

PREVALENCE AND RELATED FACTORS OF KNEE OSTEOARTHRITIS IN BUDDHIST MONKS IN AYUTTHAYA

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Abstract

The prevalence and related factors of knee osteoarthritis in specific populations with habitual knee-bending activities, such as Buddhist monks, remains unclear. The objective of this study was to evaluate the prevalence and related factors of knee osteoarthritis in Buddhist monks in Phra Nakhon Si Ayutthaya District, Thailand. This study was a cross-sectional descriptive study of 202 Buddhist monks who lived in temples located in Phra Nakhon Si Ayutthaya. Data were collected using a questionnaire and physical examination. The questionnaire had 3 parts: personal information, related factors of knee osteoarthritis, and the American College of Rheumatology's criteria for the classification and reporting of osteoarthritis of the knee. The statistical techniques used for data analysis were descriptive analytic and multiple logistic regression ($p < 0.05$). The prevalence of knee osteoarthritis in Buddhist monks in Phra Nakhon Si Ayutthaya was 26.24%. The factors significantly related to knee osteoarthritis in Buddhist monks were a family history of knee osteoarthritis (adjusted odds ratio (AOR: 45.05, 95% confidence interval (CI): 12.62-160.82, $p < 0.001$) and a history of knee trauma (AOR: 2.96, 95% CI: 1.05-8.34, $p = 0.041$). The prevalence of knee osteoarthritis in Buddhist monks in Phra Nakhon Si Ayutthaya is higher than in the Thai general population.

Keywords: Prevalence, knee osteoarthritis, Buddhist monks, coping strategy for knee pain

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Introduction

Knee osteoarthritis occurs with a change or deterioration of the knee at its articular cartilage that is slowly and continuously destroyed. It is mainly found in elderly people. The major clinical features of this disease are joint pain, joint friction, bone sprouting out of the joint, damaged function of the joint, and reduced movement. These symptoms eventually lead to joint distortion and disability (Nilkanuwong and Preechanont, 2016).

Knee osteoarthritis is one of the leading important health problems in the world (Buckwalter *et al.*, 2004), as well as the cause of joint-related diseases that lead to disability in elderly people. The prevalence of knee osteoarthritis is 11.0- 42.8% (Felson, 1990; Gabriel *et al.*, 1997; March and Bachmeier, 1997; Shiozaki *et al.*, 1999; Peat *et al.*, 2001). According to the National Statistical Office, the prevalence of osteoarthritis in Thailand in 1996 was 11.3% (Chaiamnuay *et al.*, 1998).

According to Thailand's International Health Policy Program in 2009 (International Health Policy Program, 2009), knee osteoarthritis was the fifth cause of years lived with disability (YLDs) in males (90000) and the fourth cause in females (136000). In addition, knee osteoarthritis was the sixteenth cause of disability-adjusted life years (DALYs) in males (92000) and the seventh cause in females (136000). Therefore, the problem of knee osteoarthritis can significantly affect the quality of life for Thai people. The effect of religious practice on the prevalence of knee osteoarthritis (Heidari, 2011) showed that the prevalence of osteoarthritis in the Buddhist population was significantly higher than that of the Muslim population (67.11% vs 55.80%, $p = 0.02$ in knee pain; 85.2% vs 70.67% for radiographic osteoarthritis). The gesture of praying to the Buddha in the Buddhist population has the risk of osteoarthritis. Based on this research data, there are several interesting and useful factors to evaluate in the questionnaire: age, education, and type of the toilet used and quantitative magnetic resonance imaging evaluation of knee osteoarthritis

progression over 2 years and correlation with clinical symptoms and radiologic changes (Raynauld *et al.*, 2006). The related factors are body mass index and alcohol use which were risk factors for osteoarthritis. However, alcohol drinking history was not mentioned in the questionnaire, as there was a risk of ethical issues and obscurity because it is prohibited by religious precepts.

Buddhist monks are an important religious institution for Thai society. Bone and joint disease is a major health problem as the incidence of bone and joint disease continues to increase in Thai people; in 2010, there were more than 6 million cases of bone and joint disease in the Thai population. The most serious problem is with the knee (Pereira *et al.*, 2011). Knee osteoarthritis is a major problem in the health care system in Thailand because it is one of the 10 most common diseases causing disability in the elderly (Royal College of Orthopedic Technologists of Thailand, 2011). The World Health Organization's Scientific Group on Rheumatic Disease estimates that more than 10% of the world's population is over 60 years old with knee osteoarthritis (Pereira *et al.*, 2011). Buddhist monks walk to receive food as alms every day; they kneel and squat to pray regularly. These gestures make the monks more likely to have osteoarthritis and, particularly in the cities, much of the food which people give to make merit is fat, sweet, and salty food that makes the monks become overweight. In addition, monks also have restrictions on vigorous physical exercise because of the Buddhist religious discipline, so the prevalence of knee osteoarthritis in monks in Ayutthaya is likely to be more than in the general population.

A study of Tangtrakulwanich *et al.* (2006) investigated the prevalence of knee osteoarthritis in Buddhist monks using clinical diagnostic criteria with radiography and related factors but indicated unclear results. The evaluation in this study does not require complex technology such as radiography. It can be easily screened at the primary care unit level.

It is appropriate to evaluate monks in the community and they should be diagnosed and receive treatment early to reduce disability in the future.

Therefore, this study investigated the prevalence of knee osteoarthritis in Buddhist monks using clinical diagnostic criteria only which was appropriate in the context of proactive primary care services.

Objectives

Primary Objective

The primary objective was to provide basic data on the prevalence of knee osteoarthritis in Buddhist monks in Phra Nakhon Si Ayutthaya District, Phra Nakhon Si Ayutthaya Province.

Secondary Objective

The secondary objective was to investigate the factors relating to knee osteoarthritis in Buddhist monks

Methodology

Research Methodology

This study was a cross-sectional descriptive study among Buddhist monks in Phra Nakhon Si Ayutthaya District, for a period of 3 months from September 1, 2013 to November 30, 2013, using a questionnaire and physical examination.

The Operational Definitions:

The Buddhist monks lived in temples located in Phra Nakhon Si Ayutthaya District; and Knee osteoarthritis is as diagnosed by the American College of Rheumatology's (ACR) criteria with a positive result from 3 of 6 items (the clinical criteria).

Sample

All Buddhist monks who lived in temples located in Phra Nakhon Si Ayutthaya District, Phra Nakhon Si Ayutthaya Province.

Inclusion Criteria

1. Buddhist monks who were aged over 50 years;

2. Buddhist monks who understood the Thai language and could communicate by speaking and listening in Thai; and

3. Buddhist monks who agreed to participate in the research.

Exclusion Criteria

1. Buddhist monks who had been diagnosed with a history of joint-related diseases and other types of rheumatic diseases; and

2. Buddhist monks who could not walk

Research Instrument

This study used the criteria for diagnosis of knee osteoarthritis according to the ACR criteria for the classification and reporting of osteoarthritis of the knee (Brandt *et al.*, 2003) with a sensitivity of 95% and a specificity of 69%. A patient with knee osteoarthritis was defined as a patient who had knee joint pain with 3 of the following 6 items: older than 50 years old, joint friction symptom in the morning less than 30 min, rustle in the knee joint, knee joint pain when pressing, bone sprouting out of the knee joint, and no warm feeling in the knee joint when touching. The questionnaire was divided into 2 parts. The first part was demographic data: age, marital status before ordination, educational level, and occupation before ordination. The second part was health condition: body mass index, congenital disease, history of severe knee accident, going up and down stairs to cubicle, use of toilet, walking to receive food, performing regular activities (praying) and exercise.

Data Collection

Data were collected by allowing the Buddhist monks to respond to the questionnaire by themselves and the physicians to perform a knee examination to diagnose osteoarthritis. Buddhist monks diagnosed with knee osteoarthritis were then informed accordingly and asked to answer more questions about how to cope with the pain of knee osteoarthritis. After that, they were evaluated, given primary care with medication and suggested behavior change, and referred to an orthopedic surgeon.

Buddhist monks with no diagnosis of knee osteoarthritis were advised about how to avoid risk factors, such as knee flexion positions, and taught about knee exercise to prevent osteoarthritis.

Data Analysis

Data were recorded in the Excel program and analyzed and calculated using SPSS Statistics version 17.0. Data analysis was divided into 2 parts: Part 1 was descriptive

Table 1. General characteristic of Buddhist monks and health conditions

General characteristics	Person	%
Age(years)		
Mean±SD	60.74±8.78	
Median(Min-Max)	59(50-96)	
Marital status before ordination		
Single	100	49.5
Married	60	29.7
Divorced/widowed	42	20.8
Educational level		
No education	11	5.45
Primary school	85	42.08
Secondary school	79	39.11
Higher than secondary school	27	13.36
Occupation before ordination		
No occupation	37	18.32
Farmer	23	11.39
Other occupations	142	70.29
Body mass index		
Mean ± SD	23.45±4.74	
Median(Min-Max)	22.21(14.77-40.82)	
Congenital disease		
No	118	58.42
Yes	84	41.58
History of knee osteoarthritis in family		
No	168	83.17
Yes	34	16.83
Smoking		
Never	54	26.73
Once/still smoke	60	29.70
Still smoke	88	43.56
History of severe knee accident		
No	165	81.68
Yes	37	18.32
Going up and down stairs at cubicle		
No	45	22.28
Yes	157	77.72
Mean ± SD	6.09±4.24	
Median(Min-Max)	5(1-30)	
Use of toilet		
Traditional toilet	86	42.58
Modern toilet	116	57.43
Walking for receiving foods		
No	27	13.37
Yes	175	86.63
Mean ± SD	53.71±24.74	
Median(Min-Max)	60(15-180)	
Performing regular activities		
No	2	0.99
Yes	200	99.01
Mean ± SD	54.88±26	
Median(Min-Max)	60(20-180)	
Exercise		
No	142	70.3
Yes	60	29.7
Mean±SD	23.78±18.97	
Median(Min-Max)	20(2-120)	

statistics, i.e. frequency and percentages for quantitative data presentation and mean, standard deviation, median, maximum, and minimum for qualitative data presentation, and Part 2 was analytical statistics, i.e. analysis of the correlations of factors related to knee osteoarthritis in Buddhist monks using multiple logistic regression to calculate the crude odds ratio and the adjusted odds ratio and to test the statistical significance at the P -value <0.05 .

Rights Protection and Research Ethics

This research was approved for ethical certification by the Institutional Review Board of the Royal Thai Army Medical Department, number IRB/RTA 1325/2556 dated September 7, 2013.

Results

General Characteristics of Buddhist Monks, Health Conditions, and Factors Related to Osteoarthritis

The total number of Buddhist monks in Phra Nakhon Si Ayutthaya District who met the inclusion criteria and did not meet the exclusion criteria was 202, their average age was 60.74 years (ranging from 50-96 years and

the standard deviation was 8.78), their marital status before ordination was single at 49.50%, their highest education before ordination was secondary school level and lower at 86.64%, and their occupation before ordination was general employee at 41.09% as listed in Table 1.

As for current health conditions and risks, their average body mass index was 23.45 kg/m² (14.77- 40.82 kg/m² and the standard deviation was 4.74 kg/m²), 41.58% had a congenital disease, 16.83% had a history of knee osteoarthritis in their family, 73.26% once and still smoked, 18.32% had a history of severe knee accident, 77.72% had to go up and down stairs to their cubicles, 42.58% used a traditional toilet, 86.63% often walked to receive food, 99.01% performed regular activities, and 70.30% had no knee exercise.

Prevalence and Related Factors of Knee Osteoarthritis in Buddhist Monks

The prevalence of osteoarthritis in Buddhist monks was 53 out of 202 participants, accounting for 26.2%. When calculating different variables by means of multiple logistic regression, the variables relating to the osteoarthritis included a history of osteoarthritis in the family (adjusted odds ratio (AOR): 45.05, 95% confidence interval (CI): 12.62-160.82, $p<0.001$) and

Table 2. Related factors of knee osteoarthritis in Buddhist monks

	No knee osteoarthritis n = 149	With knee osteoarthritis n = 53	Crude Odds ratio (95%CI)	Adjusted Odds ratio (95%CI)	p-value
	n(%)	n(%)			
Age(years)					
< 60	87(82.86)	18(17.14)	1	1	
60+	62(63.92)	35(36.08)	2.73(1.42-5.25)	2.35(0.97-5.71)	0.059**
Marital status before ordination					
Single	82(82)	18(18)	1	1	
Married	38(63.33)	22(36.67)	2.64(1.27-5.48)	2.01(0.74-5.44)	0.171*
Divorced/widowed	29(69.05)	13(30.95)	2.04(0.89-4.68)	1.18(0.37-3.81)	0.779
Congenital disease					
No	91(77.12)	27(22.88)	1	1	
Yes	58(69.05)	26(30.95)	1.51(0.8-2.84)	0.58(0.22-1.51)	0.264*
History of knee osteoarthritis in family					
No	145(86.31)	23(13.69)	1	1	
Yes	4(11.76)	30(88.24)	47.28(15.24-146.7)	45.05(12.62-160.82)	<0.001***
History of severe knee accident					
No	131(79.39)	34(20.61)	1	1	
Yes	18(48.65)	19(51.35)	4.07(1.93-8.58)	2.96(1.05-8.34)	0.041**
Walking for receiving foods					
No	17(62.96)	10(37.04)	1.81(0.77-4.24)	2.52(0.78-8.18)	0.123*
Yes	132(75.43)	43(24.57)	1	1	

* $p < 0.5$

** $p < 0.05$

*** $p < 0.005$

a history of severe knee accident (AOR: 2.96, 95% CI: 1.05-8.34, $p = 0.041$), as shown in Table 2.

Discussions

This study was reliable, and its design was based on a total survey with no random selection. The researchers collected the samples in a proactive manner at all temples to cover the entire population and to reduce selection bias.

The prevalence of knee osteoarthritis was 26.24%, and was consistent with a previous study of Tangkrulwanich *et al.* (2006) that revealed the prevalence of knee osteoarthritis as 29.60%. This indicates that the results of the current study regarding the prevalence of knee osteoarthritis are consistent with previous studies, despite the use of different diagnostic tools. These results also show that the use of clinical features alone can be as accurate as the use of clinical features with radiography; therefore, it is suitable for use in contexts especially where primary care units are not well prepared in terms of personnel and resources.

A history of knee osteoarthritis in the family (AOR: 45.05, 95% CI: 12.62-160.82, $p < 0.001$) was also consistent with a previous study of Spector *et al.* (1996) which indicated that a history of knee osteoarthritis in the family was a risk factor for knee osteoarthritis. However, the similar study of Tangkrulwanich *et al.* (2006) found that a history of knee osteoarthritis in the family was not associated with knee osteoarthritis (AOR 3.0, 95% CI: 0.7-13.0, P -value = 0.344). After analysis, the current study had a CI of 95%, which was relatively wide, i.e. 12.62-160.82. This means that the population of this study group might be too small.

A history of severe knee accident (AOR: 2.96, 95% CI: 1.05-8.34, $p = 0.041$) was consistent with a previous study by Muthuri *et al.* (2011) revealing that a history of severe knee accident would increase the risk of knee osteoarthritis. However, in a similar study, Tangkrulwanich *et al.* (2006) found that a history of severe knee accident was not

associated with knee osteoarthritis (AOR 1.5, 95% CI: 0.3-7.7, P -value = 0.586). It might be necessary to investigate this risk factor more in the wider population so that the relationship can be more clearly seen.

The considerations of this research are that the population size might be too small, so some factors had a CI of 95% which is relatively wide, and that this cross-sectional descriptive study might not be able to reveal the risks because the patients received risk factors for a period of time leading to their progression to knee osteoarthritis, and these factors often make the knee pain worse, so these patients try to avoid risk factors. An assessment at that time of patients with osteoarthritis might thus not obtain data of these risk factors.

Summary and Suggestions

The prevalence of knee osteoarthritis in Buddhist monks is higher than the general population and the risk factors associated with knee osteoarthritis included a history of knee osteoarthritis in the family and a history of severe knee accident.

Further research should be conducted on a more diverse population of Buddhist monks by using diagnostic criteria for knee osteoarthritis of both only clinical diagnostic criteria and clinical diagnostic criteria with radiography, which can reveal the accuracy of the use of only diagnostic criteria for knee osteoarthritis. In addition, it should be conducted as a prospective or retrospective study to better determine the relationship of risk factors to knee osteoarthritis.

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