



Original Article

The prevalence and work-related physical factors associated with knee pain in older Thai farmers

PUNNEE PEUNGSUWAN, PhD^{1, 2)*}, URAIWAN CHATCHAWAN, PhD^{1, 2)},
RUNGTHIP PUNTUMETAKUL, PhD^{1, 2)}, JUINICHIRO YAMAUCHI, PhD^{1, 3)}

¹⁾ Research Center in Back Neck and Other Joint Pain and Human Performance (BNOJPH), Khon Kaen University: 123 Mittraphap Highway, Muang District, Khon Kaen Province 40002, Thailand

²⁾ School of Physical Therapy, Faculty of Associated Medical Sciences, Khon Kaen University, Thailand

³⁾ Tokyo Metropolitan University, Japan

Abstract. [Purpose] The aim of this study was to examine the prevalence of knee pain in older farmers and to identify the associated factors, including the demographic variables, behaviours and physical activity/exercise levels. [Participants and Methods] A cross-sectional survey was conducted among a total of 285 systematically randomized farmers who were 60 years and older. [Results] The results of this study showed that the overall prevalence of knee pain in this population was 54.04% (n=154) based on a self-reported standardized Nordic Musculoskeletal Questionnaire. The highest prevalence of knee pain was 23.9% [95% confidence interval (CI): 17.75 to 30.05%] for two periods of time (within the past 7 days and over past 12 months). The intolerable physical activity risk factors that were significantly associated with knee pain included prolonged walking, standing and side sitting (odds ratio=2.39%, 95% CI: 1.06 to 5.39%). [Conclusion] The results of this study suggested that a high prevalence of knee pain in these older farmers may be particularly associated with sustaining a weight-bearing position.

Key words: Older farmers, Knee osteoarthritis, Prevalence

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INTRODUCTION

Knee osteoarthritis (KOA) is a common condition in the older population. It is caused by the lack or loss of the articular cartilage of the knee, which progresses with age until the surrounding bone exhibits related damage. The symptoms of KOA include joint pain, stiffness, limited motion and deformity, leading to disability. The prevalence of painful disabling KOA in individuals over 55 years old is 10%, of whom one-quarter are severely disabled¹⁾. However, the number of individuals affected by symptomatic KOA is likely to increase due to the obesity epidemic and the aging of the population²⁾. Unfortunately, there is a remarkable paucity of information regarding the differing KOA occurrences across racial groups and geographic regions. The prevalence that has been reported depend largely on the selected population, study design and criteria used. Therefore, the aim of this study was to examine the KOA prevalence in older rural farmers, and to identify the associated factors, including their demographic variables, behaviours and physical activity/exercise levels.

PARTICIPANTS AND METHODS

This cross-sectional survey was conducted among Thai farmers aged 60 years and older who were living in a rural area of the Khon Kaen Province in Thailand. This study was approved by the Ethics Committee for Human Research at Khon

*Corresponding author. Punnee Peungsuwan (E-mail: ppunne@kku.ac.th)

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Kaen University. A total of 285 older individuals in five subdistricts were systematically randomized by their home addresses. After the researcher explained the study aims and procedures so that the participants thoroughly understood them, informed consent was provided by each of the participants.

The questionnaire used in this study contained two parts. The first part consisted of the Thai version of the standardized Nordic Musculoskeletal Questionnaire, which was used to analyse each participant's musculoskeletal symptoms over three time periods: during the past 7 days, from 12 months ago until 7 days ago and over 12 months ago. The second part contained questions about their demographic variables (gender, age, weight, height, marital status, smoking behaviour, alcohol consumption, occupation, work pattern and exercise). The participants without knee pain did not have to answer the second part of the questionnaire. For those participants who had poor eyesight and/or were unable to read or understand the questions, the researcher's assistant read the questions aloud and filled in the answers for the participant. After they completed the questionnaire, the musculoskeletal symptoms of the participants were assessed using the Thai version of the standardized Nordic Musculoskeletal Questionnaire³⁾ for screening participants with knee pain. All of the participants with knee pain were classified according to the 1986 American College of Rheumatology criteria⁴⁾ for screening participants with KOA.

The baseline characteristics and daily physical activities were shown by the number of participants and the percentage. The knee pain data was presented by the prevalence (%) and the 95% confidence interval (CI). The correlations between the musculoskeletal symptoms and the participants' demographic and physical activity factors were described using the odds ratio (OR) calculated from a logistic regression analysis. A p value <0.05 was used as the statistical significance criterion.

RESULTS

The participants' demographic variables and physical activity levels are shown in Table 1. Most of the participants never smoked or drank alcohol, and the occupations or activities that required physical activity included mild to moderate loads. Most of the daily physical activities included walking (25.0%, $n=165$), standing (20.9%, $n=138$) and side sitting (16.5%, $n=109$). Most of the participants exercised more than 3 days each week (57.54%, $n=164$).

The overall knee pain prevalence was 54.04% ($n=154$ of 285), shown in Table 2. Moreover, the knee pain prevalence for the past 7 days and over 12 months ago were the same 23.9% (95% CI: 17.75 to 30.05), while the knee pain prevalence from 12 months through 7 days ago was 6.3% (95% CI: 2.80 to 9.80). There were more women (68.83%, $n=106$ of 154) than men (31.17%, $n=48$ of 154) in the knee pain prevalence (Table 3). Other joint pain were also surveyed including the prevalence of neck (16.14%, $n=46$), shoulder (58.25%, $n=166$), elbow (16.49%, $n=47$), hand (35.09%, $n=107$), upper back (6.32%, $n=18$) and lower back (49.12%, $n=140$), hip (37.54%, $n=107$), ankle and foot (37.19%, $n=106$).

Table 3 shows the knee pain prevalence correlated with the various factors, including the gender, age, body mass index (BMI), occupation, exercise level, alcohol use and smoking behaviour. There were no correlations between the knee pain prevalence during the past 7 days and from 12 months until 7 days ago and the various factors. However, there was an association between a knee pain prevalence of more than 12 months and a maximum physical activity load (OR=2.39, 95% CI: 1.06 to 5.39, $p<0.05$).

DISCUSSION

This study examined the knee pain prevalence of older farmers living in the same cultural area. The results showed high knee pain prevalence over the past 7 days and longer than 12 months ago. The physical activity risk factors that were significantly associated with knee pain included prolonged walking, standing and side sitting. Moreover, in this group of older farmers, the results suggested that a high knee pain prevalence may be particularly associated with sustaining a weight-bearing position over time.

Although, this study found the highest prevalence of shoulder pain; but, the most risk of knee pain was associated with prolonged physical activity. Similar to our results, Puntumetakul et al. reported that the knee pain prevalence of farmers for the past 7 days and 12 months were 28.6% and 35.4%, respectively⁵⁾. Thotsathit et al. determined that the knee pain prevalence of sewing workers ranged from 17.6% to 21.9%⁶⁾. Moreover, the prevalence of frequent knee pain was 25.1% higher in middle-aged or elderly females⁷⁾. Heavy physical activity that causes the tissues around the joints to become inflamed and painful is a risk factor for the development of KOA. The results of this study showed that knee pain was significantly correlated with a maximum physical activity load, including walking, standing and side sitting. Walking and side sitting both apply high pressure to the knee joint. Moreover, farmers, construction workers and teachers who stand for prolonged periods of time exhibit a greater risk of KOA than individuals in other occupations^{8, 9)}.

Previous systematic reviews and meta-analyses have indicated that an increased BMI, gender and age are risk factors for the onset of KOA in older adults¹⁰⁻¹²⁾. Additionally, the loss of patellar cartilage occurs at a higher rate in females than in males¹¹⁾. However, therapeutic exercise can help to prevent and relieve knee pain^{13, 14)}. Therefore, older farmers who are at risk for knee pain or KOA should be provided with information about proper exercises and working postures. To validate the results of this study, further studies should consider the physical activity levels of older farmers with knee pain.

In conclusion, high knee pain prevalence was found in the older farmers during the previous 7 days and longer than 12

Table 1. Demographic and physical activity of participants

| Characteristics | Number (%) |
|---------------------------|---------------|
| Gender | |
| Males | 103 (36.1) |
| Females | 182 (63.9) |
| Age (years) | 70.6 ± 5.85* |
| BMI (kg/m ²) | 23.82 ± 3.48* |
| Marital status (n) | |
| Single | 10 (3.5) |
| Married | 254 (68.3) |
| Separated/divorced | 80 (28.2) |
| Smoking (n) | |
| Never | 229 (80.4) |
| Former | 26 (9.1) |
| Sometimes | 6 (2.1) |
| Daily | 24 (8.4) |
| Alcohol (n) | |
| Never | 198 (80.4) |
| Former | 36 (9.1) |
| Sometimes | 43 (2.1) |
| Daily | 8 (8.4) |
| Load of physical activity | |
| No | 19 (6.7) |
| Mild | 122 (42.8) |
| Moderate | 118 (41.4) |
| Maximum | 26 (9.1) |
| Daily physical activity | |
| Side sitting | 109 (16.5) |
| Cross sitting | 86 (13.0) |
| Squatting | 47 (7.1) |
| Sitting on chair | 92 (13.9) |
| Up and down stairs | 24 (3.6) |
| Standing | 138 (20.9) |
| Walking | 165 (25.0) |
| Exercise | |
| No exercise | 28 (9.8) |
| Sometimes | 63 (22.1) |
| 1–3 days/week | 30 (10.5) |
| >3 days/week | 164 (57.5) |

*Presented by mean ± SD.

Table 2. Number and prevalence of knee pain

| Periods of knee pain | Number | Prevalence (95%CI) |
|--------------------------------|--------|---------------------|
| Past 7-days | 68 | 23.9 (17.75, 30.05) |
| Past after 7-days to 12-months | 18 | 6.3 (2.80, 9.80) |
| Past 12-months | 68 | 23.9 (17.75, 30.05) |

months previously. Moreover, the knee pain prevalence was significantly associated with a maximum physical activity load. These findings could provide knee OA education and self-care for older famers.

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Conflicts of interest

None.

Table 3. Odds ratio of knee osteoarthritis according to demographic characteristics and physical activity

| Factors | Past 7-days (N=68) | | | Past 7-days to 12-months (N=18) | | | Past 12-months (N=68) | | |
|----------------------------------|-----------------------|-------------------|---------|------------------------------------|--------------------|---------|--------------------------|-------------------|---------|
| | Number (%) | OR (95%CI) | p-value | Number (%) | OR (95%CI) | p-value | Number (%) | OR (95%CI) | p-value |
| Gender | | | | | | | | | |
| Men | 24 (23.3) | 1 | | 6 (5.8) | 1 | | 18 (17.5) | 1 | |
| Women | 44 (24.2) | 1.05 (0.59, 1.85) | 0.87 | 12 (6.6) | 1.15 (0.42, 3.16) | 0.79 | 50 (27.6) | 1.80 (0.99, 3.30) | 0.05 |
| Age | | | | | | | | | |
| 60 and < 70 | 31 (20.4) | 1 | | 12 (7.9) | 1 | | 32 (21.1) | 1 | |
| ≥ 70 | 37 (27.8) | 1.50 (0.87, 2.60) | 0.14 | 6 (4.6) | 0.56 (0.20, 1.52) | 0.25 | 36 (27.3) | 1.41 (0.81, 2.43) | 0.22 |
| BMI (kg/m²) | | | | | | | | | |
| < 23 | 22 (20) | 1 | | 5 (4.55) | 1 | | 18 (16.4) | 1 | |
| ≥ 23 | 46 (26.3) | 1.43 (0.78, 2.67) | 0.23 | 13 (7.5) | 1.69 (0.55, 6.25) | 0.32 | 50(28.7) | 1.5 (0.67, 3.53) | 0.11 |
| Alcohol | | | | | | | | | |
| Never | 49 (24.8) | 1 | | 11 (5.6) | 1 | | 53 (26.9) | 1 | |
| Former | 19 (21.8) | 0.85 (0.47, 1.55) | 0.59 | 7 (8.1) | 1.51 (0.56, 4.03) | 0.41 | 15 (17.2) | 0.57 (0.30, 1.07) | 0.08 |
| Smoking | | | | | | | | | |
| Never | 57 (24.9) | 1 | | 15 (6.6) | 1 | | 59 (25.9) | 1 | |
| Former | 11 (19.6) | 0.74 (0.36, 1.52) | 0.41 | 3 (5.4) | 0.80 (0.22, 2.88) | 0.74 | 9 (16.1) | 0.55 (0.25, 1.19) | 0.13 |
| Load of physical activity | | | | | | | | | |
| Mild | 31 (23.7) | 1 | | 8 (6.2) | 1 | | 28 (21.4) | 1 | |
| Moderate | 30 (24.8) | 1.06 (0.60, 1.89) | 0.83 | 7 (5.8) | 0.94 (0.33, 2.66) | 0.90 | 27 (22.5) | 1.07 (0.59, 1.94) | 0.83 |
| Maximum | 7 (21.2) | 0.87 (0.34, 2.19) | 0.77 | 3 (9.1) | 1.52 (0.38, 6.10) | 0.55 | 13 (39.4) | 2.39 (1.06, 5.39) | 0.036* |
| Exercise | | | | | | | | | |
| Always exercise | 5 (16.7) | 1 | | 1 (3.3) | 1 | | 9 (31.0) | 1 | |
| No exercise | 63 (24.8) | 1.65 (0.61, 4.49) | 0.33 | 17(6.7) | 2.09 (0.27, 16.28) | 0.48 | 59 (23.2) | 0.67 (0.29, 1.56) | 0.35 |

OR: odds ratio; 95%CI: 95% confidence interval.

REFERENCES

- 1) Peat G, McCarney R, Croft P: Knee pain and osteoarthritis in older adults: a review of community burden and current use of primary health care. *Ann Rheum Dis*, 2001, 60: 91–97. [[Medline](#)] [[CrossRef](#)]
- 2) Zhang Y, Jordan JM: Epidemiology of osteoarthritis. *Clin Geriatr Med*, 2010, 26: 355–369. [[Medline](#)] [[CrossRef](#)]
- 3) Saetan O, Khiewyoo J, Jones C, et al.: Musculoskeletal disorders among northeastern construction workers with temporary migration. *Srinagarind Med J*, 2007, 22: 165–173.
- 4) Altman R, Asch E, Bloch D, et al. Diagnostic and Therapeutic Criteria Committee of the American Rheumatism Association: Development of criteria for the classification and reporting of osteoarthritis. *Classification of osteoarthritis of the knee. Arthritis Rheum*, 1986, 29: 1039–1049. [[Medline](#)] [[CrossRef](#)]
- 5) Puntumetakul R, Siritarativat W, Boonprakob Y, et al.: Prevalence of musculoskeletal disorders in farmers: case study in Sila, Muang Khon Kaen, Khon Kaen province. *J Med Tech Phy Ther*, 2011, 23: 297–303.
- 6) Thotsathit N, Puntumetakul R, Eungpinichpong W, et al.: Prevalence of musculoskeletal disorders in sewing occupation in Khon Kaen province. *KKU Res J*, 2011, 11: 47–54.
- 7) Turkiewicz A, Gerhardsson de Verdier M, Engström G, et al.: Prevalence of knee pain and knee OA in southern Sweden and the proportion that seeks medical care. *Rheumatology (Oxford)*, 2015, 54: 827–835. [[Medline](#)] [[CrossRef](#)]
- 8) Sandmark H: Musculoskeletal dysfunction in physical education teachers. *Occup Environ Med*, 2000, 57: 673–677. [[Medline](#)] [[CrossRef](#)]
- 9) Sandmark H, Hogstedt C, Vingård E: Primary osteoarthritis of the knee in men and women as a result of lifelong physical load from work. *Scand J Work Environ Health*, 2000, 26: 20–25. [[Medline](#)] [[CrossRef](#)]
- 10) Blagojevic M, Jinks C, Jeffery A, et al.: Risk factors for onset of osteoarthritis of the knee in older adults: a systematic review and meta-analysis. *Osteoarthritis Cartilage*, 2010, 18: 24–33. [[Medline](#)] [[CrossRef](#)]
- 11) Brennan SL, Cicuttini FM, Shortreed S, et al.: Women lose patella cartilage at a faster rate than men: a 4.5-year cohort study of subjects with knee OA. *Maturitas*, 2010, 67: 270–274. [[Medline](#)] [[CrossRef](#)]
- 12) Eaton CB: Obesity as a risk factor for osteoarthritis: mechanical versus metabolic. *Med Health R I*, 2004, 87: 201–204. [[Medline](#)]
- 13) Sermcheep P, Peungsuwan P, Eungpinichpong W, et al.: Home self-care program with physical therapy and Thai traditional medicine for older people with knee osteoarthritis in community. *J Med Tech Phy Ther*, 2013, 25: 50–63.
- 14) Peungsuwan P, Sermcheep P, Harnmontree P, et al.: The effectiveness of Thai exercise with traditional massage on the pain, walking ability and QOL for older people with knee osteoarthritis: a randomized controlled trial in the community. *J Phys Ther Sci*, 2014, 26: 139–144. [[Medline](#)] [[CrossRef](#)]