

General

A Comparative study of osteoarthritic knee patients between urban and rural areas in knee severity and quality of life

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Osteoarthritis Knee (OA) is the leading cause of pain and disability. This may affect the patient's quality of life (QoL) and lead to the onset of mental disorders. The aim of this study was 1) To find the correlation between the severity of OA, depression, and QoL. 2) To compare the severity of OA knee and QoL between urban and rural areas. 199 patients were diagnosed with OA. All patients had self-assessment with questionnaires in terms of 1) demographic data, 2) the knee severity by using Oxford Knee Score, 3) Depression screening by using Patient Health Questionnaire, and 4) World Health Organization Quality of Life Brief-Thai. The results revealed that OA knee patients had excellent (no abnormal symptoms) and good (mild symptoms) levels of severity were 34.2% and 32.2%, respectively. They also had a good level of QoL. The correlation between residential area and other variables were age group ($p < 0.01$), severity of osteoarthritis ($p < 0.01$), and depression ($p < 0.05$). The severity of OA knee and QoL in the mental health aspect was a significant difference in patients in each age group. ($p < 0.01$ and $p < 0.05$, respectively). Depression and QoL were not correlated. The conclusion was patients had less severity of osteoarthritis, good QoL, and no anxiety or depression. Residential areas had no impact on QoL but healthcare providers should explain the treatment plan. The next study should focus on the long term of the patient's QoL.

INTRODUCTION

Osteoarthritis (OA) knee is the deterioration of the joints disease by having chronic and permanent articular cartilage damage. The destruction of the articular cartilage occurs slowly and continuously. When people were in inappropriate postures or had an accident in the knee joint, the cartilage can cause the cartilage to rub against one another. The rubbing results in pain, swelling, stiffness, inflammation, decreased ability to move, and cause a deformity of the knee joint.^{1,2} OA knee is a chronic illness that occurred in the middle age to the elderly.³ Prevalence of knee pain in OA knee around the Asian region ranged from 38.1% to 50.0% in the elderly.^{4,5} Knee pain is a common symptom in OA knee and caused disability. Chronic pain is associated with changes in the central nervous system.⁶ Pain depends on the experience of each patient, whether by direct injury (Nociceptive pain) or by nerve impulses abnormal (Neuropathic pain), psychological, personality factors, and expectations related to pain in the future.⁷⁻⁹ Pain cannot be

identified when it occurs, causing the patient to encounter problems with uncertainty, thus causing fear and anxiety.¹⁰ Chronic illness also affects psychological.¹¹ It causes several impacts such as affecting work due to structural changes in the knee joint so the difficulty in activities, walking, going up and down the stairs, which affects the quality of life (QoL) and increase the mortality rate.^{12,13} In the United States, economic loss commonly affects adults with arthritis, which is the main cause use of disability.¹⁴ There is an estimate of the disease burden in the United States. Osteoarthritis will affect the health care system and the public health system.² Although the current main treatment is medication to relieve pain, in order to reduce arthritis. But there is still periodic exacerbation of arthritis. Patients suffer from the progression of the disease. Therefore, taking care of patients with arthritis should not focus only on medication treatment, but also on consideration of the QoL.¹⁵

QoL consists of many aspects, including physical health, mental health, social health, and environmental health.

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The World Health Organization has defined the definition of “health” as no disease, but it means being physical, mental, and social complete which will be consistent with the definition of quality of life. QoL is the perception of satisfaction and status of a person or one’s goals and expectations under the context of culture, values, and standards of society.¹⁶ A previous study showed that the physical and socio-economic environment affected the prevalence of symptomatic knee osteoarthritis in rural areas was higher than in urban areas.⁴ Rural communities have higher rates of physical inactivity and obesity which affected osteoarthritis outcomes.^{17,18} Regarding other studies of patient’s life quality with joint disease, it found that patients had a low quality of life, such as in rheumatoid arthritis and osteoarthritis.^{19–22} If the patients with osteoarthritis have the wrong perception of their disease, they will obtain an inappropriate treatment which affects their quality of life. In order to have a good QoL so we focused on 1) TFind- ing the correlation between the severity of OA, depression, and quality of life. 2) To compare the severity of OA knee and QoL between urban and rural areas.

MATERIALS AND METHODS

STUDY DESIGN AND POPULATION

This is a cross-sectional study with a sample of 199 patients treated in the Outpatient Knee Surgery Service at Suranaree University of Technology Hospital, Nakhon Ratchasima, Thailand, from March to April 2019. All patients who had a medical diagnosis of unilateral or bilateral knee osteoarthritis according to the American College of Rheumatology criteria, aged between 40 and 85 years old, of both genders, without neurological disorders, agreed to sign the Informed Consent form. Exclusion criteria were: individuals who had severe psychiatric illness or dementia, intellectual disability, previous knee surgery, and had underlying diseases e.g., cancer, heart disease, Parkinson’s disease.

STUDY PROTOCOL

At the baseline visit, all patients completed self-administered questionnaires which included information on demographics, the severity level of knee osteoarthritis, depression, and QoL. The instruments used in data collection were 4 items as follows 1) demographic data, 2) Oxford Knee Score, 3) Patient Health Questionnaire-2 (PHQ-2) and PHQ-9, and 4) World Health Organization Quality of Life Brief-Thai (WHOQOL-BREF-THAI), consisted of:

1. Demographic data consisted of gender, age, and residential area.
2. The Oxford Knee Score measures the degree of knee pain and knee function with a score from 0 (most severe symptoms/problems) to 48 (least severe). It contains 12 questions with a Likert scale-type instrument, with scores ranging from 0 (almost always/severe) to 4 (almost never/ none). Cronbach’s alpha was 0.92.^{23,24}
3. Depression screening by the Patient Health Questionnaire-2 (PHQ-2) and PHQ-9. The PHQ-2 asked about the frequency of depressive mood and anhedonia over

the past two weeks. The PHQ-2 consisted of the first 2 questions of the PHQ-9. Participants who screen the PHQ-2 with positive should be further assessment with PHQ-9 to determine whether they meet the criteria for depression.^{25,26} Optimum cut-off point of PHQ-9 was 7 and above with high sensitivity, high specificity.²⁷

4. The evaluation of the QoL of the patients was measured using the World Health Organization Quality of Life Brief-Thai (WHOQOL-BREF-THAI) (Prasithsirikul et al., 2007). This instrument consists of 26 items, grouped into 4 aspects: physical health, psychological, social relationships, and environment.²⁸

The research protocol was approved by the ethics committee of Suranaree University of Technology, EC No. 44/2562 and informed consent was signed by each participant.

DATA ANALYSIS

The significance level for all variables studied was $p < 0.05$ and 0.01. Data were recorded in Excel software and analyzed by using IBM SPSS Statistics for Windows. The data of 199 knee osteoarthritis patients were analyzed as frequency, percentage, mean, and standard deviation (SD). Demographic data, severity levels, depression data, and QoL were analyzed chi-square test to define the correlation between the QoL and residential location. Based on residential location, the sample was divided into urban and rural to compare all parameters by independent t-test. Analysis of variance (ANOVA) and Least-Significant Different method (LSD) was used to compare mean difference scores. In addition, Pearson correlation was used to define the correlation between severity levels, depression data, and QoL.

RESULT

The demographic data of this study are presented in [Table 1](#). Most of the patients with knee osteoarthritis were female (64.3%), and their mean age of them was 56.22 years old. The age range in 50–60 years, over 60 years, and less than 50 years were 54.7%, 30.2%, and 24.1%, respectively. The severity of knee osteoarthritis was evaluated by Oxford Knee Score, they had excellent (no abnormal symptoms) and good (mild symptoms) levels were 34.2% and 32.2%, respectively. All patients had a moderate risk of depression. Most patients had a moderate and good quality of life. When we divided by residential area. We found that most of the patients remained female which was both urban (63.5%) and rural (65.3%), and aged 50 – 60 years which was both urban (51.0%) and rural (40.0%). However, the severity of knee osteoarthritis in urban patients had moderate and good severity were 34.7% and 29.8%, respectively. Most rural patients had an excellent level (45.3%). Patients in urban and rural areas had a moderate and good QoL in all 4 aspects. Additionally, when we studied the correlation between variables related to the residential area, there was a statistically significant difference between age range ($p < 0.01$), the severity of knee osteoarthritis ($p < 0.01$), and depression ($p < 0.05$), as shown in [Table 1](#).

Table 1. Demographic data of knee osteoarthritis participants and association between Quality of life and residential location (n = 199)

Demographic data and Quality of life	Total of n (%)	Residential Location		p
		Urban (%)	Rural (%)	
Gender				
Male	71 (35.7)	38 (36.5)	33 (34.7)	0.791
Female	128 (64.3)	66 (63.5)	62 (65.3)	
Age (years)				
< 50	48 (24.1)	15 (14.4)	33 (34.7)	0.004**
50-60	91 (45.7)	53 (51.0)	38 (40.0)	
> 60	60 (30.2)	36 (34.6)	24 (25.3)	
Mean \pm SD	56.22 \pm 8.17	57.72 \pm 7.87	54.58 \pm 8.23	
Severity Levels by Oxford Knee Score				
Poor	21 (10.6)	15 (14.5)	6 (6.3)	0.001**
Moderate	46 (23.1)	33 (31.7)	13 (13.7)	
Good	64 (32.2)	31 (29.8)	33 (34.7)	
Excellent	68 (34.2)	25 (24.0)	43 (45.3)	
Mean \pm SD	33.81 \pm 10.71	30.84 \pm 10.74	37.07 \pm 9.72	
Depression screening by 2Q9Q				
None	185 (93.0)	100 (96.2)	85 (89.5)	0.042*
Mild	11 (5.5)	2 (1.9)	9 (9.5)	
Moderate	3 (1.5)	2 (1.9)	1 (1.1)	
Severe	-	-	-	
Mean \pm SD	1.02 \pm 2.93	0.87 \pm 2.93	1.19 \pm 2.94	
Quality of life by WHOQOL-BREF-THAI				
Physical Health				
Not Good	3 (1.5)	3 (2.8)	-	0.280
Moderate	132 (66.3)	66 (63.5)	66 (69.5)	
Good	64 (32.2)	35 (33.7)	29 (30.5)	
Mean \pm SD	24.81 \pm 3.79	24.74 \pm 4.17	24.88 \pm 3.36	
Mental Health				
Not Good	3 (1.5)	2 (1.9)	1 (1.1)	0.953
Moderate	69 (34.7)	35 (33.7)	34 (35.8)	
Good	127 (63.8)	67 (64.4)	60 (63.1)	
Mean \pm SD	23.33 \pm 3.24	23.35 \pm 3.51	23.30 \pm 2.93	
Social Health				
Not Good	12 (6.0)	9 (8.6)	3 (3.2)	0.241
Moderate	137 (68.9)	71 (68.3)	66 (69.5)	
Good	50 (25.1)	24 (23.1)	26 (7.3)	
Mean \pm SD	10.11 \pm 2.03	10.00 \pm 2.09	10.23 \pm 1.97	
Environmental Health				
Not Good	4 (2.0)	4 (3.8)	-	0.187
Moderate	121 (60.8)	61 (58.7)	60 (63.2)	
Good	74 (37.2)	39 (37.5)	35 (36.8)	
Mean \pm SD	28.35 \pm 3.78	28.00 \pm 3.78	28.72 \pm 3.76	

*p<0.05, **p<0.01

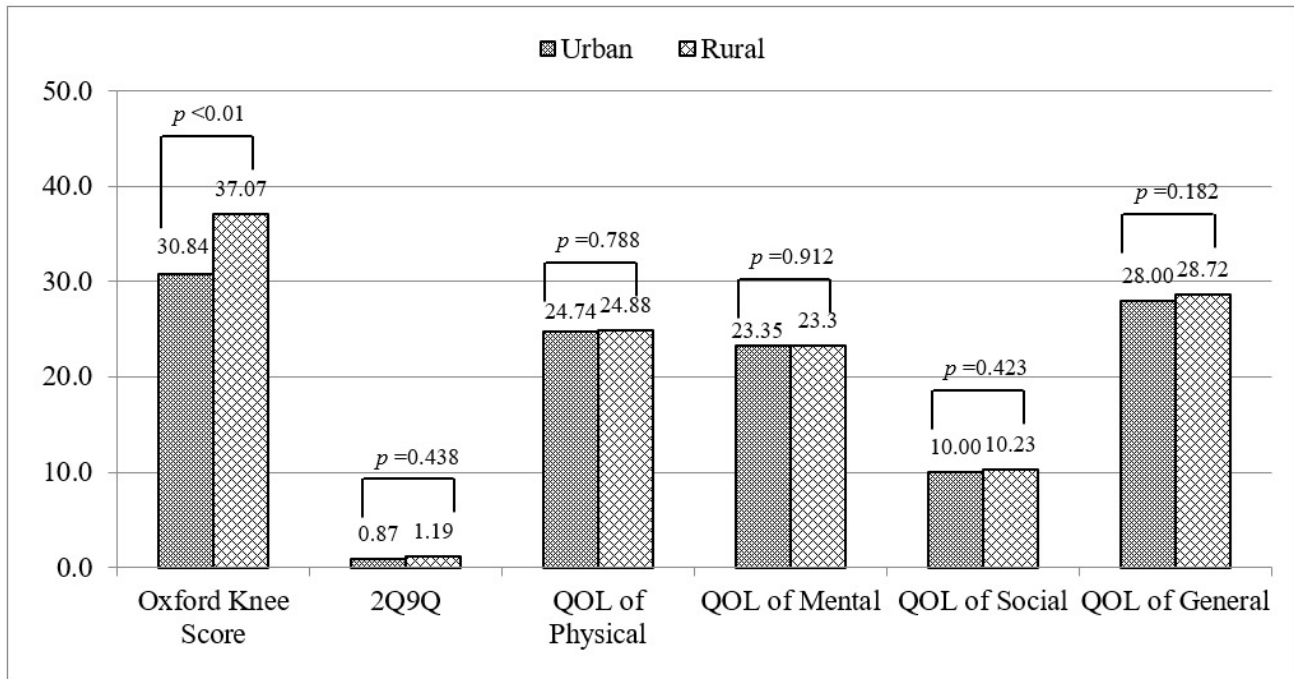


Figure 1. Comparison of Severity Levels, Depression screening and Quality of life in knee osteoarthritis patients by residential location

Table 2. Comparison of Severity Levels, Depression screening and Quality of life in knee osteoarthritis patients by age groups

Parameters	F	p
Severity Levels by Oxford Knee Score	13.765	0.000**
Depression screening by 2Q9Q	0.008	0.992
Quality of life		
Physical Health	0.178	0.837
Mental Health	3.076	0.048*
Social Health	0.063	0.939
Environmental Health	2.493	0.085

** $p < 0.01$, * $p < 0.05$

We compared the health status data of urban and rural patients, rural patients had better severity ($p < 0.01$), and they had a mean Oxford Knee Score of 37.07 (S.D.=9.72) and 30.84 (S.D.=10.74), respectively. The results of screening for depression and 4 aspects of QoL were not different between urban and rural patients, as shown in [Figure 1](#). There was a statistically significant difference for the characteristic level of age group in severity level of knee osteoarthritis ($p < 0.01$) and QoL in the mental health aspect ($p < 0.05$). Patients in the age group < 50 years had a severity less than the other groups, but they had a lower QoL than other groups, as shown in [Table 2-3](#). Moreover, there was no correlation between severity levels, depression, and QoL in knee osteoarthritis patients, as shown in [Table 4](#).

DISCUSSION

The patient was predominantly female with a mean age of 56.22 (S.D.= 8.17) years. When we classified patients by residential area in both urban and rural areas, most of the patients were still female and between the ages of 50 – and 60 years. Previous studies found that most osteoarthritis patients were female, more than 60 – 80% of them have started treatment between the ages of 50 – 65 years, and knee replacement surgery at mean age over 65 years.^{29,30} Middle-aged women have decreased estrogen levels. Estrogen deficiency can lead to excessive bone resorption followed by inadequate bone formation, resulting in overall bone resorption and causing osteoarthritis.³¹

The severity of osteoarthritis showed that 66.4% of patients had the least severe, 10.6% of patients had severe symptoms, and 1.5% of all patients had a risk of moderate

Table 3. Multiple comparison of Severity Levels, Depression screening and Quality of life in mental health with knee osteoarthritis patients by age groups

Parameters	Age (years)	Mean	Age (years) ^a		
			< 50	50-60	> 60
Severity Levels by Oxford Knee Score	< 50	40.44			
	50-60	32.00	8.44**		
	> 60	31.27	9.17**	0.73	
Quality of life In Mental Health	< 50	22.33			
	50-60	23.62	-1.29*		
	> 60	23.70	-1.37*	-0.08	

** $p < 0.01$, * $p < 0.05$, a; mean difference scores by age groups

Table 4. Correlation between Severity Levels, Depression screening and Quality of life in knee osteoarthritis patients

Quality of life	Correlation coefficient	
	Severity Levels by Oxford Knee Score	Depression screening by 2Q9Q
Physical Health	-0.104	-0.134
Mental Health	-0.127	0.060
Social Health	0.013	-0.075
Environmental Health	-0.042	-0.038

** $p < 0.01$, * $p < 0.05$

depression. Because most of the patients had treatment with medication. This osteoarthritis was not very severe. Therefore, there was not necessary to treat with knee replacement surgery. As a result, the severity of the disease was less and the patient had no anxiety from the disease.³⁰ Most patients had a moderate and good level of QoL in all aspects (physical, mental, social, and environmental health). Therefore, patients have a good QoL.³² Rural patients had a lower level of osteoarthritis severity than urban. Most rural patients were less severity (mean Oxford Knee Score = 37.07), but in an patients were mild to moderate severity (mean Oxford Knee Score = 30.84). All of these patients had a moderate and good QoL in all 4 aspects. However, when we studied factors correlated to residential areas, we found that age, the severity of osteoarthritis, and depression were correlated to the residential area. The patient lived in a rural area which is a semi-urban community with a good utility system, resulting in a QoL that was not different. Previous research found that there was no difference in each residential area in severity and quality of life. But there were differences between the gender in which females have a higher level of pain and severity.^{33,34}

Patients with knee osteoarthritis in each age group had different levels of osteoarthritis severity and QoL in the mental health aspect. Patients in the age group younger than 50 years had less osteoarthritis severity than the other groups. But they also had a lower QoL in the mental health aspects than other groups. These patients had less severity of osteoarthritis. So they can do their daily routines or work well. Because they were of working age, therefore it may cause anxiety. Unlike previous research, the group aged more than 60 years had the lowest QoL.³² Moreover, the

severity of osteoarthritis and QoL were correlated to the age group. QoL in the mental health aspect (anxiety and depression) did not correlate with the age group.^{29,30} The correlation between the severity of knee osteoarthritis, depression, and QoL, the difference was not statistically significant. Contrary to previous studies, QoL in osteoarthritis patients was correlated with the severity of osteoarthritis.^{30,35,36} The severity of osteoarthritis was correlated to the QoL in physical, mental, social, environmental health aspects, pain, and ability to perform activities of daily living.^{29,37} The patient's QoL was correlated to pain. Long-term pain is also associated with a progressively worse QoL.^{38,39} Healthcare professionals should clearly explain to the patient the treatment process in order to reduce patient anxiety and study patients' QoL in the long term with the development of information systems to monitor the quality of life.

Future research, all of the assessment tools of the severity of osteoarthritis and QoL such as Oxford Knee Score and WHOQOL-BREF-THAI are the self-assessment questionnaires, so all patients answered the questionnaires had different aspects. Researchers should study the correlation between the QoL and other factors, such as history taking, physical examination, x-ray, stage of osteoarthritis, and duration of osteoarthritis onset.^{29,30,40} Increasing sample size to clearly examine the differences between the severity of osteoarthritis and the QoL in patients who lived in urban and rural areas.

CONCLUSION

The study showed that patients had less severity of osteoarthritis, good quality of life, and no anxiety or depression. Residential areas had no impact on quality of life, but rural patients had less severity of osteoarthritis. Factors correlated to the area of residence were age, the severity of osteoarthritis, and screening of depression. In addition, patients in the age group < 50 years had low severity of osteoarthritis, but they also had lower quality of life. Therefore, healthcare professionals should explain the treatment

to patients to reduce anxiety/depression and should study the patient's QoL in the long term. For the future research, the hospital should develop an information system to collect long-term data on patients with knee osteoarthritis. The QoL should be studied in other related factors and developed a mixed method to more clearly described on the severity of osteoarthritis and the QoL of osteoarthritis patients.

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