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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/18128
DOI URL: http://dx.doi.org/10.21474/IJAR01/18128

RESEARCH ARTICLE

VISUAL OUTCOME AND EARLY POSTOPERATIVE COMPLICATIONS OF CATARACT SURGERY IN PATIENTS WITH DIABETES IN TERTIARY CARE HOSPITAL

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Manuscript Info

Manuscript History
Received: 06 November 2023
Final Accepted: 10 December 2023
Published: January 2024

Abstract

Purpose: To study the visual acuity outcomes and early complications of cataract surgery in patients with diabetes in tertiary care hospital.
Materials and Methods: The research was conducted at the Ophthalmology Outpatient Department of Pravara Rural Medical Hospital, Loni. The data was drawn from patient records, focusing on individuals diagnosed with cataracts and known cases of Diabetes Mellitus (DM). Employing a descriptive longitudinal study design, the research encompassed a sample size of 110 individuals, selected through a purposive sampling method. The study spanned from June 2022 to June 2023.
Result: The study included 110 patients. Diabetes leads to an increase in age-related cataract development more so in females. 6 weeks after the surgery 70% of patients had BCVA between 6/12-6/6, 20.9% of patients had BCVA between 6/24 and 6/18 and the remaining 9% had BCVA below 6/36. Anterior segment complications such as corneal edema, severe iritis, posterior synechiae, pupillary block, and pigmented precipitates on the IOL are more frequently observed.
Conclusion: Enhancements in Best-Corrected Visual Acuity (BCVA) following the surgical intervention suggest that cataract surgery holds promise in effectively managing the visual challenges stemming from cataracts among diabetic patients.

Introduction:-

A common cause of visual impairment in patients with diabetes is the presence of cataract. Cataract also represents a substantial healthcare burden worldwide, with a needed cataract surgery rate of 3,000 per million people per year in order to eliminate cataract blindness worldwide[1.]Compared to patients without diabetes, diabetic individuals develop cataracts approximately 20 years earlier and undergo cataract surgery for visually significant cataracts at a much younger age[2] The Framingham study revealed a three- to fourfold increased prevalence of cataract in diabetic patients under the age of 65, and up to a twofold increased prevalence in patients above 65[3] Cataract progression in diabetic eyes is more rapid and the identification of effective interventions to delay or prevent the development of visually significant cataracts in diabetic patients remains a challenge.

Although there have been dramatic advances in cataract surgery in recent years, cataract surgery in diabetic patients poses more than a 30% higher risk than in non-diabetic patients of peri- and postoperative complications.[4-6]

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Postoperative adverse events can arise in relation to complications from the cataract surgery itself or due to the subsequent progression of diabetic retinopathy (DR) or diabetic macular edema (DME)

A hallmark ‘‘snowflake’’ cataract is usually found in type 1 young diabetic patients and tends to progress rapidly. However, the most frequent cataract type in all diabetic patients is the nuclear sclerotic type. Cataract occurs earlier and progresses faster in diabetic than in nondiabetic patients. Positive correlations have been described between higher glycosylated hemoglobin levels at baseline and lens opacification .[7-9]

Cataract development in DM could be due to changes in lens proteins from hyperglycemia related glycation end-product (AGE) accumulation[10-11]

Hyperglycemia generates AGEs through non-enzymatic glycation, followed by oxidative reactions between reducing sugars and proteins, which can lead to osmotic stress and accumulation of fluid[12]It has been found that AGEs, including N-(carboxyethyl) lysine (CEL), pentosidine, N-(carboxymethyl)- L-lysine (CML), pyrraline, and fluorophore LM-1 are found at higher levels in cataractous lenses of diabetic patients when compared to the normal aging population.[13-15]

The increased glucose levels in the aqueous humor induce glycation of lens proteins and therefore increase the level of free radicals. This process, also known as ‘‘glucoxidation,’’ further opacifies the lens as a result of increased oxidative stress especially given impaired antioxidant capacity in diabetic lenses. Studies suggest that earlier cortical cataract formation is related to AGEs and subsequent osmosis, whereas the oxidative stress pathway tends to lead to later development of nuclear and mixed-type cataracts in diabetic patients.28 Similarly, in the activation of the polyol pathway, the enzyme aldose reductase causes the reduction of glucose to sorbitol. This leads to the accumulation of sorbitol within the lens, causing an osmotic gradient that may lead to the development of subcapsular cataracts that are frequently found in patients with diabetes.[16-17]

Materials and Methods:-

The research was conducted at the Ophthalmology Outpatient Department of Pravara Rural Medical Hospital, Loni. The data was drawn from patient records, focusing on individuals diagnosed with cataracts and known cases of Diabetes Mellitus (DM). Employing a descriptive longitudinal study design, the research encompassed a sample size of 110 individuals, selected through a purposive sampling method. The study spanned from June 2022 to June 2023, allowing for a comprehensive understanding.

Inclusion Criteria

1. All patients with cataract with diabetes and undergoing cataract surgery.
2. Patients willing to participate in the study after informed consent.
3. Patients above 45 years of age.

Exclusion Criteria

1. Patient having the following conditions
Uveitis
Glaucoma
Proliferative Retinopathy
Severe non-proliferative retinopathy
2. Patients with hypertensive retinopathy
3. Previous laser treatment

Figure 1:- 'Snowflake' diabetic cataract with an appearance of white subcapsular spots.

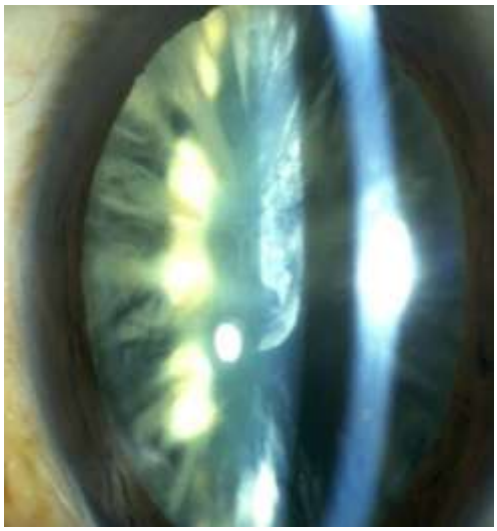


Figure 2:- Wedge-shaped opacities and vacuoles in cortical cataract.

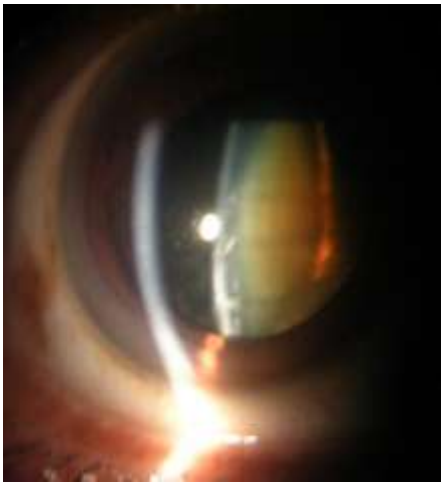
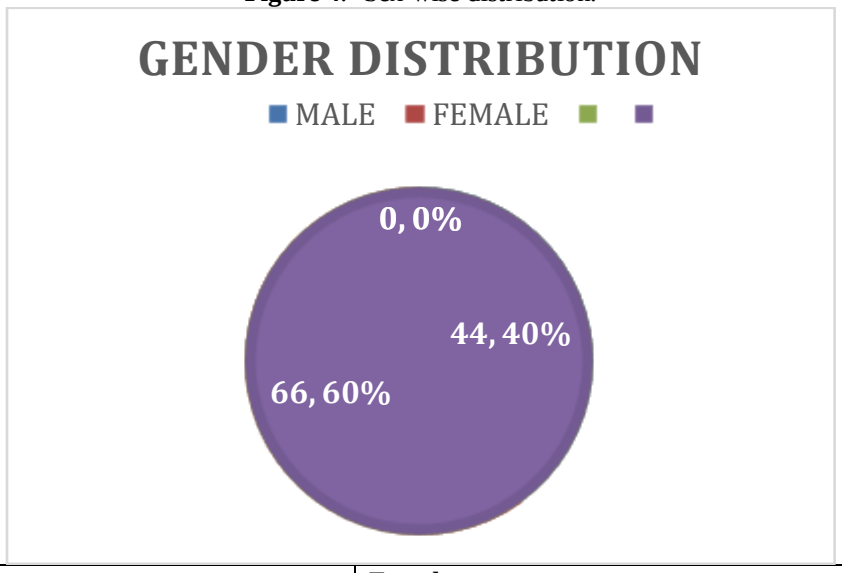


Figure 3:- Anterior and posterior subcapsular opacification.

Diabetic patients seem to be at an increased risk of developing various types of cataracts, including snowflake cataract, senile cataract, posterior subcapsular cataract, nuclear cataract, and cortical cataract. The association between cataracts and diabetes may be influenced by factors such as glycated hemoglobin levels and the duration of diabetes.[20-22]

Results:-

Figure 4:- Sex-wise distribution.



Male		Female	
No.	**Percentage**	**No.**	**Percentage**
44	40	66	60

Table 01:- 110 patients with cataract with diabetes underwent cataract surgery. Among those patients, 66 (60%) were female whereas 44 (40%) were male (figure 04).

Figure 5:- Age-wise distribution.

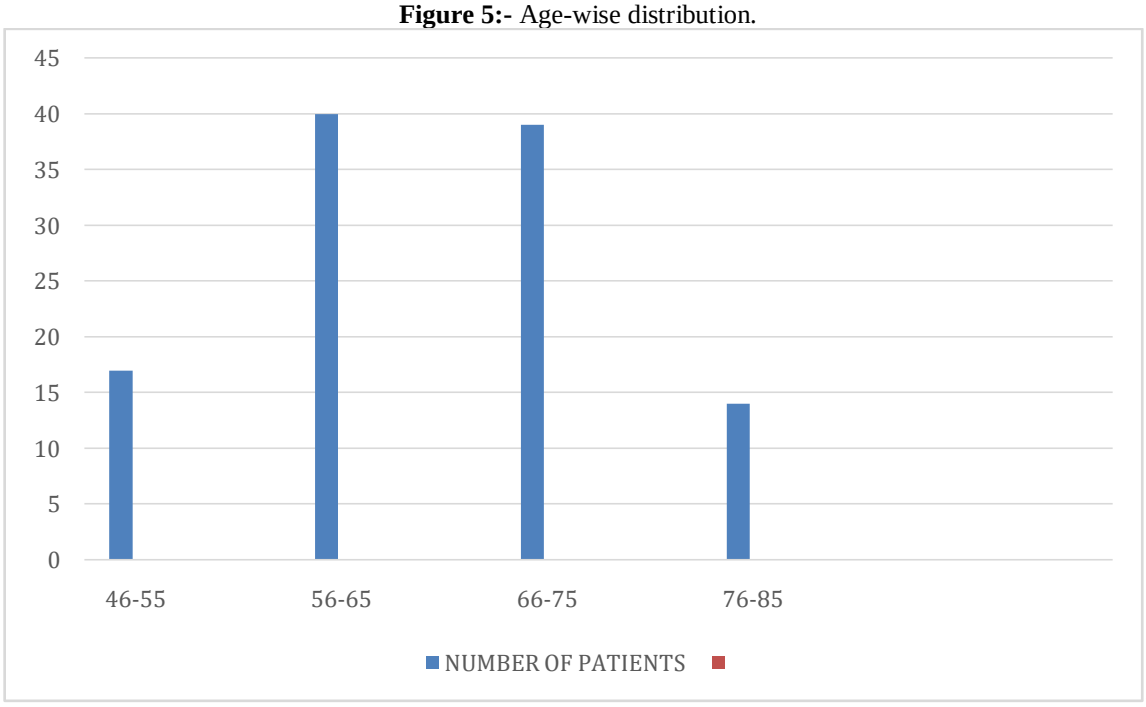


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Table 2:- The ages of 110 patients ranged from 46 years to 85 years with patients 17 patients(15.5%) in the age group of 46-55, 40 patients (36.4%)in the age group of 56-65, 39 patients (35.4%) in the age group of 66–75 and 14patients (12.7%) between 76-85 years

AGE IN YEARS	NUMBER OF PATIENTS	PERCENTAGE
46-55	17	15.5
56-65	40	36.4
66-75	39	35.4
76-85	14	12.7

Figure 6:- Visual acuity outcome before and after cataract surgery.

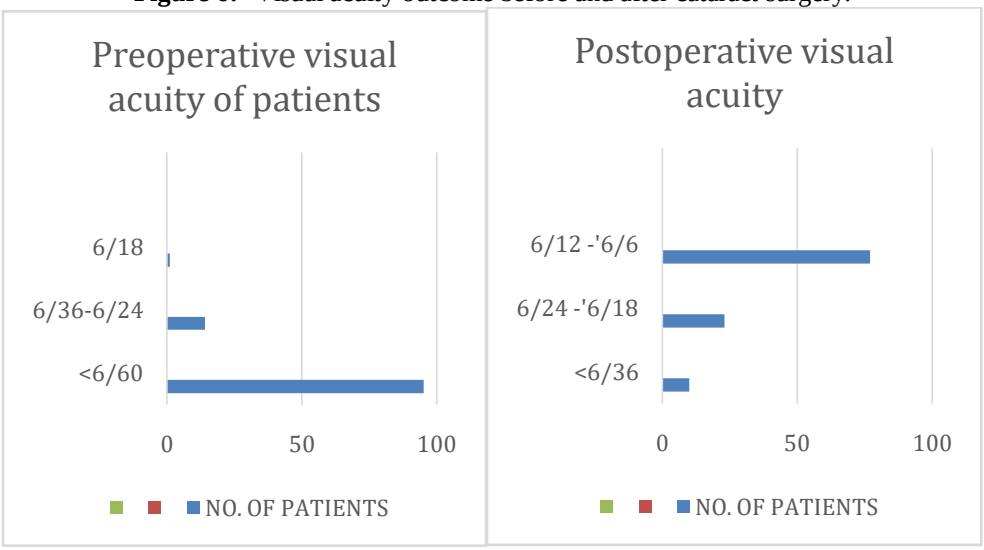

Table 3:- Before surgery, 86.36% had visual acuity below '6/60 while after the surgery 70% of patients had visual acuity between '6/12-'6/6, 20.9% of patients had VA between '6/24 –'6/18 and the remaining 9% had VA below '6/36.

VISUAL ACUITY BEFORE CATARACT SURGERY	NO. OF PATIENTS	%	VISUAL ACUITY AFTER CATARACT SURGERY	NO. OF PATIENTS	%
<6/60	95	86.36	<6/36	10	9.09
6/36-6/24	14	12.72	6/24 -'6/18	23	20.90
6/18	1	0.9	6/12 -'6/6	77	70

Table 4:- Early Complications Of Cataract Surgery In Diabetes.

EARLY COMPLICATIONS	NO. OF PATIENTS	%
Corneal edema	33	30
Corneal epithelial defect	10	9.09
Iritis	15	13.6
Retained cortical material	18	16.36
Raised IOP	6	5.45
Iris Prolapse	4	3.6
Hyphaema 1	6	5.45
Wound leak	10	9.09

IOL Malposition	9	8.18
Vitreous in wound	7	6.36

Anterior-segment complications such as severe iritis, posterior synechiae, pupillary block, and pigmented precipitates on the IOL are more frequently observed in diabetic patient

Discussion:-

In the Wisconsin study of diabetic retinopathy females constituted the majority 67% in the study. Gender standardized prevalence of diabetes in our study showed that, it is higher in females.(60%).

The incidence of cataract with regard to age was evaluated and this study shows that early 36.4% of the patients are between the age 56-65 years. This correlated with the health and nutrition examination surgery (HANES) and the Framingham study that there is an increased risk of age related cataract development in diabetic less than 65 years old.

Preoperative glycemic control was established through various methods, including oral hypoglycemic agents (OHA) and dietary management, insulin alone, or a combination of OHA and insulin. The predominant approach involved the use of OHA and insulin in the majority of cases (85%). Regular insulin was administered when plasma glucose levels exceeded 300 mg/dL, and effective glycemic control was attained by adjusting the insulin dosage based on the monitored plasma glucose levels. All 110 diabetic patients included in the study were classified as type 2 diabetes. The study excluded individuals with additional comorbidities, including uveitis, glaucoma, a history of previous laser treatment, and severe or proliferative proliferative diabetic retinopathy.All patients undergoing cataract surgery received local anesthesia. The utilization of local anesthesia during cataract surgery offers enhanced metabolic control for diabetic patients. This approach helps maintain glucose homeostasis, preventing the elevation of cortisol and glucose levels observed with general anesthesia, and eliminates the necessity for post-operative fasting.

6 weeks after the surgery 70% of patients had BCVA between ‘6/12-‘6/6, 20.9% of patients had BCVA between ‘6/24 –‘6/18 and the remaining 9% had BCVA below ‘6/36A record of early post operative complications in this study showed that corneal odema (30%) was found to be the most common post operative complication occurring in the first 48hours. Diabetic cornea has reduced sensitivity and undue stress can lead tokeratoepitheliopathy. The reduction of expression of entactin / laminin– 1, and 10, and of their binding α3β integrin in diabetic retinopathycornea may severely impair adhesive and migratory properties of corneal epithelial cells. Such alteration in the corneal cell BM adhesion may be the mechanism underlying clinically observed abnormalities inepithelial barrier function, adhesion, epithelial integrity and wound healing.[23]Menchini U et al showed an increased risk of ocular complications in diabetes after cataract surgery but modern surgical techniques have minimized them, leading to an overall good visual outcome. Kutschan A et al's study said, that among early post-operative complications, anterior segment inflammation was most frequent(10.1%).[24]

Conclusion:-

An evaluation was conducted on 110 diabetic patients who underwent cataract surgery. Diabetes is linked to an increased development of age-related cataracts, particularly in females. The once-typical snowflake diabetic cataract is now rare, with the cortical variety being the most common. Hypertension and ischemic heart disease (IHD) showed a higher association with diabetes. A comprehensive ocular assessment before cataract surgery is imperative. Adequate preoperative preparation, including mydriasis, significantly influences surgical outcomes. Local anesthesia with peribulbar/retrobulbar is the preferred choice for cataract surgery in diabetic patients.

Recent studies on cataract surgery in diabetics indicate a lower incidence of complications and improved visual outcomes. This is attributed to enhanced preoperative management of retinopathy, advancements in operative techniques, better control of glycemic and hypertensive conditions, and improved phacoemulsification surgical techniques. Diabetic patients with minimal or no retinopathy demonstrate a positive visual prognosis comparable to individuals without diabetes.

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