Participant characteristics

There were more women in this study with 83.1% female and 16.9% of the participants male, with an overall mean age of 67.0 ± 9.9 years. All of the participants had been diagnosed as having osteoarthritis by a physician (Table 1).

2. Physical activities of osteoarthritis patients

Only 11 out of the 665 osteoarthritis patients engaged in work-related high-intensity physical activities during the week, with 32 participants (4.7%) engaged in work-related mid-intensity physical activities, most commonly occurring for 3 to 4 days. More participants answered that they walk for at least 10 minutes when moving between locations during the week (51.4%), with most walking every day. Nineteen (2.8%) patients responded that they engaged in leisure-related high-intensity physical activities, and 77 (11.5%) responded that they

engaged in leisure-related mid-intensity physical activities, which was higher than those engaging in high-intensity activities. In terms of the number of days of walking for at least 10 minutes during the past week, there was a similar distribution in the responses, as 183 (27.3%) answered every day, whilst 176 (26.3%) osteoarthritis patients answered none. The most common response to the number of days of leisure-related physical activities during the past week was none, at 85.9% (Table 2).

3. HRQOL of osteoarthritis patients

In the 5 areas of the HRQOL questionnaire, a Level 1 score was the most common indicating "no problem," with the highest HRQOL score, in "self-care" reported by 87.3% participants. In contrast, in the "pain/discomfort" category, 10.6% of patients reported a Level 3 score meaning a "serious problem." In the 5 HRQOL categories, the highest mean HRQOL scores were observed for "pain/discomfort" with 1.6 ± 0.8 , and "mobility" with a mean score of 1.5 ± 0.7 (Table 3).

4. Mental health of osteoarthritis patients (results of the PHQ-9 depression assessment)

Out of the 9 items from the PHQ-9 questionnaire, the item with the highest score was "difficulties in sleeping," including "difficulty falling asleep or waking up easily, or sleeping too much", with a mean PHQ-9 score of 1.1 ± 1.5 , followed by "fatigue, decrease in energy", with a score of 1.1 ± 1.6 . The next most common items were "little to no interest or enjoyment in working," "depression or despair," and "loss of appetite or overeating." The total depression scores were 4.2 ± 4.7 , and the mean depression level of the participants was slightly depressed (Table 4).

5. The effects of physical activities and depression of osteoarthritis patients on their hrqol score

A multiple regression analysis was performed to identify the association of physical activities and depression of osteoarthritis patients with their HRQOL scores. Within physical activities, it was shown that "location changes/physical activities" ($\beta = -0.114, p < 0.01$) had a significant effect on the quality of life, with depression ($\beta = -0.399, p < 0.001$) and age ($\beta = -0.228, p < 0.001$) also significantly associated with an adverse HRQOL score Table 5).

Table 1. General characteristics of the participants (N = 665).

Characteristics	Mean \pm SD, n (%)
Age (y)	67.0 \pm 9.9
Gender	
Male	112 (16.9)
Female	553 (83.1)
Diagnosis	
Osteoarthritis	665 (100.0)

Discussion

This study used data from the first year of the 7th KNHANES (2016) to investigate the physical activities, mental health, and quality of life of osteoarthritis patients. Most of the participants

Table 2. Physical activities of osteoarthritis patients (N = 665).

Characteristics	Categories	n	%
Work-related high-intensity physical activities	Yes	11	1.6
	No	654	97.8
No. of days of Work-related high-intensity physical activities (n = 11)	1-2 d	3	27.2
	3-4 d	2	18.1
	5-6 d	2	18.1
	7 d	4	36.6
Work-related mid-intensity physical activities	Yes	32	4.8
	No	633	95.2
No. of days of work-related mid-intensity physical activities (n = 32)	1-2 d	9	28.1
	3-4 d	15	46.8
	5-6 d	3	9.3
	7 d	5	15.8
Location change/physical activities	Yes	342	51.4
	No	323	48.6
No. of days of location change/physical activities (n = 342)	1-2 d	64	18.7
	3-4 d	63	18.4
	5-6 d	74	21.6
	7 d	120	41.3
Leisure-related high-intensity physical activities	Yes	19	2.8
	No	646	97.2
No. of days of leisure-related high-intensity physical activities (n = 19)	1-2 d	3	15.7
	3-4 d	11	57.8
	5-6 d	5	26.5
	7 d	0	0.0
Leisure-related mid-intensity physical activities	Yes	77	11.5
	No	588	88.5
No. of days of leisure-related mid-intensity physical activities (n = 77)	1-2 d	22	28.5
	3-4 d	28	36.3
	5-6 d	22	28.5
	7 d	5	6.7
No. of days of walking in a week	Not at all	176	26.3
	1-2 d	99	14.8
	3-4 d	115	17.2
	5-6 d	88	13.2
	7 d	183	27.3
	No response	8	1.2
No. of days of workouts in a week	Not at all	575	85.9
	1-2 d	25	3.8
	3-4 d	23	3.4
	5-6 d	40	6.0
	7 d	0	0.0
	No response	6	0.9

Table 3. Health-related quality of life categories and scores.

Categories	Level	n (%)	Mean ± SD
Mobility	1	345 (51.8)	1.5 ± 0.7
	2	301 (45.2)	
	3	19 (3.0)	
Self-care	1	581 (87.3)	1.2 ± 0.6
	2	78 (11.7)	
	3	6 (1.0)	
Usual Activity	1	486 (73.0)	1.2 ± 0.7
	2	166 (24.9)	
	3	13 (2.1)	
Pain/discomfort	1	325 (48.8)	1.6 ± 0.8
	2	270 (40.6)	
	3	70 (10.6)	
Anxiety/depression	1	505 (75.9)	1.3 ± 0.7
	2	144 (21.6)	
	3	16 (2.5)	
Total EQ-5D-3L score			0.8 ± 0.2

Table 4. Mental health of osteoarthritis patients (results from a PHQ-9 assessment of depression).

Items	Mean ± SD
Little to no interest or enjoyment in working	0.6 ± 1.4
A sinking feeling, depression, or despair	0.6 ± 1.4
Difficult falling asleep or waking up easily, or sleeping too much	1.1 ± 1.5
Fatigue, decrease in energy	1.1 ± 1.6
Loss of appetite or overeating	0.6 ± 1.4
Thinking of oneself as a bad person, and thinking that family members have become unhappy because of oneself	0.4 ± 1.3
Difficult focussing when reading newspapers or watching TV	0.4 ± 1.4
Slow movements and speech (enough to be recognised by others)	0.3 ± 1.3
Thoughts that maybe it would be better to die, or thoughts of self-injury	0.4 ± 1.3
Total Scores of PHQ-9	4.2 ± 4.7

PHQ-9 = Patient Health Questionnaire-9.

were elderly, with a mean age of 66.98 ± 9.93 years, with a high proportion (83.1%) of female participants. According to the health statistical yearbook of 2017 [15], the prevalence rate of osteoarthritis for those over 65 years of age in Korea was 28.7%, with 5 times more female osteoarthritis patients than male. In addition, as the occurrence rate of osteoarthritis of the knee for females was 15.9% for those in their 50s, this increased to 31.2%

for those in their 60s, and 43.6% for those 70 years old and above, indicating a clear increase in osteoarthritis in women due to ageing.

In terms of physical activities of the participants, the participants rarely engaged in work-related high-intensity physical activities, and less than 5% engaged in mid-level intensity physical activities. The frequency levels of leisure-

Table 5. Multiple logistic regression analysis of the effects of physical activities and depression on health-related quality of life for osteoarthritis patients.

Categories	Health-related quality of life				
	B	Beta (β)	t	p	
Physical activities	Work-related high-intensity physical activities	0.147	0.090	1.237	0.221
	Work-related mid-intensity physical activities	0.080	0.097	-0.346	0.726
	Location changes/physical activities	-0.040	-0.114	-3.226	0.010**
	Leisure-related high-intensity physical activities	0.002	0.002	0.060	0.953
	Leisure-related mid-intensity physical activities	-0.023	-0.042	-1.169	0.243
	No. of d of walks in a week	0.001	0.040	1.134	0.257
	No. of d of workouts in a week	0.002	0.017	0.480	0.631
Characteristics	Gender	-0.016	-0.034	-0.978	0.328
	Age	-0.004	-0.228	-6.511	< 0.001***
Depression (PHQ-9)	-0.015	-0.399	-11.500	< 0.001***	

Dependent variables: Health-related quality of life.
 $R^2 = 0.280$, Adjusted $R^2 = 0.269$, $F(p) = 24.746^{***}$ (< 0.001).
 PHQ-9 = Patient Health Questionnaire-9.

related high intensity and mid-level intensity physical activities were low as well. More than half of the participants had location change/physical activities, with most participants performing this every day. In addition, 27.3% of participants reported walking for at least 10 minutes a day, indicating that they only engaged in physical activities by walking when moving between locations, instead of performing physical activities with at least a mid-level intensity. However, 26.3%, which is 1/4 of the participants, responded that they do not walk even when changing their locations, and 85.9% of the participants responded that they do not normally perform leisure-related physical activities, showing that most osteoarthritis patients do not actively engage in physical activities. The current treatment of osteoarthritis is to delay the process of the disease, and consists of drug treatment, drug-free treatment, and surgical treatment focused on decreasing pain and improving functional abilities [16]. Although drug treatments may relieve symptoms and control pain, this does not improve muscle function, therefore, there has been an increased focus on exercise. If osteoarthritis patients do not exercise, the movement range of their joints decreases and joint pain worsens, with stiffness and tension at the tissues near the joints. In addition, this may adversely affect the entire body leading to further complications and a spiralling decline

in arthritic symptoms. Therefore, to manage osteoarthritis, it is critical to select exercises that do not put a burden on the joints and worsen the symptoms [17]. The standards of physical activities recommended by WHO include regular exercises at mid-level intensity for at least 30 minutes a day, at least 5 days a week [18]. As high-intensity physical activities can cause fatigue and worsen osteoarthritis, physical activities with mid-level intensity appropriate for improving the state of health may assist in relieving stress and depression. As the elderly are considered to be a vulnerable group regarding disease management, not only should there be economic policies so that they can receive continuous support, there should also be regional institutions such as welfare centers to develop and implement rehabilitation programs tailored to the characteristics of each region.

After investigating the HRQOL of the participants, the scores in "pain/discomfort" and "exercise abilities" were shown to be the lowest, and after identifying participants' mental health status through depression assessments, the greatest problems were shown to be difficulties in sleep, fatigue, and a decrease in energy. Furthermore, the participants generally showed depressive symptoms. Many studies have analysed the relationship between sleep and pain and identified that sleep disorders cause depression or increase sensitivity to pain

[19,20]. In addition, in a state of depression, abnormal central nervous augmentation, may increase the pain of osteoarthritis [21]. According to Arbus and Cohen [22], when people age, sleep patterns change due to changes in the circadian rhythm, which leads to sleep disorders from arthropathy and greater pain from osteoarthritis. In other words, a vicious cycle appears where pain hinders sleep, sleep disorders cause depression, and greater depression causes greater pain reactions. Although there are psychological interventions besides drug treatments to improve the quality of sleep for osteoarthritis patients such as cognitive behavioural therapy, mindfulness practice, and psychiatric treatments [23], few studies have shown beneficial clinical effects. Therefore, various strategies should be used to assist osteoarthritis patients with sleep. For example, creating an environment that can positively affect the emotional wellbeing of the elderly from a variety of perspectives including natural lighting, sound, music selection, the blocking of unwanted sounds, and the elimination of factors that disturb sleep [24].

After investigating the effects of physical activities and depression on the HRQOL of osteoarthritis patients, "age" has been shown to affect HRQOL. According to Son [25], osteoarthritis is a chronic disease, and as age increases, the number of affected joints increases, leading to severe impairments in daily activities, inability to act, and limited responsibilities, supporting the findings in this study. "Location changes/physical activities" and "depression" were found to have significant effects on HRQOL. The results of a study by Jakobsson and Hallberg [26], showed that depression negatively affects the HRQOL of osteoarthritis patients; these findings are identical to the results of this study. As osteoarthritis patients experience isolation due to difficulties in their social lives from chronic pain and gait disturbance, they are more likely to be depressed compared to healthy elderly people and have greater stress levels due to psychological burdens [27]. According to a study by Son [25], disabilities related to participation in the community and daily life activities are important factors that affect HRQOL. In other words, HRQOL decreases when people cannot move freely or feel that they are restricted in their roles. Uncomfortable walking makes it difficult to move around, and there are significant difficulties when osteoarthritis patients need to move to a place other than home and need to perform different activities. All of these things would have had a negative impact on HRQOL. The chronic pain and stiffness of osteoarthritis patients lead to gait disturbances and physical disabilities and are considered to be major factors that limit the daily lives and social activities of the elderly [28], and so osteoarthritis patients tend to believe that their health statuses are worse than they actually are. Therefore, to improve the HRQOL of osteoarthritis patients, weakening functions should be prevented through continuous and systematic

symptom management, allowing for patients to maintain positive awareness about their health statuses, through regular participation in community activities. In addition, it has been shown that simply providing information on diseases, educating patients on treatment goals, and improving daily life habits, improve the symptoms of osteoarthritis. Therefore, to improve the HRQOL for osteoarthritis patients, there should be not only education on managing arthritis and using exercises to strengthen the joints, but also a detailed management system that assists in continuous self-management. For patients with depression to continue to manage stress in their daily activities and not to become bedridden because of illness, and prevent pain, it is necessary to have constant support from family and community to help change their routine. Regular attendance at mental health counselling sessions and visiting community mental health welfare centers, may help in preventing extreme situations, such as suicide owing to depression.

The results of this study suggest that there should be exercise programmes for continuous management of everyday lives for those over 65 years of age, who make up most osteoarthritis patients, as well as support from their families and the community regarding changes of daily habits, to encourage regular active movement and assistance in solving psychological problems such as depression.

The limitations of this study are that it does not reflect the most recent trends, as the information only came from a single year (2017) due to the characteristics of the data, and that the results reflect the characteristics of a select group of osteoarthritis patients, as the study used previously evaluated results. However, this study has considerable value as it may assist in national and regional health management strategies for osteoarthritis patients in the future.

Conflicts of Interest

The author has no conflicts of interest to declare.

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