Development of the Thai Knee OsteoArthritis Screening Questionnaire (Thai-KOA-SQ) in Kanleurng Sub-District, Nakronpanom Province

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Objective: *To develop a simple questionnaire to use for screening Thai people for knee osteoarthritis (OA).*
Material and Method: *Subjects' characteristics and data covering all known risk factors for OA were collected from a sample of villagers at Kanleurng Sub-District, Nakronpanom Province. Hip, knee, and finger radiographs were taken from all subjects (n = 146) to diagnose OA. Multiple logistic regression was used to select the items contained in the questionnaire. A ROC curve was used to define the best cut-off point and distinguish between OA and non-OA.*
Results: *Three factors were identified as being associated with knee OA and were included in a questionnaire. The Thai-KOA-SQ included questions about knee pain, age and body mass index (BMI). The questionnaire has 79.2% sensitivity, 78.4% specificity and 85.1% for the area under the ROC curve.*
Conclusion: *This questionnaire should be validated in a large group of people, in order to be further developed as the screening questionnaire for knee OA in the general Thai population.*

Keywords: *Knee, Osteoarthritis, Questionnaire, Screening*

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Osteoarthritis (OA), also known as degenerative joint disease is a group of mechanical abnormalities involving degradation of joints[1]. As a result of decreased movement secondary to pain, regional muscle may atrophy, and ligaments may become more lax. Treatment generally involves a combination of exercise, weight loss, and analgesics. If pain becomes debilitating, joint replacement surgery may be used to improve the quality of life[2]. OA is the most common form of arthritis[2] and the leading cause of chronic disability in the United States[3]. It affects about 8 million people in the United Kingdom[4], nearly 27 million people in the United States[5] and 70% of Thai people aged more than 70 years[6].

It is seen that OA could be very expensive for management in late OA patients, requiring regular joint replacement surgery. Moreover, diagnostic procedures and radiographs are inconvenient and costly[7].

Screening for OA is very important. If OA patients are detected early, joint degeneration may be slowed down by exercises and weight loss and these provide very cheap methods. There are some screening questionnaires for hip and knee OA, which have been developed in other countries[8-10]. However, these questionnaires depend on detailed descriptions of symptoms and a previous diagnosis from a physician. There is currently no OA screening questionnaire for Thai people. The objective of the present study was to develop a simple OA screening questionnaire for use with Thai people, who have no previous diagnosis, particularly those living in rural communities, with limited access to health care.

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Material and Method

The present study was conducted in Kanleurng sub-district, Nakae district, Nakronpanom province, Thailand, between January and February

2010. The face-to-face interviews were done by trained interviewers in a general population sample of 146 Thais, aged > 50 years, not known to have OA, in order to collect data about OA-related symptoms, risk factors, and other independent variables. After interview, they were offered joint radiographs for OA diagnosis. The present study was approved by the Mahasarakham University Ethics Committee for Human Research, Thailand. Written informed consent for each participant was obtained.

Literature reviews were performed to select the content that should be included in the screening questionnaire. The risk factor items included were gender, age, BMI (body mass index), occupation, income, history of joint injury, smoking history, alcohol drinking, tea drinking, coffee drinking, analgesic use, sitting posture, joint pain and joint pain level.

Statistical analysis

Multiple logistic regression was used to select the items that should be contained in the questionnaires. From the final model of logistic regression model, coefficient (β; multiplied by 2 and round off to the nearest integer) of the model was used to assign a score value for each variable. A ROC curve was used to define the best cut-off point and distinguish between OA and non-OA. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated from the results. Sensitivity was the proportion of individuals who tested positive out of all those who actually had OA. Specificity was the proportion of individuals who tested negative out of all those who actually did not have OA. PPV was the proportion of individuals who actually had OA out of all those who tested positive. NPV was the proportion of individuals who actually did not have OA out of all those who tested negative.

Results

One hundred forty six people were included in the present study. Diagnosis of OA was made by the same physician, for all people based on the X-ray film. Sixty-three percent of all subjects were aged 51 to 64 years old and the majority was women (67.12%). Fifty-seven participants were diagnosed with osteoarthritis (39.04%). The majority had knee OA (53, 92.98%) of whom 12 also had OA in other joints (Table 1).

For the Thai Knee OsteoArthritis Screening Questionnaire (Thai-KOA-SQ), three factors *i.e.* knee pain, age 65 years old and BMI $\geq$ 30 kg/m^2 were included. The scores for these factors were 5, 3 and 1 respectively. Using a cut-off point score of 7 gave values of 79.2% for sensitivity, 78.4% for specificity, and 85.1% were in the area under the ROC curve (Table 2). Only two factors showed an association with hip osteoarthritis i.e. age 65 years old and hip pain. Since there were only 10 subjects who had hip OA and 10 with finger OA, it was not possible to develop a screening questionnaire for hip or finger OA in the present study. The simple questionnaire developed of Thai-KOA-SQ is shown as Appendix.

Discussion

The present study found the prevalence of knee OA (36.30%) was almost the same as in the study by Kuptniratsaikul et al[11], which found that there was 34.5% to 45.6% of elderly patients in Bangkok with knee OA. However, this prevalence was higher than the worldwide estimation of 9.6% in men and 18% of women aged > 60 years[12].

Table 1. Prevalence of knee, hip and finger OA in Kanlerung villagers (n = 146)

Diagnosis	Number	Percent of total screened	Percent of those with OA
No OA	89	60.96	N/A*
Total OA	57	39.04	100
Only finger OA	1	0.69	1.75
Only knee OA	41	28.08	71.93
Only hip OA	2	1.37	3.51
Finger and knee OA	5	3.42	8.77
Finger and hip OA	1	0.69	1.75
Knee and hip OA	4	2.74	7.02
Knee, hip and finger OA	3	2.05	5.27

* Not available

Table 2. Items and screening parameter estimation in questionnaire for knee OA (n = 146)

Independent variable	Score	Cut-off point	Sensitivity	Specificity	PPV*	NPV*	Area under the ROC curve
Knee Pain	5	7	79.2%	78.4%	67.7%	86.9%	85.1% (78.5-91.7)
Agee ≥ 65 yr	3						
BMI ≥ 30 kg/m^2	1						

* PPV = positive predictive value; NPV = negative predictive value

Appendix. Example of simple questionnaires for predicting prevalent cases of knee OA (n = 146)

The Thai Knee OsteoArthritis Screening Questionnaire (Thai-KOA-SQ)		
Take this test and know your score. Find out if you might have silent OA now. Check each statement that is true for you. If a statement is not true, put a zero. Then add up all the point for a total.	Yes	No
My age is 65 years or older.	3	0
My BMI is 30 kg/m^2 or more.	1	0
I have got some knee pain within 1 year ago.	5	0

If you scored 7 or more points, you have a chance of having knee OA. You should go to the hospital to let the physician confirm diagnosis
If you scored 0-6, you probably do not have knee OA now.

There are a few studies published of a screening questionnaire for OA and these are mostly for hip and knee OA[8-10]. The first study was published in 2000 by LaValley et al[8] and was designed for epidemiologic studies, not to facilitate early treatment. This study found no instrument that could act as a perfect screening questionnaire for knee OA. In 2007, a study published, from Spain by Quintana et al[9] also found difficulties in developing a tool with adequate sensitivity and specificity. They developed a screening questionnaire for hip and knee OA, namely the Knee and Hip OsteoArthritis Screening Questionnaire (KHOA-SQ) and found that the hip algorithm showed high sensitivity (87.4%) and moderate specificity (59.8%), while the knee algorithm showed high sensitivity (94.5%) and low specificity (43.8%)[9]. Roux et al[10] developed and validated a telephone-screening questionnaire for hip and knee OA and found high sensitivity and specificity. However, the main items of the questionnaires in all those studies were signs and symptoms of OA and a previous diagnosis of OA[9,10]. In contrast, in the present study, items that were included in the Thai-KOA-SQ were age, pain and BMI. These may be more appropriate screening items for use in the general population who have not already been diagnosed as having knee OA.

For the Thai KOA-SQ, the authors found high sensitivity (79.2%) and specificity (78.4%) even though the authors' sample size (n = 146) was small compared to other studies[8-10]. This may due to the factors that were included in the present study were strong risk factors (elderly and obesity) and included the main symptom (knee pain) of knee OA. In addition, both the PPV and NPV for this questionnaire were also acceptable. Further study is required to test the questionnaire in a larger population and to develop screening questionnaires for hip and finger OA. In addition, the small sample size may have resulted in the cut-off point of age being high (age ≥ 65 years). The larger sample size in the further study will help to refine the question and scoring about age.

Aging and obesity are the main risk factors for OA, as was found in the present study [13]. The increasing aging of the population worldwide has led to an increasing incidence of OA, therefore, the World Health Organization (WHO) declared the Bone and Joint Decade 2000-2010[14]. The present study supports the aims of this initiative, since the Thai-KOA-SQ will help healthcare providers to identify currently

undiagnosed patients with knee OA. The screening questionnaire will be especially useful in the community drug store. The self-medication rate is very high in Thailand[15] and many pain killer drugs are supplied to customers by pharmacists in community drug stores. The Thai-KOA-SQ can be used by pharmacists to screen these customers, identify those with knee OA, and refer them to physicians. The simplicity of this questionnaire makes it very suitable for the general population that never been diagnosed with knee OA. Identifying previously undiagnosed patients in this way has the potential to increase the use of exercise and weight loss to minimize joint degeneration and therefore future more expensive interventions.

Conclusion

The Thai-KOA-SQ gave acceptable sensitivity and specificity. This questionnaire could be used to help identify those people among the general population who have a high risk of knee OA. However, the questionnaire should be validated in a larger population to confirm the feasibility of using this questionnaire for this purpose.

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Potential conflicts of interest

None

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Appendix. ตัวอย่างแบบสอบถามเพื่อทำนายความชุกของผู้ป่วยโรคข้อเข่าเสื่อม

แบบสอบถามสำหรับโรคข้อเข่าเสื่อมฉบับภาษาไทย (Thai-KOA-SQ)		
ให้ประเมินตามแบบสอบถามนี้ เพื่อค้นหาว่า ท่านเป็นโรคข้อเข่าเสื่อมหรือไม่ อ่านข้อความและตรวจสอบว่าเป็นจริงสำหรับตัวท่านเองหรือไม่ ให้วงกลมล้อมรอบคะแนนที่เป็นคำตอบที่เป็นจริงของท่าน แล้วรวมคะแนนทั้งหมดแล้วประเมินตามเกณฑ์ด้านล่าง	ใช่	ไม่ใช่
ฉันมีอายุ 65 ปีขึ้นไป	3	0
ฉันมีค่าดัชนีมวลกาย 30 กิโลกรัม/เมตร^2 ขึ้นไป	1	0
ฉันเคยมีอาการปวดข้อเข่าในระยะ 1 ปีที่ผ่านมา	5	0
ถ้าได้ 7 คะแนนขึ้นไป แสดงว่า ท่านมีโอกาสที่จะเป็นโรคข้อเข่าเสื่อม ท่านควรจะไปโรงพยาบาลและให้แพทย์ตรวจวินิจฉัย เพื่อยืนยันผล ถ้าได้ 0 ถึง 6 คะแนน แสดงว่า ท่านไม่น่าจะเป็นโรคข้อเข่าเสื่อมขณะนี้		

การพัฒนาแบบคัดกรองโรคข้อเข่าเสื่อมฉบับภาษาไทย (Thai-KOA-SQ) ในตำบลก้านเหลือง จังหวัดนครพนม

พุฒิพงศ์ สัตยวงศ์ทิพย์, ปาริโมก เกิดจันทึก, รจเรศ หาญรินทร์, ธีระศักดิ์ มีเที่ยง, ภูวิพล ขันพิมูล

การศึกษานี้ทำเพื่อพัฒนาแบบคัดกรองโรคข้อเข่าเสื่อมในคนไทย (Thai-KOA-SQ) โดยเก็บข้อมูลในประชาชนที่อาศัยอยู่ในตำบลก้านเหลือง จังหวัดนครพนม ผู้เข้าร่วมการศึกษาทุกคน (n = 146) ได้รับการถ่ายภาพรังสีที่ข้อนิ้วมือ ข้อเข่า และข้อสะโพก แบบสอบถามเพื่อคัดกรองโรคข้อเข่าเสื่อมนั้นมี 3 คำถาม คือ อาการปวดเข่า อายุ และดัชนีมวลกาย พบว่า มีความไว ร้อยละ 79.2 ความจำเพาะ ร้อยละ 78.4 และมีพื้นที่ใต้กราฟ ROC ร้อยละ 85.1 แบบสอบถามนี้ควรมีการทดสอบความถูกต้องในประชากรกลุ่มใหญ่ เพื่อพัฒนาเป็นแบบคัดกรองโรคข้อเข่าเสื่อมในคนไทยทั่วไปต่อไป