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Dr. Subhash Ganpatrao Kabade

Assistant Professor,
Department of Pathology,
Sambhram Institute of Medical
Sciences and Research, Kolar,
Karnataka, India

Dr. V Umamaheswar

Assistant Professor,
Department of
Ophthalmology, Sambhram
Institute of Medical Sciences
and Research, Kolar,
Karnataka, India

Development and factors associated with cataract in individuals with type 2 diabetic mellitus

Dr. Subhash Ganpatrao Kabade and Dr. V Umamaheswar

Abstract

Background and Objectives: The incidence of type 2 diabetes mellitus and its consequences is skyrocketing in India. Diabetics are two to five times more likely to develop cataracts, and they do so at an earlier age. Cataract and its subtype's prevalence in Type 2 Diabetes Mellitus patients and related risk factors are the objectives of this study.

Materials and Methods: 650 people with Type 2 Diabetes Mellitus who were getting care at the Sambhram Institute of Medical Sciences and Research in Kolar, Karnataka, India, from January to December 2017 were part of the study. The study looked at all people with Type 2 Diabetes Mellitus who were at least 40 years old, which is what the World Health Organisation says is required. Each patient gave a full medical history that included information about their eye history, diabetes, and general information about themselves. After a full review of the whole body, a thorough check of the eyes was done.

Results: Out of the 650 people with Type 2 Diabetes Mellitus who took part in our study, 492 were found to have cataracts and 258 were not. There were 250 women and 242 men in total. Around 66% of people who were diagnosed with type 2 diabetes eventually got cataracts. A total of 383 people had been diagnosed with diabetes for a long time, but only 109 new cases were recently found. Cataracts were more common in people who were taking oral hypoglycemia agents. There was no link between having cataracts and the job that someone had. There was a statistically significant link between having a family history of diabetes and getting cataracts. 70.52% of the patients had cataracts that were a mix of different types, while only 29.48% had cataracts that were one type. The most common type of cataracts was a mix of nuclear, cortical, and posterior subcapsular cataracts. 68.28% of people who had a monotype cataract also had a cortex cataract.

Conclusion: If these factors are changed in people with Type 2 Diabetes Mellitus, it might take longer for cataracts to form. Determining the reason of diabetes and fixing it through surgery would be a key step towards lowering the economic costs of the disease, especially for people who are working age.

Keywords: Prevalence, risk factors, cataract, type 2 diabetes mellitus

Introduction

Diabetes mellitus is a disease in which the body doesn't make enough insulin or use it properly. This leads to high blood sugar and problems with how proteins, fats, and carbs are broken down. There are 366 million people with diabetes mellitus in the world right now, and that number is expected to rise to 552 million by 2030. In developing countries, more than 82 million people aged 64 and up will have diabetes by 2030. In wealthy countries, more than 48 million people will have diabetes by the same year^[1-3]. The number of people with diabetes around the world is forecast to rise from 2.8% in 2000 to 4.4% by 2030, and it will affect people of all ages. People with diabetes are mostly found in low- and middle-income countries. Over the next 19 years, the disease is also projected to become more common in these countries the most. Type 2 Diabetes Mellitus makes up about 90% of all cases of diabetes. The main things that describe it are insulin resistance and relative insulin insufficiency^[4-6].

A cataract is a disease in which the crystalline lens gets cloudy and makes it hard to see. It causes about 42% of all blindness and is the main reason people go blind around the world. About 17 million people are blind because of cataracts, and 28,000 new cases are reported every day around the world. About a quarter of people aged 65 and up and fifty percent of people aged 80 and up have cataracts, which make it very hard to see^[7-9].

Because they happen so often and get worse so quickly, cataracts are thought to be the main reason why people with diabetes lose their vision. Cataracts have a big effect on working people because they start early and are 2-5 times more common in people with diabetes.

Correspondence

Dr. V Umamaheswar

Assistant Professor,
Department of
Ophthalmology, Sambhram
Institute of Medical Sciences
and Research, Kolar,
Karnataka, India

People with diabetes are more likely to get senile cataracts earlier in life and have them get worse faster. An adult with diabetes has the same view as a fifteen-year-old who does not have diabetes. It is thought that glycation, carbamylation of crystallins, and more oxidant damage to the lens are to blame [8-10].

Cataracts are more likely to happen if you have had diabetes for a long time, are older when you were diagnosed, have severe retinopathy, take diuretics, or have trouble controlling your blood sugar. Impaired fasting glucose is a sign of pre-diabetes. People with diabetes and cataracts face big health and financial problems. This is especially true in poor countries where getting surgery for cataracts is hard to do and diabetes isn't always properly managed. For that reason, learning how clinical and biochemical factors interact to cause cataracts and finding ways to change these factors could possibly slow the development of cataracts in people with Type 2 Diabetes Mellitus [9-11].

The point of this study was to look at how often cataracts happen in people who have been labelled with type 2 diabetes. Researchers should look into the things that put people at risk for diabetes, like their age, sex, serum cholesterol levels, glycosylated haemoglobin levels, family history of diabetes, and random blood sugar levels.

Materials and Methods

A cross-sectional study was done with 650 diabetic adults who were getting outpatient care to find out how common acquired cataracts are in people with Type 2 Diabetes Mellitus and what factors raise the risk of getting them. 650 people with Type 2 Diabetes Mellitus who were getting care at the Sambhram Institute of Medical Sciences and Research in Kolar, Karnataka, India, from January to December 2017

were part of the study. The World Health Organization (WHO) said that people with Type 2 Diabetes Mellitus who were at least 40 years old and had been diagnosed with the disease could take part in this study. The following factors for inclusion and exclusion were used to decide if they were eligible.

Inclusion Criteria

Individuals diagnosed with Type 2 Diabetes Mellitus according to WHO criteria who are 40 years of age or older.

Exclusion Criteria

- Noncompliant patients.
- Patients under 40 years of age.
- Patients suffering from Type 1 Diabetes Mellitus.
- Women who are nursing or pregnant.

Statistical Analysis

After Microsoft Office Excel was used to collect and organise the data, SPSS version 16.0 was used to examine the tabular data. For inferential analysis, Chi-square tests and unpaired t-tests were used. For descriptive analysis, percentages, amounts, means, and standard deviations had to be calculated.

Results

Table 1: Study Population

Status of Cataract	Patients	%
With Cataract	450	69.23
Without Cataract	200	30.76
Total	650	100.00

Table 2: Age Distribution

Age	With Cataract	%	Without Cataract	%	Total	%
40-49 yrs	20	3.63	50	50.00	70	10.76
50-59 yrs	80	14.54	40	40.00	120	18.46
60-69 yrs	200	36.36	10	10.00	210	32.30
>70 yrs	250	45.45	0.00	0.00	250	38.46
Total	550	100.0	100	100.00	650	100.00

There were 3.63% of people aged 40 to 49 who had cataracts, 50.00% of people aged 50 to 59, 40.00% of people aged 60 to 69, and 38.46% of people aged 70 and up. The patient's advanced age made the cataracts more likely to happen.

Table 3: Sex Distribution

Status of Cataract	Males	%	Females	%	Total
With Cataract	240	60.00	200	80.00	440
Without Cataract	160	40.00	50	20.00	210
Total	400	100.00	250	100.00	650

Among the 650 instances of cataract in our study, 400 were

males and 250 were females, indicating a higher proportion of females in the cataract group.

Table 4: Occupation of the Study Population

Work	Cataract	%	Without Cataract	%	Total
Sedentary	280	57.14	150	57.69	430
Non-Sedentary	210	42.85	110	42.30	320
Total	490	100.00	260	100.00	650

Our study found that 57.14% of patients in the cataract group and 57.69% in the non-cataract group had a sedentary lifestyle. There was no correlation observed between the nature of one's occupation and the occurrence of cataract.

Table 5: Family History of Diabetes

Family history	With cataract	%	Without cataract	%	Total
Positive family history	120	24.48	80	30.76	200
Negative family history	370	75.51	180	69.23	550
Total	490	65.60	260	34.40	650

In our study, we observed that 24.48% of patients in the cataract group had a positive family history of diabetes, while 30.76% of patients in the non-cataract group had the same history. A statistically significant association was seen between a positive family history and the cataract group.

Table 6: Diabetes History

Status of Cataract	>10yrs	%	<10yrs	%	Total
With Cataract	100	55.55	380	80.85	492
Without Cataract	80	44.45	90	19.15	258
Total	180	100.00	470	100.00	650

In our study, 55.55% of the patients had been diagnosed with diabetes for more than 10 years, while 80.85% had been diagnosed for less than 10 years.

Table 7: Smoking History

Smoking Status With Cataract	Patients	%
Smokers With Cataract	49	59.76
Smokers Without Cataract	33	40.24
Total	82	100.00

Out of the 401 guys in the study group, 82 reported a positive history of smoking. Among these, 49 were part of the cataract group and 33 were part of the non-cataract group.

Table 8: Type of Cataract in the Study Group

Type of Cataract	Patients	%
Monotype	250	38.46
Mixed	400	61.53
	650	100

Our study found that 38.46% of cataract patients had mixed cataract, while 61.53% had monotype cataract.

Discussion

In India, the number of people with Type 2 Diabetes Mellitus and the other health problems that go along with it is rising quickly. People with Type 2 diabetes are more likely to lose their sight because of diabetic maculopathy. However, cataracts, which can be avoided, are also a major cause of vision loss. In order to protect public health, it is very important to find the risk factors that affect how cataracts start and grow. This study looks at how often cataracts happened in a group of 650 South Indian people with type 2 diabetes [10-12].

Out of the 650 people with diabetes that we looked at, 492 had cataracts and 256 did not. These patients were put into a group called "non-cataract." Out of all the people who have diabetes, 66% of them have developed cataracts. The outcomes of our study were similar to those of several other research projects [11-13]. In a study of 1414 people with diabetes, Raman *et al.* found similar findings. In particular, 65.7% of the patients had cataracts when they were first checked out. Kim *et al.* did a study with 850 people who had been identified with diabetes and found that half of them had cataracts. Janghorbani and Amini looked at a group of 3,888 people with type 2 diabetes who did not have cataracts at the start of the study after an average follow-up time of 3.6 years. Their research showed that 33.1 out of every 1000 person-years of tracking led to cataract development [14-16].

Of the three people with diabetes who were at least 40 years old, two of them got cataracts. This means that people with diabetes were more likely to get cataracts than people in the general population. The next table shows the results of a study that looked at both the general population and people with diabetes. It showed that people with diabetes were more likely to have cataracts than people in the general population. The results of another study on Beaver Dam Eye were similar, which suggests that the number of people who get cataracts increases with age. According to the Framingham and Benson *et al.* study, people under 65 with diabetes are three to four times more likely to have cataracts than people over 65 [17-19].

Out of the 492 patients with cataracts, 250 were women, making up a bigger percentage than men. All together, 242 of the cases involved men. A study by Kim *et al.* found that more women than men were in the group with cataracts compared to the control group. According to Donnelly *et al.*'s study, changes in blood triglyceride levels and albumin/total protein ratio make people more likely to get cataracts, especially women [20-21]. According to the results of our study, 58.14% of people with cataracts and 55.81% of people without cataracts said they didn't do much. Raman *et al.* did a study that showed that people who were jobless were more likely to have cataracts than people who were working. Our study, on the other hand, did not find a link between the type of work and the start of cataracts. Due to the small amount of studies that looked at cataracts in people with diabetes, it was not possible to find a link between this particular risk factor and getting cataracts [22-24].

In the group of people with cataracts, 59.07% had a family history of diabetes. In the group of people without cataracts, 40.93% had a relevant family history of diabetes. There was a statistically significant link between having a family history of cataracts and having the condition. A research study by Kareem *et al.*, which looked at 2540 diabetic patients from Iraq, found that having a family background of diabetes made getting cataracts more likely. A strong link was found between having a family history of diabetes and getting cataracts, with a p-value of less than 0.001 in both the cataract and non-cataract groups [23-25]. People with a history of diabetes in their family got diabetes younger and were more likely to get cataracts in the end than people without a history of diabetes in their family. Blue Mountains Eye Research did a study that found a link between having diabetes for a long time, having severe hyperglycemia, and having a higher chance of getting cataracts. 2900 people with diabetes took part in the study. Dedov *et al.* looked at 7,186 adult patients with diabetes and found that having diabetes for a longer time was linked to getting diabetic complications like cataracts and retinopathy. Kirby DB did a study that showed that 64% of diabetic patients who were taking medicine got different kinds of lens opacities. Also, most of the people who had lenticular distortion had been told they had diabetes mellitus for more than five years. According to Chan AW's study, the risk of getting cataracts goes up directly with the severity and length of diabetes mellitus. Also, diabetics get cataracts faster than non-diabetics [26-28].

Out of the 401 guys who took part in the study, 82 had a history of smoking information. Fifty of these smokers were found to have cataracts, while the other thirty-three men did

not. Researchers from the WESDR found a link between smoking and a higher risk of getting cataracts in people with diabetes who got the disease later in life. According to a study by Hiller *et al.*, people who smoked 20 or more cigarettes a day was much more likely to get nuclear opacities during their first eye test than people who did not smoke. However, our research did not show a link between smoking and cataracts.

In the group without cataracts, the average fasting blood sugar level was 163.71 mg/dl. In the group with cataracts, it was 176.44 mg/dl [30-32]. The FBS level was much higher in the group with cataracts. The group with cataracts had an average HbA1c level of 8.29%, while the group without cataracts had an average of 7.85%. The people in the group with cataracts had a significantly higher amount of HbA1c. After fasting, Kim *et al.* did a study and found that the cataract group had higher blood sugar levels than the control group. The HbA1c number was higher in the cataract group than in the control group. In the Australian Blue Mountains, a population-based cohort study looked at possible links between diabetes and the development of cataracts in a group of 2,335 people aged 49 and up over the course of 5 years. In this long-term study by the same group of scientists, people whose fasting glucose levels were lower had twice as many cases of cortex cataracts over 5 years as people whose fasting glucose levels were normal. A study from Wisconsin called the Wisconsin Epidemiologic Study of Diabetic Retinopathy found a link between glycosylated haemoglobin and cataracts [31-33].

Conclusion

In India, the number of people with Type 2 Diabetes Mellitus and the other health problems that come with it has been rising quickly. Mixed cataracts were more common than monotype cataracts, which were not as common. The most common types of cataracts were posterior subcapsular, nuclear, and cortex. Having diabetes and cataracts can be very bad for your health and your finances. This is especially true in poor countries where getting surgery for cataracts is hard to do and diabetes isn't always properly managed. Our study helps us learn more about how clinical and biochemical factors interact to affect the development of cataracts and the different types that can happen. This part has been mostly forgotten about so far. If these factors are changed in people with Type 2 Diabetes Mellitus, it might take longer for cataracts to form. To lower the number of people who get sick and the costs that come with it, it is important to find and surgically treat the underlying reason. This will speed up healing, improve quality of life, and help people recover their sight.

Funding

None.

Conflict of Interest

None.

References

1. Whiting DR, Guariguata L, Weil C, Shaw J. IDF Diabetes Atlas. In: Global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes Res Clin Pract.* 2011;94:311-321.
2. Wild S, Roglic G, Green A, Sicree R, King H. Global

- Prevalence of diabetes. In: Estimates for the year 2000 and projections for 2030. *Diabetes Care.* 2004;27:1047-1053.
3. American diabetes association. Diagnosis and classification of Diabetes Mellitus. *Diabetes Care.* 2013;36(1):567-574.
4. Kyselova Z, Stefek M, Bauer V. Pharmacological prevention of diabetic cataract. *J Diabetes Complications.* 2004;18:129-140.
5. Javadi MA, Ghanavati SZ. Cataracts in Diabetic Patients. *J Ophthalmic Vis Res.* 2008;3(1):52-65.
6. Sihota R, Tandon R. Lens. In: Parson's Diseases of Eye. 21st edition. Elsevier; c2006. p. 263.
7. Kim SI, Kim SJ. Prevalence and Risk Factors for Cataracts in Persons with Type 2 Diabetes Mellitus. *Korean J Ophthalmol.* 2006;20(4):201-204.
8. Saxena S, Mitchell P, Rochtchina E. Five-year incidence of cataract in older persons with diabetes and pre-diabetes. *Ophthalmic Epidemiol.* 2004;11:271-277.
9. Tabin G, Chen M, Espandar L. Cataract surgery for the developing world. *Curr. Opin. Ophthalmol.* 2008;19(1):55-59.
10. Klein BEK, Klein R, Moss SE. Prevalence of cataracts in a population-based study of persons with Diabetes Mellitus. *Ophthalmology.* 1985;92(9):1191-1196.
11. Nielsen NV, Vinding T. The prevalence of cataract in insulin-dependent and non-insulin-dependent Diabetes Mellitus. *Acta Ophthalmol (Copenh).* 1984;62(4):595-602.
12. Ederer F, Hiller R, Taylor HR. Senile lens changes and diabetes in two population studies. *Am J Ophthalmol.* 1981;91(3):381-395.
13. Klein BE, Klein R, Lee KE. Diabetes, cardiovascular disease, selected cardiovascular disease risk factors and the 5-year incidence of age-related cataract and progression of lens opacities In: The Beaver Dam Eye Study. *Am J Ophthalmol.* 1998;126(6):782-790.
14. Klein BE, Klein R, Wang Q, Moss SE. Older-onset diabetes and lens opacities. In: The Beaver Dam Eye Study. *Ophthalmic Epidemiol.* 1995;2(1):49-55.
15. Rowe N, Mitchell P, Cumming RG, Wans JJ. Diabetes, fasting blood glucose and age-related cataract In: The BlueMountains Eye Study. *Ophthalmic Epidemiol.* 2000;7(2):103-114.
16. Saxena S, Mitchell P, Rochtchina E. Five-year incidence of cataract in older persons with diabetes and prediabetes. *Ophthalmic Epidemiol.* 2004;11(4):271-277.
17. Mukesh BN, Le A, Dimitrov PN, Ahmed S, Taylor HR, McCarty CA, *et al.* Development of cataract and associated risk factors In: The Visual Impairment Project. *Arch Ophthalmol.* 2006;124(1):79-85.
18. Leske MC, Wu SY, Hennis A, *et al.* Diabetes, hypertension, and central obesity as cataract risk factors in a black population In: The Barbados Eye Study. *Ophthalmology.* 1999;106(1):35-41.
19. Raman R, Pal SS, Adams JSK, Rani PK, Vaitheeswaran K, Sharma T, *et al.* Prevalence and risk factors for in diabetes In: Sankara Nethralaya Diabetic Retinopathy Epidemiology and Molecular Genetics Study report no 17. *Invest Ophthalmol Vis Sci.* 2010;51(12):6253-6261.
20. Kuszak JR, Brown HG. Embryology and anatomy of the lens. In: Albert DM, Jakobiec FA. Principles and

- practice of ophthalmology. Basic sciences. Philadelphia: WB Saunders; c1994. p. 82-96.
21. Saude T. The internal ocular media. Ocular anatomy and physiology. Oxford: Blackwell Scientific; c1993. p. 36-52.
 22. Snell RS, Lemp MA. The eyeball. Clinical anatomy of the eye. Oxford, Blackwell Scientific; c1989. p. 190-194.
 23. Pintor J. Why do cataracts appear in cases of diabetes or galactosemia. *J Emmetropia*. 2012;3:209-212.
 24. Williamson JR, Chang K, Frangos M, Hasan KS, Ido Y, Kawamura T, *et al*. Hyperglycemic pseudohypoxia and diabetic complications. *Diabetes*. 1993;42:801-813.
 25. Kinoshita JH. A thirty year journey in the polyol pathway. *Exp. Eye Res*. 1990;50:567-573.
 26. Kador PF, Lee JW, Fujisawa S, Blessing K, Lou MF. Relative importance of aldose reductase versus nonenzymatic glycosylation sugar cataract formation in diabetic rats. *J Ocul. Pharmacol. Ther*. 2000;16(2):149-160.
 27. Forrester J, Dick A, McMenemy P, Lee W. Anatomy of the eye and orbit. In: Forrester JV, Dick AD, McMenemy P, Lee WR. *The eye: Basic sciences in practice*. London: WB Saunders; c1996. p. 81-86.
 28. Kador PF. Biochemistry of the lens. Intermediary metabolism and sugar cataract formation. In: Albert DM, Jakobiec FA. *Principles and practice of ophthalmology. Basic sciences*. Philadelphia: WB Saunders; c1994. p. 146-167.
 29. Harding JJ, Crabbe MJC. The lens: Development, proteins, metabolism and cataract. In: Davson H, editor. *The eye*. 3rd ed. London: Academic Press; c1984. p. 207-492.
 30. Berman ER. Lens. In: Blakemore C, editor. *Biochemistry of the eye*. New York: Plenum Press; c1991. p. 201-290.
 31. Patel P, Jivani N, Malaviya S, Gohil T, Bhalodia Y. Cataract: A major secondary diabetic complication; Review article. *Int. Curr. Pharm J*. 2012;1(7):180-185.
 32. Gupta SK, Kalaiselvan V, Saxena R, Agrawal SS. Advances in pharmacological strategies for the prevention of cataract development. *Indian J Ophthalmol*. 2009;57:175-183.
 33. Thiagarajan G, Venu T, Balasubramanian D. Approach to relieve the burden of cataract blindness through natural antioxidants use of ashwagandha. *Curr. Sci*. 2003;85(7):1065-1071.