



Prevalence of symptomatic knee, hand and hip osteoarthritis among individuals 40 years or older: a study conducted in İzmir city

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Objective: This cross-sectional study was conducted to determine the prevalence of symptomatic knee, hand and hip osteoarthritis among men and women at or over 40 years of age, living in the Bayraklı Adalet district of İzmir.

Methods: The study included a sample size of 522 people calculated using the Epi Info™ software. Demographic information, weight, height and body mass index were recorded. Patients were physically examined for evidence of osteoarthritis, such as joint tenderness, range of motion deficiency, deformity, 1st carpometacarpal joint involvement and Heberden's and/or Bouchard's nodes. One hundred and ninety-one individuals were suspected of having knee/hand/hip osteoarthritis and 152 of these were called in for radiographs.

Results: The prevalence of symptomatic knee, hand and hip osteoarthritis of adults aged ≥ 40 years was 20.9%, 2.8% and 1.0%, respectively. Symptomatic knee and hand osteoarthritis was significantly higher among women ($p < 0.05$). However, there was no significant difference between two genders regarding symptomatic hip osteoarthritis.

Conclusion: Knee osteoarthritis is frequent in the region in which the study was conducted. An effective health policy regarding osteoarthritis can be created following further studies with larger samples representing the entire country.

Key words: Epidemiology; knee, hand and hip joint; symptomatic osteoarthritis.

Osteoarthritis (OA) is the most common type of arthritis worldwide^[1] and one of the major causes of morbidity among people 65 years or older.^[2,3] The World Health Organization (WHO) predicts OA to be a cause of morbidity for at least 10% of people over 60.^[4]

Incidence and prevalence studies provide useful information about the natural course, predisposition and prophylactic factors of the disease. However, it is difficult to determine absolute prevalence values as

they vary according to a population's age distribution, diagnostic criteria and the method of the study.

No countrywide OA prevalence study has been conducted in Turkey. A previous study was conducted in Antalya which determined prevalence of symptomatic knee OA and distal interphalangeal joint (DIP) OA of the hand. OA prevalence was determined as 14.8% and hand DIP 10.5% among people of 50 years of age or older.^[5] Another study conducted in Ankara in 2001 reported a radiological hip OA prevalence of 8.8%.^[6]

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The aim of this cross-sectional study was to determine the knee, hand and hip OA prevalence among men and women aged 40 years or older living in the Bayraklı Adalet district of İzmir.

Patients and methods

The Adalet district, located in Bayraklı, İzmir, has a population of 17,682. The sample size of 522 was calculated using the Epi Info™ software^[7] from the total population of 17,682 with a 3% margin of error, 95% confidence interval and 1% design effect (DEFF). The number of people older than 40 years was determined using the central registration system (mukhtar). The cycle number was 20 and subjects were chosen by systematic randomization, accordingly. Exclusion criteria included metabolic diseases, such as ochronosis, acromegaly, hemochromatosis, epiphyseal dysplasia, slipped capital femoral epiphysis, limb length disorders, major joint trauma, history of joint surgery, inflammation, intra-articular tumor, neurologic deficit, peripheral neuropathy preventing the assessment of range of motion (ROM), morbidity or mental disorder. Selected individuals subject to the exclusion criteria were replaced with the person after him/her.

Face-to-face meetings were held with subjects who agreed to participate in our study and informed consent forms were obtained. Age and gender of all subjects were recorded and detailed physical examinations were performed by the same physician. Joint tenderness, ROM restrictions, joint deformities, crepitation of the knee joint, Heberden's or Bouchard's nodes and OA in the first carpometacarpal (CMC) joint were all noted. Height and weight was measured using the same scale

Table 1. Mean age and BMI ratio.

	Men n=132	Women n=390	All n=522
Age (years) mean±SD	55.9±8.2	53.1±8.5	53.9±8.5
BMI (kg/m ²) mean±SD	28.2±4.3	30.0±4.5	29.6±4.6

Student's t-test; p=0.001. BMI: body mass index

Table 2. Symptomatic knee, hand and hip osteoarthritis ratio for gender.

	Men n=132	Women n=390	p
SKO (+)	6 (5.8)	97 (94.2)	<0.001
SHaO (+)	0 (0)	14 (100)	=0.026
SHO (+)	2 (40)	3 (60)	=0.608

Fisher's χ^2 test; p<0.05. SHaO: symptomatic hand osteoarthritis, SHO: symptomatic hip osteoarthritis, SKO: symptomatic knee osteoarthritis. P values less than 0.05 are written in bold.

and body mass index (BMI) was calculated by the formula weight (kg)/height² (m²).

Using American College of Rheumatology (ACR) criteria, 191 subjects were suspected of having OA and 152 of these were invited to the Ege University Radiology Department for radiographs. Nine subjects had previous radiographs and 30 refused to come. Radiograph costs were covered by the Ege University Research Foundation (Project No: 09.TIP-15). Radiographs of the hand were taken bilaterally in two directions, of the knee with the subject standing (weight-bearing) and knees in 20 degrees of flexion and of the hip with the pelvis in the neutral supine position. All X-rays were taken using a Siemens Multix (serial number: 792AxA00052; Siemens Healthcare, Erlangen, Germany) digital X-ray device and images were transferred to a computer. Images were assessed by the same radiologist using the Kellgren-Lawrence (KL) scoring system for the hand/knee/hip.^[8] The KL scores of 2 or greater in any joint of the knee, hand or hip were considered to be OA. Symptomatic OA of the knee,^[9] hand^[10] and hip^[11] were diagnosed according to ACR criteria.

All statistical analyses were made using the Statistical Package for Social Sciences (SPSS) for Windows 14.0 (SPSS Inc., Chicago, IL, USA).

The Shapiro-Wilk test was used to determine equal distribution. The Student t-test was used for matched groups, the Mann-Whitney U test for non-equal distributed variables and normal variables were analyzed using the chi-square or Fisher's exact chi-square test via cross-tables. Significance value was p≤0.05 at 95% confidence interval and p≤0.01 at 99% confidence interval.

Results

The study included a total population of 522 subjects, 390 (74.7%) female and 132 (25.3%) male, aged 40 years or older. Average age was 53.9±8.5 years. Males were significantly older than females (p=0.001) (Table 1). Average BMI was 29.6±4.6 kg/m² and women (30.0±4.5)

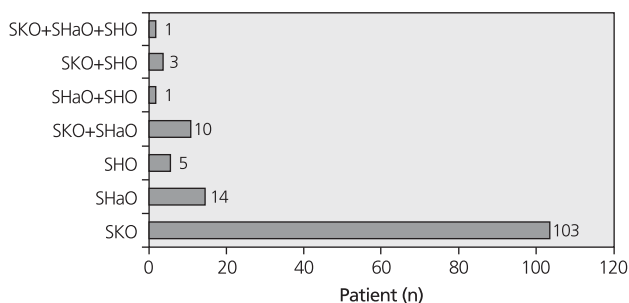


Fig. 1. Symptomatic OA distribution rates. (SHaO: symptomatic hand osteoarthritis, SHO: symptomatic hip osteoarthritis, SKO: symptomatic knee osteoarthritis.)

had significantly higher BMI than men (28.2 ± 4.3) ($p < 0.001$) (Table 1).

Symptomatic knee (SKO), hand (SHaO) and hip (SHO) osteoarthritis were present in 20.9%, 2.8% and 1.0% of the subjects, respectively. The frequency of SKO and SHaO was significantly ($p < 0.05$) higher in females (Table 2). Ten subjects had both SKO and SHaO, 3 had SKO and SHO, one subject had SHaO and SHO and one subject had SHO, SKO and SHaO (Fig. 1). Bilateral involvement was found in 95.1% of SKO subjects, 100% of SHaO subjects and 60% of SHO subjects (Table 3). SHaO involved mostly the DIP joints (92.9%) and the 1st CMC joint (21.4%) (Fig. 2). All types of OA were frequent in the 70 to 79 age group and SKO was common in all age groups older than 40 years. According to the KL scoring system, the majority of the symptomatic knee, hand and hip OA subjects were Grade 2 (47.6%, 78.6% and 60%, respectively).

Discussion

Both increases in average life time expectancy and in the elderly population result in an increased global prevalence of OA. Incidence and prevalence studies provide useful information about the natural course, predisposition and prophylactic factors of diseases. Although numerous studies on radiological prevalence of OA have been published, there is little data on symptomatic OA prevalence (Table 4). Our study is the first in Turkey to determine the symptomatic prevalence of knee, hand and hip OA.

The prevalence of symptomatic knee, hand and hip OA in individuals 40 years of age or older in the Bayraklı district of İzmir was 20.9%, 2.8% and 1.0%, respectively. Knee and hand OA prevalence was significantly higher in women ($p < 0.05$), whereas there was no significant difference in hip OA prevalence between the two genders. In a Greek cross-sectional study of 8,740 subjects aged 19 or older (mean age: 46.95 ± 17.74 years), SKO prevalence was reported at 6%.^[12] SKO prevalence was reported as 29.8% in a study based on ACR criteria in Dicomano, Italy of 697 individuals aged 65 or older.^[13] Zhang et al. reported a SKO prevalence of 11.2% based on the Framingham protocol in a study with subjects aged 60 or older and randomly chosen from three regions of Beijing, China.^[14] Another study in Shanghai, China, aiming to determine the prevalence of SKO and associated risk factors, based on a population aged 40 years or older, reported a prevalence rate of 7.2%.^[15] A study based on a population aged 40 and older chosen from 20 different regions of Spain reported a SKO prevalence of 16.9%.^[16] And in a population based study in Antalya,

Table 3. Bilateral symptomatic osteoarthritis ratio.

	Women n=390 (%)	Men n=132 (%)	All n=522 (%)
BSKO	92 (93.9)	6 (6.1)	98 (95.1)
BShAO	14 (100)	0 (0)	14 (100)
BShO	3 (100)	0 (0)	3 (60)

BShAO: bilateral symptomatic hand osteoarthritis, BShO: bilateral symptomatic hip osteoarthritis, BSKO: bilateral symptomatic knee osteoarthritis.

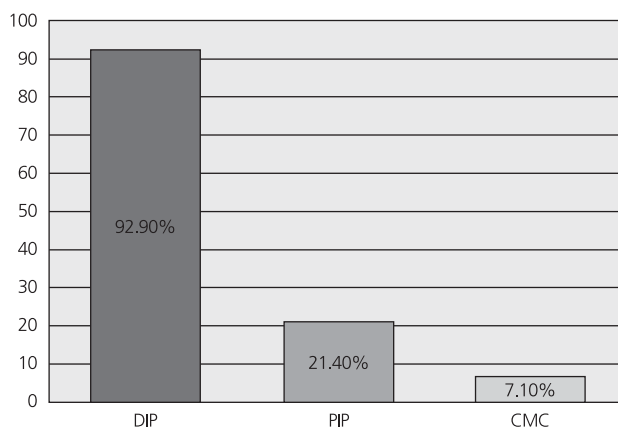


Fig. 2. Symptomatic hand OA distribution. (CMC: carpometacarpal joint, DIP: distal interphalangeal joint, PIP: proximal interphalangeal joint)

Table 4. Prevalence of symptomatic knee, hand, and hip OA in European, Asian, and American populations.

Symptomatic OA	Country	Prevalence (→ our study prevalence - same ages considered)
Knee OA		
30+	United States ^[1]	6.1
40+	Spain ^[16]	16.9 → 20.9
60+	Beijing ^[14]	11.2 → 40.2
65+	Italy ^[13]	29.8 → 48.3
45+	Greece ^[12]	5.7 → 23.9
40+	Shanghai ^[15]	7.2 → 20.9
Hand OA		
40+	Spain ^[16]	6.2 → 2.8
60+	China ^[17]	4.7 → 6.9
65+	Italy ^[13]	14.9 → 6.9
45+	Greece ^[12]	1.9 → 3.3
60+	United States ^[18]	8.0 → 6.9
Hip OA		
55-74	America ^[1]	0.7 → 0.5
60+	China ^[25]	0.07 → 2.0
65+	Italy ^[13]	7.7 → 1.7
45+	Greece ^[12]	0.8 → 1.2

OA: osteoarthritis

Turkey, Kacar et al. reported a SKO prevalence of 14.8% among 655 subjects 50 or older chosen with a cluster sampling method.^[5]

SHaO prevalence was reported as 6.2% in the Spanish study,^[16] 7.7% in the Dicomano, Italy study.^[13] In a Beijing study conducted by Zhang et al. of 2,525 individuals, aged 60 years or older, assessed using the Framingham protocol, SHaO prevalence was 4.7%.^[17] In the second phase of The National Health and Nutrition Examination Survey (NHANES) III study, SHaO prevalence was reported as 8.0% among 2,498 subjects 60 years or older.^[18] The Greek study reported a SHaO prevalence rate of 1.9%^[12] and Kacar et al. a DIP SHaO rate of 10.5%.^[5]

SHaO involvement is seen mostly in the DIP joint, 1st metacarpal base and PIF joint, respectively.^[19] Reports from a previous longitudinal study evaluating 286 people with hand OA showed that hand OA was commonly seen in the DIP joint.^[20] Similarly, in a 20 to 23 year longitudinal Tecumseh, MI, USA study, OA was seen mostly in the DIP joint in both genders.^[21] Our findings were parallel with literature as SHaO involvement was mostly in the DIP joint (92.9%), 1st CMC (21.4%) and the PIP joint (7.1%) and was more common among women ($p < 0.05$). In the Beijing study, it was reported that hand OA involved mostly the DIP, PIP and 1st metacarpal joint in women while the DIP and 1st metacarpal joint more common among men.^[17] This different pattern of involvement may be due to lesser genetic inheritance of OA in the Chinese population when compared to Caucasians.^[17] Naoki et al. reported that first CMC involvement was more common in Caucasians than the Japanese population and this result was attributed to both genetic inheritance and some Japanese traditions such as dining with chopsticks instead of a fork and spoon.^[22]

Recent studies have reported that hand OA had a symmetrical feature and OA involvement in one side had a strong correlation with the involvement of the other side (male odds ratio [OR]: 14.0, 95% confidence interval [CI]: 7.1 to 27.8; female OR: 29.8, 95% CI: 19.2 to 46.3).^[23] We also found that individuals with hand OA had a strong symmetrical correlation.

The Heberden's and Bouchard's nodes are important clinical signs for hand OA diagnosis. Although they have minor value as a sole marker, they can be good markers if other clinical signs accompany them. For example, an individual with Heberden's node has a 20% likelihood of hand OA. On the other hand, if the subject is older than 40 years, has a family history of OA or has joint space limitation, this rate increases to 88% (evidence level stage 1b).^[19] In the NHANES III study, it was reported that Heberden's nodes were seen most commonly and Bouchard's nodes and 1st CMC

joint deformities were also seen in a decreasing frequency.^[18] In the current study, most individuals with SHaO had Heberden's node (92.9%) and Bouchard's node less frequently (7.1%). We also determined that all people with Heberden's nodes had also symptomatic DIP joint OA involvement. Zhang et al. reported that subjects with polyarticular hand OA have increased risk for knee OA (OR: 3.0, 95% CI: 1.2 to 7.5) and hip OA (OR: 3.25, 95% CI: 2.19 to 4.84) (evidence level stage 2b).^[19] In a cohort study with 1,235 subjects, it was found that those with initial hand OA were two times more likely to develop knee or hip OA during a 6-year period than those who did not have hand OA (OR: 2.1, 95% CI: 1.3 to 3.1) (evidence level stage 2a).^[24] In the Antalya, Turkey study it was reported that DIP joint OA was significantly related to knee OA ($p < 0.001$) and 33.3% of those with DIP joint OA also had knee OA.^[5] In our study, we also found that DIP joint OA had a significant relationship with knee OA ($p < 0.05$) and that 69.2% also had knee OA.

Nevitt et al. reported SHO prevalence of 0.01% in their study of 1,506 Chinese people aged 60 or older.^[25] In the USA, Lawrence et al. reported SHO prevalence of 0.7% among subjects aged 55 to 74 years.^[11] Additionally, the Greek and Dicomano, Italy studies reported SHO prevalence of 0.8% and 7.7%, respectively.^[12,13]

Osteoarthritis prevalence values vary according to the age distribution of the population participated in the study and the evaluation method and diagnostic criteria used. It is important to mention the criteria used for diagnosis, as in many conditions it is possible for a patient to have radiological findings without any clinical symptoms. In the majority of studies, diagnosis is made based on clinical findings or radiographs alone without evaluation of the patient. In this study, ACR clinical criteria and clinical/radiological examinations were used. We assume that this had influence on some of our results which seemed to contradict with the existing literature. On the other hand, ACR clinical criteria have a sensitivity of 95% and specificity of 69% for knee OA^[9] and 89% and 91%, respectively, for hip OA.^[11]

Subjects aged 40 and older were included in our study. When we reviewed the literature, we saw that the Shanghai and Spanish studies included individuals aged 40 or older, whereas other studies included different age groups (Table 4).

When we reviewed previous results that have been reported we saw that genetic differences, ethnical differences (e.g. Chinese people have less frequent

acetabular dysplasia) or traditional differences may influence results.

The difference in results between our study and the one conducted in Antalya may be related to regional characteristics of the areas studied and, thus, reflect regional prevalence rates as opposed to countrywide ones. When it is considered that the populations of the two regions have different climatic and geographical conditions, along with different level of socioeconomic development, some difference in results should be expected.

In conclusion, symptomatic knee OA was widespread throughout the region evaluated. However, we do not have a countrywide prevalence value. For this reason, a countrywide study with a larger sample size is needed to produce more logical health policies regarding OA.

Conflicts of Interest: No conflicts declared.

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