

## ARTICLE INFO

Date Received:  
21/02/2022;  
Date Revised:  
25/07/2022;  
Date Published Online:  
31/10/2022;

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**How to Cite:**

Shahzad M, Zulfiqar T, Ali A,  
(2022). Radiographic  
Evaluation of Knee Joint in  
Patients with Knee pain and  
its correlation with  
Osteoarthritis and Gender.  
Adv. Life Sci. 9(3): 309-312.

**Keywords:**

Osteoarthritis; Radiographic  
aspects of knee  
osteoarthritis; Aging,  
Kellgren-Lawrence scoring  
system

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## Radiographic Evaluation of Knee Joint in Patients with Knee pain and its correlation with Osteoarthritis and Gender

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### Abstract

**Background:** Osteoarthritis (OA) is the most rampant reason of knee discomfort and pain. Knee osteoarthritis accounts for 83 percent of the overall Osteoarthritis burden. Knee osteoarthritis (KOA) is projected to grow more frequent as age progresses, and it is more common in women and overweight individuals. The Kellgren and Lawrence scoring criteria is usually employed to estimate the severity of disease. To evaluate the Radiographic findings associated with knee joint pain and to assess the prevalence of osteoarthritis in individuals with knee joint discomfort, as well as its correlation with gender.

**Methods:** From August to December 2021, cross-sectional research was undertaken at the Department of Radiology, Amin Medical Complex, Sialkot. This research comprised participants of both gender having knee discomfort, ranging in age from forty to eighty yrs. SPSS version 24 was employed to record the data and analyze the information.

**Results:** Total 100 Patients (M=45, F=55) were enrolled in this study. Out of 100 participants with knee pain 45(45%) patients had abnormal knee radiographic findings. Osteoarthritis of the knee accounted for 35% of all abnormal radiographic findings in this study, with synovial effusion accounting for 8% of the total, and erosion only contributing for 2%. Knee osteoarthritis was found to be more prevalent in females than in males (24% vs. 11%), demonstrating that gender is a significant predictor for knee osteoarthritic disease. Findings corroborate the implementation of the Kellgren-Lawrence marking scheme to characterize Knee osteoarthritis in population research.

**Conclusion:** The findings suggest that radiographic aspects of knee Osteoarthritis are substantially linked to knee discomfort, and that it is more frequent in people over the age of 55. Knee osteoarthritis is substantially linked with gender, with females suffering from it at a higher rate. The findings authenticate the implementation of the Kellgren-Lawrence grading scheme to characterize Knee osteoarthritis in population research.

## Introduction

Osteoarthritis (OA) seems to be the most frequent sort of arthritis, afflicting almost 250 million individuals across the globe [1]. Osteoarthritis is a degenerative joint ailment characterized by the degradation of basal bone structure and joint cartilage [2]. OA is a widespread joint ailment and the significant contributor of morbidity in the elderly [3]. The knees, feet, hips, facets and hands are the most often afflicted joints by OA, although knee OA contributes for 83% of the entire OA stress.[4]. According to research in Pakistan, knee osteoarthritis affects twenty-eight percent of the urban population and twenty-five percent of the rural population [5]. Around 12% of adults above the age of sixty have symptomatic knee OA [6]. Knee osteoarthritis (OA) is a complex, deteriorative joint disease marked by persistent discomfort and functional impairment [7]. Knee OA, the most prominent category of OA, is the eleventh leading element of worldwide disability and the thirty-eight leading cause of malady-adjusted life yrs[8]. For the assessment of knee OA, the EULAR proposed 3 symptoms i.e persistent knee discomfort, limited joint stiffness, and diminished mobility. Crepitus, joint mobility limitation, and bony hypertrophy are also helpful in the diagnosis of knee OA [9]. Knee OA constitutes about 4th or 5th of all OA cases globally, and its prevalence rises with obesity and age [10]. Obesity is one of the significant warning indicators, producing inflammatory response, discomfort, decreased joint mobility, and a lower quality of life [11]. Knee discomfort and pain is frequently the initial presenting indication of knee OA, and it is typically attributed to OA in people over 55 years of age. In many nations, the condition is projected to grow more widespread as a result of aging and obesity [12]. Walking up and down stairs causes discomfort in the patellofemoral joint, which can be addressed with conservative treatment such as quadriceps strengthening exercises, and rarely, with surgical procedure such as arthroplasty of the patellofemoral joint [13]. According to a comprehensive assessment of the literature, fifteen to seventy-six percent of individuals with knee joint pain had radiographic OA, while fifteen to eighty-one percent of those with radiographic knee Osteoarthritis had pain and discomfort [14]. Currently, joint ache is diagnosed using traditional radiography, which is insensitive and has a number of drawbacks. In individuals suspected of having knee OA, the appearance of osteophytes on all radiographic projections of the knee correctly anticipates the knee pain [15]. The Kellgren and Lawrence classification scale is utilized to determine disease intensity regarding clinical evaluations of joint stiffness, pain and impairments in functional capacity,

as well as radiographic examination of osteophytes, osseous sclerosis, and knee joint-space constriction [16].

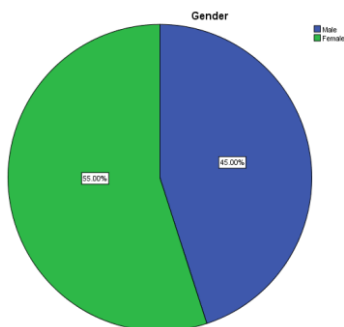
## Methods

From August to December 2021, cross-sectional research was undertaken at the Department of Radiology, Amin Medical Complex, Sialkot. The ethical authorization was acquired from the ethical review committee and each participant granted their informed consent. An aggregate of 100 patients were enrolled in this study. Antero-posterior and Lateral radiographs were acquired for the radiographic evaluation of knee pain. Simple random sampling technique was used and on the basis of firsthand observation, data was obtained with the assistance of Radiologist. This research comprised participants of both gender with knee discomfort, ranging in age from forty to eighty yrs. The individuals with specific prior knee joint medical issue (such as, tumors, knee trauma, knee surgery or rheumatoid arthritis) were ruled out from this study. To examine radiographic abnormalities related with knee pain and to estimate the prevalence of OA among participants with knee joint discomfort and its correlation with gender, all patients encountered radiographic examination and x-rays of the knee joint were collected from each patient. The Kellgren-Lawrence and individual characteristics scales were used to evaluate radiographs. Age and gender were also collected as demographic data. In order to calculate the sample size, the convenient approach was employed. All of the information was gathered and entered into a pre-made proforma. SPSS version 24 was utilized to code and analyze the results. The correlation method was utilized to explore relation b/w Gender and knee osteoarthritis (KOA). P-value less than or equal to 0.05 is generally regarded as significant.

## Results

This research comprised a total of hundred participants who had knee pain. Out of 100 patients, 45 (45%) were men and 55 (55%) were women (Figure I). The patients' average age was  $58.89 \pm 9.675$  years. Among 100 participants with knee discomfort, 45 percent of the subjects had aberrant knee radiographic findings, with osteoarthritis accounting for 35%. Synovial effusion accounts for 8% of the total, whereas erosion only contributes for 2% (Table-I). Among the anomalous radiographic findings, the most prevalent was osteoarthritis (OA), which accounted for 35% of all abnormal findings (Figure II).

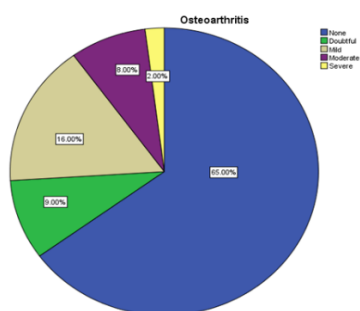
The findings showed that radiographic characteristics of knee Osteoarthritis are strongly correlated to knee discomfort and pain. The findings also reconfigure the application of Kellgren-Lawrence scoring method to classify knee OA in population studies.



**Figure 1:** Gender Distribution of Study participants

Knee Radiographic Findings	Present	Absent
Synovial effusion	8	92
Erosion	2	98
Osteoarthritis	35	65

**Table 1:** Knee Radiographic Findings in patients with knee pain



**Figure 2:** Percentages of different grades of Osteoarthritis

Osteoarthritis	Gender		Total
	Male	Female	
None	34	31	65
Doubtful	3	6	9
Mild	6	10	16
Moderate	2	6	8
Severe	0	2	2
Total	45	55	100

**Table 2:** Cross tabulation between Gender and Osteoarthritis

		Gender	Osteoarthritis
Gender	Pearson Correlation	1	0.214 <sup>*</sup>
	Sig. (2-tailed)		0.032
	N	100	100
Osteoarthritis	Pearson Correlation	0.214 <sup>*</sup>	1
	Sig. (2-tailed)	0.032	
	N	100	100

**Table 3:** Correlation between Gender and Osteoarthritis

Osteoarthritis	Kellgren Lawrence					Total
	Grade 0	Grade I	Grade II	Grade III	Grade IV	
None	65	0	0	0	0	65
Doubtful	0	9	0	0	0	9
Mild	0	0	16	0	0	16
Moderate	0	0	0	8	0	8
Severe	0	0	0	0	2	2
Total	65	9	16	8	2	100

**Table 4:** Cross tabulation between Osteoarthritis and Kellgren-Lawrence Scale

Age category	Kellgren Lawrence					Total
	Grade 0	Grade I	Grade II	Grade III	Grade IV	
<45	9	1	0	0	0	10
45-54	19	5	0	0	0	24
55-64	18	3	13	0	0	34
65-74	15	0	3	8	0	26
>74	4	0	0	0	2	6
Total	65	9	16	8	2	100

**Table 5:** Cross tabulation between Age category and Kellgren-Lawrence Scale

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	80.638 <sup>a</sup>	16	.000
Likelihood Ratio	64.568	16	.000
Linear-by-Linear Association	13.252	1	.000
N of Valid Cases	100		

**Table 6:** Correlation between Age group and grades of osteoarthritis

According to the Kellgren-Lawrence grading scale, 65% of the participants have (Grade 0) OA (i.e., no radiographic findings associated with KOA), (Grade 1) accounts for 9% (9 participants have Doubtful OA), (Grade 2) accounts for 16% (16 participants have Mild OA), (Grade 3) accounts for 8% (8 participants have moderate OA), and (Grade 4) accounts for 2% (2 participants have Severe OA), as shown in (Table IV). The severity of knee osteoarthritis increases with advancing age i.e., patients with age greater than 55 have more severe type of osteoarthritis (Table-V).

## Discussion

The objective of this study was to determine the radiographic findings linked with knee pain and to examine the occurrence of osteoarthritis in individuals with knee joint pain, as well as its association with gender. The most typical joint malady in the world is osteoarthritis of the knee. The findings show that radiographic aspects of knee OA are strongly linked to knee pain and discomfort. Depending on age, gender distribution, and disease criteria, the approximate population prevalence ranges from four to fifty percent [5, 17-21]. These disparities might be attributed to variances in ethnicity, way of living, or sociodemographic status, and knee osteoarthritis (KOA) affects between 27 to 90 % of those aged 60 years or older in developed nations [22]. The average age of the participants in this study was  $58.89 \pm 9.675$  years which is comparable to the mean age of  $56.28 \pm 8.786$  years reported by Iqbal MN et al in their study [5]. KOA was found to be more frequent in females than in males (24% vs. 11%), designating that gender is a substantial provoking element for knee osteoarthritis (KOA).

This discrepancy might well be explained by scarcity of regular exercise, motility, societal concerns, especially in our location, and a greater obesity rate among women in general. Additional factor for the gender disproportion might be cartilage tissue's vulnerability to sex hormones, as men have larger knee articular volume than women [23]. The increased rate of OA in females shortly after menopause indicates that estrogen insufficiency is a factor in the disease's development [5, 24]. A Kellgren-Lawrence score of 0 (normal), I (doubtful possible osteophytic lipping and narrowed Knee JS), II (definite osteophytes and possible JS narrowing), III (moderate numerous osteophytes, definite JS narrowing, and some sclerosis and possible malformation of bone ends), or IV (large osteophytes, marked JS narrowing, severe sclerosis, and definite deformity of bone ends) was assigned to each knee. For the purposes of this investigation, the highest grade given to a subject's radiograph was given to the knee that was more badly afflicted. A KL score of 2 or above indicated the presence of OA in the knee [25]. In this study, 65 % of the subjects exhibited (Grade 0) Osteoarthritis, 9 % had (Grade 1), 16 % experienced (Grade 2), 8 % showed (Grade 3), and 2 % had (Grade 4) OA as per the KL scoring system. Furthermore, Age groups and grades of osteoarthritis are significantly correlated with each other as shown in the Table-V (Chi-Square Tests). The results indicate that radiographic aspects of knee osteoarthritis (OA) are substantially linked to knee discomfort and pain, and that knee pain and discomfort is more frequent in people over 55 years old. Knee osteoarthritis has a strong association to gender, with females having the highest prevalence. The findings also corroborate the implementation of the Kellgren-Lawrence marking scheme to characterize KOA in population research.

## Competing Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

## Authors' Contribution

Maryam made conception and design of data. Taiba accomplished data analysis and interpretation of data. Revising it critically for important intellectual content.

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