Prevalence of Cataract and Risk Factors in Al-Kharj, Saudi Arabia

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Abstract

Introduction: Cataracts are a leading cause of blindness, predominantly affecting the elderly. This study aims to estimate the prevalence of cataracts in Al-Kharj, Saudi Arabia, and identify associated risk factors and demographic characteristics. **Method:** The study is a cross-sectional survey conducted for patients over 18 years old. The patients' demographics and medical history, including cataract diagnosis and risk factors, were collected and analyzed using Statistical Package for the Social Sciences. Statistical tests included the Chi-square for categorical variables and the t-test for continuous variables, with significance set at $P < 0.05$. **Results:** The study sample consisted of 100 participants, with a female majority (59%) and a significant proportion of individuals over 67 years old (37%). Nuclear cataracts were the most common (80%), followed by cortical (36%) and posterior subcapsular (PSC) cataracts (27%). Significant associations were found between diabetes and PSC cataracts ($P = 0.027$), and between age and cataract grade ($P < 0.001$). Smoking and hypertension also showed significant correlations with cataract types. **Conclusion:** Age, diabetes, hypertension, and smoking are significant risk factors for cataracts in Al-Kharj. Nuclear cataracts are the most prevalent, especially in individuals over 67 years old. The associations between cataracts (types and grades) and risk factors such as diabetes, smoking, and hypertension should be considered. Addressing risk factors could reduce cataract-related visual impairment.

Key words: Cataract, cortical cataract, diabetes, hypertension, nuclear cataract, posterior subcapsular cataract, prevalence, risk factors, smoking

INTRODUCTION

A cataract is a thick, hazy patch that develops in your eye's lens. It progresses gradually till it obstructs the way you see. Cataract is one of the most common causes of decreased vision, and the most common cause of preventable eye blindness.[1,2] It is a cloudiness in the eye's lens.[3] The lens is made of a single type of cell, has nearly the highest concentration of protein than any other organ, and is encased by a capsule. It serves as a focus of light on the retina. Proteins and cells stop regenerating as we age, leaving the lens vulnerable to injury.[4] The World Health Organization (WHO) estimates that around 180 million people with diminished vision in the world, and 46% of these cases are believed to be caused by cataracts.[5] In the southwest of Saudi Arabia, cataract was discovered to be the cause of 20.6% of diminished vision cases and >50% of total blindness cases.[6] In the majority of Eastern Mediterranean Region nations, blindness and diminished vision continue to be major health problems. There were significant regional disparities in Saudi Arabia's rates of cataract-related blindness and diminished vision, 41% in Taif as opposed to 58.9% in Jizan.[7] Individuals with cataracts have a worse quality of life and a higher risk of death than the normal population.[1,2,5] A

financial strain is placed on patients with poor socioeconomic status because of the high expense of cataract surgery and care.[6] There are three morphological types of cataracts which are nuclear, cortical, and posterior subcapsular (PSC). Nuclear was the most prevalent type of cataract then cortical and PSC types. There is no association between sex and cataracts.[8] Aging is considered the most probable risk for developing cataracts, others include sun exposure, smoking, diabetes, and other hereditary factors.[6,9] Its manifestation appears as glare, halo-like appearances surrounding light, and foggy vision.[6] According to the WHO, the prevalence of visual defects is required because they are important to point out the demand for treatment and recovery programs and to build a system to prevent blindness.[10] There are minimal studies about visual impairment in Saudi Arabia, and it revealed that there are different etiologies with regard to age and location.[10,11] The study's main outcome was to estimate the prevalence of cataracts in Al-Kharj city and the secondary outcome was to determine the risk factors and demographic factors related to the several types of cataracts.

METHODS

A population-based cross-sectional survey was conducted using a chart review from January 2023 to December 2023 to determine the prevalence of cataracts and risk factors in the Al-Kharj region.

Al-Kharj is located in the southeast of the capital, Riyadh. Its area is 19,790 km², and its population is around 332,243 people based on the latest survey from the Saudi Authority of Statistics in 2017. In Al-Kharj, the government offers nine Primary health-care centers (PHC) and three hospitals, the PHC centers are the community's initial point of contact for health care, and registration there is necessary to be allowed for services. Data collection has been taken at King Khalid Hospital and Prince Sattam University Hospital.

The chart review inclusion criteria are adults at the age of 18 or older, of both genders, and residents in Al-Kharj. Patients with incomplete or missed data that may harm the study will be excluded.

The registered charts have been used to derive the following information, patient's demographic such as gender, age, and nationality, and medical data such as cataract diagnoses, type of cataract, topical ophthalmic drugs used, ophthalmic surgeries used, previous eye injury, or disease.

Each patient underwent testing for their best-corrected visual acuity, visual field assessment, pupillary examination, and slit-lamp examination. The study was reviewed by the research committee of Prince Sattam bin Abdulaziz University.

The collected data were first entered into a Microsoft Excel file and later transferred to Statistical Package for the Social Sciences for further analysis. The mean and standard deviation were reported for continuous variables, while categorical variables were described using frequencies and percentages. The Chi-square test was used to compare categorical variables and the t-test for continuous variables. A $P < 0.05$ was considered significant.

RESULTS

Demographics and Medical history

The study sample comprised 100 participants, with a female majority of 59% and a male proportion of 41%. The age distribution showed that the largest group was those aged more than 67 years (37%), followed by 58–67 years (29%), and 48–57 years (22%). Most participants were non-employees (60%) and of Saudi nationality (76%). In terms of medical history, 39% had no chronic diseases, whereas 39% had diabetes, and 38% had hypertension. The prevalence of different types of cataracts revealed that nuclear cataracts were the most common (80%), followed by cortical (36%) and PSC (27%) (Table 1).

Sex and Age Effect on Cataract

Cross-tabulation results indicated that among males, 80.5% had nuclear cataracts, 41.5% had cortical cataracts, and 7.3% had PSC cataracts. Among females, 79.7% had nuclear cataracts, 32.2% had cortical cataracts, and 40.7% had PSC cataracts. Regarding age, nuclear cataracts were prevalent across all age groups, particularly in those aged 58–67 (86.2%) and more than 67 (83.8%). Cortical cataracts were most common in the oldest age group (51.4%), whereas PSC cataracts were significantly higher in the more than 67 age group (43.2%) (Table 2).

The Chi-square tests indicated a statistically significant association between sex and types of cataracts ($P = 0.011$), particularly in the context of PSC cataracts. However, no significant association was found between sex and cataract grade ($P = 0.983$). Age showed a close association with types of cataracts ($P = 0.060$) and a statistically significant association with cataract grade ($P < 0.001$).

Effect of Risk Factors

Risk factors such as smoking, diabetes, and hypertension had notable impacts on the associations observed. Smoking was significantly associated with PSC cataracts in non-smokers ($P = 0.009$) and age with PSC cataracts in smokers ($P = 0.040$). Diabetes showed a significant association with PSC cataracts in both diabetics ($P = 0.027$) and non-diabetics ($P = 0.019$), and with nuclear cataracts in non-diabetics ($P = 0.008$). Furthermore, age was significantly associated with cataract grade in both diabetics ($P = 0.041$) and non-diabetics ($P < 0.001$). Hypertension influenced the association between sex and PSC
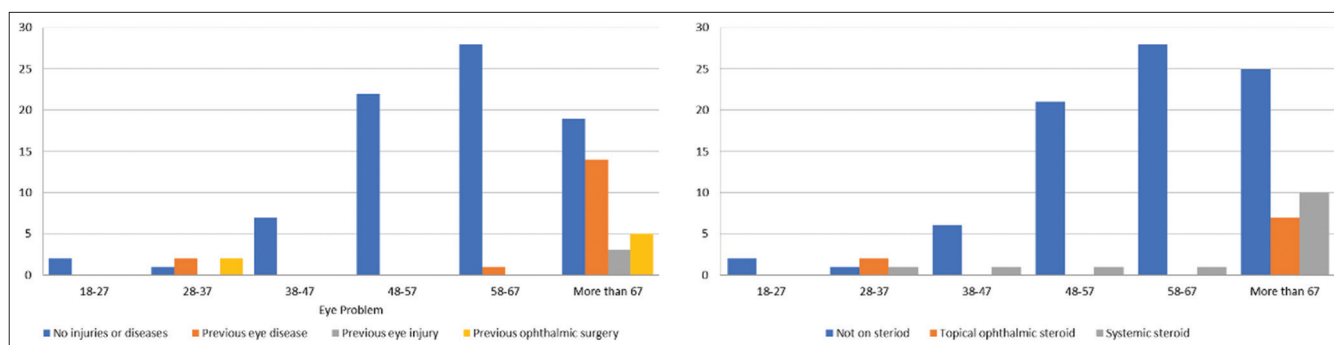
Figure 1: Represents the different age groups and cataract patients versus previous eye history (a) and the use of steroids (b)

Table 1: Demographics and Medical history of the patients			
Medical history	**Freq (%)**	**Medical history**	**Freq (%)**
Gender		Chronic diseases	
Female	59 (59)	No chronic diseases	39 (39)
Male	41 (41)	Diabetes	39 (39)
Age Groups		Hypertension	38 (38)
18–27	2 (2)	Dyslipidemia	9 (9)
28–37	3 (3)	Any immune diseases	2 (2)
38–47	7 (7)	Other Chronic diseases	2 (2)
48–57	22 (22)	Steroid Medications	
58–67	29 (29)	Not on steroid	83 (83)
More than 67	37 (37)	Topical ophthalmic steroid	9 (9)
Occupation		Systemic steroid	14 (14)
Employee	40 (40)	No injuries or diseases	79 (79)
Non-employee	60 (60)	Previous eye disease	17 (17)
Nationality		Previous eye injury	3 (3)
Non-Saudi	24 (24)	Previous ophthalmic surgery	7 (7)
Saudi	76 (76)	Type of cataract	
Smoking Habits		Nuclear	80 (80)
Non-smoking	86 (86)	Cortical	36 (36)
Smoking	14 (14)	Posterior subcapsular	27 (27)
Refractive error		Cataract grade scale	
Astigmatism	19 (19)	Grade 0	7 (7)
Emmetropia	9 (9)	Grade 1	43 (43)
Hyperopia	53 (53)	Grade 2	26 (26)
Myopia	19 (19)	Grade 3	24 (24)

cataracts in non-hypertensive individuals ($P = 0.017$) and age with PSC cataracts in hypertensive individuals ($P = 0.017$). In addition, age was significantly associated with cataract grade in both hypertensive ($P = 0.023$) and non-hypertensive groups ($P = 0.034$) (Figure 1).

DISCUSSION

Cataracts remain the leading cause of blindness globally, predominantly affecting the elderly. Age-related cataracts,

including nuclear, cortical, and PSC types, are influenced by various risk factors such as diabetes, hypertension, and smoking. The study aimed to investigate the prevalence of cataracts in Al-Kharj, Saudi Arabia, and to identify the risk factors and demographic characteristics associated with different types of cataracts.

The findings of the study revealed that the highest prevalence of nuclear cataracts (80%), followed by cortical (36%) and PSC cataracts (27%). The findings also revealed that nuclear cataracts were the highest among all types 33 (80.5%) and

Table 2: Cataract versus sex and age							
	Sex Freq (%)		Age Groups Freq (%)					
	Male	Female	18–27	28–37	38–47	48–57	58–67	>67
Cataract Type								
Nuclear	33 (80.5)	47 (79.7)	2 (100.0)	1 (33.3)	6 (85.7)	15 (68.2)	25 (86.2)	31 (83.8)
Cortical	17 (41.5)	19 (32.2)	0 (0.0)	2 (66.7)	1 (14.3)	7 (31.8)	7 (24.1)	19 (51.4)
Posterior Subcapsular	3 (7.3)	24 (40.7)	0 (0.0)	0 (0.0)	1 (14.3)	4 (18.2)	6 (20.7)	16 (43.2)
Cataract Grade								
Grade 0	3 (7.3)	4 (6.8)	0 (0.0)	1 (33.3)	4 (57.1)	1 (4.5)	0 (0.0)	1 (2.7)
Grade 1	18 (43.9)	25 (42.4)	2 (100.0)	2 (66.7)	2 (28.6)	16 (72.7)	16 (55.2)	5 (13.5)
Grade 2	11 (26.8)	15 (25.4)	0 (0.0)	0 (0.0)	1 (14.3)	4 (18.2)	11 (37.9)	10 (27.0)
Grade 3	9 (22.0)	15 (25.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.5)	2 (6.9)	21 (56.8)

47 (79.7%) in males and females, respectively. Age remains the most significant risk factor for cataracts. The study found that individuals over the age of 67 had the highest prevalence of nuclear cataracts (83.8%). These findings are consistent with global findings stating that age significantly influences the development of cataracts. For instance, the Beaver Dam Eye Study found that the incidence of nuclear cataracts increased with age, particularly among individuals over 65 years old.[12] Similarly, the India Study of Age-Related Eye Disease also found a high prevalence of nuclear cataracts, especially in northern India.[13] However, studies from different regions show variations; for example, a study in Brazil indicated a significant prevalence of PSC cataracts among long-term steroid users.[14]

Gender-specific analysis of the data indicated that female prevalence is higher than male. A similar finding was reported by Vashist *et al.* who mentioned that the prevalence of unoperated cataracts increased with age and was higher in women than men.[13] Conversely, McCarty *et al.* (1999), reported higher cataract rates among women.[15] However, Krishnaiah *et al.* (2005) found no significant gender differences in cataract prevalence.[16]

Statistical analysis indicated significant associations between diabetes and PSC cataracts ($P = 0.027$) and between age and cataract grade ($P < 0.001$). Smoking was significantly associated with PSC cataracts in non-smokers ($P = 0.009$), and hypertension was linked to PSC cataracts in non-hypertensive individuals ($P = 0.017$). The strong association between diabetes and PSC cataracts aligns with previous research indicating diabetes as a significant risk factor.[17] Similarly, the association between smoking and cataracts, particularly PSC cataracts, has been documented.[18] However, Delcourt *et al.* (2000) reported varying degrees of association between smoking and different cataract types, indicating the need for further research.[19]

The study identified diabetes, hypertension, and smoking as significant risk factors for cataract development. These findings are consistent with global literature that recognizes these conditions as major contributors to cataract formation.[20] Nevertheless, some studies highlight additional risk factors such as socioeconomic status and UV exposure, which were not extensively covered in the research.[16]

CONCLUSION

The study concluded that the most common type of cataract in Al-Kharj was the nuclear cataract, affecting 80% of the participants. There were significant associations between cataract types and several risk factors, including diabetes and age. Specifically, PSC cataracts were significantly associated with diabetes ($P = 0.027$), and there was a significant correlation between age and cataract grade ($P < 0.001$). In addition, smoking and hypertension also showed significant correlations with different cataract types. These findings highlight the importance of addressing the risk factors associated with the cataract.

ACKNOWLEDGMENTS

INFORMED CONSENT

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

The data are available upon request from the authors.

ETHICS APPROVAL

All series of steps that were implemented in this study that included animal models were in compliance with the Ethics

Committee of Prince Sattam bin Abdulaziz University Institutional Review Board (SCBR-035-2023).

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