

Associated Risk Factors in Middle Eastern Patients who had Primary Knee Osteoarthritis – a Hospital Based Study

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Abstract

We report a three-year prospective study of 348 knees in 174 patients who had knee osteoarthritis. The mean age of patients was 59.9 ± 8.41 (SD) years with a range of 38–80. All patients had plain radiograph of the knee joints (weight-bearing anteroposterior, Skyline, and lateral 20 degrees flexion views) pelvis, and hips. Patients with a history of back pain had lumbar spine radiograph. Variables such as gender, age, body mass index (BMI), stair climbing, kneeling, squatting and osteoarthritis of the spine were included for further analysis. Quetelet's index of obesity exceeded the healthy range in 96.55% of cases. Lower back pain was reported by 49.42% of patients in the previous 12 months. More females than males tended to have lower back pain, but the difference was not significant. No significant difference was noted between lower back pain and age. More males tended to develop osteoarthritis of the spine than females (40% versus 35.4%), but the difference was not significant. No statistical significance was detected between osteoarthritis and habitual or occupational factors. Primary hip disease was extremely rare in our patients. A strong association was found between BMI and knee osteoarthritis. ($P = 0.009$). This implies that early modification of this factor may influence knee osteoarthritis.

INTRODUCTION

Osteoarthritis is not a simple disorder but represents a heterogeneous group of conditions with different risk factors for different joints and even different classifications within the same joint group.¹²

In Western countries radiographic evidence of this disease is present in the majority of individuals by the age of 65 and in approximately 80% at more than 75 years of age.³

Obesity, female gender, kneeling and squatting at work are thought to be important risk factors for osteoarthritis of the knee.⁴⁵⁶⁷ Heredity, cultural (lifestyle) differences, and environmental backgrounds have also been suggested to explain the variations in incidence, anatomical distribution, and the pattern of the disease.⁸⁹

Conflicting information still exists about the associated risk factors of osteoarthritis of the knee in different populations and races.⁴⁵⁶⁷⁸⁹

Since knee osteoarthritis is one of the commonest diseases, identification of its associated risk factors are of preventive significance. The roles of gender, age, body mass index, squatting,

kneeling, stair climbing, and osteoarthritis of the spine were studied as factors associated with osteoarthritis of the knee joint.

Associated osteoarthritis of the hip, spine, and hand were recorded.

Results were compared with other populations.

PATIENTS AND METHODS

A prospective study was conducted over a three-year period on 174 patients who attended the first author's general orthopedic clinic, complaining of persistent knee pain and some limitation of function.

All patients fulfilled the criteria of primary osteoarthritis of the knee which includes no history of previous trauma, infection, rheumatoid arthritis, congenital deformity or other systemic diseases causing joint pathology.

A detailed history and physical examination were undertaken by the authors including a history of squatting, kneeling, stair climbing, and back pain in the previous 12 months.

Height and weight of the patients were obtained and body mass index (BMI) was calculated by the standard formula.

A BMI 24–29 was considered as overweight and ≥ 30 as obese. Plain radiographs of the knee joint (weight-bearing anteroposterior, skyline, and lateral 20 degrees flexion views), pelvis, and hips were taken. Patients who had suffered low back pain in the previous 12 months had anteroposterior and lateral view plain radiographs of the lumbar spine. Radiographic films were graded according to the Kellgren/Lawrence (K/L) grading system, which uses the following grades: grade 0, normal; grade 1, possible osteophytes only; grade 2, definite osteophytes and possible joint space narrowing; grade 3, moderate osteophytes and/or definite joint space narrowing; and grade 4, large osteophytes, severe joint space narrowing, and/or bony sclerosis. Definite radiographic knee or hip osteoarthritis was defined on the K/L scale as grade ≥ 2 , and the final grade assigned to a patient's radiograph was the highest grade for the most severely affected knee. ¹⁰

The degree of osteoarthritis of the lumbosacral spine was evaluated using a radiographic scoring system described by Weiner et al. ¹¹

Osteoarthritis was graded from 0 to 3: grade 0 indicates no disease, defined by normal disk height, no spur formation, no eburnation, and no gas; grade 1 indicates mild disease, defined by $<25\%$ disc space narrowing, small spur formation, minimal eburnation, and no gas; grade 2 indicates moderate disease, defined by $25\text{--}75\%$ disk space narrowing, moderate spur formation, moderate eburnation, and no gas; grade 3 indicates advanced disease, defined by $>75\%$ disk space narrowing, large spur formation, marked eburnation, and presence of gas.

The diagnosis of osteoarthritis of the spine was made if the

grade was 2 or higher.

All radiographs were evaluated by the authors independently.

The final score was that which was agreed upon by the authors; however, when differences occurred among the authors, the lowest score was accepted.

STATISTICAL ANALYSIS

Statistical analysis of the data was performed by use of a PC program (SPSS 16 for Windows).

The Pearson Chi-squared analysis was used to test the difference between the variables in associated risk factors.

Statistical significance was set at a level of $P = < 0.05$.

RESULTS

GENDER, AGE

Majority of the patients were female (82.8%) aged 38–80 with a mean of 58 years and 17.2% were male with an age range of 48–80 and a mean of 64.5 years. 54.6% of the patients were under 60 years of age.

117 (67.24%) female patients were aged between 38 and 65 years (mean 53.4 years) and 27 female patients were between 66 and 80 years (mean 70.8 years). 15 male patients were between 48 and 65 years (mean 64.8 years) with the remainder between 66 and 80 years (mean 69.4 years).

OBESITY

96.5% exceeded a healthy BMI ($P < 0.009$).

144 patients (82.75%) were obese and 24 (13.79%) were overweight. Mean BMI for female patients was 36.50 with a range of 26–50 (SD 4.96), while for male patients it was 32.41 with a range of 22–44 (SD 6.26).

No statistical significance was found between mean BMI in females and males.

The following habitual and occupational activities were found to be associated with osteoarthritis of the knee in both genders (Table 1).

Figure 1

Table 1: Distribution of habitual and occupational risk factors.

Occupational & habitual risk factors	% of patients	Mean daily exposure	Mean year exposure
Climbing stairs	124 (71.3%)	24 step/day	25.79 year
Squatting	108 (62%)	1.86 hour	18.28 year
Kneeling	114 (65.51%)	1.14 hour	23.88 year

CLIMBING STAIRS

50 (28.7%) patients did not have stairs in their home or at work.

124 (71.3%) patients climbed 5–40 stair steps/day (mean 23.9 stair steps/day) on a regular basis during daily activities or at work.

51 patients had used stairs for 3–20 years (mean 17.7 years), 50 patients for 21–30 years (mean 28 years), and 23 patients had used stairs for 31–50 years (mean 39 years).

SQUATTING HABIT

66 (37.9%) patients did not squat during their daily life on a regular daily basis.

108 (62%) patients reported squatting for 1–5 hours/day regularly (mean 1.86 hours).

52 (29.8%) patients reported squatting for 6–20 years (mean 14 years) and 56 (32.2%) patients for 21–30 years (mean 22.26 years).

KNEELING HABIT

60 (34.48%) patients did not kneel on a regular basis during their daily activities apart from praying time which is less than 25 min/day.

114 (65.51%) patients reported kneeling on a regular basis for 1–4 hours/day (mean

1.14 hours) for 16–40 years (mean 23.88 years).

COEXISTING CONDITIONS

86 (49.42%) patients reported lower back pain in the previous 12 months of whom 72

(50%) were females and 14 (46.66%) males.

63 (47.72%) patients were aged 38–65 years and 23 (54.76%) were aged 66–80 years.

More females than males tended to have lower back pain, but the difference was not significant. Table -2

Figure 2

Table 2: Distribution of osteoarthritis of the spine classified by Weiner grading System.

Weiner Grading	Male	Female	Total
Grade 0	1 (7.14%)	14 (19.44%)	15 (17.44%)
Grade 1	7 (50%)	31 (43%)	38 (44.18%)
Grade 2	4 (28.57%)	19 (26.38%)	23 (26.74%)
Grade 3	2 (14.28%)	8 (11.11%)	10 (11.62%)
Total	14	72	86

No significant difference was noted between lower back pain and age.

38 (44.18%) of 86 of the patients with low back pain had grade 1 osteoarthritis, 23

(26.74%) grade 2 and 10 (11.62%) grade 3. Table -2

More males than females tended to develop osteoarthritis of the spine (42.85%

versus 37.5%), but the difference was not significant.

There was no significant correlation between age and grade of osteoarthritis. Table -3

Figure 3

Table 3: Incidence of lower back pain and the grade of osteoarthritis

Weiner Grading	Grade 0	Grade 1	Grade 2	Grade 3
Mean age/ year	59.8	61.7	62.2	64
No. of patients with lower back pain	15 (17.44%)	38 (44.18%)	23 (26.74%)	10 (11.62%)

67 (38.5%) had hypertension and 39 (22.4%) were diabetics. None of the patients had osteoarthritis of the hip joint.

DISCUSSION

Osteoarthritis of the knee is the most common joint disorder

worldwide. The estimated population prevalence varies from 4 to 50%, depending on age, gender distribution and disease definition. These discrepancies may be due to differences in race, lifestyle, or socioeconomic background. ¹²¹³¹⁴

Osteoarthritis of the knee is an incurable disease, with the only way of reducing the burden of this disorder being prevention.

To prevent osteoarthritis of the knee the etiologic or risk factors for the condition need to be identified in time.

The prevalence of knee osteoarthritis in developed countries is between 27 and 90% in people of 60 years or older. ¹⁵¹⁶

The current study was designed to investigate the risk factors for symptomatic and advanced cases of osteoarthritis.

Before proceeding to interpret these findings and to expound upon the possibilities of prevention, we considered the potential sources of bias in our study.

Throughout our study we recruited osteoarthritis patients from only one orthopedic clinic to minimize referral bias.

Subjects with a history of joint pain and stiffness were excluded.

The lack of controls is another factor; however, in so doing, we avoided comparing subjects who had fairly severe osteoarthritis with a very healthy (with respect to joint pain) control group and this may have resulted in elimination of odds ratios. Knee osteoarthritis is uncommon under the age of 60 years in Sweden ¹⁷ whereas 54.6% of the studied patients were less than 60 years.

The age distribution in our patients was the same as that noted in other populations. ¹⁸¹⁹

This was specifically the case in female patients, but whether the earlier onset in females is related to the additive effect of the constitutional

factors (obesity, grandmultiparity, and/or mechanical environmental factors (lifestyle) is a matter of speculation.

The prevalence of knee osteoarthritis was reported to be significantly higher in women than in men. ³²⁰

Our study demonstrated that knee osteoarthritis was higher in women than in men (82.75% versus 17.24%), with a F: M ratio of 4.8:1, indicating that gender is an important risk factor for knee osteoarthritis.

These findings are compatible with previous studies from France, ²¹ but contradict other Caucasian populations ⁸²² where the ratio was shown to be about 1.4–1.76:1. The difference in gender distribution may be due to sensitivity of cartilage tissue to sex hormones as knee cartilage volume is higher in males than in females. ²³ The high incidence of osteoarthritis in women just after menopause suggests that estrogen deficiency plays a role in causing disease.

Cohort studies have reported that women taking estrogen have a decreased incidence of radiographic knee osteoarthritis. ²⁴

Genetic factors may also play a role in this association. ²⁵

There is a strong correlation between high BMI and osteoarthritis of the knee. ¹³

Weight reduction can obviously decrease the incidence of osteoarthritis of the knee by 25–50%. ¹³

Our results showed that BMI is high in osteoarthritis of the knee.

96.55% of our patients exceeded the healthy range of Quetelet's index of obesity, while 82.7% of them were considered obese ($P = 0.009$). This should be compared with the 49.7% incidence of obesity among our population. ²⁶

Our observation regarding the association between obesity and osteoarthritis of the knee concurs with those in Caucasians and other populations. ⁴²⁷²⁸²⁹ These findings indicate that the influence of excessive weight on the development of knee OA is consistent across ethnic groups. The stress and amount of force on the weight-bearing joints

are increased in overweight individuals. This additional physical load could cause cartilage breakdown leading to OA.³⁰ It has been proved that overweightness antedates the development of osteoarthritis.³¹³²

Furthermore, in people with osteoarthritis, being overweight increases the risk for radiographic progression.³³³⁴³⁵

Leptin may act as a systemic or local factor that might mediate the metabolic link between obesity and OA and partially account for the gender disparity towards the disease.³⁶

Given that obesity is associated with the onset and progression of OA, weight loss represents an important preventive strategy. Furthermore, obesity was found to predispose to osteoarthritis of the hip in Caucasians.³⁷³⁸

A distinctive striking feature in the present series is the absence of a single case associated with osteoarthritis of the hip, which may be due to the common use of squatting postures in our culture, that force the hip through extreme ranges of motion.

This finding merits further research.

There is conflicting evidence with regard to occupational risk factors and osteoarthritis of the knee. Jobs that require kneeling and squatting have been associated with osteoarthritis of the knee.⁴⁵³⁹ Other studies have found that prolonged sitting at work and climbing stairs are associated with decreased risk of knee OA but increase the likelihood of hip osteoarthritis.⁶⁴⁰⁴¹

Squatting and kneeling are common cultural habits in our society, but none of our female patients were involved in work situations that necessitated these positions. We did find that climbing stairs, squatting, and kneeling were associated with osteoarthritis of the knee, but were not statistically significant.

They may act as contributing factors to the development of knee osteoarthritis, but a control study is required to

elucidate the role of these factors. Lumbar spine disk degeneration has been reported to be higher in patients with osteoarthritis at other sites.⁴²⁴³

Thus we included lumbar spine osteoarthritis as one of the potential anatomical sites associated with knee osteoarthritis in patients with a history of low back pain.

Only 38.37% of patients with symptomatic back pain had osteoarthritis of the spine.

More females than males tended to have lower back pain.

Males tended to develop osteoarthritis of the spine more than females, but these findings were not significant.

There were no significant differences noted between lower back pain and age or between age and grade of osteoarthritis of the spine. Our analysis of individual risk factors for symptomatic knee osteoarthritis confirms that obesity represents the main independent statistically significant risk factor for knee osteoarthritis, as observed in other populations, suggesting that prevention should be initiated early.

Controlling body weight and avoiding obesity are important in preventing knee osteoarthritis.

On the other hand climbing stairs, squatting, and kneeling were not statistically significant risk factor in osteoarthritis of the knee joint.

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