Original Article

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Study of Outcome of Cataract Surgery in Diabetic and Non-Diabetic Patients

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Abstract

Aims & Objectives: To evaluate the postoperative visual acuity and complications in diabetics and non-diabetics with cataract surgery

Method: A prospective case study of 100 eyes group A 50 eyes of diabetic and group B 50 eyes of non–diabetic all cases were operated by single surgeon. Patients underwent minimal incision cataract surgery SICS with PCIOL. Age group was taken 30 to 60years and above with good glycaemic control, surgical technique, and preoperatively and postoperative follow up day 1, POD 1week , 6weeks respectively, complication and ocular evaluation done with visual acuity (BCVA).

Results: Total 100 eyes 50 diabetic and 50 non-diabetics 41 males and 59 females. The mean age group in diabetic was 57.66 ± 8.29 years and 57 ± 7.27 years in non-diabetic group. All cases underwent SICS with PCIOL. Mean pre-operative visual acuity in the diabetic patients group A was 1.28 + 0.42 and non-diabetic patients group B was 1.37 +0.59. Mean post-operative best corrected visual acuity in log MAR units in the diabetic group A was 0.30 + 0.4 and in the group, B was 0.28 +0.5. The difference in pre and post op visual outcome was statistically not significant (p=0.01). Post-operative visual acuity of 6/9 or better was achieved in 36 (72%) eyes in diabetics and 40 (80%) among non-diabetics. Post-operative complications like Wound malposition, corneal oedema, striate keratopathy, anterior chamber reaction, pigment dispersion, cystoids macular edema and posterior capsular opacification. This incidence was higher in the diabetics (p<0.01).

Conclusion: Patients with no diabetic retinopathy or maculopathy do not require any special management if cataract surgery was uncomplicated. Visual acuity is similar in both groups. Post-operative complications like corneal oedema and anterior chamber reaction are more common in diabetics.

Keywords: Diabetic; Non-Diabetic; Cataract Surgery; Diabetic Cataract; Diabetes Mellitus.

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Introduction

Diabetes mellitus is a risk factor for development of cataract [1]. Development of cataract is the second most ocular common complication of diabetic mellitus [2]. Population growth, ageing, urbanization, sedentary lifestyles and an increasing prevalence of obesity are increasing the number of people with diabetes mellitus. Worldwide more than 285 million people are affected by diabetes mellitus. This number is expected to increase to 439 million by 2030 according to the International Diabetes Federation. Globally, cataracts remain the leading cause of blindness, affecting approximately 18 million people. Cataracts occur at an early age and 2-5 times more frequently in patients with diabetes, thus visual loss has a significant impact on the working population. Overall, upto 20% of all cataract procedures are estimated to be performed for diabetic patients [3]. Patients with diabetes

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mellitus have higher complication rates from cataract surgery. Furthermore some studies have reported that cataract surgery may have adverse effects, including, progression of retinopathy, vitreous haemorrhage, iris neovascularisation and decrease or loss of vision. Both diabetes and cataract pose an enormous health and economic burden, particularly in developing countries, where diabetes treatment is insufficient and cataract surgery often inaccessible [4].

Materials and Methods

This is a prospective study conducted between November 2016-May 2017 at Navodaya Medical College and Hospital. During this period, Total 100 patients underwent cataract surgery 50 diabetics and 50 non-diabetics who underwent Small Incision Cataract Surgery with Posterior Chamber Intraocular lens Implantation. The Patients included Age group 30-60 years and above with type 2 diabetes mellitus patients with good glycaemic control prior to surgery who have given informed consent were examined prospectively, Preoperative examination of visual acuity by Snellen's chart , measuring of Intraocular pressure (IOP) by Applanation tonometry, Anterior segment Slit lamp Examination, Gonioscopy (examination of the anterior chamber angle) and Posterior segment evaluation by Indirect Ophthalmoscope, In order to exclude, Patients with traumatic, uveitis or complicated cataract, glaucoma, Neovascularisation of iris, Iridocyclitis, Uncontrolled diabetes, Posterior segment diseases like pre-existing maculopathy and retinopathy . All these patients underwent pre-operative evaluation and complete ophthalmic examination, including a thorough history with required demographic data. Systemic evaluation was also carried out.

Pre-operative preparation: A day before prior to surgery one drop of moxifloxacin eye drops was given at hourly intervals. Pupillary dilatation by using tropicamide and phenylephrine 0.5% eye drop one hour before surgery. All patients underwent small incision cataract surgery with posterior chamber intraocular lens implantation under peribulbar anaesthesia.

Post-operative evaluation: On post-operative day 1, Visual acuity was recorded to all the patients and with detailed slit lamp examination and fundus examination. Patients were discharged on the second post-operative day. Advised On discharge all patients should receive same brand of ofloxocin dexamethasone combination eye drops 6-8 times per day, which was then tapered over a period of 6 weeks. The patients were asked to review at 1 week, 6 weeks and 3 months from the date of surgery. Fallow ups were subjected to examine; Slit lamp examination assessment of anterior chamber inflammation aqueous flare and cells measured by counting within the field visible with a slit lamp keeping the beam at maximum intensity. Fundus examination, Visual acuity was recorded on every visit.

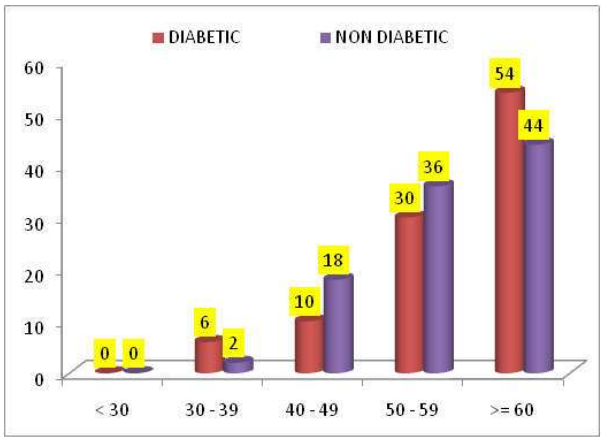
Results

In the prospective study 100 patients were divided into two group and examined. Group A 50 eyes of diabetics group A and 50 eyes of non-diabetics in group B underwent small incision cataract surgery with intraocular lens implantation. The age and sex wise distribution, glycaemic control, preoperative visual acuity, complications of the procedure and final visual outcome were analyzed.

In this study, highest number of patients were in the Age group of 60 years and above 49 (49%) in group A 27 (54%) in group B. 22 (44%). Remaining 23 (46%) of the patients in diabetics and 28 (56%) of the patients in non-diabetic group B were below 60 years (Table 1 and Graph 1).

Table 1: Age distrbution

Age (Years)	Diabetic		Non Diabetic		Total	
	No	%	No	%	No	%
< 30	0	0	0	0	0	0
30 – 39	3	6	1	2	4	4
40 – 49	5	10	9	18	14	14
50 – 59	15	30	18	36	33	33
>= 60	27	54	22	44	49	49
Total	50	100	50	100	100	100
Mean ± SD	57.66 ± 8.29		57.18 ± 7.27		57.42 ± 7.764	

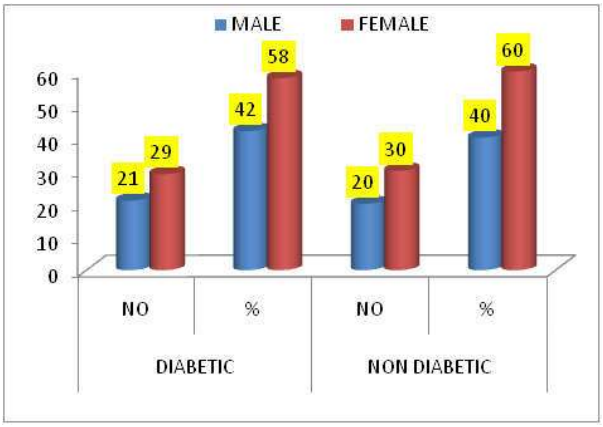


Graph 1:

In this study gender distribution, in group A 29 (58%) were females and 21 (42%) were males. Among group B, 28 (56%) were Females & 22 (44%) were males (Table 2 and Graph 2).

Table 2: Gender distribution

Sex	Diabetic		Non Diabetic		Total	
	No	%	No	%	No	%
Male	21	42	22	44	41	41
Female	29	58	28	56	59	59
Total	50	100	50	100	100	100



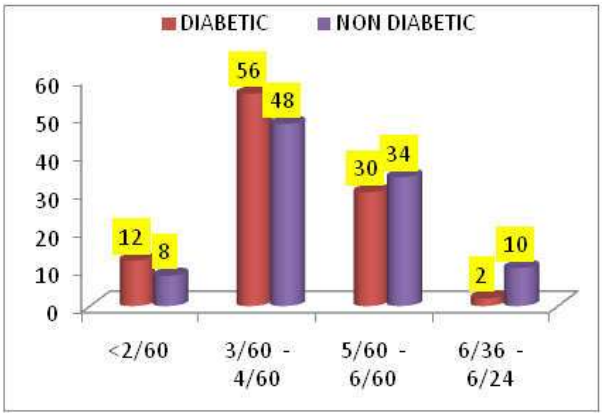
Graph 2:

In group A diabetic patients 34 (68%) had good glycemic control prior to surgery (RBS: 79–160 mg/dl). 1 (2%) patients had low blood sugar levels at the time of examination (<79 mg/dl). Their blood sugars normalized eventually and they were operated. More importantly, 15 (30%) patients had high fasting blood sugar levels (RBS: >160 mg/dl). The height fasting blood glucose value recorded was 120 mg/dl. This included patients with and without treatment.

In this study, 44 (88%) of the patients were type 2 diabetes mellitus on either injection insulin or oral hypo-glycaemic agents while the remaining 6 (12%) of patients without any treatment. 28 eyes (56%) of the diabetics and 24 eyes (48%) of the non-diabetics patients had vision acuity 3/60 to 4/60. Among all patients were more in 49 (98%) of the diabetics and 45 {90%) of the non-diabetics had visual acuity less than 6/60. 1 (2%) of the group A and 5 (10%) of the group B had vision of 6/36 - 6/24. The mean preoperative BCVA in the diabetic group was 1.28 ±0.42 and ingroup B was 1.37 ± 0.59. The p value (<0.10) was not statistically significant. (Table 3 and Graph 3).

Table 3: Preoperative visual acutiy

Visual Acuity	Diabetic		Non Diabetic		Total	
	No	%	No	%	No	%
<2/60	6	12	4	8	10	10
3/60 - 4/60	28	56	24	48	52	52
5/60 - 6/60	15	30	17	34	32	32
6/36 - 6/24	1	2	5	10	6	6
Total	50	100	50	100	100	100

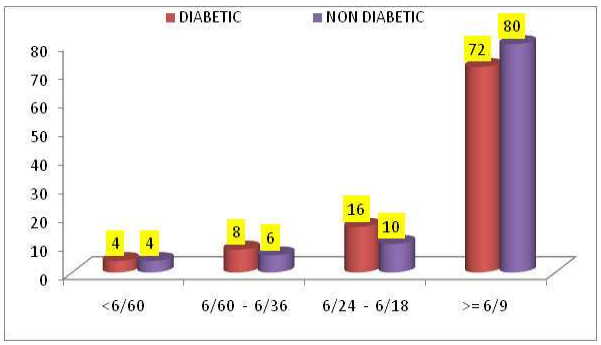


Graph 3:

the final visual outcome was recorded using Snellen's visual acuity chart. Majority of the patient's Visual acuity of 6/9 or better at the end of 6 weeks of follow up. Only 2 patients in the diabetic group and 2 patients in the non-diabetic group had visual acuity less than 6/60. The mean post-operative best corrected visual acuity in log MAR units in the diabetic group A was 0.30 + 0.4 and in the group B was 0.28 + 0.5. On comparing the post op values in both the groups the p value was (<0.2) which was not statistically significant. On comparing the pre-operative and post-operative visual acuity in both the groups the p value (0.01) was statistically significant (Table 4 and Graph 4).

Table 4: Post operative visual acuity

Visual Acuity	Diabetic		Non Diabetic		Total	
	No	%	No	%	No	%
<6/60	2	4	2	4	4	4
6/60 - 6/36	4	8	3	6	7	7
6/24 - 6/12	8	16	5	10	13	13
>= 6/9	36	72	40	80	76	76
Total	50	100	50	100	100	100



Graph 4:

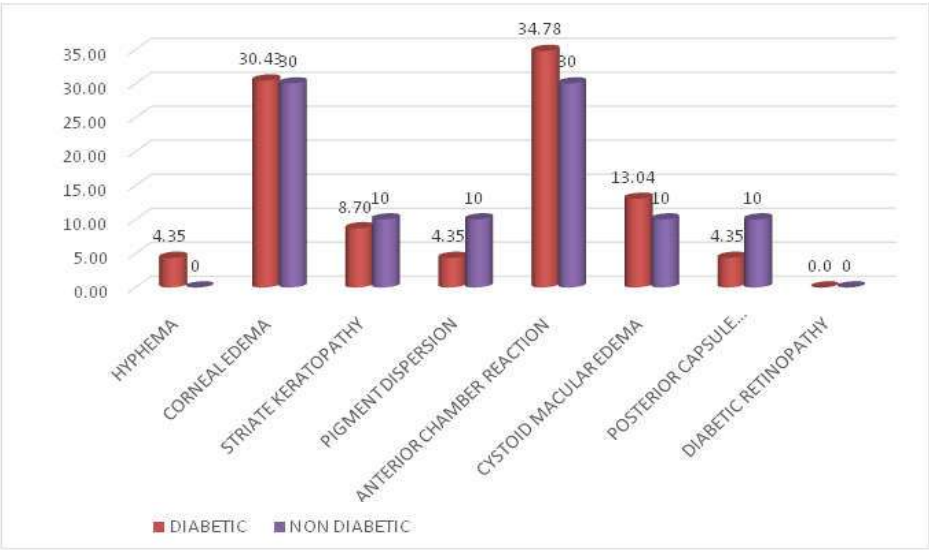
Post-operative complications were noted development of PCO was in diabetics 1 (4.35%) and 1 eye (10%) in non-diabetics after 6 weeks fallow up. Cystoid macular edema was noted in 3 (13.04%) of diabetic and 1 (10%) of non-diabetic eyes post operatively at the end of 6 weeks. Hyphema seen in 1 (4.35%) in diabetic group.Corneal oedema 7 (30.43%) and 3 (30%) of the cases in diabetic and non-diabetic groups respectively which was considerably higher in diabetics compared to non-diabetics. Striate keratopathy was found in 2(8.70%) of the diabetics compared to 1 (10%) in non-diabetics. Pigments Dispersion were seen in 1 (4.35%) of the cases in diabetics as compared to 1 (10%) in the group B. It was similar in both the groups in our study (Table 5 and Graph 5).

Discussion

This study, highest number of patients were in the age group of 60 years and above that is 27 (56%) in diabetics & 22 (44%) in control group. Remaining 23 (46%) of the patients in diabetics and 28 (56%) of the patients in non-diabetic group B were below 60 years. The mean age group of the patients in diabetic group was 57.66 ± 8.29 and 57.18 ± 7.26 years in non-diabetic group.

Table 5: Postoperative complications

Complications	Diabetic		Non Diabetic		Total	
	No	%	No	%	No	%
Hyphema	1	4.35	0	0	1	3.03
Corneal Edema	7	30.43	3	30	10	30.30
Striate Keratopathy	2	8.70	1	10	3	9.09
Pigment Dispersion	1	4.35	1	10	2	6.06
Anterior Chamber Reaction	8	34.78	3	30	11	33.33
Cystoid Macular Edema	3	13.04	1	10	4	12.12
Posterior Capsule Opacification	1	4.35	1	10	2	6.06
Diabetic Retinopathy	0	0.0	0	0	0	0
Total	23	100	10	100	33	100



Graph 5:

The Framingham and other eye studies indicate a 3-4 fold increased prevalence of cataract in patients with diabetes under 65 [5,6]. In this study, in diabetic group 29 (58%) were females and 21 (42%) were males. Among the non-diabetic 22 (44%) males & 28 (56%) were females.

In the Framingham eye study also senile lens changes were more common in women. In our study majority of patients were also females. In these 50 patients in group A, we assessed the pre-operative 15 (30%) patients had high Random blood sugar levels (RBS > 160 mg/dl). Under control of glycaemic levels and they were operated. In the present study, 44 (88%) patients on treatment for type 2 diabetes mellitus on either injection insulin or oral hypo-glycaemic agents, 6 (12%) without treatment. Nascimento et al. reported that serum glucose level had no influence on the peri-operative clinical complications and final visual outcome of cataract surgery amongst diabetic patients [7]. Rapid pre-operative glycemic control should be avoided as it may increase the risk of post-operative progression of retinopathy and maculopathy [8]. The risk for cataract formation and diabetic retinopathy is increased in patients with longer duration of diabetes and in those with poor metabolic control. The prevalence of cataract was higher in those with a longer duration of diabetes and known diabetes, suggesting a more prolonged influence of biochemical cataractogenic stimuli (hyperglycemia) The other systemic co-morbidities in our study was not statistically significant. Patients underwent SICS with PCIOL implantation, and all the Surgeries were done by the single surgeon. On evaluation of patients on post-operative day 1 in diabetic group corneal oedema was noted 7 (30.43%) and 3 (30%) and non-diabetic groups. which was higher in diabetics compared to non-diabetics. Hyphema was noted in 1 (4.35%) in diabetic group. Striate keratopathy was noted in 2 (8.70%) of the diabetics 1 (10%) in nondiabetics. Other studies showing similar higher percentage of striate keratopathy are: Onakpoya H Oluwatoyin et al. [9] 30% in diabetic compared to 13% in control group. Larsson et al. [10] have shown that diabetes has been associated with structural changes in corneal endothelial cells such as polymegathism and pleomorphism. The cornea has been reported to be thicker in eyes of diabetic patients than in eyes of non-diabetic subjects. Cataract extraction and IOL implantation causes trauma to the already compromised corneal endothelium and causes corneal edema. Lee JS et al. [11] showed a decrease in corneal endothelial cell density and the coefficient of variation by cell size significantly increased for high risk proliferative diabetic retinopathy.

Study by Morikuba S et al. [12] has shown increase in the corneal thickness was greater on post-op day one among diabetic patients. The same study also showed that corneal endothelial loss was maximal at 1st week after operation. It said that the corneal endothelium in diabetic patients is under metabolic stress, and weakness against mechanical loads such as cataract surgery, than that in non-diabetic subjects. Hence compared with non-diabetic subjects, eyes of diabetic patients showed more damage in corneal endothelial cells after cataract surgery and a delay in the post-operative recovery of corneal edema.

Pigments Dispersion over IOL noted in 1 (4.35%) of the cases in diabetics as compared to 1 (10%) in the group B. Which was equal in both the groups. Onakpoya H Oluwatoyin et al. [9] showed increase amount of pigment over IOL in diabetic patients compared to non-diabetic.

In this study, total 8 (34.78%) eyes in diabetic group and three (30%) eyes in the non-diabetic group had anterior chamber reaction. 19% of diabetic & 7% of non-diabetic patients with grade II cells and flare on 1st post-operative day, 10% in the diabetics group A & 4% in non-diabetic group B had grade I cells & flare. Grade III was found in 8% in the diabetics group A & 4% in non-diabetic group B and grade IV was found in 3% of the patients in diabetic group and 3% in non-diabetic group.

Cystoid macular edema was noted in 3 (13.04%) in diabetic 3 (30%) of non-diabetic eyes post-operative 6th week. clinical and angiographic cystoid macular oedema, postoperative inflammation, prolong surgery, wound size and posterior capsular rupture or vitreous loss are the influencing factors.

The LEC's proliferate in response to many factors; one of these triggers is inflammation. It has been suggested that surgical invasion and contact with the IOL stimulate residual LECs to produce cytokines such as interleukin-1 (IL-1), IL-6, IL-8, basic fibroblast growth factors and transforming growth factor-ß. These cytokines may in turn affect epithelial cells as autocrine or paracrine factors and induce collagen production and fibrous proliferation. Thus, the degree of postoperative inflammation may be related to the development of PCO [13].

Diabetic and non-diabetic patients have no significant change in PCO after 6 week POD cataract surgery in our study. Opacification of the posterior capsule undoubtedly interferes with postoperative fundoscopy of the retina, retinal photocoagulation,

and even vitreous surgery, which is necessary in some cases. Therefore, it is important to maintain transparency of the posterior capsule in patients with diabetes for view fundoscopy, retinal photocoagulation, and even vitreous surgery.

Visual Acuity was measured by using Snellen's visual acuity chart and the values were converted to log MAR units for statistical analysis. Majority of the patients, 36 (72%) in the diabetic group A and 40 (80%) in the non-diabetic group B had visual acuity of 6/9 or better at the end of 6 weeks of follow up. 2 patients in the diabetic group and 2 patients in the non-diabetic group had visual acuity less than 6/60. This was due to PCO and Cystoid macular oedema in the patients. The mean post-operative best corrected visual acuity in log MAR units in the diabetic group was 0.30 + 0.4 and in the control group was 0.28 + 0.5. On comparing the post-operative values in both the groups the p value was (<0.2) which was not statistically significant. Both the groups have good visual acuity following cataract surgery. That means similar visual outcome in diabetic and no diabetic patients without retinopathy prior to surgery in diabetic's patients.

Conclusion

The visual outcomes following small incision cataract surgery with PCIOL in diabetics and non-diabetics. The pre-operative visual acuity was compared to the post-operative best corrected visual acuity in both the groups and the P value was statistically significant (p=0.01). The post-operative complications like corneal oedema and anterior chamber reaction are more common in diabetics that were observed during the study were significantly more in the diabetic group when compared to the non-diabetics. Patients with no diabetic retinopathy or maculopathy do not require any special management if cataract surgery was uncomplicated. Visual acuity is similar in both groups.

Therefore, we concluded that small incision cataract surgery in diabetics without diabetic retinopathy yields similar visual outcomes as non-diabetics.

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