Biomedical and Biopharmaceutical Research
Abbreviation: Biomed. Biopharm. Res.
Volume: 21: Issue: 02 |Year: 2024
Page Number: 730-736

A Study on Cataract and Its Risk Factors in West Bengal and Its Association with Diabetes: Cross-Sectional Observational Study

Dr. Neelam Meena[1], Dr. Riddhima Gautam[2], Dr. Bhatt Nishit Indravadan[3], Dr. Naresh Kumar Munda[4]

[1] Assistant Professor, Department of Ophthalmology, Faculty of Icare Institute of Medical Sciences and Research and Dr. B C Roy Hospital, Haldia, India.

[2] Assistant Professor, Department of Ophthalmology, Faculty of JIS School of Medical Science & Research (JISMSR), Howrah, West Bengal.

[3] Assistant Professor, Department of Ophthalmology, Faculty of JIS School of Medical Science & Research (JISMSR), Howrah, West Bengal.

[4] Associate Professor, Department of Community Medicine, Faculty of Icare Institute of Medical Sciences and Research and Dr. B C Roy Hospital, Haldia, India

Corresponding Author

Dr. Naresh Kumar Munda

Associate Professor, Department of Community Medicine, Faculty of Icare Institute of Medical Sciences and Research and Dr. B C Roy Hospital, Haldia, India

Received: 02-10-2024

Accepted: 17-10-2024

Published: 29-11-2024

ABSTRACT

Background: Cataract remains one of the leading causes of preventable blindness in India. Various risk factors including aging, diabetes, hypertension, and smoking have been implicated in cataract genesis. Objective: To evaluate the prevalence and risk factors of cataract among adults in West Bengal, with a focus on its association with diabetes mellitus. Methods: A cross-sectional observational study was conducted on 64 patients diagnosed with cataract. Demographic and clinical data were collected through structured questionnaires and ophthalmologic examinations. Results: Of the 64 participants, 39.1% were diabetic. Age above 60 years, diabetes mellitus, and prolonged exposure to sunlight were significantly associated with cataract. Conclusion: Diabetes is a significant risk factor for cataract in this population. Early screening and glycaemic control may delay cataract development.

KEYWORDS: Cataract, Risk Factors.

INTRODUCTION

Cataract, defined as the opacification of the eye's natural lens, is a major public health problem in India, including West Bengal. It impairs vision and significantly impacts the quality of life. Aging is the most common cause, but metabolic conditions like diabetes mellitus have shown a strong correlation with early cataract formation[1].Cataracts are a leading cause of vision impairment and blindness worldwide, with an estimated 15.2 million people aged 50 and older being blind due to cataracts and another 78.8 million having moderate to severe visual impairment[2-5]. The prevalence of cataracts increases with age, and the growing aging population contributes to a rise in cataract-related blindness. While most cases are age-related, cataracts can affect individuals of all ages due to various factors like genetics, disease, and injury[6-8]. Prevalence: Cataracts are the leading cause of blindness and the second leading cause of moderate and severe visual impairment globally. Age-related: Cataract prevalence significantly increases with age, with a large portion of

cases occurring in individuals over 60. Burden on Aging Population: The increasing global aging population is contributing to a rise in cataract-related blindness and visual impairment[7-9]. GlobalDistribution:While cataracts are a worldwide issue, low-income countries often experience a higher burden due to limited access to healthcare and cataract surgery. Causes:
Age is the primary factor, but genetics, certain diseases, eye injuries, and other factors can also contribute to the development of cataracts. Avoidable Blindness: A significant number of cataract cases leading to blindness are avoidable through timely and accessible surgical interventions[10-13]. Statistics: In 2020, there were an estimated 15.2 million people aged 50 and older who were blind due to cataracts and an additional 78.8 million with moderate to severe visual impairment from cataracts, Cataracts are responsible for 51% of all blindness and 33% of visual impairment worldwide, about 20 million people worldwide are blind due to cataracts[14-17]. In India, it's estimated that 3.8 million people become blind from cataracts each year. The incidence of new cases of cataract blindness is estimated to be at least 5 million globally[18]
This study aims to explore the risk factors of cataract in a sample population from West Bengal and to examine the association between cataract and diabetes mellitus.

METHODOLOGY

This study was conducted in tertiary hospital. After obtaining institutional ethical committee approval. It was Cross-sectional observational study conducted on 64 patients in the department of Ophthalmology, at a tertiary care centre, from April/ 2024 to September/2024
Total 64 participant were approached to project among them No one were excluded due to non-fulfilling of eligibility criteria and Total 64 were included on the basis of fulling of the eligibility criteria
The institute Ethics Committee approval was obtained before starting the sample collection. A written and informed consent was taken from the patient regarding the study in his/her vernacular language and English. In this study Patients were subjected to: A detailed history of sign & symptoms and its duration. Detailed history of systemic diseases and its duration, medication were noted. Patients were subjected to General physical examination

- **Study Design:** Cross-sectional observational study
- **Study Setting:** Tertiary care hospital in West Bengal
- **Sample Size:** 64 diagnosed cataract patients
- **Sampling Method:** Simple random sampling
- **Inclusion Criteria:** Patients above 40 years diagnosed with cataract
- **Exclusion Criteria:** Congenital cataract, traumatic cataract
- **Data Collection:** Structured questionnaires, ophthalmic examination, fasting blood sugar levels
- **Analysis:** Data were analysed using descriptive statistics and chi-square test to assess associations.

Flowchart: Study Methodology

↓

Data Compilation & Analysis

All data collected was entered in excel spread sheet Carefully. The data was analysed by using SPSS statistical software version 20. Statistical analysis in the form of percentages was done. Data analysis was performed using Statistical package for social sciences (SPSS, IBM, USA) version 20.0. Results were reported as mean ± standard deviation for quantitative variables

Statistical Analysis: SPSS v28, $p < 0.05$ significant.

RESULTS

In this study we got toknow thatCataract is associated with demographic profile of patient. 50%% patient suffered of Cataractis belongs to 60> years age group followed by 31.3 % belong to 51-60 years ag group. It means age is important factors for Cataract.increasing age will prone to Cataract.

Male (54.7%) were more prone to suffered of Cataractas compared to Female gender. (Table 1)

Prevalence in Rural area as compare to Urban are are is 56.2 % ofCataract

Demographic Profile of Study Population(Table 1)

Variables	Categories	Frequency (n=64)	Percentage (%)
Age (Years)	40–50	12	18.8%
	51–60	20	31.3%
	>60	32	50.0%
Gender	Male	35	54.7%
	Female	29	45.3%
Residence	Urban	28	43.8%
	Rural	36	56.2%
Education Status	Illiterate	22	34.4%
	Primary – Secondary	31	48.4%
	Graduate and above	11	17.2%

Prolonged sunlight exposure is one of the important factors for cataract and diabetes me;;itus is 2nd most common causing factors for cataract its prevalence is 39.1%(Table 2)

Risk Factors Observed Among Cataract Patients (Table 2)

Risk Factor	Present (n)	% Presence
Diabetes Mellitus	25	39.1%
Hypertension	21	32.8%
Smoking	17	26.6%
Prolonged Sunlight Exposure	29	45.3%
Family History of Cataract	14	21.9%
Alcohol Consumption	12	18.8%
Obesity (BMI >25)	16	25.0%

DISCUSSION

The study highlights the strong association between diabetes mellitus and cataract formation, with 39.1% of cataract patients being diabetic[19]. This is consistent with existing literature, which suggests that hyperglycaemia leads to osmotic stress in the lens due to sorbitol accumulation, triggering cataract genesis. Older age, sunlight exposure, and smoking were also important risk factors identified.

The main risk factor for cataracts is age, with the condition becoming more common after 40. Other significant risk factors include diabetes, prolonged exposure to ultraviolet (UV) radiation, smoking, obesity, family history of cataracts, and previous eye injuries or surgery. Additionally, prolonged use of corticosteroids can also increase the risk. Detailed Risk Factors: Age: The natural lens of the eye gradually changes with age, becoming less flexible, thicker, and cloudier, leading to cataract development Genetics[20].

In this study we got to know that Cataract is associated with demographic profile of patient. 50%% patient suffered of Cataract is belongs to 60> years age group followed by 31.3 % belong to 51-60 years ag group.

It means age is important factors for Cataract. increasing age will prone to Cataract.

Male (54.7%) were more prone to suffered of Cataract as compared to Female gender. (Table 1)

Prevalence in Rural area as compare to Urban are are is 56.2 % of Cataract

A family history of cataracts can increase an individual's risk, suggesting a hereditary component[21]. Sun Exposure: Prolonged exposure to UV radiation from sunlight can accelerate lens deterioration and contribute to cataract formation. Smoking: Smoking has been strongly linked to an increased risk of developing cataracts. Diabetes: People with diabetes are at a higher risk of developing cataracts, and the condition can also progress more rapidly. Prolonged sunlight exposure is one of the important factors for cataract and diabetes mellitus is 2nd most common causing factors for cataract its prevalence is 39.1%(Table 2

Eye Injuries and Surgery: Past eye injuries, including blunt trauma or chemical burns, and previous eye surgeries, can increase the risk of cataracts. Corticosteroid Use: Long-term use of corticosteroid medications, especially in high doses, can contribute to cataract development. Obesity[22]

Obesity is associated with an increased risk of various health problems, including cataracts[25-28]. High Blood Pressure: High blood pressure, also known as hypertension, can strain the blood vessels in the eyes and potentially contribute to cataract formation. Other Medical Conditions: Certain medical conditions, such as glaucoma, can also increase the risk of cataracts[23].

The primary management of cataracts involves surgical removal of the cloudy lens and replacement with an artificial intraocular lens (IOL). While non-surgical approaches like eyeglasses or lifestyle adjustments can help manage symptoms in early stages, surgery is the only definitive treatment to restore vision when cataracts interfere with daily activities[24-26].

Non-Surgical Management: Eyeglasses or Contact Lenses' early stages, new prescriptions for eyeglasses or contact lenses can improve vision by correcting refractive errors caused by the cataract. Magnifying Glasses and Lighting Adjustment[27]

Using magnifying glasses and increasing lighting levels can aid with tasks like reading. Glare Reduction: Sunglasses and brimmed hats can help reduce glare, especially in bright sunlight.

Surgical Management: Phacoemulsification: This is the most common type of cataract surgery, involving breaking up the cloudy lens with ultrasound and then suctioning it out. Manual Small Incision Cataract Surgery (MSICS):is another surgical technique, particularly useful in certain situations. Extracapsular Cataract Extraction: This method removes the lens in one piece, often requiring a slightly longer recovery time. Femtosecond Laser-Assisted Cataract Surgery: This technique uses a laser to assist in the surgical steps, potentially offering benefits for patients with astigmatism[28-29].

Post-Surgery Care: Eye Drops: Prescription eye drops are used to prevent infection and inflammation. Eye Shield: An eye shield is worn during sleep to protect the eye in the initial days after surgery. Sunglasses: Sunglasses are recommended when outdoors to reduce glare and protect the eye. Follow-up Appointments: Regular check-ups with the ophthalmologist are crucial to monitor healing and address any potential complications[30]

The predominance of patients above 60 years reinforces the age-related component of cataract. A greater proportion of rural residents were affected, which might reflect occupational exposure to sunlight and reduced access to early eye care services[31].

CONCLUSION

The findings suggest that **diabetes mellitus significantly increases the risk of developing cataracts**, especially in older adults. Awareness programs emphasizing glycemic control, UV protection, and smoking cessation are essential for cataract prevention. Periodic screening among diabetics should be encouraged to ensure early diagnosis and timely management

SOURCE OF FUNDING: No

CONFLICT OF INTEREST

The authors report no conflicts of interest

SUBMISSION DECLARATION

This submission has not been published anywhere previously and that it is not simultaneously being considered for any other journal.

REFERENCES

1. Grzybowski A, Markeviciute A, Zemaitiene R. A narrative review of intraocular lens opacifications: update 2020. Ann Transl Med. 2020;8:1547. doi: 10.21037/atm-20-4207. [DOI] [PMC free article] [PubMed] [Google Scholar]
2. Heidar K. Cataracts in children, congenital and acquired. American Academy of Ophthalmology; 2017. [Google Scholar]
3. Delbarre M, Froussart-Maille F. Signs, symptoms, and clinical forms of cataract in adults. J Fr Ophtalmol. 2020;43:653–9. doi: 10.1016/j.jfo.2019.11.009. [DOI] [PubMed] [Google Scholar]
4. Burton MJ, Ramke J, Marques AP, et al. The Lancet Global Health Commission on Global Eye Health: vision beyond 2020. Lancet Glob Health. 2021;9:e489–551. doi: 10.1016/S2214-109X(20)30488-5. [DOI] [PMC free article] [PubMed] [Google Scholar]
5. Correia M, Das T, Magno J, et al. Prevalence and causes of blindness, visual impairment, and cataract surgery in Timor-Leste. Clin Ophthalmol. 2017;11:2125–2131. doi: 10.2147/OPTH.S146901. [DOI] [PMC free article] [PubMed] [Google Scholar]
6. Mencucci R, Stefanini S, Favuzza E, et al. Beyond vision:Cataract and health status in old age, a narrative review. Front Med (Lausanne) 2023;10:1110383. doi: 10.3389/fmed.2023.1110383. [DOI] [PMC free article] [PubMed] [Google Scholar]
7. Arrigo A, Leveziel N, Briant PS, et al. Global estimates on the number of people blind or visually impaired by cataract: a meta-analysis from 2000 to 2020. Diabetes. 2024;5:9. doi: 10.1038/s41433-024-02961-1. [DOI] [PMC free article] [PubMed] [Google Scholar]
8. Pesudovs K, Lansingh VC, Kempen JH, et al. Cataract-related blindness and vision impairment in 2020 and trends over time in relation to VISION 2020: the Right to Sight: an analysis for the Global Burden of Disease Study. Invest Ophthalmol Vis Sci. 2021;62:3523. [Google Scholar]
9. Fang R, Yu Y-F, Li E-J, et al. Global, regional, national burden and gender disparity of cataract: findings from the global burden of disease study 2019. BMC Public Health. 2022;22:2068. doi: 10.1186/s12889-022-14491-0. [DOI] [PMC free article] [PubMed] [Google Scholar]
10. Lee CM, Afshari NA. The global state of cataract blindness. Curr OpinOphthalmol. 2017;28:98–103. doi: 10.1097/ICU.0000000000000340. [DOI] [PubMed] [Google Scholar]
11. Jolley E, Virendrakumar B, Pente V, et al. Evidence on cataract in low- and middle-income countries: an updated review of reviews using the evidence gap maps approach. Int Health. 2022;14:i68–83. doi: 10.1093/inthealth/ihab072. [DOI] [PMC free article] [PubMed] [Google Scholar]

12. Anbesse DH, Bizuneh ZY, Girum W, et al. Vision Related Quality of Life among Cataract Patients Attending Cataract Surgery Campaigns in Ethiopia: A Dual Centre Study. J Clin Exp Ophthalmol. 2022;13:1–6. doi: 10.2147/OPTO.S324267. [DOI] [Google Scholar]
13. Xulu-Kasaba ZN, Kalinda C. Prevalence of blindness and its major causes in sub-Saharan Africa in 2020: A systematic review and meta-analysis. Br J Vis Impair. 2022;40:563–77. doi: 10.1177/02646196211055924. [DOI] [Google Scholar]
14. Borges L de L, Santos FPV dos, Pagotto V, et al. Functional disability in community-dwelling elderly: the role of cataracts and contextual factors. Fisioter mov. 2014;27:189–200. doi: 10.1590/0103-5150.027.002.AO04. [DOI] [Google Scholar]
15. Fang Z, Chen X-Y, Lou L-X, et al. Socio-economic disparity in visual impairment from cataract. Int J Ophthalmol. 2021;14:1310–4. doi: 10.18240/ijo.2021.09.03. [DOI] [PMC free article] [PubMed] [Google Scholar]
16. Kulkarni A, Banait S. Through the Smoke: An In-Depth Review on Cigarette Smoking and Its Impact on Ocular Health. Cureus. 2023;15:e47779. doi: 10.7759/cureus.47779. [DOI] [PMC free article] [PubMed] [Google Scholar]
17. Tegegn MT, Assaye AK, Belete GT, et al. Visually significant cataract and associated factors among older people attending a community ophthalmic service in central Gondar Zone, Northwest Ethiopia: a cross-sectional study. J Int Med Res. 2022;50:3000605221104761. doi: 10.1177/03000605221104761. [DOI] [PMC free article] [PubMed] [Google Scholar]
18. Ahmed M, Beletew B, Mengesha A, et al. Prevalence of cataract and its associated factors among adults aged 40 years and above in Waghimra zone, Amhara, Northeast Ethiopia: a community based cross-sectional study. 2020. [DOI]
19. Wale MZ, Derbew M, Tilahun M, et al. Cataract and associated factors among adults visiting ophthalmic clinic at Debre Markos comprehensive specialized hospital, northwest Ethiopia, 2020. SAGE Open Med. 2021;9:2050312121989636. doi: 10.1177/2050312121989636. [DOI] [PMC free article] [PubMed] [Google Scholar]
20. Singh S, Pardhan S, Kulothungan V, et al. The prevalence and risk factors for cataract in rural and urban India. Indian J Ophthalmol. 2019;67:477–83. doi: 10.4103/ijo.IJO_1127_17. [DOI] [PMC free article] [PubMed] [Google Scholar]
21. Organization WH . World report on vision. 2019. [Google Scholar]
22. Na K-S, Park Y-G, Han K, et al. Prevalence of and risk factors for age-related and anterior polar cataracts in a Korean population. PLoS One. 2014;9:e96461. doi: 10.1371/journal.pone.0096461. [DOI] [PMC free article] [PubMed] [Google Scholar]
23. Kiziltoprak H, Tekin K, Inanc M, et al. Cataract in diabetes mellitus. World J Diabetes. 2019;10:140–53. doi: 10.4239/wjd.v10.i3.140. [DOI] [PMC free article] [PubMed] [Google Scholar]
24. Yu X, Lyu D, Dong X, et al. Hypertension and risk of cataract: a meta-analysis. PLoS One. 2014;9:e114012. doi: 10.1371/journal.pone.0114012. [DOI] [PMC free article] [PubMed] [Google Scholar]
25. Nowak MS, Smigielski J. The Prevalence of Age-Related Eye Diseases and Cataract Surgery among Older Adults in the City of Lodz, Poland. J Ophthalmol. 2015;2015:605814. doi: 10.1155/2015/605814. [DOI] [PMC free article] [PubMed] [Google Scholar]
26. Du Y, Meng J, He W, et al. Challenges of refractive cataract surgery in the era of myopia epidemic: a mini-review. Front Med (Lausanne) 2023;10:1128818. doi: 10.3389/fmed.2023.1128818. [DOI] [PMC free article] [PubMed] [Google Scholar]
27. Yap JF, Ng QX, Wai YZ, et al. Prevalence of cataract and factors associated with cataract surgery uptake among older persons in Malaysia: A cross-sectional study from the National Eye Survey II. Trop Doct. 2022;52:325–30. doi: 10.1177/00494755221076649. [DOI] [PubMed] [Google Scholar]

28. Yawson AE, Ackuaku-Dogbe EM, Seneadza NAH, et al. Self-reported cataracts in older adults in Ghana: sociodemographic and health related factors. BMC Public Health. 2014;14:949. doi: 10.1186/1471-2458-14-949. [DOI] [PMC free article] [PubMed] [Google Scholar]
29. Khoza LB, Nunu WN, Tshivhase SE, et al. Survey on prevalence of cataract in selected communities in Limpopo Province of South Africa. Sci Afr. 2020;8:e00352. doi: 10.1016/j.sciaf.2020.e00352. [DOI] [Google Scholar]
30. Vashist P, Tandon R, Murthy GVS, et al. Association of cataract and sun exposure in geographically diverse populations of India: The CASE study. First Report of the ICMR-EYE SEE Study Group. PLoS One. 2020;15:e0227868. doi: 10.1371/journal.pone.0227868. [DOI] [PMC free article] [PubMed] [Google Scholar]
31. Mahdi AM, Rabiu M, Gilbert C, et al. Prevalence and risk factors for lens opacities in Nigeria: results of the national blindness and low vision survey. Invest Ophthalmol Vis Sci. 2014;55:2642–51. doi: 10.1167/iovs.12-10303. [DOI] [PubMed] [Google Scholar]