Research Article

Clinical Study of Prevalence and Risk Factors for Cataract in Patients with Type 2 Diabetes Mellitus

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Abstract

Aims and Objectives: Aim: To study the prevalence and risk factors associated with cataract in patients with type 2 diabetes mellitus.

Objectives: To study the prevalence of cataract in T2DM. To assess the correlation of age, gender, duration of diabetes and level of blood glucose (HbA1c/RBS) with the development of cataract.

Methods: An observational cross-sectional study conducted over a duration of 12 months. A complete medical history and detailed local and systemic examination were obtained. RBS, FBS, PPBS and HbA1c were measured. Cataract was graded using the Lens Opacities Classification System III (LOCS III).

Results: 50 patients with cataract and 50 without cataract were enrolled; all were known cases of diabetes mellitus, with or without medication. The prevalence of cataract of any type in T2DM patients was 45%. Of these, the majority had mixed cataract (29%) and 16% had a monotype cataract. Cataract was more common among females (57.8%), in patients with a longer duration of diabetes (>10 years; 71.1%) and in older patients.

Conclusions: T2DM patients with cataract were significantly older (P<0.001), more likely to be female (P=0.12) and had a longer duration of diabetes (P<0.001). Prevalence of cataract of any type was 45%; 29% had mixed cataract and 16% had monotype cataract.

Keywords: Type 2 diabetes mellitus; Cataract; Prevalence; Risk factors; LOCS III; HbA1c; Cortical cataract; Mixed cataract.

Introduction

As the prevalence of type 2 diabetes mellitus (T2DM) continues to rise, especially in India, studying the ocular complications of this disease assumes major epidemiological significance. Diabetes is a chronic metabolic disorder characterized by elevated blood glucose levels leading to long-term damage, dysfunction and/or failure of various organs, especially the blood vessels, eyes, kidneys and nerves.

Cataract is considered a major cause of visual impairment in diabetic patients, as both the incidence and progression of cataract are high in this population. The underlying mechanisms involve glycation and carbamylation of lens crystallins, together with increased oxidative damage to the lens. Long duration of diabetes, advanced age at diagnosis, advanced retinopathy, diuretic use, poor glycemic control, and even impaired fasting glucose (a pre-diabetic state) are recognized risk factors for the development of cataract.

Materials And Methods

An observational cross-sectional study was conducted on 100 patients over a duration of 12 months in the Department of Ophthalmology. Patients were enrolled after obtaining full written and verbal consent, with the entire study explained to the patient and attendants. A complete slit-lamp-assisted ophthalmic examination, including fundus examination, was performed for all participants. Cataract was graded using the Lens Opacities Classification System III (LOCS III). Standard

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laboratory evaluations included random blood sugar (RBS), fasting blood sugar (FBS), postprandial blood sugar (PPBS), and glycated hemoglobin (HbA1c).

Study Design

Grading Procedure

The Lens Opacities Classification System III (LOCS III) is a standard system for grading and comparing cataract severity, derived from the LOCS II classification. It consists of three sets of standardized photographs and evaluates four features: nuclear opalescence (NO), nuclear color (NC), cortical cataract (CC) and posterior subcapsular cataract (PSC). Its narrower scaling intervals allow detection of small changes in cataract severity.

Inclusion Criteria

- Patients giving consent for the study.
- Patients aged ≥40 years, of either gender.
- Known cases of diabetes mellitus, with or without medication.

Exclusion Criteria

- History of any systemic disease except diabetes.
- History of trauma.
- Patients not willing to give consent.
- Any ocular pathology or surgery in either eye except diabetic retinopathy.
- History of exposure to any toxic agent (e.g. steroids, radiation, gold, busulphan).
- History of relevant drug intake.
- History of pregnancy.

Results

A total of 100 patients were studied: 50 with cataract (cases) and 50 without cataract (controls), all of whom were known cases of T2DM. T2DM was more prevalent in females (58%) than males (42%). The prevalence of cataract of any type in T2DM patients was found to be 45%.

Of the 45 T2DM patients with cataract, the majority presented with mixed cataract (29% of total study cohort) while 16% exhibited a monotype cataract. Analyzing monotype morphological distributions, cortical cataract (CC) was the most prevalent subtype at 9%, followed by nuclear opalescence (NO) at 6% and posterior subcapsular cataract (PSC) at 3%. Among mixed structural presentations, the combination of cortical and posterior subcapsular cataract (CC+PSC) was the most prominent presentation (14%), followed by the triple combination (NO+CC+PSC) at 9%, NO+PSC at 4%, and NO+CC at 2%.

Discussion

The prevalence of type 2 DM is on the rise; more so in India, it is important to study the prevalence of cataract in this selected population. Therefore, the association between diabetes and cataract would be of great interest in an epidemiological study.

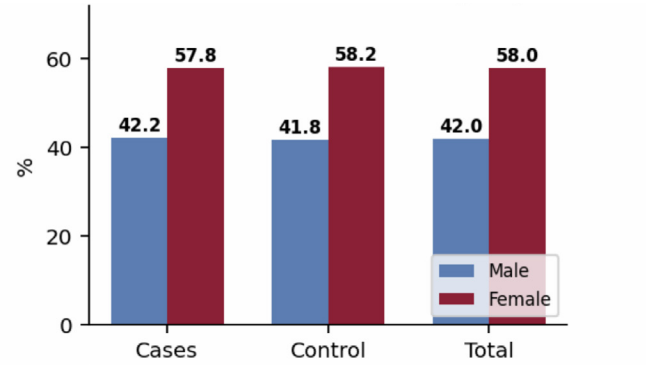

Figure 1: Sex Distribution of Study Population

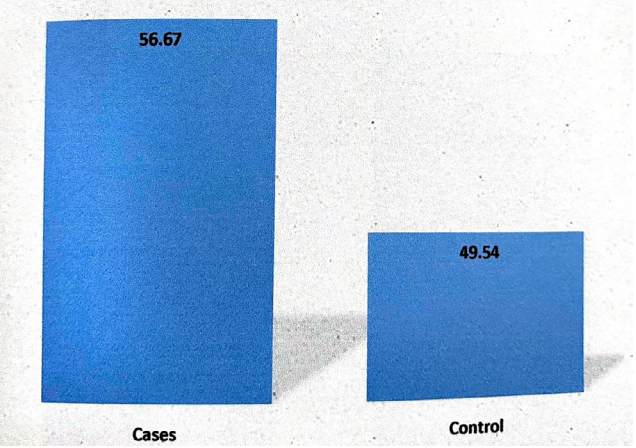

Figure 2 A: Comparing age (years) between groups

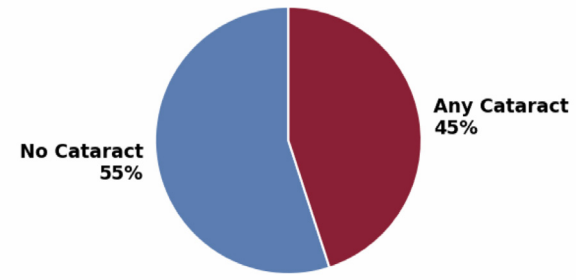

Figure 3: Prevalence of Cataract of Any Type

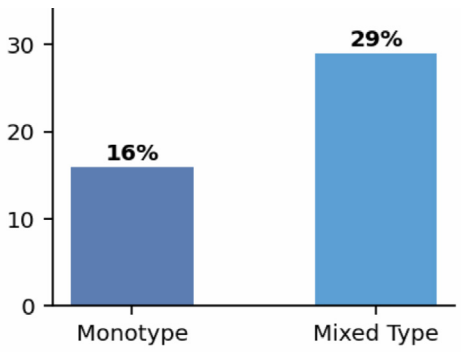

Figure 4: Prevalence of Monotype and Mixed Type Cataract

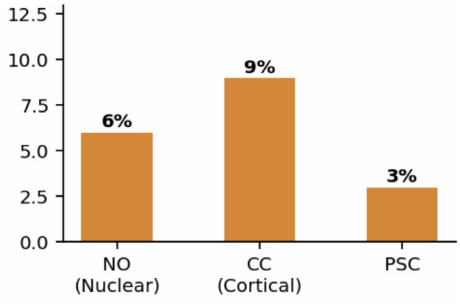

Figure 5: Prevalence of Monotype Cataract

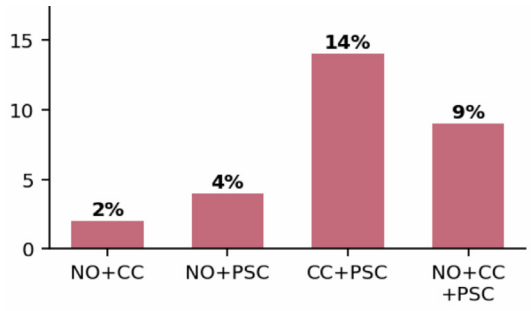

Figure 6: Prevalence of Mixed Cataract Types

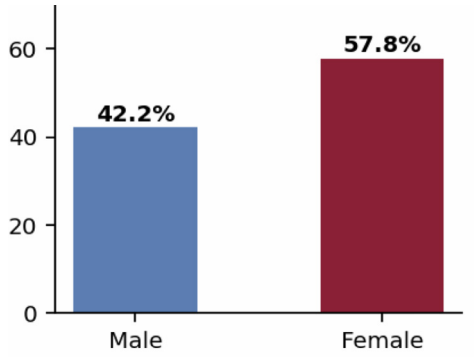

Figure 7: Prevalence of Cataract According to Sex (n=45)

A total of 100 patients participated in this study, which we conducted in a tertiary care hospital, out of these 100 participants, 50 patients had cataract, and the remaining 50 patients were without cataract.

T2DM was more prevalent in females (58%) as compared to males (42%). Among the control group (those without cataract), females (58.2%) were more prevalent as compared to males (41.8%).

T2DM patients with cataract (56.67 ± 9.2) were much older than those without cataract (49.54 ± 7.8), as revealed by the significant p-value of 0.021. Duration of diabetes was significantly longer among the patients with cataract (6.87 ± 1.2 years) as compared to those without cataract (4.32 ± 0.89 years). Similar results were revealed by the previous study by Raman *et al*[1] (R 2010); it was found that the cataract group consisted of an older group (60.1), more women (49.8%), and more subjects on insulin (6.5%).

However, the HbA1C was similar in both groups, as revealed by the insignificant *p-value* of 0.541.

Out of 45 T2DM patients, the majority had mixed cataract (29%) and 16% had monotype cataract.

Monotype cataract was found in 32 and 25% in rural and urban populations, and 12.68 and 18.6% were mixed cataract in the rural and urban groups (Singh S 2019).[2]

In a similar study by Raman *et al.*evaluating 1283 patients with type 2 diabetes mellitus reported that mixed cataract was more common than monotype (41.69 *vs* 19.4%) (Raman R 2010).

Among monotype cataract, cortical cataract was more prevalent (9%), followed by nuclear sclerotic cataract (6%) and posterior subcapsular cataract (3%)

Among mixed cataract combination of cortical cataract and posterior subcapsular cataract was most common (14%), followed by the combination of all three types of monogenic cataract. 4% of patients had a combination of nuclear sclerotic cataract and posterior subcapsular cataract, whereas only 2% patient had a combination of nuclear sclerotic cataract and cortical cataract.

Cataract was found to be more common among females (57.8%). Relative risk of developing cataract was 1.28 times higher in females as compared to males. Previous reports by Raman *et al* also revealed that the prevalence of cataract was higher in women than in men (51.4 *vs* 44.8%).

Kim *et al.*[3,] in a similar study, also reported that the prevalence of diabetic cataract was higher in women as compared to men (Kim SI 2006).

Donnelly *et al.*[4] noted differences in the albumin/total protein ratio and serum triglyceride level, predisposing them to cataract (Donnelly CA 1995).

Younan C[5] suggested that estrogen and hormone replacement therapy play a protective role in reducing the incidence of age-related cataract and cataract surgery (Younan C 2002).

Cataract was more common among those with longer duration of diabetes (>10 years).

In a similar study by Caird *et al.*[6] it is reported that 10.7% of patients of senile cataract extraction had diabetes mellitus and that the cataract extraction rate in those cases was 4 to 6 times higher than those without diabetes mellitus (Caird F1 1964).

Conclusion

This study demonstrates a high prevalence of cataract (45%) among patients diagnosed with type 2 diabetes mellitus. Advanced age and prolonged metabolic disease duration constitute the primary drivers of cataract development, showing a higher vulnerability in female patients. Mixed structural patterns dominate development profiles, with cortical types leading localized morphology. Comprehensive, programmatic ophthalmic screen intervals are strictly recommended for individuals dealing with T2DM, specifically focusing resources towards aging female segments managing extended disease histories to maintain ocular equity.

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Nil.

Conflicts Of Interest

Nil.

References

1. Raman R, Pal SS, Adams JSK, Rani PK, Vaitheeswarna K, Sharma T. Prevalence and risk factors for cataract in diabetes: Sankara Nethralaya Diabetic Retinopathy Epidemiology and Molecular Genetics Study, Report No. 17. Investigative Ophthalmology & Visual Science 2010;51(12):6253-61.
2. Singh S, Pradhan S, Kulothungan V, Swaminathan G, Ravichandran JS, Ganesan S, Sharma T, Raman R. The prevalence and risk factors for cataract in rural and urban India. Indian J Ophthalmology 2019; 67:477-83.
3. Kim SI, Kim SJ. Prevalence and risk factors for cataract in persons with type 2 diabetes mellitus. Korean J Ophthalmol 2006;20(4):201-204. doi:10.3341/kjo.2006.20.4.201.
4. Donnelly CA, Seth J, Clayton RM, Phillips CI, Cuthbert J, Prescott RJ. Some blood plasma constituents correlate with human cataract. Br J Ophthalmol 1995;79(11):1036-1041.
5. Younan C, Mitchell P, Cumming RG, Panchapakesan J, Rochtchinan E, Hales AM. Hormone replacement therapy, reproductive factors, and the incidence of cataract and cataract surgery: The Blue Mountains Eye Study. Am J Epidemiol 2002;155(11):997-1006.
6. Caird FI, Hutchinson M, Pirie A. Cataract extraction in diabetics. Br Med J 1964;2(5421):