



RISK FACTORS FOR CATARACT IN PATIENTS AGED 40 YEARS AND OLDER AT MOSUL SPECIALIZED CENTER OF OPHTHALMOLOGY

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ABSTRACT

Cataract is a leading cause of vision impairment globally, with aging and various modifiable and non-modifiable risk factors contributing to its development. A case-control study in Mosul City examined cataract risk factors in individuals aged 40 and above. The study included 300 participants and found that advancing age (especially 70 and older), low education levels, rural living, outdoor work, and low socioeconomic status significantly increased cataract risk. The findings highlight the importance of the risk factors assessment to aid in cataract prevention and management.

KEYWORDS: Cataract, Iraq, Mosul, Risk factors.

INTRODUCTION

Cataracts, a clouding of the eye's lens, are a major cause of blindness globally, particularly in older adults. While primarily treated by ophthalmologists, primary care physicians play a key role in early detection and referral. Cataracts are linked to both non-modifiable (e.g., age, genetics, systemic diseases) and modifiable (e.g., smoking, UV exposure, alcohol use) risk factors. Surgery is currently the only effective treatment, with modern techniques like phacoemulsification and laser-assisted procedures offering better outcomes. However, access to these surgeries remains limited in developing countries.^[1,2,3,4]

Epidemiology

Cataract remains a major global cause of vision loss, affecting millions, especially people over 50. By 2020, 15 million were blind and 79 million had moderate to severe visual impairment due to cataracts a significant increase since 2000. Although age-adjusted blindness rates have decreased, the total number of cases has risen due to aging populations. Women continue to bear a higher burden of cataracts than men, particularly in older age groups and low-income countries. Cataracts are both a result and driver of poverty in these regions, with South Asia having the highest prevalence. Nevertheless, some regions have seen notable reductions in cataract-related blindness over the past two decades.^[5,6,7,8]

Etiology and risk factors for age-related cataract

Cataracts develop due to a combination of age-related changes, environmental exposures, systemic diseases, lifestyle factors, medications, and genetic predisposition:

- **Aging** is the leading cause, involving oxidative stress, protein aggregation, decreased antioxidant levels (like glutathione and vitamin C), and accumulation of damaged proteins in the lens.
- **Sex** Differences show that women are at higher risk, possibly due to hormonal changes post-menopause affecting lens protection.
- **Trauma** (blunt or penetrating) can cause distinctive cataract patterns and disrupt the lens capsule, leading to focal or complete opacification.
- **Diabetes** causes lens damage through sorbitol accumulation and glycoxidation (oxidative stress from high glucose).
- **Hypertension** increases inflammatory markers and oxidative stress, affecting lens clarity.
- **Obesity** contributes via chronic inflammation and oxidative imbalance.
- **Nutritional Deficiencies**, especially of vitamin C and glutathione, weaken antioxidant defenses, increasing vulnerability to cataracts.
- **Radiation Exposure** (UV and ionizing like X-rays) damages lens cells directly through oxidative stress and gene expression changes.
- **Smoking** introduces reactive oxygen species and

depletes ocular antioxidants.

- **Medications:** Steroids are strongly linked to posterior subcapsular cataracts via glucocorticoid receptor pathways. Aspirin and statins may contribute through metabolic or oxidative mechanisms.
- **Genetics** play a role, with specific gene variants increasing susceptibility, especially when combined with environmental insults.^[9,10,11, 12,13,14-15-16-17-18-19]

Aim of The Study

The study aims to assess the risk factors of cataracts among patients aged 40 years and older in Mosul City. Identifying these risk factors will help in prevention and management strategies.

Specific Objective

- To assess the significant risk factors associated with cataract development among individuals aged 40 and older in Mosul City.
- To identify the sociodemographic characteristics of the study sample and their relation to cataract occurrence.
- To evaluate the association between behavioral factors and cataract development.
- To estimate the impact of the Body Mass Index on cataract occurrence.
- To examine the influence of medical history on cataract formation.
- To investigate the ocular causes associated with cataract.
- To describe the distribution of types of cataract.

Patients and methods Study setting

The study was conducted at Mosul Specialized Center of Ophthalmology, which is located near the 4th bridge in

the Al Jawsaq neighborhood on the west side of Mosul City, Nineveh Governorate, Iraq. It is a governmental tertiary ophthalmological center that serves the entire governorate.

Study design

An observational, analytic, hospital-based, case-control study was conducted. Data was collected retrospectively from the participants using a non-randomized convenient technique. A modified questionnaire was used to assess the important risk factors associated with the development of cataracts.

Study Period

Data was collected over six months, from the 2nd of January 2024 to the 30th of June 2024.

Study sample

300 participants were enrolled in this study: 150 were cases, and 150 were controls.

RESULTS

3.1 Distribution of study sample according to age and sex

The study included 300 subjects; cataract cases were 150 (50%), and controls were 150 (50%). Table 3.1 shows the mean (\pm SD) of age 64.15 ± 9.31 (40-88) years for cases is significantly higher than controls 57.55 ± 10.30 (40-86) years with $p\text{-value} < 0.05$. Male: Female Ratio was 0.79: 1.00 for cases and 0.9: 1.00 for controls. Figure 3.1 shows that males comprised 44.0% of cases and 47.3% of controls, and females comprised 56% of the cases and 52.7% of controls.

Table 3.1: Mean age and sex distribution of study sample.

	Cataract (n=150)	No Cataract (n=50)	P-value*
	Mean \pm SD (min-max)	Mean \pm SD (min-max)	
Age (year)	64.15 ± 9.31 (40-88)	57.55 ± 10.30 (40-86)	0.000
Male: Female Ratio	0.79: 1.00	0.90: 1.00	

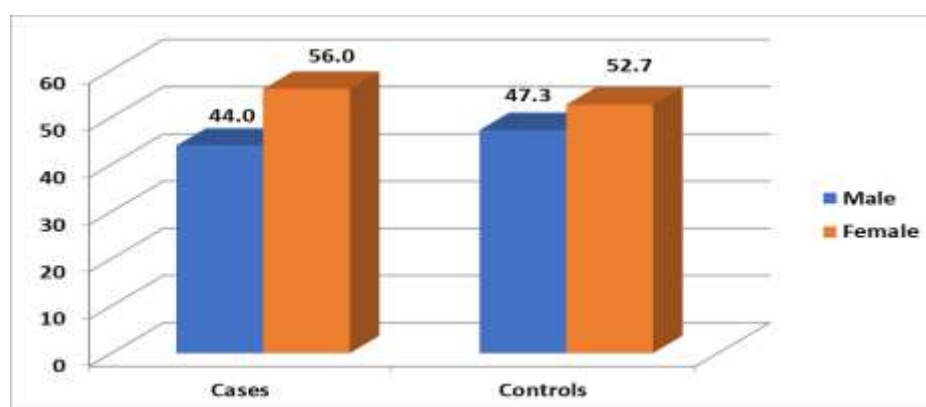


Figure 3.1: Study sample distribution according to sex (n=300).

3.2 Comparison of demographic characteristics between study groups

This table compares demographic factors between subjects with and those without cataracts. There was a risk association and statistically significant difference in individuals aged 70 and older (OR 3.05, p-value < 0.05).

No significant difference in cataract risk association between males and females was observed (p-value 0.562). Rural residents have a statistically significant risk of cataracts compared to urban residents (OR 6.85, p-value < 0.05).

Table 3.2: Comparison of demographic characteristics between subjects with and without cataracts (n=300).

Demographic factors	Cataract (n=150)		No Cataract (n=150)		OR	95% C.I (OR)	P-value*
	No.	%	No.	%			
Age (years)							
40 -	8	5.3	37	24.7	0.17	0.08-0.38	0.000
50 -	30	20.0	41	27.3	0.67	0.39-1.14	0.135
60 -	66	44.0	53	35.3	1.44	0.90-2.29	0.125
≥ 70	46	30.7	19	12.7	3.05	1.69-5.52	0.000
Sex							
Female	66	44.0	71	47.3	1.14	0.73-1.80	0.562
Male	84	56.0	79	52.7			
Residence							
Rural	56	37.3	12	8.0	6.85	3.48-13.47	0.000
Urban	94	62.7	138	92.0			

* Chi-square test.

3.3 Comparison of socio-economic factors between study groups

This table compares socio-economic factors between subjects with and without cataracts. Illiteracy is strongly associated with cataract development (OR 7.94, p-value < 0.05), and the same for the primary level of education (OR 2.12, p-value < 0.05). Outdoor working showed

increased cataract risk (OR 2.53, p-value < 0.05). In contrast, statistically significant protective associations (OR 0.07, 0.30, p-value < 0.05) were found in healthcare professionals and office workers, respectively. A clear association exists between lower socio-economic status and higher cataract risk (OR 9.0, p-value < 0.05).

Table 3.3: Comparison of socio-economic factors between subjects with and without cataracts (n=300).

Socio-economic factors	Cataract (n=150)		No Cataract (n=150)		OR	95% C.I (OR)	P-value*
	No.	%	No.	%			
Education							
Illiterate	73	48.7	16	10.7	7.94	4.32-14.60	0.000
Primary	52	34.7	30	20.0	2.12	1.26-3.58	0.004
Secondary	14	9.3	25	16.7	0.52	0.26-1.03	0.059
University +	11	7.3	79	52.7	0.07	0.04-0.14	0.000
Occupation							
Healthcare professional	1	0.7	13	8.7	0.07	0.01-0.55	0.001
Office workers	15	10.0	41	27.3	0.30	0.16-0.56	0.000
Outdoor and transportation workers	68	45.3	37	24.7	2.53	1.55-4.14	0.000
Retirees and homemakers	66	44.0	59	39.3	1.21	0.77-1.92	0.412
Socio-economic status							
Low	113	75.3	38	25.3	9.00	5.34-15.18	0.000
Moderate	26	17.3	53	35.3	0.38	0.22-0.66	0.000
High	11	7.3	59	39.3	0.12	0.06-0.25	0.000

* Chi-square test

3.4 Comparison of BMI between study groups

This table compares the study groups regarding BMI; most BMI categories did not show significant statistical differences as a risk for cataract, although the individuals with a BMI of 30.0-34.9 and 35.0-39.9 who had risk associations with cataracts (OR 1.16, 1.63) respectively,

but still with no statistical significance.

Table 3.4: Comparison of BMI between subjects with and without cataract (n=300).

Body mass index (BMI)	Cataract		No Cataract		OR	95% C.I (OR)	P-value*
	No.	%	No.	%			
< 18.5	2	1.3	0	0.0	-----	-----	0.490**
18.5 – 24.9	24	16.0	26	17.3	1.00	-----	Ref***
25.0 – 29.9	46	30.7	55	36.7	0.91	0.46-1.79	0.776
30.0 – 34.9	45	30.0	42	28.0	1.16	0.58-2.33	0.675
35.0 – 39.9	24	16.0	16	10.7	1.63	0.70-3.77	0.257
≥ 40.0	9	6.0	11	7.3	0.89	0.31-2.51	0.820
Total	150	100.0	150	100.0			

* Chi-square test.

** Fisher exact test.

*** Reference measurements.

3.5 Distribution of cataract types among cases.

Figure 3.2 shows the distribution of cataract types among cases (n=150). The most common type of cataract was Nuclear Sclerosis 78 cases, 52 %, followed by

Mixed cataract: 38 cases, 25.3%; Posterior Subcapsular cataract: 13 cases, 8.7%; Mature cataract: 12 cases, 8%; and Cortical cataract: 9 cases, 6 %.

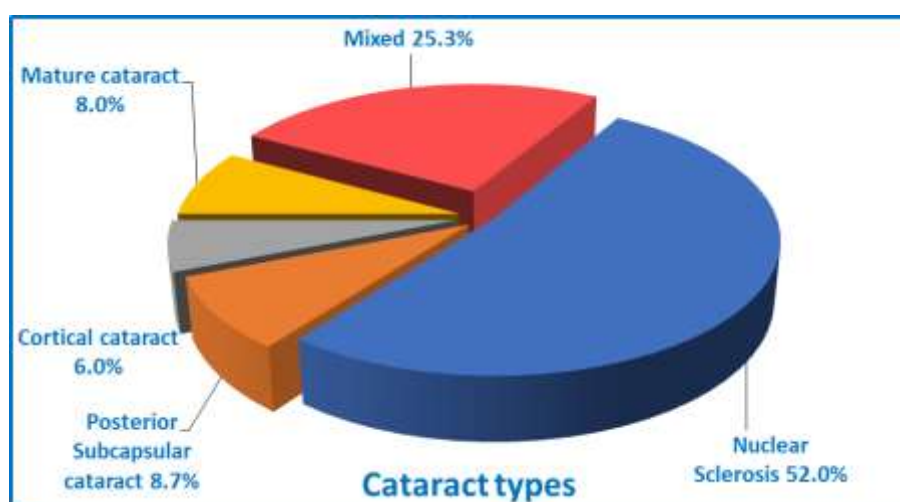
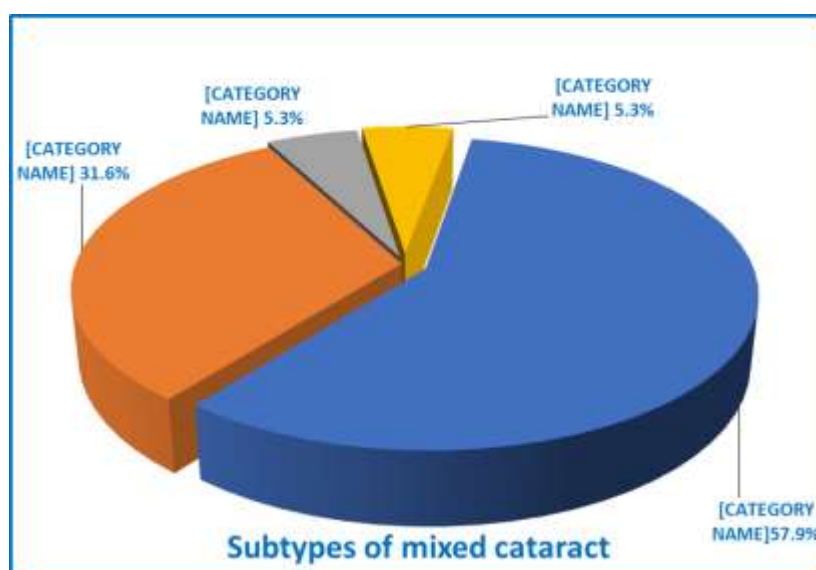
**Figure 3.2: Distribution of cataract types (n=150).**

Figure 3.3 shows the distribution of subtypes of Mixed cataract types (n=38). The most common type was Nuclear Sclerosis-Posterior Subcapsular type 22 cases, 57.9%, followed by Nuclear Sclerosis-Cortical cataract:

12 cases, 31.6%, Posterior Subcapsular-Cortical cataract: 2 cases, 5.3%, Nuclear Sclerosis-Posterior Subcapsular-Cortical cataract: 2 cases, 5.3%.

**Figure 3.3: Subtypes of mixed cataracts (n=38).**

DISCUSSION

Cataracts remain the leading cause of visual impairment worldwide. This study explores the risk factors associated with cataract development among individuals aged 40+ in Mosul, Iraq, with emphasis on modifiable and demographic variables.

1. Demographic Risk Factors

Age: Cataract risk increases significantly with age, especially in individuals aged 70 and above (OR 3.05, $p < 0.05$). This is supported by studies in Baghdad and Sweden that link aging with protein aggregation and oxidative stress in the lens.^[20]

Sex: No statistically significant association between sex and cataract risk was found in this study. While some global studies suggest females may have higher risk due to hormonal differences and longevity, the evidence remains mixed.^[21]

Residence

Rural residents had significantly higher cataract risk (OR 6.85, $p < 0.05$), likely due to increased UV exposure and limited access to healthcare. Similar findings were reported in China (2024), although some data from India suggest urban living may also pose risks due to pollution and stress.^[22]

2. Socio-Economic Factors

Education: Illiteracy and low educational levels (e.g., primary education) were strongly associated with cataract (OR 7.94, $p < 0.05$). Lower educational attainment often correlates with outdoor occupations, poor health awareness, and reduced access to care. Studies in China (2020) and Ethiopia (2022) confirm this link.^[23]

Occupation: Outdoor workers had higher cataract risk (OR 2.53, $p < 0.05$), primarily due to UV radiation exposure. Healthcare professionals (OR 0.07) and office workers (OR 0.30) had a protective association, possibly due to better health literacy and preventive care access. These results are in line with Modenese et al. (Italy, 2018).^[24]

Socioeconomic Status: Lower SES was one of the strongest risk factors (OR 9.00, $p < 0.05$), highlighting the importance of access to healthcare and education. Findings align with a study from Peru. Interestingly, Xu et al. (2024) reported higher cataract risk among high-SES females in China, suggesting regional and gender-specific variations.^[25]

3. Other Risk Factors

Body Mass Index (BMI): BMI was not a statistically significant predictor of cataract, although a slight increase in risk was observed in the 35.0–39.9 range (OR 1.63, $p = 0.257$). This aligns with Garg et al. (India), but contrasts with Niode et al. (2024), who found obesity-related oxidative stress to be contributory.^[26]

4. Cataract Types Identified

Among the 150-patient sample, the following distribution was found: Nuclear sclerosis: 52%, Mixed-type cataracts: 25.3%, Posterior subcapsular cataracts: 8.7%, Mature cataracts: 8%, Cortical cataracts: 6%. This aligns with global patterns, such as those reported by Irawan et al. (Indonesia), with nuclear sclerosis being the most prevalent.^[27]

CONCLUSIONS

Based on the findings of this study, the following conclusions have been drawn:

1. The sociodemographic factors (advancing age, rural areas residence, illiteracy, lower levels of education, low socio-economic status, and working outdoors) elevate the risk of cataract development.
2. The most prevalent type of cataracts is the nuclear sclerotic type.

Recommendations

Address Socio-Economic and Educational Gaps: Launch educational campaigns on cataract prevention and the importance of eye exams, especially targeting low-income and less-educated communities. Improve access to eye care in underserved areas via mobile clinics and subsidized services.

Protect Outdoor Workers: Promote UV-protective eyewear to reduce cataract risk. Introduce workplace policies that ensure regular eye exams and protective measures.

Implement Public Health Strategies: Establish routine cataract screening for high-risk groups like older adults and diabetics. Run public campaigns on lifestyle-related cataract risks and preventive behaviors. These actions aim to improve cataract awareness, prevention, and reduce its overall burden on public health.

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