Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-7, Issue-4 | July-August, 2021
Page no- 56-67 | Section- Research Article (Ophthalmology)

Corneal Endothelial Cell Change after Phacoemulsification: A Comparison between Diabetic and Non-diabetic patient

Israt Jahan[1*], Mohammad Mashiur Rahman[2]

[1]Assistant professor (Ophthalmology), National Institute of Ophthalmology and Hospital, Dhaka, Bangladesh. Email: isratira96@gmail.com, Orcid Id: 0000-0001-5515-0450
*Corresponding Author

[2]Junior Consultant (Surgery), OSD, DGHS, Dhaka, Bangladesh. Email: rahmanmashiur40@gmail.com, Orcid Id: 0000-0003-4773-4899

Received:April 2021
Accepted: May 2021

Abstract

Introduction: Cataract is the main cause of avoidable blindness especially in the developing world and phacoemulsification is one of the most practicing method to perform cataract surgery. Corneal clarity after cataract surgery is a special interest to the ophthalmologist which is mostly maintained by endothelium. Some degree of endothelial cell loss is inevitable after cataract surgery.**Aim of the study:** To evaluate the effect of diabetes mellitus on corneal endothelium after phacoemulsification with PCIOL implantation. **Methods:**The study was a prospective observational study and conducted on 100 diagnosed patients of age related cataract (diabetic and non-diabetic 1:1 basis) attending in the cataract clinic of National Institute of Ophthalmology and Hospital, over the period of December, 2011 to May, 2012. Patients were selected based on specific selection criteria. All surgery was done by same surgeon of NIOH. Patient information, ocular examination and pre and post-operative endothelial cell count and morphology was recorded on a standard data collection sheet. Results were presented by appropriate table and graphs, data was analyzed by SPSS version 15. **Result:** Goup-1 was cataract patient without diabetes mellitus and Group-2 was cataract patient with diabetes mellitus. In Group-1 endothelial cell count per square millimeter in base line period was 2432.36, on 1st POD 2309.10, after 1 week 2272.63 and after 1 month 2251.16. In Group -2 endothelial cell count per square millimeter in base line period was 2409.10, on 1st POD 2219.30, after 1 week 2189.30 and after 1 monthly 2164.16. Cell size variability (%) in Group-1 in base line period, on 1st POD, after 1 week, and after 1 month were -35.36, 36.76,38.60, 38.71; Group-2 in base line period, on 1st POD, after 1 week, and after 1 month were- 35.38, 38.56,39.43,40.19 respectively. Hexagonality of endothelial cell in Group-1 in pre-operative and post-operative value were 51.50 and 49.10; in Group-2 in pre-operative and post-operative value were 48.60 and 46.50 respectively. Mean Intra ocular pressure in Group 1 and Group 2 was 12.13 and 12.23 mm Hg and on 1st POD 13.96 and 15.20 mm Hg, after 1st week of operation mean IOP was declined to 12.03mm and 12.10 mm of Hg, after 1 month further declined to 11.96 and 11.82 mm of Hg respectively. Mean visual acuity expressed in log MAR, Group-1 in base line period, on 1st POD, after 1 week, and after 1 month were- 1.15, 0.45, 0.08 and 0.07 respectively. Group-2 in base line period, on 1st POD, after 1 week, and after 1 month were-1.12, 0.41, 0.07 and 0.06 respectively. Mean age in Group -1 was 55.3±5.89 years, male were 32 (64%) and female were 18 (36%). Mean age in Group -2 was 55.60±6.14 years, male were 37 (74%) and female were 13 (26%). **Conclusion**: Diabetes mellitus is a causative factor for more endothelial cell loss and morphological changes which are reflected by decrease in percentage of hexagonal cells and increase in cell size after phacoemulsification. So special care should be taken for diabetic patients during surgery.

Keywords:Corneal Endothelial Cell, Phacoemulsification, Diabetic and Non-Diabetic Patient.

INTRODUCTION

Cataract is currently the main cause of avoidable blindness especially in the developing world accounting for about three-quarters of blindness. In developed world phacoemulsification is the primary method of performing cataract surgery. Even in the developing countries this method is being adopted increasingly day by day. Corneal endothelium after cataract surgery is a matter of special interest to the ophthalmologists. Several studies have indicated an increased corneal vulnerability in diabetic subjects to intraocular surgical stress. It is likely that this phenomenon occurs because of chronic metabolic changes on the cellular level that primarily seems to affect the monolayer of corneal endothelial cells. These largely hexagonal cells are responsible for maintaining the desiccation of the stroma by actively removing the water and thus play a pivotal role in maintaining the clarity of the cornea. Disturbance in the endothelial homeostasis might therefore have a profound effect on the clarity of the cornea. Some degree of endothelial cell loss is inevitable after any type of cataract surgery. Phacoemulsification surgery involves complex interaction between power, flow and vacuum. For smooth surgery maintenance of space and protection of ocular structures are very important. Many studies conducted regarding corneal endothelial cell in different interests. Some studies recommend no significant change of corneal endothelium before and after cataract surgery as well as no change between diabetic and non-diabetic. Some study put controversy as they reveal that the diabetic corneal endothelium is morphologically abnormal and may be at risk in any intraocular surgical procedure. The purpose of this study is to investigate the differences in corneal endothelial cell density and morphology in diabetic patients and normal patients after phacoemulsification with intraocular lens implantation. Diabetes mellitus is a metabolic disorder resulting in raised blood glucose that is hyperglycemia from defect in insulin secretion, insulin action or both that arises from genetic as well as environmental factors. Epidemiological study suggests that the incidence of diabetes is increasing worldwide.

Its global prevalence was about 8% in 2011 and is predicted to rise to 10% by 2030[1].In Bangladesh, which had a population of 149.8 million in 2011[2]a recent meta- analysis showed that the prevalence of diabetes among adults had increased substantially, from 4% in 1995 to 2000 and 5% in 2001 to 2005 to 9%in 2006 to 2010.[3] According to the International Diabetes Federation, the prevalence will be 13% by 2030.[1]

It is a chronic debilitating disease with a range of severe complications. Complication of diabetes increases with its duration. It is the leading cause of new cases of blindness and 25 times more prone to eye problems.So management of diabetes as well as

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-7, Issue-4 | July-August, 2021
Page no- 56-67 | Section- Research Article (Ophthalmology)

prevention of its complication isimportant. There are ample evidences from applied clinical research that morbidity and mortality risks associated with diabetes are preventable.[4] Diabetes mellitus cause cataract. Hyper glycaemia is reflected in a high level of glucose in the aqueous humour, which diffuses into the lens. Here glucose is metabolized by aldose reductase into sorbitol, which then accumulates within the lens, resulting in secondary osmotic over hydration of the lens substance. In mild degree, this may affect the refractive index. Cortical fluid vacuoles develop and later evolve into frank opacities. Classical diabetic cataract consists of snowflake cortical opacities occurring in the young diabetic that may resolve spontaneously or mature within a few days. Age related cataract occurs earlier in diabetes mellitus. Nuclear opacities are common and tend to progress rapidly. Hyperglycemia cause increase glycation leading to accumulation of basement membrane collagen and membrane leakiness. Stimulation of intracellular polyol pathway leading to basement membrane and capillary endothelial cell damage.[5] The corneal endothelial cell is a regular hexagon. The normal cell density is about 3000cell/mm., count below 1000 are associated with a significant risk of endothelial decompensation. The diabetic corneas tended to be thicker and had more pleomorphism and polymegathism.[6] Duration of diabetes mellitus correlated significantly with these corneal changes. This suggests that corneal changes should be evaluated and confirmed before intraocular surgery in chronic diabetic patients.[7] Our interest to see whether there is any significant change occurs in corneal endothelium especially after cataract surgery in diabetic patient.

Some older studies have showed that the corneal endothelium in diabetic patients is morphologically abnormal. Kraff MC et al[8] measured the CCT in 81 patients with type 1 diabetes and found that this was significantly augmented compared with healthy controls. Schultz et al[9]investigated corneal endothelial changes in type 1 and type 2 diabetes. They found a significant higher coefficient of variance and a significant decrease in the percentage of hexagonal cells in the diabetic group. In both the studies, the level of glycemic control was not indicated. Some recent studies have supported these early findings. Su et al[10] designed a population-based, cross-sectional study including 3239 eyes and examined the relationship of diabetes and CCT. They found that diabetes is associated with greater CCT, independent of age, sex, and IOP levels. The patients with diabetes in this study had poor glycemic control (HbA_1c 8.4%),which could explain why they were able to detect a difference in CCT between diabetic and nondiabetic groups. Itoi M et al[11] investigated corneal endothelial structure and corneal thickness in 99 eyes with type 2 diabetes and 97 control eyes without diabetes. They found a decrease in cell density and an increase in CV and concluded that the corneal endothelial cell structure was damaged. Theoretically, this process of repair might be delayed or diminished in diabetes. In the present study, there was no difference in endothelial cell size, percentage of hexagonal cells, or corneal thickness before cataract surgery. Three months postoperatively, the percentage of hexagonal cells in the diabetic group was still significantly decreased compared with the non-diabetic group, which reveals that the endothelial cells have not yet returned to the preoperative status of steady state. Several other studies have indicated that the endothelium of diabetic subjects might be more vulnerable to surgical traumas than that of non-diabetic subjects. compared corneal thickness and morphology in 93 eyes in patients with type 2 diabetes with 93 eyes in patients without diabetes before and 1 day, 1 week, and 1 month after phacoemulsification. Compared with non-diabetic group, eyes of patients with diabetes showed more changes in corneal endothelial cells because of cataract surgery and a delay in the postoperative recovery of the corneal edema. The higher cell loss observed among patients with diabetes might be because of more complicated surgery. In this study, because of study design, they did not record parameters such as nuclear density, pupil size, or total phaco energy. It is a deficiency of their study; on the other hand, we observed no difference in visual acuity between the 2 groups before (P = 0.73) or after surgery (P = 0.87), indicating fairly uniform degree of cataract. Zaczek and Zetterstrom[12]found that surgically induced miosis at the end of the phacoemulsification operation was more pronounced in diabetic subjects and that the entire surgical procedure lasted significantly longer when performed in diabetic eyes. These findings were later supported by Mirzaet al.[13] Thus, it is likely that these factors have an effect on the corneal endothelium and its recovery after surgery.

Incidence of diabetes mellitus and association of cataract with diabetes is increasing in Bangladesh. On this background this study is designed to see effect of diabetes mellitus on corneal endothelium after phacoemulsification cataract surgery and if so; it may help to take necessary measure to protect corneal endothelium of diabetic patient who is undergoing cataract surgery.

OBJECTIVES:

General objectives

- To evaluate the effect of diabetes mellitus on corneal endothelium after phacoemulsification with PCIOL implantation.

Specific objectives

- To perform specular microscopy for the endothelial cell count before and after phacoemulsification with PCIOL implantation.
- To see whether there is any change in corneal endothelium between diabetic and non-diabetic before and after phacoemulsification with PCIOL implantation.

- To measure intra ocular pressure before and afterphacoemulsification with PCIOL implantation.
- To see whether there is any relation between intra ocular pressure and corneal endothelium among diabetic and non-diabetic before and after phacoemulsification with PCIOL implantation.

- To evaluate visual acuity before and after phacoemulsification with PCIOL implantation in diabetic and non-diabetic patients for corneal clearity.

MATERIALS & METHODS

In this prospective observational study of 100 cases of diagnosed age related cataract, diabetic patient were 50 in number and non-diabetic patients were 50 in number. It was carried out at cataract clinic of National Institute of Ophthalmology and Hospital, over the period of December, 2011 to May, 2012. The purpose was to evaluate corneal endothelial cell change after phacoemulsification and compare them between diabetic and non-diabetic patients.Patient having senile cataract and without any other ocular pathology, cataract of nuclear sclerosis grade lll, cataract patient having diabetes mellitus with good control, cataract patient without diabetes mellitus were included in the study.Patient with vision threatening condition glaucoma, ARMD, diabetic retinopathy, hypertensive retinopathy, having history of trauma, complicated or traumatic cataract, with zonular dehiscence, having corneal diseases, under any ocular or systemic medication were excluded from the study.Cataract patients without diabetes mellitus were included in Group-1 and Cataract patients with diabetes mellitus were included in Group-2.A preliminary study protocol which contained all necessary and relevant information were recorded. Ocular examination included condition of the anterior segment, type of cataract, sac patency test when needed. Visual acuity were recorded by log MAR chart, IOP measured by applanation tonometer and biometry was done with Keratometer GR 3100K and Grand Seiko Co, Lt, Japan. Fundal evaluation done in every patient. RBS,ECG, HbA1c for diabetic patients and pre and post-operative endothelial cell count by noncontact specular microscope (TOPCON, SP 2000p,Japan.) was done as per investigation protocol.Data were collected in a pre-design data collection sheet. Difference between the two study groups was analyzed by SPSS Standard Version 15 software.

Inclusion criteria:

- Cataract of nuclear grading III.
- Cataract patient having diabetes mellitus with good control.
- Cataract patient without diabetes mellitus.

Exclusion criteria:

- Cataract patient with vision threatening condition (glaucoma, ARMD etc).
- Cataract patient with retinal disease (diabetic retinopathy, hypertensive retinopathy etc).
- Cataract patient with history of trauma and history of cataract surgery.
- Complicated and traumatic cataract.
- Cataract with zonular dehiscence.
- Cataract with history of corneal diseases.
- Patient subjected to ocular surgery in preceding 6 months.
- Patient under eye drops and systemic medication for other disease.
- Patient enrolled in experimental trial in the previous 6 months.

Surgical procedure and follow up:

After having a detail explanation all patients provide informed written consent for operation. Preoperatively the pupil was dilated with phenylephrine 5% and tropicamide 8% eye drops 15 minutes before surgery. Patients received peribulbar infiltration anaesthesia by peribulbar injection of anaesthetic agent which contains 2% lignocaine, 0.5% bupivacaine mixed with hyaluronidase before 10 minutes of surgery.All surgeries were done by the same surgeon at NIOH, Dhaka. A one step self –sealing 2.8 mm incision was done and a side port incision by 1.2 mm side port knife 70-90 degree away from the main port was made. The incision begins at the middle of the vascular arcade. The blade was oriented parallel to the iris, tilted up and heel down so that the blade is angled 10 degree from iris plane and then advanced into the anterior chamber in one smooth continuous motion. CCC was performed with a 26 G cystotome needle under a viscoelastic in both group. Complete hydro dissection was performed by injecting Ringers solution between the lens capsule and the cortex with a 27 G canula, nuclear phaco emulsification was done with a white star signature phacomachine (software version 2). In phacoemulsification a modified stop and chop step down nucleofractis technique were followed, foldable intra ocular lens were implanted. No patient received intra cameral miotic or subconjunctival injection after surgery. Total period of surgery was noted.Post operatively eye was examined after 24 hours; topical steroid, topical antibiotic, and NSAID was given. Discharge paper with proper advice was provided to every patient.Specular microscopy was done by non-contact specular microscope on 1st POD, 7th POD and after 1st month. Endothelial cell count (number/mm^2) was determined centrally. Visual acuity and IOP are also recorded in every follow-up.

Age distribution, status of visual acuity, intra ocular pressure, endothelial cell count and morphology were measured and compared between two groups by unpaired "t" test. Sex distribution were analyzed by Chi square test. A probability value "p" at 0.05 or less than

RESULTS

0.05 considered as significant.The main objective was to assess the effect of diabetes mellitus on corneal endothelial cell in relation to phacoemulsification surgery.Table 1 shows the distribution of age and sex distribution of the study subjects. Mean age in Group 1 was 55.3years ±5.89 (SD) and Group 2 was 55.60 years±6.14 (SD). In Group 1 male were 32 (64%) and female were 18 (36%). In Group 2 male subjects were 37 (74%), female were 13 (26%).Bar diagram-1 showing endothelial cell count between Group 1 and Group 2. In pre –operative period 2432.36±160.62(SD) and 2409.10±157.74(SD), on 1st POD 2309.10±157.74(SD) and 2219.30±164.65 (SD), on 7th POD 2272.63±166.62 (SD) and 2189.33±161.74(SD) , after 1 month 2251.16±166.30 (SD) and 2164.16±162.41(SD) respectively.Table 3 shows distribution of the cell size variability (in%) between the twogroup. In Group 1 and Group 2 in pre-operative period polymegathism were35.36±7.21 (SD) and 35.38±7.88 (SD); on 1st POD 36.76±7.50 (SD) and 38.56±8.18 (SD); on 7th POD 38.60±6.50 (SD) and 39.43±8.25 (SD); and after 1 month38.71±7.68(SD) and 40.19±8.35 (SD) respectively.Diagram-2 shows comparison of hexagonality of corneal endothelial cell between two group in pre-operative period and 1month after operation. In Group 1 in pre-operative periodit was 51.50±10.60 (SD) and after 1 month 48.60±10.88 (SD); in Group 2 in pre-operative period it was 50.10±10.69 (SD)and after 1 month 46.50±10.99(SD).

Table 1. Distribution of age and sex of the study subjects (N=100)

Group	Mean Age ±SD	Age range	p	Male	Female	p
Group 1(n=50)	55.3±5.89	40-69 years	>0.5	32(64%)	18 (36%)	>0.5
Group 2(n=50)	55.60±6.14	40-69 years		37(74%)	13(26%)	

Table 2. Distribution of mean IOP among the study subjects (N=100)

Period of observation	Mean value ±SD mmHg in Group 1.	Mean value ±SD mmHg in Group 2.	P
Pre- operative	12.13 ±1.35	12.23 ±1.59	>0.50
1st POD	13.96 ±1.56	15.20 ±1.73	<0.01**
7th POD	12.03±1.58	12.10 ±1.42	>0.50
1 month	11.96± 1.26	11.82 ±1.19	>0.50

**=highly significant

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-7, Issue-4 | July-August, 2021
Page no- 56-67 | Section- Research Article (Ophthalmology)

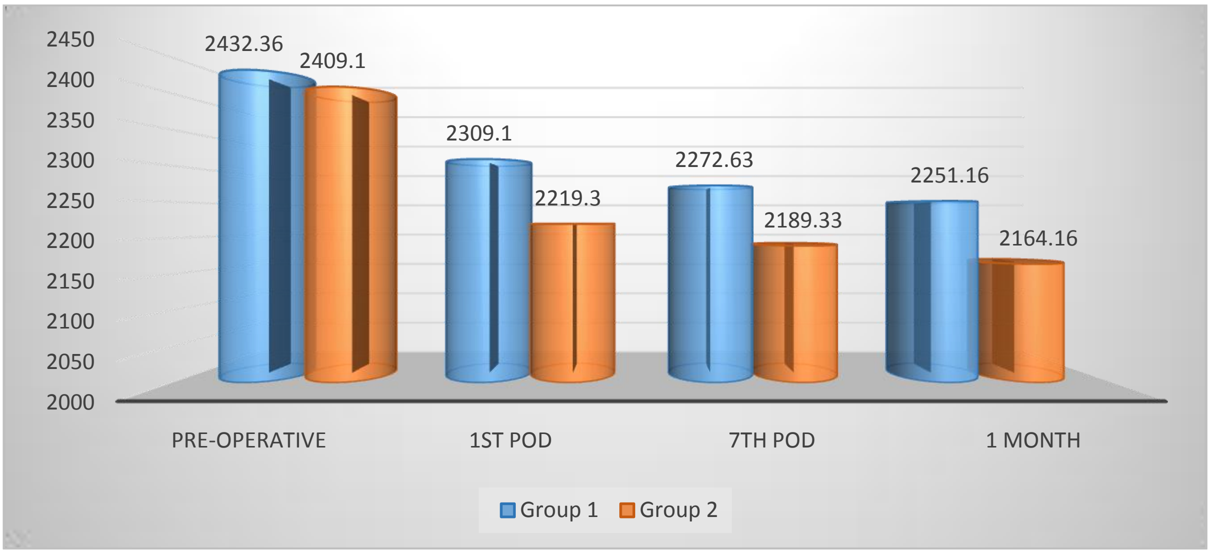

Fig 1. Bar diagram showing endothelial cell count of the study subjects (N=100)

Table 3. Distribution of cell size variability of study subjects (N=100)

Period of observation	Mean value ±SD in Group 1. Polymegathism (in %)	Mean value ±SD in Group 2. Polymegathism (in %)	P
Pre-operative	35.36±7.21	35.38±7.88	>0.5
1st POD	36.76±7.50	38.56±8.18	<0.05*
7th POD	38.60±6.50	39.43±8.25	<0.05*
1 month	38.71±7.68	40.19±8.35	<0.05*

*= significant.

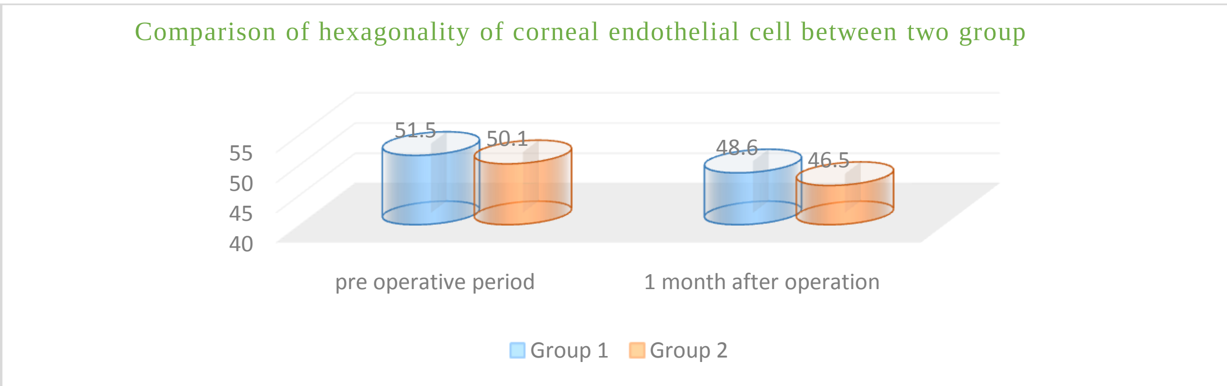

Fig 2. Bar diagram showing hexagonality of endothelial cell between two groups (N=100)

Table 4. Mean visual acuity expressed in logMAR among the study subjects (n=100)

Period of observation	Group 1	Group 2	P
Pre- operative	1.15	1.12	>0.05
1st POD	0.45	0.41	>0.05
7th POD	0.08	0.07	>0.05
1 month	0.07	0.06	>0.05

DISCUSSION

Corneal endothelial abnormalities in diabetic patients have been reported. However, this are morphological abnormalities, such as polymegathism and pleomorphism. On this basis the study is designed and result is formulated.Table 1 shows the distribution of age and sex distribution of the study subjects. Mean age in Group 1 was 55.3years ±5.89 (SD) and Group 2 was 55.60 years±6.14 (SD). In Group 1 male were 32 (64%) and female were 18 (36%). In Group 2 male subjects were 37 (74%), femalewere13 (26%). Mean age and sex distribution in both groups were homogeneous statistically.Table 2 shows the distribution of intra ocular pressure of patients between Group 1 and Group 2. Pre-operative mean IOP was 12.13 ±1.35(SD) and 12.23±1.59(SD) mm of Hg respectively. On 1st POD 13.96±1.56(SD) and 15.20±1.73(SD); on 7th POD mean IOP was declined to 12.03±1.58 and 12.10±1.42(SD); after that IOP on 1stmonth further declined to 11.96±1.26(SD) and 11.82±1.19(SD) in Group1 and Group2 respectively. The difference was significant but after one month, IOP of both groups came closer, yielding no significant difference. Mastropasqua et al (1998)[14] demonstrated that retained viscoelastic may cause raised IOP by either trabecular meshwork blockage physically or by postoperative capsular block syndrome from occlusion of the circular anterior opening by the IOL optic. Roszkowska et al (1999)[15] has shown mean postoperative IOP was 22.3±9.0 mm of Hg for non-diabetic and 19.6±6.9 mm of Hg for diabetic. Luchtenberg et al (2000)[16] measured IOP after 24 hours postoperatively. At 24 hours IOP was statistically significantly higher for diabetic patients (18.7+/-6.6 mm Hg) than non-diabetic patients (16.3+/-4.8 mmhg). Yoshio Akagi (2005)[17] has demonstrated that the mean preoperative IOP in nondibetic and diabetic group were 13.3+/-2.0 , 14.0+/-2.0 mmHg respectively, which change to 12.20+/-4.7 and 16.0+/-4.7 mmHg respectively on 1st POD. These findings are very much consistent with my study finding. Comparable postoperative IOPs were noted in the two groups of patients. Both groups showed an early spike possibly due to blockage of

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-7, Issue-4 | July-August, 2021
Page no- 56-67 | Section- Research Article (Ophthalmology)

trabecular meshwork by viscoelastic substances. But after one month IOP of both groups came closer, yielding no significant difference may be due to absorption of viscoelastics. In Fig.1 Bar diagram showed endothelial cell count between Group 1 and Group 2. In pre –operative period 2432.36±160.62(SD) and 2409.10±157.74(SD), on 1st POD 2309.10±157.74(SD) and 2219.30±164.65 (SD), on 7th POD 2272.63±166.62 (SD) and 2189.33±161.74(SD) , after 1 month 2251.16±166.30 (SD) and 2164.16±162.41(SD) respectively. Endothelial cell count difference between two groups in postoperative visits were statistically significant. Koch et al (1993)[18] reported that sixteen weeks postoperatively, endothelial cell loss was 11.6% in diabetic group compared to 2.1% in non-diabetic group. Saini JS, Mittal S (1996)[19] found more endothelial cell loss in diabetic patients. These findings are consistent with my study findings. This signifies that diabetes mellitus is a causative factor for more endothelial cell loss after phacoemulsification. Table 3 shows distribution of the cell size variability (in%) between the two group. In Group 1 and Group 2 pre-operative period polymegathism were35.36±7.21 (SD) and 35.38±7.88 (SD); on 1st POD 36.76±7.50 (SD)and 38.56±8.18 (SD); on 7th POD 38.60±6.50 (SD) and 39.43±8.25 (SD); and after 1 month38.71±7.68(SD) and 40.19±8.35 (SD) respectively.Variability among two groups were significant statistically. Matsuda et al (1985)[20] also found there was significant difference between male and female group of patient having diabetes. These findings are consistent with our study findings.Fig.2 Bar diagram showed hexagonality of endothelial cell between two group in pre-operative period and 1month after operation. In Group 1 in pre-operative period it was 51.50±10.60 (SD) and after 1 month 48.60±10.88 (SD); in Group 2 in pre-operative period it was 50.10±10.69 (SD)and after 1 month 46.50±10.99(SD). So here we see loss of cell hexagonality is more in diabetic group.Table 4 shows mean visual acuity expressed in logMAR among the study subjects. In Group 1 visual acuity in Pre- operative period, on 1st POD, on 7th POD and after 1month of operation were – 1.15, 0.45, 0.08, 0.07 respectively. In Group 2 visual acuity in Pre- operative period, on 1st POD, on 7th POD and after 1month of operation were- 1.12, 0.41, 0.07 and 0.06 respectively. Visual acuity was measured and compared in the current study as it is indirectly affected by endothelium damage, increased corneal thickness and rise of IOP. Two groups have shown significant differences in the early postoperative periods but the difference was not found statistically significant after 1 month post operatively. Visual acuity becomes comparatively equal in two groups of patients. Clear cornea is the most desired outcome for the ophthalmologist

after phacoemulsification to give better vision to the patients. And corneal endothelium plays the most important role to fulfill the desire. It is also the most vulnerable structure to undergo damage by the process of phacoemulsification. Its reaction is reflected by cell count, morphology (hexagonality) as well as IOP and VA. In this study significant loss of endothelial cell was found in diabetic group. But it has no effect on IOP and VA after 1 month. Howeverthere is every chance to develop complication later in diabetic cornea; because endothelial cell plays the major role to maintain corneal integrity. As diabetic cornea losses its endothelial cell more in proportionate to no diabetic cornea, we should deal the diabetic cornea very carefully and the focus should be doing minimum damage to corneal endothelium while performing phacoemulsification. For preserving more endothelial cell use of dispersive viscoelastic substances, changes of phacoemulsification parameters might be helpful to fulfill the purpose.

Limitations of the study:

The present study had few limitations such as this study was conducted in a single hospital and had a small sample size that may not reflect the whole scenario.

CONCLUSION

Analytical results of the study recommends that diabetes mellitus is a causative factor for more endothelial cell loss after phacoemulsification. And it also brings a change in morphology reflecting increase in cell size and decrease in the percentage of hexagonal cells. As endothelium plays the major role to maintain corneal integrity, chance to develop long term complication might be more in diabetic patients. So special care like use of ocular dispersive viscoelastic substances, changes of phacoemulsification parameters etc. should be taken for diabetic patients.

REFERRENCE

1. International Diabetes Federation (IDF) [Internet]. Country estimates table 2011. IDF diabetes atlas. 6th ed. 2012. Available from: http://www.idf.org/sites/default/files/EN_6E_Atlas_Full_0.pdf [accessed 7 June 2013].
2. Bangladesh population and housing census 2011. Dhaka: Bangladesh Bureau of Statistics, Government of the People's Republic of Bangladesh; 2012.
3. Saquib N, Saquib J, Ahmed T, Khanam MA, Cullen MR. Cardiovascular diseases and type 2 diabetes in Bangladesh: a systematic review and metaanalysis of studies between 1995 and 2010. BMC Public Health 012;12:434.

doi: http://dx.doi.org/10.1186/1471-2458-12-434 PMID:22694854
4. Hugod M, Storr-Paulsen A, Norregaard JC, Nicolini J, Larsen AB, Thulesen J. Corneal endothelial cell changes associated with cataract surgery in patients with type 2 diabetes mellitus. Cornea. 2011 Jul 1;30(7):749-53.
5. MódisJr L, Szalai E, Kertész K, Kemény-Beke Á, Kettesy B, Berta A. Evaluation of the corneal endothelium in patients with diabetes mellitus type I and II. Histology and histopathology. 2010.
6. Suzuki H, Oki K, Takahashi K, Shiwa T, Takahashi H. Functional evaluation of corneal endothelium by combined measurement of corneal volume alteration and cell density after phacoemulsification. Journal of Cataract & Refractive Surgery. 2007 Dec 1;33(12):2077-82.
7. Mencucci R, Ponchietti C, Virgili G, Giansanti F, Menchini U. Corneal endothelial damage after cataract surgery: microincision versus standard technique. Journal of Cataract & Refractive Surgery. 2006 Aug 1;32(8):1351-4.
8. Kraff MC, Sanders DR, Lieberman HL. Specular microscopy in cataract and intraocular lens patients: a report of 564 cases. Archives of Ophthalmology. 1980 Oct 1;98(10):1782-4.
9. Schultz R O. Glasser D B. Matsuda M, et al. Response of the corneal endothelium to cataract surgery. Arch Ophthalmol. 1986;104:1164-9.
10. Su et al., Endothelial cell loss from intraocular lens insertion. Ophthalmology(1978).85.394-399.
11. Itoi M, Nakamura T, Mizobe K, Kodama Y. Nakagawa N. Itoi M. Specular microscopicstudies of the corneal endothelia of Japanese diabetics. Cornea. 1989;8: 2-6.
12. Zaczek and Zetterstrom. Efficacy and safety of the soft-shell technique in cases with a hard lens nucleas. J Cataract Refract Surg. 2002 Sep; 28(9):1546-50.
13. Mirza et al., Endothelial barrier function after phacoemulsification: a comparison between diabetic and non-diabetic patients. Graefes Arch ClinExpOphthalmol. 1991;229:254-257.
14. Mastropasqua L, Carpineto P, Ciancaglini M, Falconio G. Intraocular pressure changes after phacoemulsification and foldable silicone lens implantation using Healon GV. Ophthalmologic. 1998;212(5):318-21.
15. Roszkowska AM, Tringali CG, Colosi P, Squeri CA, Ferreri G. Corneal endothelium evaluation in type I and type II diabetes mellitus. Ophthalmologica. 1999;213(4):258-61.
16. Luchtenberg. Watts P, Austin M. Retained viscoat and intraocular pressure after phacoemulsification. Indian J Ophthalmol 2000; 47(4): 237-240.
17. Yoshio Akagi, Bourne W M, Nelson L R, Hodge D O. continued endothelial cell loss ten years after lens implantation. Ophthalmology 2005 Jun: 101 (6) 1014-22.
18. Koch,Siribunkum J, Kosrirukvongs P. Corneal abnormalities in diabetes. ArchOphthalmol 1993;8(4):294-302.
19. Saini JS,Mittal S de la Messeliere S, Renard G. The corneal endothelium of diabetic patients- A study using specular microscopy. Indian J Ophthalmol 1996;10(11):647-55.
20. Matsuda M, Sawa M, Edelhauser HF, Bartels SP, Neufeld AH, Kenyon KR. Cellular migration and morphology in corneal endothelial wound repair. Investigative ophthalmology & visual science. 1985 Apr 1;26(4):443-9.

Source of Support: Nil, Conflict of Interest: None declared