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Association Between Age-Related Cataract and Knee Osteoarthritis: a Comparative and Correlational Study Focusing on Disease Severity

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Abstract

Introduction: There are several common features between age-related cataract and knee osteoarthritis. Both disorders are associated with serum immunoglobulin E levels, connective tissue growth factor, and oxidative stress. Musculoskeletal disorders have been identified as the most common comorbidities in patients with age-related cataract, with knee osteoarthritis being the most frequent. Therefore, the authors aimed to further investigate this association, considering the severity of these disorders.

Materials and Methods: In this study, data from 350 knee joints and 350 eyes were analyzed. The severity of knee osteoarthritis was assessed radiographically using the Kellgren-Lawrence (KL) grading system. The severity of cataracts was evaluated based on the degree of opacification, using the Lens Opacities Classification System III.

Results: Cataract grades were significantly lower in KL grade 0 compared to other grades for cortical cataract and posterior subcapsular cataract. Additionally, cataract grades were significantly lower in KL grade 1 compared to grades 3 and 4 for posterior subcapsular cataract. There were significant positive correlations between knee osteoarthritis grades and the grades of nuclear cataract , cortical cataract , and posterior subcapsular cataract

Conclusions: There is a significant relationship between age-related cataracts and knee osteoarthritis in terms of disease severity. Beyond their association with aging, these two conditions may share common pathophysiological features. This study may provide new insights into the mechanisms underlying age-related cataracts and knee osteoarthritis.

Key words: Cataract; knee osteoarthritis; aging; lens opacity; knee joints.

Introduction

Cataract refers to a lens disorder characterized by the loss of lens transparency, and cataracts are common causes of visual impairment and blindness (1,2). Age-related cataract is the most common form, characterized by progressive clouding of the normal lens (2). Advanced age is the main risk factor for age-related cataract; its prevalence increases as the people age and often develops after 50 years of age (1-3). Other risk factors include lower education levels and diabetes (3), although all these factors interact with genetic and environmental components (1). The treatment for age-related cataracts is surgical intervention, which involves replacing the cloudy lens with an artificial intraocular lens and also prevents many complications associated with cataracts (4,5).

Knee osteoarthritis is a very common chronic joint disease and represents a significant global health problem and burden, particularly associated with advanced age and obesity (6). The symptomatology of knee osteoarthritis is characterized by joint pain that worsens with use and improves with rest (7). The pathological process is complex, leading to the degeneration of articular cartilage and deterioration of joint structures (8). In knee osteoarthritis, to relieve pain and improve function, conservative treatments that provide only symptomatic relief, semi-invasive procedures with questionable ability to reverse the pathological process, and surgical interventions are recommended in severe cases (7–9). There are several common features between age-related cataracts and knee osteoarthritis. For instance, serum immunoglobulin E

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levels (10,11), connective tissue growth factor (12, 13), and oxidative stress (14,15) have been associated with both age-related cataracts and knee osteoarthritis. Additionally, various comorbidities have been observed in patients with age-related cataracts, with musculoskeletal disorders being the most prevalent, and knee osteoarthritis identified as the most frequent (16). Therefore, the relationship between age-related cataracts and knee osteoarthritis warrants further investigation. In this study, the authors aimed to explorethe previously underexamined relationsh ip between age-related cataracts and knee osteoarthritis, considering the severity of both conditions.

Materials and Methods

After obtaining ethical approval (decision number: 2025-02-10; date: 28 February 2025), a retrospective analysis was conducted using previously collected data. Data from June 2024 to February 2025 were included in the analysis. The study adhered to the ethical standards outlined in the Declaration of Helsinki. Cases were selected based on the following inclusion and exclusion criteria. Inclusion criteria included knee osteoarthritis, age-related cataract, age of at least 50 years, and complete evaluation parameters. Exclusion criteria comprised secondary knee osteoarthritis, cataract types other than age-related cataract, age under 50 years, history of knee or eye surgery, absence of a knee or eye, and incomplete evaluation parameters. A total of 175 patients with both knee and ocular data were included in the study. Consequently, data from 350 knee joints and 350 eyes were analyzed. The severity of knee osteoarthritis was assessed radiographically using the Kellgren-Lawrence grading system (17). This widely used classification grades osteoarthritis severity from 0 (normal) to 4 (severe). Cataract severity was evaluated based on the degree of lens opacification using the Lens Opacities Classification System III (18), a system commonly employed by ophthalmologists to grade cataract severity. In this study, patients were classified according to the Kellgren-Lawrence grading system. The groups were then compared statistically based on the severity of cataracts. Additionally, a statistical correlation analysis was conducted to examine the relationship between age-related cataracts and knee osteoarthritis, taking into account the severity of both conditions.

Ethical Approval: The ethical approval (Decision Number: 2025-02-10, Date: 28.02.2025) was granted by the Ethics Committee of the University of Health Sciences Van Training and Research Hospital. This study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

Statistical Analysis: Statistical analysis was performed using IBM SPSS Statistics version 27. The analyses followed the recommendations for reporting statistics in medical literature (19). The Kolmogorov-Smirnov test assessed the normality of distribution for continuous variables. Since the dataset exhibited a skewed distribution, non-parametric tests were employed. Specifically, the Independent Samples Kruskal-Wallis test was used to compare knee osteoarthritis groups. Significance values were adjusted by the Bonferroni correction for multiple tests. The Spearman test was applied to determine the significance of correlations. Data for group comparisons are presented as median (IQR) and mean ± SD. Correlation data are reported as r and p values. A p-value < 0.05 was considered statistically significant.

Table 1: Baseline characteristics of subjects.

Age, years	64.06±8.28 (50-88)
Female, n (%)	137 (78.29)
Weight, kg	78.70±11.64 (47-110)
Height, m	1.59±0.09 (1.40-1.85)
BMI, kg/m²	31.47±5.10 (20.34-47.61)
Education, n (a/b/c/d)	(14/75/50/27/9)
Kellgren-Lawrence grade, n (0/1/2/3/4)	(24/151/104/50/21)
Nuclear cataract grade	3.21±1.12 (0.0-6.0)
Cortical cataract grade	1.78±1.43 (0.0-5.0)
Posterior subcapsular cataract grade	0.83±1.21 (0.0-5.0)

(a/b/c/d): (none/primary/high school/university); Data of continuous variables were presented as mean ± SD (min-max).

Results

Table 1 presents the baseline characteristics of the subjects. A total of 175 patients were investigated, with a mean age of 64.06 ± 8.28 years (range 50–88), a female proportion of 78.29%, and a mean BMI of 31.47 ± 5.10 kg/m² (range 20.34–47.61). For a total of 350 knee joints,

the Kellgren-Lawrence grades (0/1/2/3/4) were distributed as follows: 24, 151, 104, 50, and 21, respectively. For a total of 350 eyes, the mean ± SD (range)grades for nuclear cataract, cortical cataract,a nd posterior subcapsular cataract were 3.21 ± 1.12 (0.0–6.0), 1.78 ± 1.43 (0.0–5.0), and 0.83 ± 1.21

Table 2: The comparison of knee osteoarthritis grades for age-related cataract grades.

	KLG 0 (n=24)	KLG 1 (n=151)	KLG 2 (n=104)	KLG 3 (n=50)	KLG 4 (n=21)	p^{KW}
NC grade	3.0 (1.0)	3.0 (2.0)	3.0 (1.0)	3.0 (1.0)	3.0 (2.0)	0.066
	2.71±0.75	3.17±1.15	3.35±1.07	3.32±1.13	3.10±1.34	
CC grade	0.5 (2.0)	2.0 (2.0)	2.0 (3.0)	2.0 (2.25)	2.0 (3.0)	0.025
	0.96±1.12	1.73±1.30	1.85±1.58	1.98±1.45	2.29±1.55	
PSC grade	0.0 (0.0)	0.0 (1.0)	0.0 (2.0)	1.0 (2.0)	1.0 (2.0)	<0.001
	0.17±0.38	0.72±1.16	0.91±1.25	1.04±1.21	1.48±1.47	
p^{KWB}	**0 vs 1**: 0.011^{CC}, 0.036^{PSC}			**1 vs 3**: 0.212^{CC}, 0.031^{PSC}		
	0 vs 2: 0.009^{CC}, 0.006^{PSC}			**1 vs 4**: 0.161^{CC}, 0.006^{PSC}		
	0 vs 3: 0.004^{CC}, 0.001^{PSC}			**2 vs 3**: 0.450^{CC}, 0.268^{PSC}		
	0 vs 4: 0.003^{CC}, 0.001^{PSC}			**2 vs 4**: 0.223^{CC}, 0.044^{PSC}		
	1 vs 2: 0.785^{CC}, 0.206^{PSC}			**3 vs 4**: 0.534^{CC}, 0.263^{PSC}		

KLG: Kellgren-Lawrence grade; NC: Nuclear cataract CC: Cortical cataract; PSC: Posterior subcapsular cataract; p^{KW}: Kruskal-Wallis test; p^{KWB}: Kruskal-Wallis with Bonferroni correction.

Table 3: The correlation of knee osteoarthritis grade with age, BMI, and cataract grade.

	Age	BMI	Nuclear cataract grade	Cortical cataract grade	PSC grade
r	0.257	0.270	0.121	0.137	0.215
p	0.001	0.001	0.024	0.010	0.001

PSC: Posterior subcapsular cataract; The Spearman test was used in correlation analysis.

(0.0–5.0), respectively. Table 2 presents the comparisons between knee osteoarthritis groups (Kellgren-Lawrence grades) for age - related cataract grades (cataract severity). Multiple comparisons were not performed for nuclear cataract grade because the Independent Samples Kruskal-Wallis test did not show significant differences across samples (p = 0.066). Specifically, significantly lower cataract severity were observed in Kellgren-Lawrence grade 0 compared to other grades for cortical cataract, and posterior subcapsular cataract. Kellgren-Lawrence grade 1 showed significantly lower cataract severity than grades 3 (p = 0.031) and 4 (p = 0.006) in terms of posterior subcapsular cataract. Additionally, Kellgren-Lawrence grade 2 showed significantly lower cataract severity than grade 4 (p = 0.044) in terms of posterior subcapsular cataract. However, no significant differences were found in other comparisons. In Table 3, the correlations between knee osteoarthritis grade and age, BMI, and age-related cataract grades are presented. Knee osteoarthritis grades were found to be significantly correlated with age (r = 0.257, p = 0.001), BMI (r = 0.270, p = 0.001), and with nuclear cataract (r = 0.121, p = 0.024), cortical cataract (r = 0.137, p = 0.010), and posterior subcapsular cataract (r = 0.215, p = 0.001).

Discussion

In this comparative and correlational study, the authors aimed to evaluate the association between age-related cataracts and knee osteoarthritis. For this end, comparisons were made between knee osteoarthritis grades in terms of cataract severity. Additionally, correlations were made between knee osteoarthritis and age-related cataracts in terms of the severity of these conditions. The results demonstrated that higher grades of knee osteoarthritis corresponded to higher cataract grades, and a positive correlation was found between the severity of knee osteoarthritis and age-related cataracts. These findings suggest that these diseases are related and may share similar underlying pathophysiological mechanisms. Previous studies have demonstrated that age-related cataracts and knee osteoarthritis share several common features. Findings from

various studies have revealed that serum immunoglobulin E levels (10,11), connective tissue growth factor (12,13), and oxidative stress (14,15) are associated with both age-related cataracts and knee osteoarthritis. Additionally, research has shown that patients with age-related cataracts often have multiple comorbidities, with musculoskeletal disorders-particularly knee osteoarthritis-being the most prevalent (16). These findings suggest a relationship between age-related cataracts andknee osteoarthritis and provid e a strong foundation for the present study. Therefore, this study is grounded in logical and scientific rationale. Although the association between age-related cataract and knee osteoarthritis has been previously reported in the literature (16,20), the relevant studies are limited. The present study provides the additional evidence demonstrating a relationship between the severity of age-related cataract and the severity of knee osteoarthritis. Specifically, the current results show that patients with advanced knee osteoarthritis also tend to have more severe cataracts, particularly posterior subcapsular cataracts, and that there is a positive but not strong correlation between the severity of these two conditions. These results seem to be compatible with the results of the study by Biçer et al. (20). Based on the current findings and existing literature, it can be argued that age-related cataract and knee osteoarthritis are related and may share similar developmental pathophysiological mechanisms.

Study Limitations: The following potential limitations should be considered when reviewing the results of this study. Firstly, since this study is a retrospective analysis, it may carry risks of bias, missing data, and unpredictable influencing factors. Another potential limitation is that it is a single-center study with a relatively small sample size and strict selection criteria; thus, the generalizability of the results may be limited. In addition, these preliminary findings should be expanded upon or confirmed by future studies. Lastly, the discussion may lack depth due to the limited literature available on the research topic.

Conclusions

In conclusion, there is a significant relationship between age-related cataracts and knee osteoarthritis. Beyond their association with aging, these two conditions may also share common pathophysiological features. The present study may provide new insights into age-related cataracts and knee osteoarthritis.

Ethical approval: The ethical approval (Decision Number: 2025-02-10, Date: 28.02.2025) was granted by the Ethics Committee of the University of Health Sciences Van Training and Research Hospital. This study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

Conflict of interest: The authors have no relevant financial or non-financial interests to disclose.

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Availability of data and materials: The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

References

1. Shiels A, Hejtmancik JF. Mutations and mechanisms in congenital and age-related cataracts. Exp Eye Res 2017;156: 95-102.
2. Chen SP, Woreta F, Chang DF. Cataracts: A Review. JAMA. 2025;333(20):2093-2103.
3. Giloyan A, Harutyunyan T, Petrosyan V. Prevalence and risk factors of age-related cataract among adults aged 50 + in Gegharkunik, Armenia. Int Ophthalmol 2025;45:114.
4. Wang T, Li H, Cao Q. Age-related cataract without surgery is related to exacerbated depression symptoms: a cross-sectional study of Chinese adults from Anhui, China. Front Med (Lausanne) 2024; 11: 1483709.
5. Hackl CM, Moore BP, Samai IM, Wong BR. Age-related cataract extraction is associated with decreased falls, fractures, and intracranial hemorrhages in older adults. J Am Geriatr Soc. 2025;73(7):1779-1786.
6. Li M, Xia Q, Nie Q, Ding L, Huang Z, Jiang Z. Burden of knee osteoarthritis in China and globally, 1990–2025. BMC Musculoskelet Disord 2025; 26: 582. doi: 10.1186/s12891-025-08858-8
7. Gelber AC. Knee osteoarthritis. Annals of Internal Medicine. 2024;177(ITC):129–144.
8. Jang S, Lee K, Ju JH. Recent Updates of diagnosis, pathophysiology, and treatment on osteoarthritis of the knee. Int J Mol Sci. 2021;22 (5):2619.

9. Goh SL, Chong MW, Ling J, Jaafar Z, Lim ZL, Yau MY, et al. Semi-invasive therapies for pain in knee osteoarthritis: A systematic review and network meta-analysis. Pain Pract. 2025;25:e13404.
10. Yoo TK, Kim SW, Seo KY. Age-related cataract is associated with elevated serum immunoglobulin E levels in the South Korean population: A cross-sectional study. PLoS ONE. 2016;11(11):e0166331.
11. Park S, Choi NK. Association between serum immunoglobulin E levels and knee osteoarthritis in Korean adults. Osteoarthritis and Cartilage. 2020;28(4):462-467.
12. Hwang HB, Yim HB, Cho YK, Choi JA. The association between aqueous connective tissue growth factor and the severity of age-related cataracts as graded by the lens opacities classification system III. Curr Eye Res. 2016;41(3):350-356.
13. Tang X, Muhammad H, McLean C, Miotla-Zarebska J, Fleming J, Didangelos A, et al. Connective tissue growth factor contributes to joint homeostasis and osteoarthritis severity by controlling the matrix sequestration and activation of latent TGFβ. Ann Rheum Dis. 2018;77(9):1372-1380.
14. Fu L, Yang Q, Han Y, Sun F, Jin J, Wang J. Slit2 Promotes H2O2-induced lens epithelial cells oxidative damage and age-related cataract. Curr Eye Res. 2025;50(1):41-50.
15. Liu L, Luo P, Yang M, Wang J, Hou W, Xu P. The role of oxidative stress in the development of knee osteoarthritis: A comprehensive research review. Front Mol Biosci 2022; 9: 1001212.
16. Erdem S. Diseases associated with age-related cataract: a health-board-based retrospective study focusing on common physiopathological mechanisms. J Public Health 2021; 29: 163–167.
17. Kellgren JH, Lawrence JS. Radiological assessment of osteoarthrosis. Ann Rheum Dis. 1957;16(4):494-502.
18. Wan Zaki WMD, Abdul Mutalib H, Ramlan LA, Hussain A, Mustapha A. Towards a connected mobile cataract screening system: A future approach. J Imaging 2022;8(2):41.
19. Habibzadeh F. Statistical data editing in scientific articles. J Korean Med Sci. 2017;32(7):1072-1076.
20. Biçer KE, Biçer GY. Two major causes of morbidity in geriatrics: Cataract, knee osteoarthritis and patients' body awareness. Ann Clin Anal Med 2023;14(Suppl_03):S391-394.