

Association Between Physical Activity and Osteoarthritis of Knee with Quality of Life in Community-Dwelling Older Adults

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Abstract Older adults are relatively physically active compared to other age group. A lack of physical activity (PA) can cause chronic diseases including osteoarthritis of knee (OA knee) and might eventually reduce quality of life (QOL). This present study was aimed to investigate association between levels of PA and OA knee with levels of QOL in community-dwelling older adults. One thousand and sixty-seven community-dwelling older persons were recruited to this descriptive study. PA activity questionnaire was invented. Standardized Oxford knee score and World Health Organization's Quality of Life scale (WHOQOL-BREF) were used to measure OA knee and QOL levels. Results showed that levels of PA in older adults were significantly associated with levels of OKS ($\chi^2 = 78.565$, P-value < .001) and levels of OA knee in older adults were significantly associated with levels of overall QOL ($\chi^2 = 57.738$, P-value < .001). Pearson's correlation also showed interrelation among PA, OA knee, and QOL. In conclusion, PA, OA knee, and QOL are interrelated. Therefore, close monitoring and design of proper PA activity should be implemented in community-dwelling older adults with OA knee.

Keywords. Osteoarthritis of knee, Older adults, Physical activity, Quality of life, Personal health

1. Introduction

Older adults are the least physically active age group with less than 25% performing regular physical activity (PA) [7]. A lack of PA has been considered as an important factor in etiology of diabetes, hypertension, cancer, and osteoarthritis [6]. Osteoarthritis of knee (OA knee) is a leading cause of global disability and is associated with significant economic costs [3]. The incidence of OA knee increases with advancing age, especially in the people of age above 60 years old [8]. OA knee leads to knee joint instability, postural sway, and risk of fall [20]. The Oxford Knee Score (OKS) is well correlated increasing age [4]. Quality of life (QOL) is an individual's perception of position in life in the context of the culture and value systems in relation to one's goals, expectations, standards and concerns [13]. The World Health Organization's Quality of Life scale (WHOQOL-BREF) is a widely used, reliable, valid, and self-report questionnaire which

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assesses 4 domains of QOL in terms of physical health, psychological health, social relationships, and environment [22]. Relationship between PA and QOL or OA knee and QOL have been extensively reported [1; 11; 16; 17; 19; 23]. However, interrelationship among these three domain were still elusive. Therefore, this present study was aimed to investigate association between levels of PA and OA knee with levels of QOL in community-dwelling older adults.

Table 1 Questionnaires of physical activity over the last one month

Items
1 .You exercise 3-5 times a week.
2 .You exercise at least 30 minutes at a time.
3. You can walk until you feel moderately tired or breathe a little harder than usual, but can still talk to others until the end of the sentence at least 3- 5days a week
4. You can jog until you feel moderately tired or breathe a little harder than usual, but can still talk to others until the end of the sentence at least 3- 5days a week
5 .You warm up 5- 10minutes before exercising or playing sports.
6 .You stretch after exercising or playing sports for 5-10 minutes.
7 .You do housework such as sweeping and mopping the house by yourself.
8 .You walk up and down stairs by yourself.

2. Methods

2.1. Study design and participants

One thousand and sixty-seven community-dwelling older persons from Nonghi district, Roi Et, Thailand, voluntarily participated in this descriptive research. Inclusion criteria was age ≥ 60 years old. All procedures have been voted by 2 reviewers, approved by the Ethics Committee for Research Subjects of Roi Et Provincial Public Health Office, Ministry of Public Health and endorsed by the chairperson Mr.Pitak Payuha (No.COE 063256).

2.2. Questionnaires

The 8-item questionnaire of physical activity (Table 1) was approved by index of item-objective congruence (IOC), a procedure used in test development for evaluating content validity at the item development stage. Only the items with IOC scores ≥ 0.5 were qualified for the questionnaire. The items with Cronbach's α (test score reliability coefficient) ≥ 0.7 were acceptable and used in the questionnaire. Each item was scored 1-4 (never, sometimes, frequently, and always, respectively), given total score of 32. The total score was further ranked as physical activity levels from low, moderate, and high (< 17 , 17-24, and ≥ 25 , respectively). The Oxford Knee Score (OKS) and WHOQOL-BREF are standardized questionnaires [12; 13]. The WHOQOL-BREF consists of 4 subscales with 26 items that measure different health concepts. Responses are rated from 1 (very poor/very dissatisfied/not at all) to 5 (very good/very satisfied/completely). The total score ranging from 0-100 is calculated by averaging all item responses. Score ≥ 60 and < 60 indicate good and poor QOL, respectively [18].

2.3. Statistical Analyses

The data was employed descriptive statistics, then the association of categorical and continuous data were analyzed by χ^2 and Pearson’s correlation tests (a measure of linear correlation between two sets of data). The level of statistical significance was $p < 0.05$. All data were analyzed by SPSS Statistics version 18.

Table 2 Personal characteristics of participants

Characteristics	Number	Percentage
Sex		
Male	425	39.8
Female	642	60.2
Age (years old)		
60 - 69	529	54.3
70 - 79	315	32.3
> 80	130	13.3
Educational level		
Primary school	7	0.7
Secondary school	973	92.7
High school	53	5.0
Diploma	5	0.5
Bachelor and higher	12	1.1
Marital status		
Single	43	4.1
Married	609	58.2
Divorced/widowed	364	34.5
Separated	34	3.2
Average income per month		
less than 5,000 baht	964	90.4
5,000 – 10,000 baht	82	7.7
10,001 – 15,000 baht	8	0.8
More than 15,000 baht	12	1.1
Body mass index level		
Underweight	644	60.8
Normal	370	34.9
Overweight	19	1.8
Obese	26	2.5
Living status		
Alone	64	6.0
With spouse	545	51.1
With children/grandchildren	491	46.0
With other relatives	33	3.1

3. Results

3.1. Association between levels of physical activity and levels of OA knee

Personal characteristics of the participants are shown in Table 2. Results showed that the levels of PA of 1,067 older adults were significantly associated with levels of OKS ($\chi^2 = 78.565$, P-value $< .001$) (Table 3).

Table 3 Association between levels of physical activity and levels of OA knee

Physical activity level	OA knee level				χ^2	P-value
	Excellent	Good	Moderate	Poor		
High	277	102	20	8	78.565	<.001

Moderate	292	114	34	25
Low	83	51	28	33

3.2. Association between Levels of OA Knee and Levels of Quality of Life

Chi-square analysis showed that the levels of OA knee in older adults were significantly associated with levels of overall QOL ($\chi^2 = 57.738$, P-value < .001) (Table 4).

Table 4 Association between levels of OA knee and levels of quality of life

OA knee level	Quality of life level		χ^2	P-value
	Good	Poor		
Excellent	597	55	57.738	<.001
Good	232	35		
Moderate	75	7		
Poor	40	26		

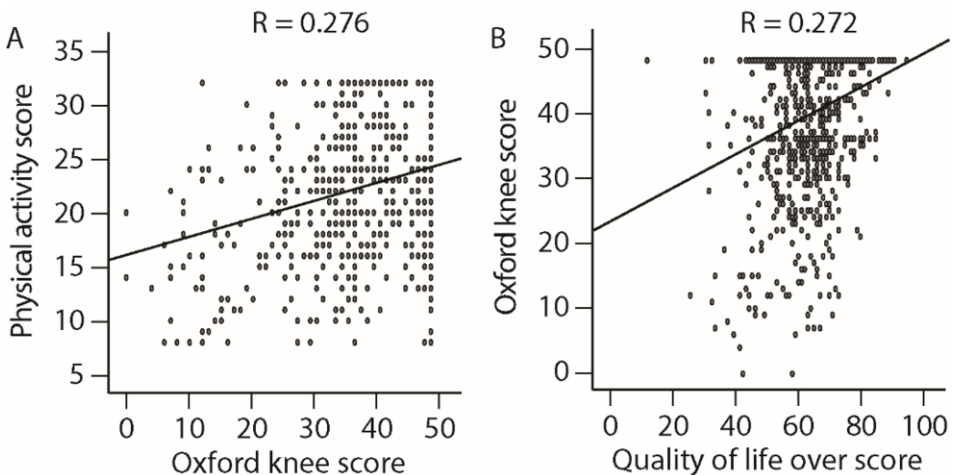


Figure 1. Pearson correlation between levels of physical activity and levels of OA knee (A); and levels of OA knee and levels of quality of life (B)

3.3 Correlation of scores of physical activity, osteoarthritis of knee, and quality of life

Pearson's correlation analysis revealed that PA, OKS, and WHOQOL-bref scores were interrelated (Pearson's correlation = .275 and .273; $R = 0.276$ and 0.272 ; and P-value < .001 and .001, in PA vs OKS (Figure 1A) and OKS vs WHOQOL-bref (Figure 1B), respectively).

4. Discussion

4.1. Characteristics of the Older Adults

The characteristics studied were the sex of the participants, age, educational levels, marital status, income, body mass index, and living status. Most of the participants low educational levels and low income (< 5,000 baht). Low educational levels are inversely

associated with higher QOL scores [15]. Similarly, low income is also associated low QOL level [10]. Therefore, low educational levels and low income found in this present study might be also the factors for low QOL.

4.2. Physical Activity on Osteoarthritis of Knee

This study revealed that PA levels were associated with OA knee levels. PA and OA knee levels are interrelated. Previous study showed that pain and disability in OA knee individuals limited an ability to perform exercises [17]. The PA with low impact on knee joints was reportedly beneficial to OA outcomes [19]. For OA knee patients, low-intensity exercise was recommended [16]. Therefore, it can be implied that appropriate level of PA might be able to prevent OA and the low-intensity with low impact on lower extremities should be implemented in older adult population.

4.3. Osteoarthritis of Knee and Quality of Life

Previous study showed that QOL was associated with self-reported disability in patients with OA knee [1; 11; 23]. OA knee also influences mental health and QOL [14]. Both conservative and surgical treatments were found to improve QOL in individuals with OA knee [5; 9; 21]. Interestingly, the older adults with OA knee reported their good QOL when they participated voluntary work and received proper recommendation for physical activity, especially resistance exercises [2]. This finding indicates that better QOL of the persons with OA knee can be obtained through appropriate design of physical activity.

5. Conclusion

In conclusion, physical activity, osteoarthritis of knee, and quality of life are interrelated. Therefore, in order to improve their quality of life, appropriate levels of physical activity should be tailor-made for individual needs of the older adults with osteoarthritis of knee. Further analysis for health service accessibility among osteoarthritis of knee patients as well as follow-up of its impacts on quality of life are of interest in the field of community public health and personalized health.

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