

COMPARISON OF RADIOGRAPHIC PATTERNS OF KNEE OSTEOARTHRITIS IN TURKISH AND BRITISH PATIENTS: RELATIONSHIP BETWEEN SYMPTOMS AND DISABILITY

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ABSTRACT

Osteoarthritis, with different risk factors and classifications is a heterogenous disease. Symptoms poorly correlate with structural damage as seen on plain radiographs. Cultural (lifestyle) differences between the populations may also account for some of the differences. In a group of hospital referred British patients with knee OA, bilateral knee joints with the involvement of more than one compartment was observed. Severe and multicompartamental radiographic changes were associated with calcium pyrophosphate crystal deposition, nodal changes, and polyarticular interphalangeal osteoarthritis. With a similarly designed study, radiographic patterns of 165 patients were analyzed and looked for associations with clinical findings and disability; besides the results were compared with those of British patients. Presence of nodal changes, chondrocalcinosis, effusions and the presence of previous trauma were more frequent in women. 96 patients (61.2%) had bilateral knee OA whereas 62 (39.4%) had unilateral involvement. Isolated patellofemoral involvement was rare with the lowest ratio in lateral OA. Bicompartamental involvement was the most common form both in unilateral and bilateral clinical presentations. Osteophyte was present in 93.9% of radiographs. On univariate analysis, WOMAC had a correlation with female sex ($p<0.05$), chondrocalcinosis ($p<0.05$), night pain ($p<0.05$) and inactivity stiffness ($p<0.05$). On multivariate analysis there was a correlation with WOMAC and activity pain ($p<0.01$), night pain ($p<0.01$), rest pain ($p<0.01$), inactivity stiffness ($p<0.01$), older age ($p<0.05$) and female sex ($p<0.05$). Radiographic features were not found associated with any clinical finding or disability. This is an observational study and reflects the characteristics of hospital referred patients, so epidemiological studies will give more data on the clinical, radiological presentations of knee osteoarthritis and possible associations.

Key Words: Knee osteoarthritis, radiographic pattern, disability

ÖZET

DİZ OSTEOARTRİTİ OLAN TÜRK VE İNGİLİZ HASTALARIN RADYOGRAFİK TİPLERİNİN KARŞILAŞTIRILMASI: SEMPTOMLAR VE DİSABİLİTE İLE İLİŞKİSİ

Osteoartrit değişik risk faktörleri ve sınıflamaları olan heterojen bir hastalıktır. Direkt grafilerde görülen yapısal hasar ile semptomlar zayıf korelasyon gösterir. Popülasyonlar arası kültürel farklılıklar bu değişikliklerin bir kısmını açıklayabilir. Diz osteoartriti ile hastaneye başvuran bir grup İngiliz hastada bilateral diz ekleminde birden fazla tutulum gözlemlendi. Ağır ve çok kompartmanlı radyografik değişiklikler kalsiyum pirofosfat kristal depolanması, nodal değişiklikler ve poliartriküler interfalangeal osteoartritle ilişkiliydi. Benzer çalışma dizaynı ile, 165 hastanın radyografik bulguları analiz edildi, klinik bulgular ve disabilite ile ilişki arandı; yanısıra bu bulgular İngiliz hastaların bulguları ile karşılaştırıldı. Nodal değişiklikler, kondrokalsinoz ve efüzyonun varlığı ile travma kadınlarda daha sıklıkla görüldü. Doksanssekiz hastada (% 61.2) her iki diz, altmışiki hastada tek diz (%39.4) tutulumu vardı. İzole patellofemoral tutulum nadir olmakla birlikte, en düşük oran lateral tutulum şeklindeydi. Hem tek hem de her iki diz tutulumunda iki kompartman tutulumu en sık formdu. Osteofit radyografilerin % 93.9'unda saptandı. Tek değişkenli analizde, WOMAC kadın cinsiyeti ($p<0.05$), kondrokalsinoz ($p<0.05$), gece ağrısı ($p<0.05$) ve inaktivite tutukluğu ile ($p<0.05$) ilişkili bulundu. Çok değişkenli analizde WOMAC, inaktivite ağrısı ($p<0.001$), gece ağrısı ($p<0.001$), istirahat ağrısı ($p<0.01$), inaktivite tutukluğu ($p<0.001$), ileri yaş ($p<0.05$), kadın cinsiyet ile ($p<0.05$) ilişkili bulundu. Radyografik özellikler ile klinik bulgular ve disabilite arasında ilişki bulunmadı. Bu çalışma gözlemsel olup hastaneye başvuran hastaların özelliklerini yansıttığından, epidemiyolojik çalışmalar diz osteoartritin klinik ve radyografik tipleri ile muhtemel ilişkiler hakkında daha çok veri sağlayacaktır.

Anahtar Kelimeler: Diz osteoartriti, radyografik tiplendirme, disabilite

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Knee osteoarthritis (OA) detected by radiography is present in as many as 30 % of people aged over 65 in developed countries and is often associated with pain and disability (1, 2). OA is accepted as a heterogeneous disease with different risk factors for different joints and even different classifications within the same joint group (3). Obesity, age and female sex are thought to be important risk factors for OA of the knee; symptoms poorly correlate with structural damage as seen on plain radiographs (4, 5, 6, 7).

Different racial (genetic) and environmental backgrounds gave the rationale of many studies which compare the prevalences of OA in different populations. Cultural (lifestyle) differences between the populations may also account for some of the differences (8,9). In a group of hospital referred British patients with knee OA, bilateral knee joints with the involvement of more than one compartment was observed. Severe and multicompartamental radiographic changes were associated with calcium pyrophosphate crystal deposition, nodal changes, and polyarticular interphalangeal osteoarthritis (8).

The aim of this study was to conduct a similarly designed study with our patients referred to hospital with knee pain and to analyse the radiographic patterns; and look out for associations with clinical findings and disability; besides to compare our results with those found with British patients.

PATIENTS AND METHODS

One hundred and sixtyfive patients with knee pain and disability who referred to Physical Therapy and Rehabilitation Clinic Rheumatology outpatient department were consecutively recruited.

Physical examination and laboratory analysis were performed (erythrocyte sedimentation

rate, C reactive protein, rheumatoid factor, calcium, phosphorus, alkaline phosphatase). The presence of previous trauma, duration of symptoms, operations were recorded. Height and weight of the patients were obtained and body mass index (BMI) was calculated. Nonsteroidal antiinflammatory consumption, number of intraarticular injections performed, any previous advice about exercise or diet were asked. Pain (activity, rest, nightpain) was evaluated with visual analog scale (VAS). The presence of effusion and Heberden nodes were recorded. Knee X-rays (standing anteroposterior and 20 degrees flexion and lateral), pelvis and thoracolumbar anteroposterior radiographs were taken. Knee radiographs were evaluated according to Kellgren and Lawrence (10). Mild change was defined by definite narrowing with osteophyte / sclerosis (= Kellgren grade 2), moderate change as marked narrowing with osteophytes / sclerosis, and severe change as obliteration of the joint space. Chondrocalcinosis and Forrestier's disease were also recorded if present. These evaluations were done for each compartment of the knee joint (medial tibiofemoral, lateral tibiofemoral, patellofemoral compartments). The films were reevaluated by two observers in two different sessions independently. For functional evaluation a disease specific instrument, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was used (11). It has 24 items in three dimensions: stiffness, pain and physical function. The summary scores for the items under each dimension were calculated. Then we calculated a global score using an unweighted average of the score of each dimension, an approach used by others (12).

Statistical analysis: For intra and interobserver variability, two observers evaluated 60 sets of radiographs and Kappa statistics was used. Odd's ratios were calculated according to the

presence of associated factors. Univariate analysis was done and according to the data multivariate analysis was also performed.

RESULTS

One hundred and sixty five patients were recruited into the study. 7 patients were excluded because of their normal X ray examination (5 women and 2 men). 158 patients were (118 women, 40 men) predominantly consisted of women (Table I). Age, obesity and duration of symptoms were similar in both of the groups. Presence of nodal changes, chondrocalcinosis,

Table I. Characteristics of the patients

	Women N=118	Men N=40
Mean age(range)(years)	60.3 (42-79)	58.9 (38-75)
Mean symptom duration (range)(years)	7.2 (1-31)	8.1 (1-29)
BMI	32.1	28.5
Nodal changes	38 (32.2 %)	6 (15 %)
Chondrocalcinosis	8 (6.7 %)	4 (10 %)
Forrestier's disease	1 (10.9 %)	1 (2.5 %)
Deformity	43 (37.2 %)	13 (32.5 %)
Trauma	34 (28.8 %)	7 (17.5 %)
Effusion	32 (26.2 %)	7 (17.5 %)

Table II. The ratio of the compartmental involvement

	Unilateral N=62 (39.4 %)	Bilateral N= 96 (61.2 %)
MTF + PF	70 %	68.4 %
MTF	16.9 %	18.2 %
PF	5.6 %	4.9 %
LTF	2.1 %	1.0 %
Tricompartamental	5.4 %	7.5 %

Table III. Odds ratios and confidence intervals for selected symptoms and signs and disability.

WOMAC	Odds ratios	95 % confidence interval
Rest pain	4.05	1.93-8.48*
Night pain	5.29	2.51-11.1*
Activity pain	4.08	1.84-9.03*
Inactivity stiffness	6.71	1.93-23.2*
Age	2.73	1.29-5.77**
Female sex	3.51	1.71-7.65**

* $p < 0.01$, ** $p < 0.05$

effusions and the presence of previous trauma were more frequent in women. Forrestier's disease was present in one patient in both of the groups. 96 patients (61.2 %) had bilateral knee OA whereas 62 (39.4 %) had unilateral involvement (Table II). Isolated patellofemoral type (PF) was rare; but the lowest ratio was in lateral OA (LTF). Bicompartamental involvement was the most common form both in unilateral and bilateral clinical presentations. Osteophyte was present in 93.9 % of radiographs. On univariate analysis, functional disability index (WOMAC) was found associated with female sex ($p < 0.05$), chondrocalcinosis ($p < 0.05$), night pain ($p < 0.05$) and inactivity stiffness ($p < 0.05$). On multivariate analysis WOMAC was found associated with activity pain ($p < 0.01$), night pain ($p < 0.01$), rest pain ($p < 0.01$), inactivity stiffness ($p < 0.01$), older age ($p < 0.05$) and female sex ($p < 0.05$) (Table III). Radiographic features were not found associated with any clinical finding or disability.

We found night pain associated with inactivity stiffness (odds ratio 4.04 ,95% confidence interval (CI) 1.62 to 10.0), activity pain was found associated with effusion(odds ratio 0.28 , 95% CI 0.11 to 0.69). Intraobserver agreement was high for all the compartmental evaluation (observer I kappa value 0.84 95% Confidence Interval 0.72-0.98) (observer II kappa value 0.84 95% confidence interval 0.75-0.95) except for PF compartment (observer I kappa value 0.64 95%CI 0.51-0.74; observer II kappa value 0.62 95% CI 0.54-0.70), interobserver agreement for PF compartment was also low (kappa value 0.68,95% CI 0.52-0.75). Interobserver agreement for both medial (MTF) and lateral tibiofemoral (LTF) compartments was high (kappa value 0.85 , 95% CI 0.76-0.97; and 0.88 ,95%CI 0.79-0.94 respectively).

DISCUSSION

Osteoarthritis is a heterogenous disease determined and affected by a variety of systemic and local factors, besides has a genetic background

(13 ,14). Knee OA is generally bilateral, bicompartamental and symmetrical (15). Women carry a higher risk of developing knee OA and have a more severe functional disability (16). In our study; most of the patients were women and were found severely disabled like British patients. Disability was found associated not only with female sex, but also with inactivity stiffness, pain as well as older age in agreement with a previous study (17). In the former study, functional disability (Steinbrocker) was found associated with female sex, and presence of chondrocalcinosis whereas effusion was found associated with male sex and chondrocalcinosis. It is known that different mechanisms of pain production result in different clinical patterns of pain in OA (15). In a 'hospital based study' only a marginal relationship was found between pain in the knee and disability (17). Study of pain is further hampered by the effect of sex, personal, ethnic, cultural and psychological factors (18). Studies of pain in OA are complicated because correlation between radiographic severity and pain intensity is generally low (19,20,21).

In our study radiographic features were not found associated with any clinical finding or disability whereas in British patients multicompartamental involvement was found associated with total pain and chondrocalcinosis. We found that chondrocalcinosis was found associated with disability.

When we compare our results with the British patients, we saw that bilateral involvement was more frequent. British patients were older and had more frequent chondrocalcinosis and Forrester's disease. Multicompartamental involvement was found similar in both of the groups whereas in British patients multicompartamental involvement was found associated with total pain and chondrocalcinosis. Radiographs of weight bearing joints are superior to supine films for the detection of joint

space narrowing, it still has some limitations. Knee radiographs, the standard method for diagnosing and assessing the severity of knee OA, have been questioned by several investigators for its weak predictive validity in terms of clinical manifestations (10). Lateral view evaluation of PF joint, although it is easier to obtain, particularly in elderly people; and has been used in epidemiological studies, carry a high variation ratio (22). In a community survey, MTF compartment was found as the most common site of involvement (45 %) followed by PF (35 %) (16). In British patients MTF + PF ratio was 50 %, isolated MTF OA was 10 %, LTF OA was 1 %, isolated PF OA was 24.5 %, tricompartmental OA was 6 %. In our study these ratios were as follows respectively : 68.4 %, 18.2 %, 1 %, 4.9 %, and 7.5 %. In agreement with these studies, we found bilateral and bicompartamental involvement as more frequent with MTF+PF involvement being the most frequent pattern. In unilateral presentation isolated PF OA was 5.6 % and in bilateral OA it was 4.9 %; it was uncommon like some published studies (23) whereas in British patients this ratio was found very high, 24.5 %. In British patients obesity was also found associated with bilateral involvement and with multicompartamental pattern. Turkish population BMI was higher than British patients, we couldn't find any association with symptoms or radiological pattern. While mechanical factors are likely to be involved (24), various systemic or metabolic factors play an important role in the etiology of knee OA (25). A distinct genetic trait or physiological adaptation to chronic obesity has been mentioned (26).

This study has several limitations. One of the investigators of this study attended the clinics where the previously mentioned study (8) conducted; so this study was planned and carried out in a very similar way ; but still we know that direct international comparison of the clinical presentations of OA in different countries is difficult, methodology and disease definitions may

have some differences. On the other hand, these results belong to the symptomatic patients referred to hospital, those who might have some differences than normal population.

But this attempt may be accepted as an observational study and future epidemiological studies comparing populations might give data about symptoms and risk factors for knee OA.

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