Section: Research Paper
ISSN 2063-5346

A Study of Cataract surgery- Its Complications & Visual Outcome in Diabetic patients of Eastern Zone of Uttar Pradesh

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DOI: 10.48047/ecb/2023.12.si4.1787

Abstract:

Introduction: India is considered the diabetes capital of the world and many diabetics have cataract also needing surgery. Complication of cataract surgery may be more if the person is diabetic. Considering this we aimed to study the problems and visual outcome associated with cataract surgery in diabetic patients. **Material and methods:** This was a hospital based prospective study carried in the department of ophthalmology of institute of Azamgarh during the period between August 2022 to March 2023. A total of 190 patients were enrolled after applying exclusion criteria. A detailed history regarding socio-demographic profile was taken and after cataract extraction patients were followed for 3 months to see if any complication is there. Visual acuity is tested at 6 weeks. **Results:** Complications was observed in more than $3/5^{th}$ of the diabetic patients. Most common immediate post-operative complication was corneal edema present in more than $1/4^{th}$ patients affecting females significantly more as compared to males and this association was found to be statistically significant. Second most common complication was iritis. Cystoid macular edema was the commonest late complication followed by recurrent uveitis. **Conclusion:** Older age is a predisposing factor for diabetes as well as cataract. Diabetes may be the reason for more complication in the patients. Management of blood sugar level is a must before and even after the cataract extraction surgery.

Keywords: Cataract, Diabetic, Complications, Visual Outcome, Surgery

Introduction: Diabetes mellitus (DM) is one of the most common chronic diseases which causes morbidity. The occurrence of diabetes is increasing globally in the recent years. (1)

Globally, more than 285 million people are affected by DM. According to the International Diabetes Federation (IDF), this number is expected to be nearly double (439 million) by the year 2030. (2)

In India almost 69 million people are affected with diabetes mellitus as 2015 data.

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Cataract is an opacity in the normally transparent crystalline lens of the eye. This cloudiness can cause a decrease in vision and may lead to eventual blindness. [1] Cataract is the most important cause of blindness and cataract extraction is the commonest intraocular surgery being done worldwide. (3)

Individuals with diabetes are at increased risk of cataract development and later on they need surgery for the same. Now a days cataract surgery is very commonly used procedure, even done on ambulatory basis. Overall, it is seen that up to 20 % of cataract surgery are done on diabetic patients. In addition to improving visual acuity (VA), it is also important to perform cataract extraction in diabetics to facilitate adequate screening and treatment of diabetic retinopathy (DR). (4)

In previous publication it has been shown that visual outcome was very poor in diabetic patients after cataract surgery. (5,6,7)

But in recent past major development have occurred in the management of cataract and diabetes. In contrast to older surgical procedures such as extracapsular cataract surgery, new surgical method like modern small-incision phacoemulsification has been associated with improved outcome. (8,9)

There are very few studies which demonstrate the outcome of cataract surgery in diabetic patients. So it is useful to see complication and visual outcome of these new cataract surgical techniques in diabetic patients.

Material and methods: This follow up study was carried out in the department of ophthalmology of institute of Azamgarh, in the period between August 2022 to March 2023. Approval was obtained from institutional ethics committee of the institute. All patients with diagnosed diabetes mellitus with good glycaemic control, either by insulin or by oral hypoglycaemic drug and willing to participate in the study were included. Traumatic cataract, paediatric cataract, cataract associated with glaucoma, cataract associated with other ocular pathology (e.g. uveitis cataract, pseudo exfoliation syndrome etc.), corneal pathology (corneal ulcer, trauma) and all cases of extracapsular cataract extraction (ECCE) were excluded from the study. After applying inclusion and exclusion criteria, a total of 204 subjects could be included in this study. Out of this 14 patients lost to follow up. So our final sample size came out to be 190. A detailed history regarding demographic profile, socioeconomic status and diabetes were taken. Small-incision cataract surgery or phacoemulsification was carried among all patients as cataract extraction procedure. Patients were followed for 3 months to see for complications. Complications occurring within 48 hours were observed and best corrected visual acuity (BCVA) was seen at 6 weeks. Posterior capsular opacification (PCO) was done by Evaluation of PCO grading. The visual outcome was recorded using Snellen's visual acuity chart. Data were entered in SPSS (Statistical Package for Social Science, IBM Corp.) software version 20 and analysis was done. To know the socioeconomic status, modified BG Prasad classification was used. Chi-square test was applied to see the association between different variables. A p-value <0.05 was considered to be statistically significant.

Results:

In this study, a total of 190 patients were included. Table 1 shows the socio-demographic characteristics of the patients. Age of diabetic patients who were having cataract and planned

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for cataract extraction varied between 41 to 77 years with mean age of 64 ± 16.42 years. Cataract in diabetics was found to be more common in males as compared to females. Out of 190 patients, 104 (54.7%) were males while 86 (45.3%) were females. Common age groups of the patients were 51-60 years and 61-70 years. Combined together, these 2 groups constituted 69.5% of the study participants. 36 patients (18.9%) were having >70 years age. Only 22 patients (11.6%) were there in the age group of 41-50 years. As can be seen in the table, older women were affected significantly more in older age than men ($p<0.05$). Among males, most common age group was 51-60 years having 44 (42.3%) patients. This was followed by 61-70 years age group with 36 (34.6%) patient. Least common age group was 41-50 years. Among females, 61-70 years age group was most common (30, 34.9%) followed by age group of >70 years (23, 26.7%). Of the total patients, 140 (73.7%) were Hindus and 50 (26.3%) were Muslims. As far as socioeconomic status of the patients was concerned, almost $3/4^{th}$ belonged to IV and V of BG Prasad scale and association of socio-economic status with cataract was found to be non-significant. Newly diagnosed cases of diabetes among cataract patients was 13 (6.8%) and rest were diagnosed with diabetes previously.

Table 1: Socio-demographic profile of patients

Characteristics		**Male (104) n (%)**	**Female (86) n (%)**	**Chi square**	**p-value**
Age	41-50 years	10 (9.6%)	12 (13.9%)	**9.434**	**0.024**
	51-60 years	44 (42.3%)	21 (24.4%)		
	61-70 years	36 (34.6%)	30 (34.9%)		
	>70 years	14 (13.5%)	23 (26.7%)		
Religion	Hindu	80 (76.9%)	60 (69.76%)	1.243	0.264
	Muslim	24 (23.1%)	26 (30.23%)		
Socioeconomic status*	Class II	12 (11.5%)	10 (11.6%)	1.054	0.788
	Class III	16 (15.4%)	12 (13.9%)		
	Class IV	36 (34.6%)	25 (29.1%)		
	Class V	40 (38.5%)	39 (45.3%)		
Diabetes	Newly diagnosed	5 (4.8%)	8 (9.3%)	1.492	0.221
	Previously diagnosed	99 (95.2%)	78 (90.7%)		

*modified BG Prasad classification

Table 2 shows complications of cataract extraction in diabetic patients. Out of total 190 patients, complications was observed in 127 i.e. 64.2% of diabetic patients who underwent cataract extraction faced one or other complications. 12 among them showed multiple complications. So, total number of complications was 139. Most common complication of cataract extraction was found to be corneal edema which was found to be in 50 (26.3%) patients. Females were affected more (33.7%) with corneal edema as compared to males (20.2%) and this association was found to be statistically significant. Second most common complication was iritis (post-operative inflammation). It was present in 23 patients (12.1%) in which females (13.9%) were affected more than males (10.6%). But this association was not found to be significant. Vitreous haemorrhage (VH) and Raised IOP were also common as it

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affected 21 (11.0%) and 19 (10.0%) patients respectively. These two complications were seen more in males than females but this association was found to be non-significant. Retained cortical material was found in 7 (3.7%) diabetic patients affecting 4 (3.8%) males and 3 (3.5%) females. Iris prolapsed and Retinal detachment (RD) were also relatively lesser common complications. Iris prolapsed affected total 5 (2.63%) patients out of which 3 (2.9%) were males and 2 (2.3%) were females. 4 (2.1%) patients suffered from retinal detachment, 1 (0.9%) being male and 3 (3.5%) females. Wound leakage and intra-ocular lens (IOL) malposition were 2 rare complications affecting 2 patients each. Wound leakage was seen in 1 male and 1 female while IOL malposition was seen in 2 males only. All these association was found to be non-significant as p-value came out to be >0.05.

Table 2: Early complications of cataract extraction within 48 hours (n=139)

Complications	**Total (190) n (%)**	**Male (104) n (%)**	**Female (86) n (%)**	**Chi square**	**p-value**
Corneal Edema	50 (26.3%)	21 (20.2%)	29 (33.7%)	**4.443**	**0.035**
Iritis/anterior chamber reaction	23 (12.1%)	11 (10.6%)	12 (13.9%)	0.504	0.477
VH	21 (11.0%)	12 (11.5%)	9 (10.5%)	0.055	0.814
Raised IOP	19 (10.0%)	12 (11.5%)	7 (8.1%)	0.604	0.437
Retained cortical material	7 (3.7%)	4 (3.8%)	3 (3.5%)	0.017	0.896
Iris Prolapse	5 (2.63%)	3 (2.9%)	2 (2.3%)	0.057	0.811
Retinal detachment	4 (2.1%)	1 (0.9%)	3 (3.5%)	1.458	0.227
Wound Leak	2 (1.2%)	1 (0.9%)	1 (1.2%)	0.018	0.893
IOL Malposition	2 (1.2%)	2 (1.9%)	0	1.671	0.196
Intra-operative complications	12 (6.3%)	5 (4.8%)	7 (8.1%)	0.883	0.347

As can be seen in table 3, Cystoid macular edema was the most common long term complication affecting 9 (8.6%) patients with 5 (4.8%) males and 4 (4.6%) females. Recurrent uveitis was the 2nd most common complication after 48 hours. It occurred in 7 (3.7%) patients undergoing cataract surgery consisting of 4 (3.8%) males and 3 (3.5%) females. Posterior capsular opacity developed in 6 (3.1%) patients while Endophthalmitis in 4 (2.1%) diabetic patients who underwent surgery for cataract.

Table 3: Long term complications of cataract extraction (after 48 hours)

Complications	**Total (190) n (%)**	**Male (104) n (%)**	**Female (86) n (%)**	**Chi square**	**p-value**
Cystoid macular edema	9 (8.6%)	5 (4.8)	4 (4.6%)	0.003	0.956
Recurrent uveitis	7 (3.7%)	4 (3.8%)	3 (3.5%)	0.017	0.896
Posterior capsule opacity	6 (3.1%)	4 (3.8%)	2 (2.3%)	0.356	0.550
Endophthalmitis	4 (2.1%)	2 (1.9%)	2 (2.3%)	0.037	0.847

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Figure 1 shows best corrected visual acuity (BCVA) after 6 weeks of cataract surgery in diabetic patients. As can be seen, 114 (60.0%) patients could achieve visual acuity of 6/6-6/18 at 6 weeks of cataract extraction. 43 (22.6%) patients were having visual acuity of 6/18-6/60 after cataract surgery. It was even poorer (6/60-3/60) in 26 (13.7%) patients. Best corrected visual acuity was worst in 7 patients in which it was <3/60. In some patients intra-operative complications were also noted with intra-operative miosis being most common.

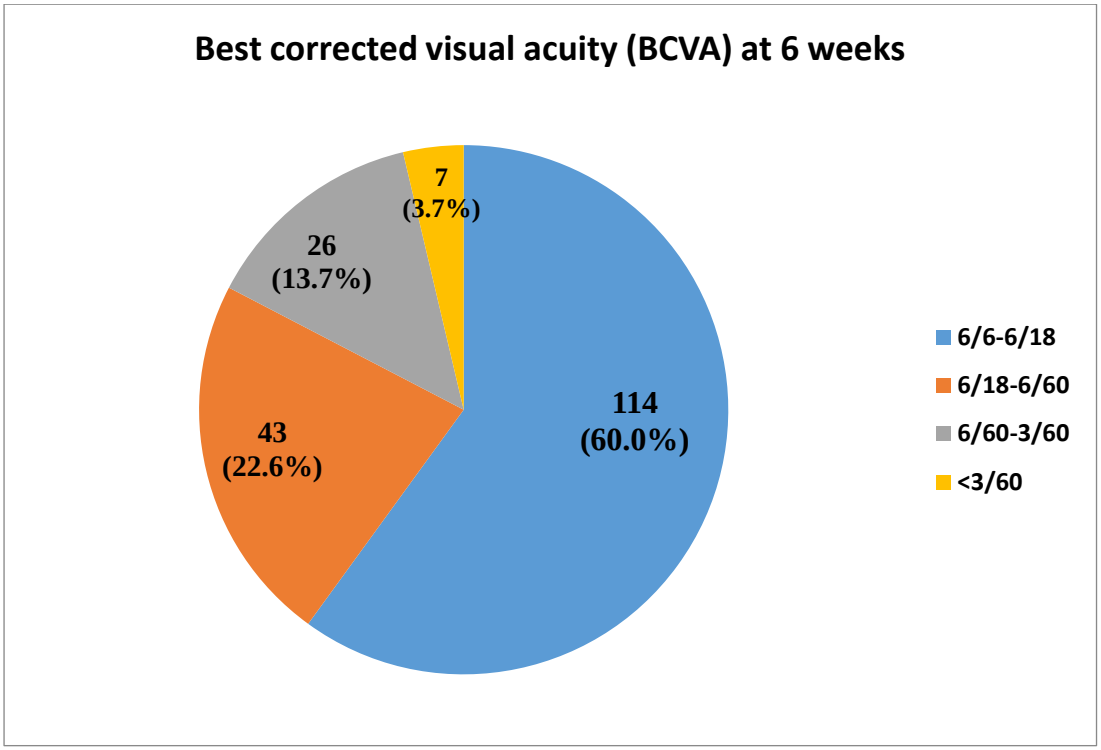

Figure 1: Best corrected visual acuity (BCVA) at 6 weeks

Discussion:

The current study investigated complications and visual outcome of cataract surgery in diabetic patients of eastern zone of Uttar Pradesh. In this study, patient's age ranged between 41 to 77 years with mean age of 63 ± 9.42 years. Males in the current study were 54.7% with male female ratio of 1.21:1. This is similar to the study by Lee D et al. They found mean age of diabetic patients to be 65.6±6.3 years who underwent cataract surgery. They also found male prevalence (58.4%) with male female ratio of 1.40:1. (10) Another study by Eva I. Mönestam found mean age of the type 2 diabetic patients with cataract surgery to be much higher i.e. 76 ± 8.8 years. (11) Cataract with diabetes was found to be more common among higher age group females which was statistically significant.

Most of the patients in this study were Hindus and from lower and middle socio-economic status, signifying that poor and middle class people visit government institution for their treatment. Those who are from higher class, prefer private institute. Out of all patients, 13 (6.8%) were newly diagnosed with diabetes when they got screened before surgery for cataract while rest were already diagnosed with diabetes when they first visited to hospital.

All patients were given peribulbar anaesthesia before cataract surgery. It prevents increase in cortisol and glucose which are seen under general anaesthesia. So, post-operative starvation is

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not needed. New techniques of cataract extraction have improved the outcome but it may not be true in diabetic individuals. Diabetics have higher complication rate for any surgery, so is true for cataract surgery also. In this study 64.2% (127) patients had developed complications, 12 among them showed more than 1 complication. Total number of complications in this study was 139. Corneal edema was the most common complication and it was found to occur significantly more in higher age females than the males. This was similar to the finding by Modi A. who observed corneal edema in 32% of diabetic patients who had cataract surgery. (12) Other studies also showed similar results depicting corneal edema to be the most common post-operative complication in diabetic eye after cataract surgery with female predominance. (13) Shakya K also obtained similar result showing that postoperative corneal edema was significantly higher in diabetic patients. (14) Other studies depicted similar results. Onakpoya H Oluwatoyin et a1. Found 30% in diabetics compared to 13% in control group. (15) Corneal endothelial cell damage is more in diabetic patients following cataract surgery, so it may cause delayed recovery. (16,17)

Next common complication in this study was iritis which were in 12.1%. Study by Honjo and Ogura also showed anterior chamber reaction to be present in 10% of diabetic patients who underwent cataract surgery. (18) Canan et al. observed anterior chamber reaction in 4.7% of the patients. (19) 11.0% patients in our study developed vitreous haemorrhage which was more than that was found by Lee et al. (7.5%). (20) Raised IOP in the current study was present in 19 (10.0%) patients. Although Canan et al. showed much higher rate of raised IOP i.e. 29.4%. (19)

Present study showed 4 (2.1%) patients developing retinal detachment as a complication. Lee et al. observed nearly similar incidence of retinal detachment in cataract surgery of diabetic patients (2.2%). (20) Silva et al. found it to be 3.1% while Honjo and Ogura found much higher rate (10%). (21,18) Intra-ocular lens (IOL) malposition was a rare complication affecting 2 patients only i.e. 1.2%. Kumar J and Pratap V also found that IOL dislocation was in less than 1% cases. (22)

As far as long term complication are concerned, Cystoid macular edema was the most common complication affecting 8.6% patient which was lesser than that found by Modi M and Meena MK (14%). (12) In contrast to present study, Alsarhani et al. observed it to be (3.1%). (13) Other studies also concluded that there was no significant association between cataract surgery and development of macular edema. (23,24) Recurrent uveitis was the 2nd most common complication after 48 hours. It occurred in 7 (3.7%) patients undergoing cataract surgery consisting of 4 (3.8%) males and 3 (3.5%) females. Kumar J and Pratap V found it as a rare complication of cataract extraction (0.9%). (22) Intra operative complications were noted in some patients & intra operative miosis was the most common complication. This coincided with Kutschan A.et al. study. (25)

In our study, majority of patients (60.0%) had visual acuity 6/18 or better at the end of 6 weeks. This is in accordance with the findings by Modi M and Meena MK in which 68% of the patients in diabetic group were found to have BCVA 6/12 or better at the end of 6 weeks of follow up. (12) 22.6% patients were having visual acuity of 6/18-6/60 after cataract surgery. It was even poorer (6/60-3/60) in 26 (13.7%) patients. Best corrected visual acuity was worst in 7 patients in which it was <3/60.

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Conclusion: Most common age group of diabetics having cataract is 61-70 years with older women were affected significantly more. Complications are common in cataract surgery and in diabetics it is even more. Out of 190 diabetic patients who underwent cataract surgery, complication was developed in 64.2% of them. In this study most common immediate complication was corneal edema followed by iritis vitreous haemorrhage (VH) and raised IOP. Cystoid macular edema and recurrent uveitis were the most common long term complication. Among patients 60% could achieve good visual acuity with BCVA 6/18 or better. To decrease complications, careful management of diabetes is necessary before and after the cataract surgery.

Acknowledgement: The authors are thankful to all the patients for giving consent to participate in the study.

Conflict of Interest: None

Source of funding: NIL

Authors' contribution: All the authors have made valuable contribution in designing, data collection, analysis and interpretation.

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