The Epidemiology of Osteoarthritis of the Knee in Elderly Patients Living an Urban Area of Bangkok

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Abstract

An epidemiological study of 392 elderly Thai patients with osteoarthritis (OA) of the knee, 86 males and 306 females, with a mean age of 67.8 years, was performed. The prevalence of knee OA was 34.5-45.6 per cent. Most of the patients had completed primary education and had sufficient income. More than half of the patients had pain in both knees, but many of the elderly people used neither knee supports nor walking aids (82.7 and 90.6%). Sixty-four per cent had no previous knowledge concerning the value of exercise. Sixty-five per cent of the patients had never used any pain medication. Three-fourths of the subjects evaluated themselves to have fair to good health. Sixty per cent presented with knee pain when climbing the stairs, and 64.8 per cent had a fair quality of life. Almost all the subjects had mild to moderately severe grade of OA and their X-ray findings were level II-III. The average quadriceps strength and six-minute walking distance were 12.95 ± 5.51 kilograms and 363.69 ± 99.34 meters respectively. The five factors that significantly correlated with walking ability were age, sex, the functional incapacity score, using walking aids and level of severity found on X-ray. Previous knowledge about knee exercise did not affect walking ability, but may have been due to the irregularity of the exercise schedule they performed. The elderly should be encouraged to exercise regularly in addition to receive knowledge about proper exercise.

Key word : Osteoarthritis, Knee, Epidemiology, Elderly

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Osteoarthritis (OA) occurs in 44 per cent to 70 per cent of individuals who are more than 55 years old[1-3]. These numbers are expected to increase substantially as the ageing population grows. Studies[4] estimate that the number of those with arthritis in the US, who are not in nursing homes will increase to 14 million by the year 2000. Of the elderly living in the community, approximately 50 per cent of women and 35 per cent of men have arthritis[5]. This condition causes an elderly person to be faced with an impairment,[6] which limits the activities of daily living (the ability to perform the most basic functions, such as eating, dressing, and bathing).

This disease is particularly disabling when the knees are affected as they are in 10 per cent of the elderly, limiting the ability to use stairs, rise from a chair, get in and out of a car, lift and carry objects, stand comfortably and eventually to walk [1]. These activities are essential for independent living and a good quality of life[7,8]. Disability will occur after 20 to 25 years, eventually requiring surgical intervention[2]. This disease causes important health problems[8,9] due to its high prevalence and disabling effects. The objective of this study is to survey the epidemiology of knee OA in Thai elderly patients to estimate the burden of the disease and to determine the factors which relate to the patients' walking ability in order to establish a treatment plan for this disease.

METHOD AND SUBJECTS

In November, 1997, the Geriatric Study of Siriraj Hospital recruited 1366 elderly people (age >60 years) in the urban community of the Bangkok Metropolitan area around Siriraj Hospital. They were interviewed by well-trained nurses concerning demographic details, medical problems, and underlying diseases. Six-hundred and twenty-three subjects reported that they had had knee pain for at least one year. They were given an appointment to come in to the campus areas near the hospital for detailed evaluation.

Only three hundred and ninety-two elderly people (85 males and 306 females) attended the study and were interviewed to obtain detailed demographic data, knee pain symptom, whether they had any previous knowledge about exercise, the severity of their knee OA[10] (score ranged from 10-30), pain and satisfaction score, health status (AIMS arthritis impact subscale)[11], frequency of use of medication, quality of life, height and weight (for calculation of body mass index, BMI)[12], and functional incapacity score (Modified Bandi's criteria of functional incapacity scale score[13], with a score ranging from 0-20).

Quadriceps muscle strength was measured for either the right or left affected leg by using a leg dynamometer. The maximal isometric force for knee extension was determined. Two measurements were performed at each examination. The highest value was recorded.

The range of motion for flexion and extension of the knee was evaluated by using a goniometer on two occasions. The highest value was recorded.

The total walking distance in six minutes was assessed. All subjects were encouraged to walk as fast as they could with or without walking aids. They could stop and take a rest if they could not walk farther due to their physical fitness or other medical conditions. The total distance walked within six minutes was recorded.

All subjects had weight-bearing radiographs of both knee joints and these were analysed by using the criteria of Kellgren and Lawrence[14].

Data Analysis

Student *t*-test, and ANOVA were used to compare measured values between the groups with a 95 per cent confidence interval obtained to measure the efficacy. A *p*-value less than 0.05 was considered statistically significant. Multiple regression analyses was used to analyse the factors affecting the walking ability.

RESULTS

Among the 392 elderly people who attended the study, evidence of osteoarthritis was confirmed by X-ray in all subjects. The prevalence of knee OA by X-ray was 34.5 per cent (95% confidence interval 31.8-37.3%). The other 231 elderly who could not attend the study complained of knee pain. It could be assumed that all had knee OA, so the prevalence of knee OA by history was 45.6 per cent (95% confidence interval 43.0-48.2%). (Fig. 1).

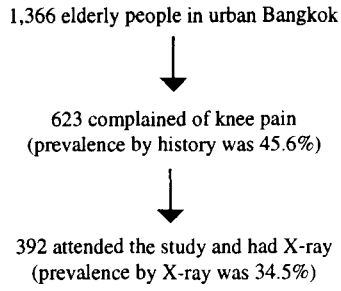

Fig. 1. Prevalence of knee OA by history and X-ray evidence.

Table 1. Demographic characteristics of the 392 subjects.

Characteristics		N	%
Sex	Male	86	21.9
	Female	306	78.1
Mean age ± SD (yr)	67.8 ± 5.9		
Education	Primary school	226	57.7
	Secondary school	76	19.4
	University	20	5.1
	Non-educated	70	17.9
Income	Yes	372	94.9
	No	20	5.1
Average income ± SD (baht)	4,425 ± 6,765		
Knee pain	Left knee	91	23.2
	Right knee	90	23.0
	Both knees	210	53.6
Average duration of knee pain ± SD (month)	45.35 ± 40.22		
Knee support :	Always	23	5.9
	Often	7	1.8
	Rarely	35	8.9
	Never	324	82.7
Using walking aids :	Yes	34	8.7
	No	355	90.6
Frequency of pain medication use			
	Always	33	8.4
	Very often	7	1.8
	Fairly often	15	3.8
	Sometimes	41	10.5
	Almost never	39	9.9
	Never	254	64.8
Knowledge about knee exercise			
	Yes	137	34.9
	No	252	64.3

The demographic characteristics of the 392 subjects are summarized in Table 1. The mean age was 67.8 years (range from 60 to 88 years). There were more women than men. Most of the subjects had an adequate income. Fifty-eight per cent of them had graduated from primary school. About half of them had pain in both knees, but knee support or walking aids were used by only 16.6 and 8.7 per cent respectively. More than half of the subjects (64.8%) never used pain medication to control knee pain. One-third of them knew about the value of knee exercise.

Table 2. Subjects' self assessment, body mass index and severity grading.

Variables		N	%
Health status	Very good	12	3.1
(physical, mental, social)	Good	125	31.9
	Fair	171	43.6
	Poor	79	20.2
	Very poor	4	1.0
Pain level	No pain	30	7.7
	Pain on climbing stairs	237	60.5
	Pain on level walking	86	21.9
	Pain all the time	38	9.7
Quality of life	Good	87	22.2
	Fair	254	64.8
	Poor	50	12.8
Body mass index	Normal (18.5-24.9 kg/m^2)	145	37.0
	Overt (25-29.9 kg/m^2)	113	28.8
	Obese ($\geq$ 30 kg/m^2)	33	8.4
Severity of knee OA	Mild (1-16)	219	55.9
	Moderate (17-23)	169	43.1
	Severe (24-30)	3	0.8
Knee X-ray	Level I	4	1.0
	Level II	175	44.6
	Level III	171	43.6
	Level IV	16	4.1

Table 3. Health related scores and parameters related to knee functions.

Parameters	Mean ± SD	Range
Health score	6.14 ± 1.73	0 – 10
Satisfaction score	6.84 ± 2.17	1 – 10
Pain score +	5.47 ± 2.19	0 – 10
Functional incapacity score +	6.53 ± 3.43	0 – 18
ROM : flexion (degree)	121.70 ± 9.27	110 – 160
ROM : lack extension + (degree)	11.86 ± 6.9	0 – 45
Quadriceps strength (kg)	12.95 ± 5.51	4 – 30
6-minute walking distance (meter)	363.69 ± 99.34	14 – 601

+ The higher the score, the worse the outcome

Patients' self assessment of their health is shown in Table 2. Most of them (75.5%) rated their health to be fair to good and 64.8 per cent had a fair quality of life. Sixty per cent complained about knee pain when climbing the stairs. Only thirty-seven per cent had a BMI within the normal range. Almost all of them (99%) had a mild to moderate degree of OA while eighty-eight per cent had level II and III on X-ray.

Health related scores and parameters related to knee function are shown in Table 3. The mean health and satisfaction scores were 6.14 ± 1.73 and 6.84 ± 2.17 respectively. The mean pain score was 5.47 ± 2.19, ranged 0-10. The average quadriceps strength was 12.95 ± 5.51 kilograms and the six-minute walking distance ranged from 14-601 meters with the average distance of 364 meters. The factors related to the walking ability are analyzed in Table 4. Groups with difference in sex, age, duration, using walking aids, pain score, quality of life level, severity grading, X-ray level and functional incapacity score had significantly different 6 minute walking ability. Using a multiple regression analyses method, the factors which affected walking ability were:- using walking aids, the severity of the X-ray, the functional incapacity score, age and sex with the

Table 4. Factors related to walking ability.

Factors		N	6 min walking distance (meter)	p-value
Sex	Male	86	404.67 ± 10.25	
	Female	305	352.13 ± 5.59	< 0.001*
Age	60 – 69	252	383.94 ± 93.94	
	70 – 79	121	333.63 ± 97.46	< 0.001*
	≥ 80	19	287.63 ± 100.05	
Knee pain	Unilateral	181	374.18 ± 91.65	
	Bilateral	210	354.65 ± 104.89	0.052
Duration of knee pain	1 year	114	383.00 ± 99.65	
	> 1 – 5 year	199	359.51 ± 97.05	0.028*
	> 5 year	78	346.12 ± 101.39	
Freq. of pain medication use	Frequent	55	325.52 ± 116.56	
	Sometime	80	365.76 ± 104.75	0.006
	Never	254	372.37 ± 91.34	
Knowledge about knee exercise	Yes	137	360.36 ± 90.74	0.555
	No	252	366.58 ± 103.48	
Using knee support	Yes	65	342.75 ± 88.43	0.054
	No	324	368.73 ± 100.67	
Using walking aids	Yes	34	246.41 ± 94.05	< 0.001*
	No	355	375.69 ± 92.06	
Knee pain score	≤ 5	308	359.25 ± 101.09	0.020*
	> 5	33	401.92 ± 84.46	
QOL **	Good	87	369.56 ± 93.21	
	Fair	254	368.24 ± 96.32	0.039*
	Poor	50	330.34 ± 118.71	
BMI	Normal	145	373.58 ±97.38	
	Overt	113	364.92 ± 93.36	0.491
	Obese	33	353.03 ± 92.85	
Severity of knee OA	Mild	219	381.42 ± 92.33	
	Moderate	169	343.69 ± 102.42	< 0.001*
	Severe	3	196.00 ± 59.19	
Knee X-ray finding	Level I	4	409.50 ± 64.54	
	Level II	175	379.15 ± 102.87	0.002*
	Level III	171	348.89 ± 92.28	
	Level IV	16	302.44 ± 76.26	
Functional incapacity score	≤ 10	341	371.40 ± 94.30	
	> 10	50	311.08 ± 116.63	< 0.001*

* Statistically significant
** Quality of life

coefficient of determination = 0.209 and standard error of the estimated equals to 85 meters.

DISCUSSION

Osteoarthritis of the knee is the most common degenerative joint disease found in elderly people[15]. The prevalence of knee OA in this study ranged from 34.5-45.6 per cent (by X-ray evidence and history of knee pain respectively). Felson et al [1] reported that the prevalence of knee OA increased with age, from 27 per cent in subjects younger than age 70, to 44 per cent in subjects aged 80 or older. Another report analyzed 60 subjects with a mean age of more than seventy years and found an osteoarthritic tibiofemoral joint in 55 per cent and 69 per cent of the men and women respectively[16]. In the present study, the authors did not analyze the prevalence by sex, but the majority were women (78%).

The goal of therapy in osteoarthritis is to improve the functional abilities of the patient. Increasing muscle strength is a way to achieve better functional performance[17]. The authors, therefore, postulate that the six minute walking distance is the most direct and most valid procedure to judge the functional ability of daily activities. From this study,

there are nine factors that affect the walking ability ($p < 0.05$ by univariate analysis). When using a multiple regression analyses, the only five significant factors which affect walking ability are age, sex, severity of the X-ray, using walking aids and the functional incapacity score. The relationship of OA to age is its most striking feature[18]. Ageing is one of the epidemiological risk factors for knee OA[19]. After the age of 55, the disease occurs significantly more frequently and also more severely in women[20]. Data on the epidemiology of arthritis from the National Health and Nutrition Examination Survey revealed that the prevalence of moderate to severe abnormality in the knee among older women was more than three times that among older men [21]. The grade of the X-ray findings, using walking aids and functional incapacity score are all representatives of the severity of disease. The greater the functional incapacity score, the worse the knee function.

Leach et al found an increased frequency of OA in obese patients, particularly when weight-bearing joints were evaluated[22]. Other studies reported that obesity was associated with osteoarthritis of the knees, with the strongest association seen in women[23]. The authors did not find that BMI was related to walking ability because of the confounding effect of age. (the obese elderly were mostly younger than those of normal weight : mean age = 65 and 68.5 years respectively).

Using univariate analysis, pain score and QOL were associated with walking ability according to the subjects' self assessment, which might be determined by other factors, such as psychological, socioeconomical or familial factors. The frequency of medication use and previous knowledge about the value of exercise were not related to walking ability. This might imply that the elderly knew how to exercise, but they did not do it regularly.

SUMMARY

The prevalence of osteoarthritis of the knee in elderly patients living in a Bangkok urban area was between 34.5-45.6 per cent. The disease affected women more often than men. The prevalence increased as they aged. More than half of them had pain in both knees, but many elderly used neither knee support nor walking aids. Most of them never used any pain medication, had no knowledge about the value of exercise, and had complaints about knee pain while climbing stairs. The average quadriceps strength and six minute walking distance were 12.95 kg and 363.69 meters. Age, sex, functional incapacity score, using walking aids and severity of the findings on X-ray were the only factors found to affect walking ability significantly.

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ระบาดวิทยาของโรคข้อเข่าเสื่อมในผู้สูงอายุในชุมชนเมืองกรุงเทพ ฯ

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คณะผู้วิจัยศึกษาระบาดวิทยาของโรคข้อเข่าเสื่อมในผู้สูงอายุที่มีอาการปวดเข่า 392 ราย เป็นชาย 86 ราย หญิง 306 ราย อายุเฉลี่ย 67.8 ปี พบความชุกของโรคข้อเข่าเสื่อมร้อยละ 34.5–45.6 ผู้สูงอายุส่วนใหญ่มีการศึกษาระดับประถมศึกษา และมีรายได้พอเพียง, ประมาณครึ่งหนึ่ง (ร้อยละ 53.6) มีอาการปวดเข่าสองข้าง แต่ส่วนใหญ่ไม่ต้องใช้สนับเข่าหรือเครื่องช่วยเดิน (ร้อยละ 82.7 และ 90.6 ตามลำดับ) และร้อยละ 64.8 ไม่ต้องใช้ยาแก้ปวด–แก้อักเสบ, ผู้ป่วยส่วนมาก (ร้อยละ 64.3) ไม่เคยรู้เรื่องออกกำลังเข่ามาก่อน, การประเมินสุขภาพทั่วไป ผู้สูงอายุร้อยละ 75.5 คิดว่าตนมีสุขภาพระดับปานกลางถึงดี และร้อยละ 60.5 บอกว่ามีอาการปวดเข่าขณะขึ้นบันได, ร้อยละ 64.8 ประเมินว่าตนมีคุณภาพชีวิตดีปานกลาง, ร้อยละ 99 มีความรุนแรงของโรคระดับน้อยถึงปานกลาง และร้อยละ 88.2 มีภาพถ่ายรังสีข้อเข่าที่แสดงถึงภาวะข้อเข่าเสื่อมระดับ 2–3, ค่าเฉลี่ยกำลังกล้ามเนื้อควอดไดรเซพส์และค่าเฉลี่ยระยะทางที่เดินได้ในเวลา 6 นาที คือ 12.95 $\pm$ 5.51 กิโลกรัม และ 363.69 $\pm$ 99.34 เมตรตามลำดับ, ปัจจัยที่มีผลต่อความสามารถในการเดิน พบว่า เพศ, อายุ, ความสามารถในการใช้เข่า, การใช้เครื่องช่วยเดิน และความรุนแรงของโรคข้อเข่าเสื่อมโดยดูจากภาพถ่ายรังสีข้อ เป็นปัจจัยที่มีความสัมพันธ์ที่แท้จริงกับการเดินของผู้สูงอายุโรคข้อเข่าเสื่อม, ความรู้เรื่องออกกำลังกายกล้ามเนื้อเข่ามาก่อนไม่มีผลต่อความสามารถในการเดิน อาจเนื่องมาจากแม้ผู้สูงอายุทราบวิธีการออกกำลังกล้ามเนื้อเข่า แต่มิได้ปฏิบัติอย่างสม่ำเสมอ จึงควรมุ่งเน้นส่งเสริมให้ผู้สูงอายุได้ออกกำลังเข่าอย่างจริงจังดีกว่ามุ่งให้ความรู้แต่เพียงอย่างเดียว

คำสำคัญ : ข้อเข่าเสื่อม, ระบาดวิทยา, ผู้สูงอายุ

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