

The Effect of Nd: Yag Laser Posterior Capsulotomy on Visual Acuity, Intraocular Pressure And Macular Thickness By Oct

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Abstract: Posterior capsular opacification (PCO) also called 'after' or 'secondary' cataract is a common long-term complication of cataract surgery that causes decreased vision. Nd: YAG laser is use to treat PCO/ after cataract

Material And Methodes: This was a prospective interventional study, with a sample size of 100 eyes of 100 consecutive patients. It was conducted for 2 years. Patients were explained about the study after taking the consent; patients were examined and treated by Nd: YAG laser. Macular thickness is measured by OCT.

Results: BCVA improves more in group A 0.18 ± 0.07 log MAR than in group B 0.25 ± 0.10 log MAR on 1st week follow up. We were comparing BCVA, IOP, and Macular Thickness measurements between this group at 1 week, 3 week and 6 week postoperatively. Measurements of macular thickness at 1st week and 3rd week postoperatively were significantly higher in group B than in group A.

Summary and conclusions: We found that visual acuity after doing Nd: YAG capsulotomy in patients of PSA with PCO is quite satisfactory. Increase in IOP and macular thickness is inevitable after Nd: YAG laser capsulotomy.

Date of Submission: 02 -01-2018

Date of acceptance: 11 -01-2018

I. Introduction

A cataract is one of the most leading cause of curable blindness all over world. In the developing world, most popular method of cataract surgery is extra capsular cataract extraction with posterior chamber intraocular lens (IOL). In this operation the posterior and part of the anterior capsule are left in situ.(1) Posterior capsular opacification (PCO) also called 'after' or 'secondary' cataract is a common long-term complication of cataract surgery that causes decreased vision, glare and other symptoms similar to that of the original cataract.(2) PCO is caused by a proliferation of lens epithelial cells which causes fibrotic changes and wrinkling of the posterior capsule.(3,4) It also decreases the field of view during therapeutic and diagnostic procedures and also causes uniocular diplopia (5).

The rate of posterior capsule opacification following ECCE and phacoemulsification varies with the age of the patient, the surgeon, surgical technique, the type of intraocular lens used and the duration after surgery. (6) PCO results from migration and proliferation of residual lens epithelial cells (LECs) onto the central posterior capsule. When the cells invade the visual axis as pearls, fibrotic plaques, or wrinkles, the patient experiences a decrease in visual function, and ultimately in visual acuity.(7) The epithelium of the crystalline lens consists of a sheet of anterior epithelial cells ('A' cells) that are in continuity with the cells of the equatorial lens bow ('E' cells). The latter cells comprise the germinal cells that undergo mitosis as they peel off from the equator. They constantly form new lens fibres during normal lens growth. Although both the anterior and equatorial LECs stem from a continuous cell line and remain in continuity, it is useful to divide these into two functional groups. They differ in terms of function, growth patterns and pathologic processes. The anterior or 'A' cells, when disturbed, tend to remain in place and not migrate. They are prone to a transformation into fibrous-like tissue (pseudo-fibrous metaplasia). (8)

Safe and successful laser capsulotomy involves accurate focusing and use of the minimum energy required. Laser power is initially set at 1 mJ/pulse, and may be increased if necessary. A series of punctures is applied in a cruciate pattern using single-pulse shots, the first puncture aimed at the visual axis. The opening should equate approximately to the size of the physiologically dilated pupil under scotopic conditions – this averages around 4–5 mm in the pseudophakic eye. (9) n many studies it was stated that intraocular pressure always rises within 1 week after Nd: YAG laser posterior capsulotomy therefore in present study we started prophylactic anti-glaucoma therapy to post operative Nd: YAG patient's i.e after posterior capsulotomy for 2 weeks period. In present study we have to find out the long term rise of intraocular pressure after Nd: YAG laser

posterior capsulotomy. (10) In short the purpose of our study was to measure visual acuity, intraocular pressure and the macular thickness change after Nd:YAG capsulotomy using optical coherence tomography (OCT).

II. Aim And Objectives

- To study the effect of Nd: YAG laser capsulotomy on Visual acuity, IOP, and Macular thickness by OCT.
- To evaluate the effect of different energy level of Nd: YAG laser on change in Visual acuity.
- To evaluate the effect of different energy level of Nd: YAG laser on change in IOP.
- To evaluate the effect of different energy level of Nd: YAG laser on change in Macular thickness by OCT.
- To evaluate whether anti-glaucoma drugs blunt the effect of IOP rise which frequently follows post Nd: YAG laser capsulotomy.

III. Material And Methodes

This was a prospective interventional study. A total of 100 pseudophakic eyes of 100 consecutive patient following uncomplicated Phacoemulsification, SICS, conventional ECCE with posterior chamber intraocular lens implantation surgery attending the EYE OPD of Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe), Wardha were selected.

Inclusion criteria:

- Patients with PCO following cataract extraction with posterior chamber intraocular lens implantation.
- Pseudophakic eye with visual impairment due to significant PCO.
- Minimum period of 3 months following uneventful cataract surgery.
- Co-operative patients those were understood the full understanding of the procedure.

Exclusion criteria:

- Patient with anterior segment abnormalities such as with corneal opacities, glaucoma, aphakia and posterior segment abnormalities such as with retinopathy, PVD, maculopathy, and optic neuropathy and patients with diabetes mellitus.
- Patients with IOL implantation other than posterior chamber IOL.
- Patients with glaucoma or any anti-glaucoma medications.
- Any pre-existing inflammation in the eye.

All patients were treated with Nd: YAG laser Capsulotomy (NIDEK YC-1800) at a single centre. A standard contact lens was used to enhance power density at the level of the posterior capsule and an approximately 4.0-4.5mm size of capsulotomy done. Energy level starting from 0.8mJ is applied to the capsule depending on the type of PCO. Tropicamide 0.8% and phenylephrine 5% was used for pupillary dilatation prior to procedure. After capsulotomy, Timolol 0.5% E/D 2 times for 15 days, Flubiprofen E/D 3 times for 15 days, Cap acetazolamide SR once a day For 3 days were advised. Comparison of change in visual acuity, change in IOP, and change in macular thickness before Nd: YAG laser capsulotomy and on 1, 3 & 6 weeks after Nd: YAG laser capsulotomy was done. VA was measured with a snellen system. The VA values were converted to log MAR units for statistical analysis

Following stepwise Posterior Capsulotomy Techniques were followed.(124)

- Initially single pulse shots of minimum energy (starting from 0.8 mJ) was used.
- The energy and pulses were gradually increased according to the thickness of the PCO.
- Tension lines were cut across after identification.
- A cruciate opening was performed, first puncture was aimed at the visual axis.
- Residual tags were cleaned up.
- Free floating fragments were avoided.

Inclusion criteria:

- Patients with PCO following cataract extraction with posterior chamber intraocular lens implantation.
- Pseudophakic eye with visual impairment due to significant PCO.
- Minimum period of 3 months following uneventful cataract surgery.
- Co-operative patients those were understood the full understanding of the procedure.

Exclusion criteria:

- Patient with anterior segment abnormalities such as with corneal opacities, glaucoma, aphakia and posterior segment abnormalities such as with retinopathy, PVD, maculopathy, and optic neuropathy and patients with diabetes mellitus.

- Patients with IOL implantation other than posterior chamber IOL.
- Patients with glaucoma or any anti-glaucoma medications.
- Any pre-existing inflammation in the eye.

IV. Statistical Analysis

Statistical analysis was done by using descriptive and inferential statistics using Student's paired and unpaired t test and software used in the analysis were SPSS 22.0 version, GraphPad Prism 6.0 version and EPI-INFO 6.0 version and $p < 0.05$ is considered as level of significance ($p < 0.05$).

V. Observations And Results

The present study was carried out in Department Of Ophthalmology. The study was conducted in eyes of 2 groups of patients, depending upon energy used by Nd: YAG laser for posterior capsulotomy
 Group A - less than 3mJ energy used in 54 patients.
 Group B - more than 3mJ energy used in 46 patients.

Table 1: Distribution of patients according to gender

Gender	No of patients	Percentage
Male	56	56.00
Female	44	44.00
Total	100	100.00
M:F Ratio	1.27 : 1	

Table no 1 show: Distribution of patients according to gender. Out of 100 patients 56 were male and 44 were females

Graph 1: Distribution of patients according to gender

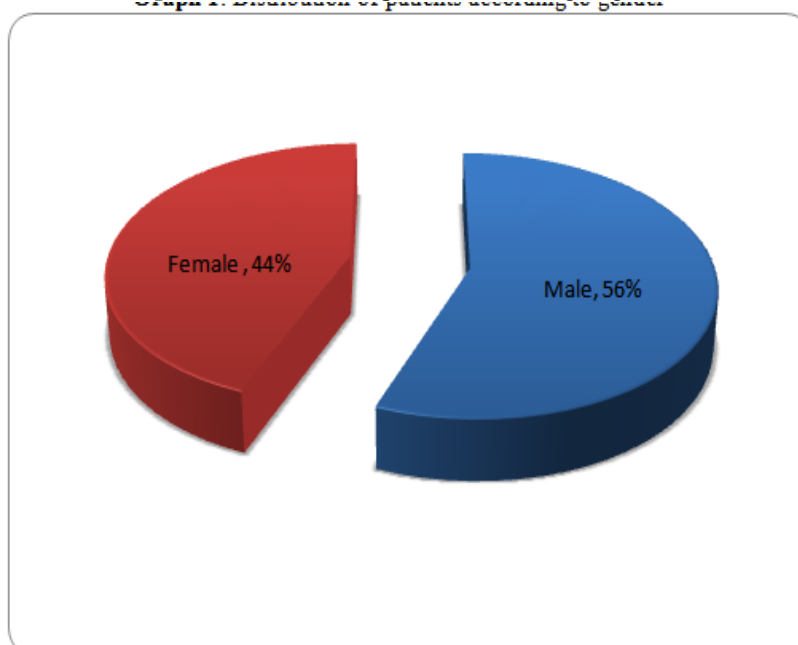


Table 2: Distribution of patients in two groups according to gender

Gender	Group A	Group B
Male	35(64.81%)	21(45.65%)
Female	19(35.19%)	25(54.35%)
Total	54(100%)	46(100%)
M:F Ratio	1.84 : 1	1 : 1.19

Table no 2 shows: Distribution of patients in two groups according to gender. Out of 54 patients in group A 35 were male and 19 were females. Out of 46 patients in group B 21 were male and 25 were females

Graph 2: Distribution of patients in two groups according to gender

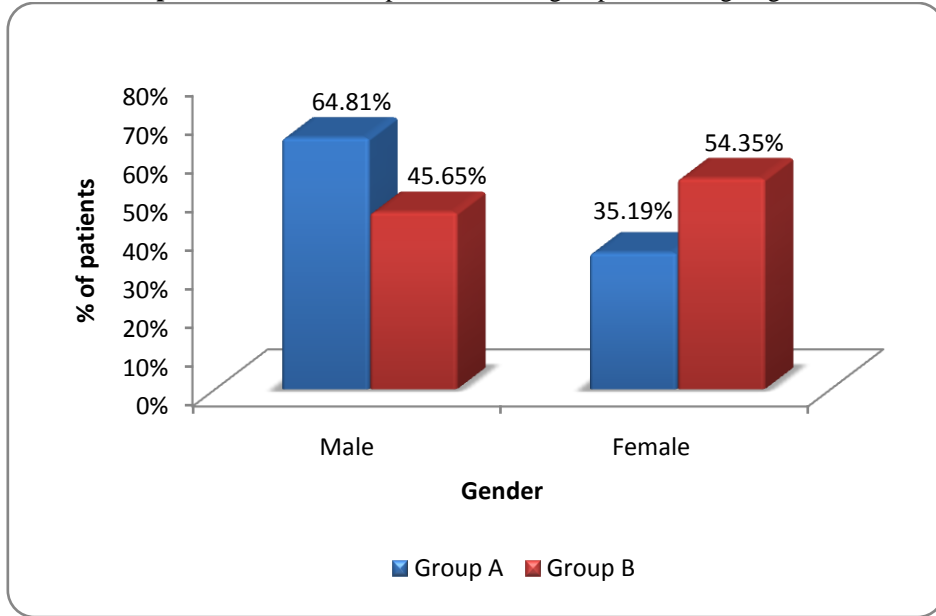


Table 3: Distribution of patients according to age in years

Age Group(yrs)	No of patients	Percentage
15-24 yrs	3	3
25-34 yrs	2	2
35-44 yrs	5	5
45-54 yrs	9	9
55-64 yrs	25	25
65-69 yrs	24	24
≥70 yrs	32	32
Total	100	100
Mean ±SD	61.84±13.35(15-82 years)	

Table no 3 shows: Distribution of patients according to age in years. Out of 100 patients 32 patients were of more than 70 years of age, 24 patients were of age group 65-69, 25 patients were of age group 55-64, 9 patients were of age group 45-54, 5 patients were of age group 35-44, 2 patients were of age group 25-34, 3 patients were of age group 15-24

Graph 3: Distribution of patients according to age in years

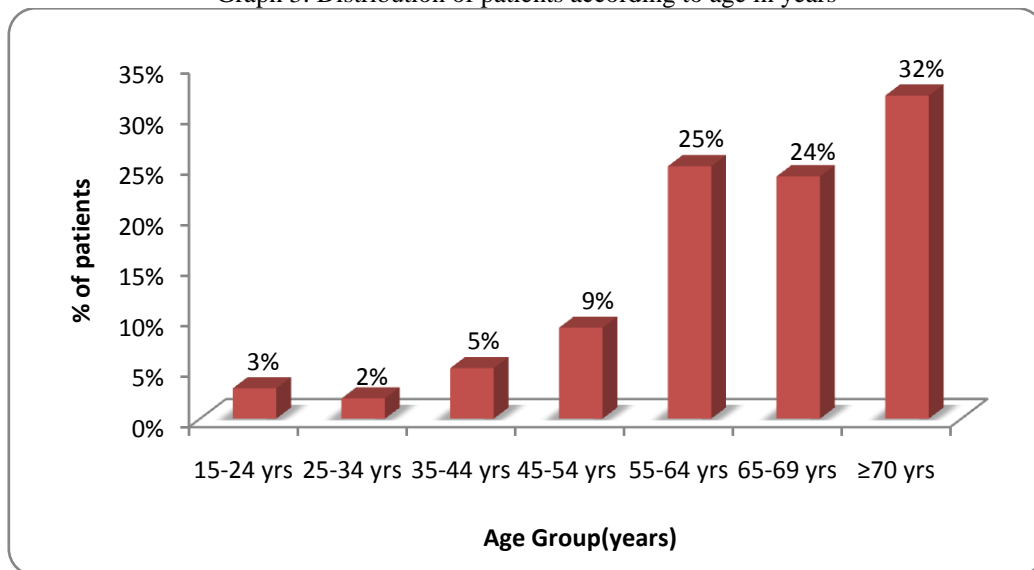


Table 4: Distribution of patients according to duration of cataract extraction surgery and PCO formation

Duration(yrs)	No of patients	Percentage
≤5	45	45
>5	55	55
Total	100	100
Mean ± SD	5.22±1.70(2-9 years)	

Table no 4 shows Distribution of patients according to duration of cataract extraction surgery and PCO formation. Out of 100 patients 45 patients had their cataract extraction less than 5 years back, and 55 patients had cataract extraction more than 5 year back.

Graph 4: Distribution of patients according to duration of cataract extraction surgery and PCO formation

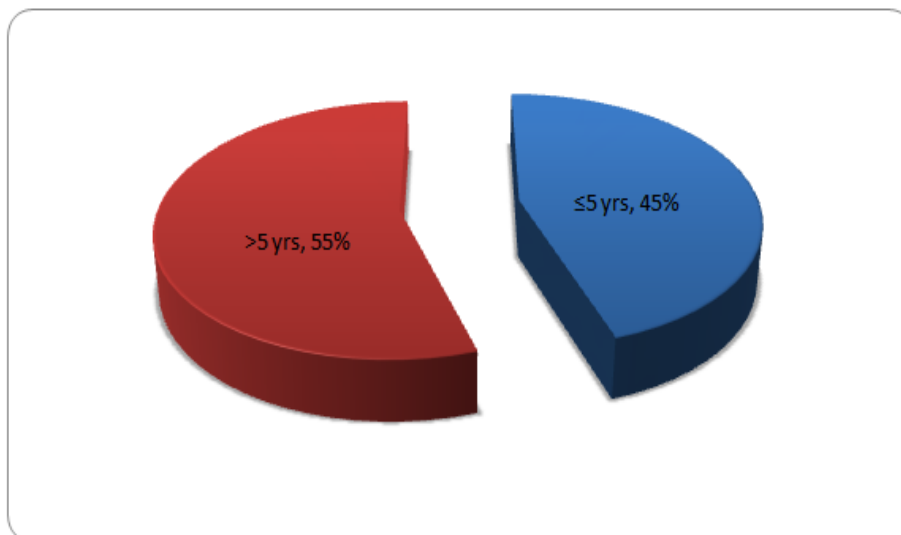


Table 5: Distribution of patients according to operative eye

Operative Eye	No of patients	Percentage
Right Eye	55	55
Left Eye	45	45
Total	100	100

Table no 5 shows distribution of patients according to operative eye. Out of 100 patient 55 patients operated right eye and 45 patients operated left eye

Graph 5: Distribution of patients according to operative eye

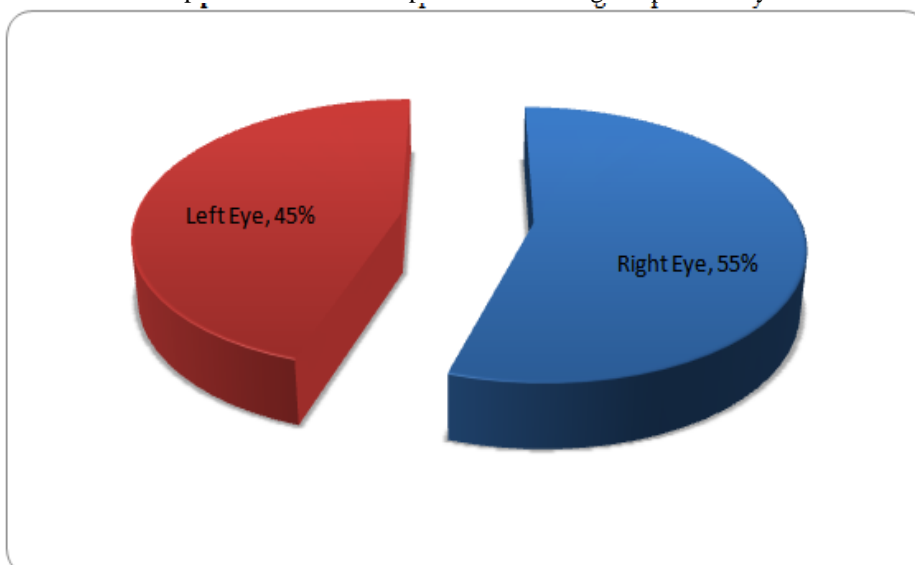


Table 6A: Comparison of patients according to BCVA in log MAR
By Student's unpaired t test

	Group A (n=54)	Group B (n=46)	t-value	p-value
Baseline	0.57±0.09	0.72±0.23	4.41	0.0001,S
First Week	0.18±0.07	0.25±0.10	3.99	0.0001,S
Third Week	0.07±0.08	0.18±0.06	7.56	0.0001,S
Sixth Week	0.006±0.03	0.06±0.08	4.87	0.0001,S

Table no 6A shows comparison of repeated measurement of BCVA in log MAR of group A and group B by student's unpaired t test.

Graph 6A: Comparison of patients according to BCVA in log MAR by Student's unpaired t test.

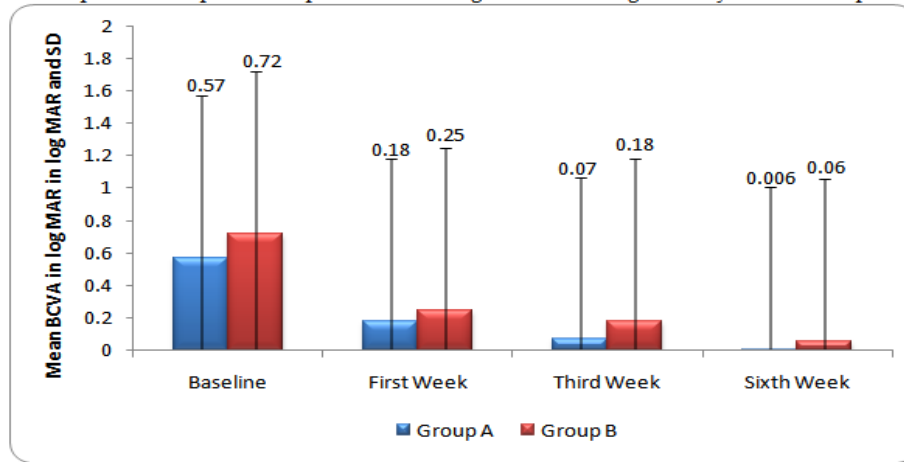


Table 6B: Comparison of patients according to mean difference in BCVA in log MAR from baseline by Student's unpaired t test

	Group A (n=54)	Group B (n=46)	t-value	p-value
First Week	0.39±0.07	0.47±0.19	2.74	0.007,S
Third Week	0.50±0.10	0.53±0.20	1.13	0.26,NS
Sixth Week	0.56±0.09	0.65±0.21	2.85	0.005,S

Table no 6B shows Comparison of patients according to mean difference in BCVA in log MAR from baseline of group A and group B by Student's unpaired t test

Graph 6B: Comparison of patients according to mean difference in BCVA in log MAR from baseline by Student's unpaired t test

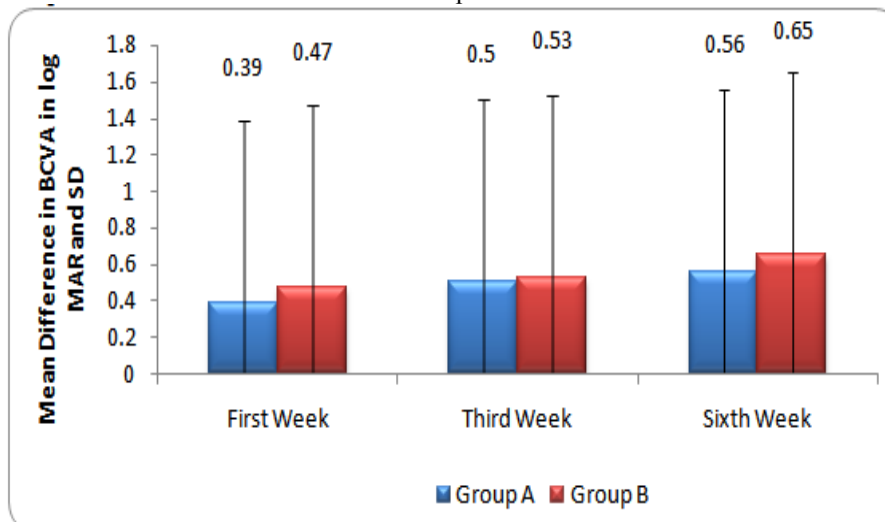
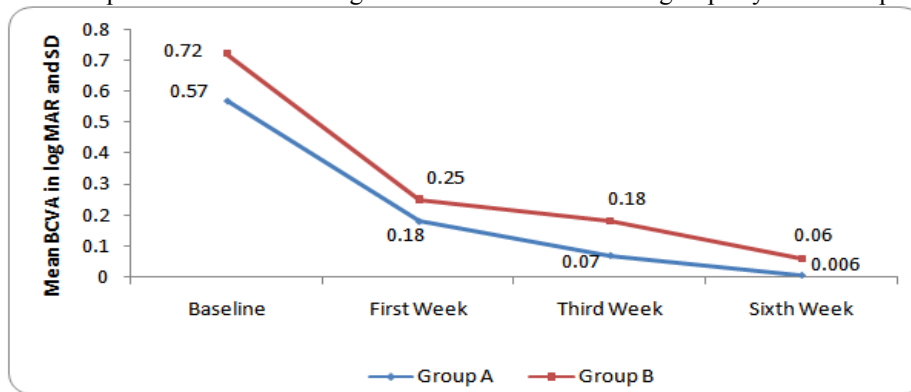


Table 7A: Comparison of BCVA in log MAR with baseline in two groups by Student's paired t test

		Mean	N	Std. Deviation	Std. Error Mean	t-value	p-value
Group A	Baseline	0.57	54	0.09	0.01	-	-
	First Week	0.18	54	0.07	0.01	37.82	0.0001,S
	Third Week	0.07	54	0.08	0.01	35.52	0.0001,S
	Sixth Week	0.006	54	0.03	0.00	43.86	0.0001,S
Group B	Baseline	0.72	46	0.23	0.03	-	-
	First Week	0.25	46	0.10	0.01	16.22	0.0001,S
	Third Week	0.18	46	0.06	0.008	17.46	0.0001,S
	Sixth Week	0.06	46	0.08	0.01	20.46	0.40,NS

Table no 7A shows comparison of repeated measurement of BCVA in log MAR with base line of group A and group B by Student's paired t test.

Graph 7A: Comparison of BCVA in log MAR with baseline in two groups by Student's paired t test



		Paired Differences					T	df	p-value
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Group A	BL-1 Week	0.39	0.07	0.010	0.37	0.41	37.82	53	0.0001,S
	BL-3 Week	0.50	0.10	0.014	0.47	0.52			
	BL-6 Week	0.56	0.09	0.012	0.54	0.59			
Group B	BL-1 Week	0.47	0.19	0.029	0.41	0.53	16.22	45	0.0001,S
	BL-3 Week	0.53	0.20	0.030	0.47	0.60			
	BL-6 Week	0.65	0.21	0.031	0.59	0.72			

Table no 7 B shows Comparison of patients according to mean difference in BCVA in log MAR from baseline of group A and group B by Paired Samples Test.

Graph 7B Comparison of patients according to mean difference in BCVA in log MAR from baseline by Paired Samples Test

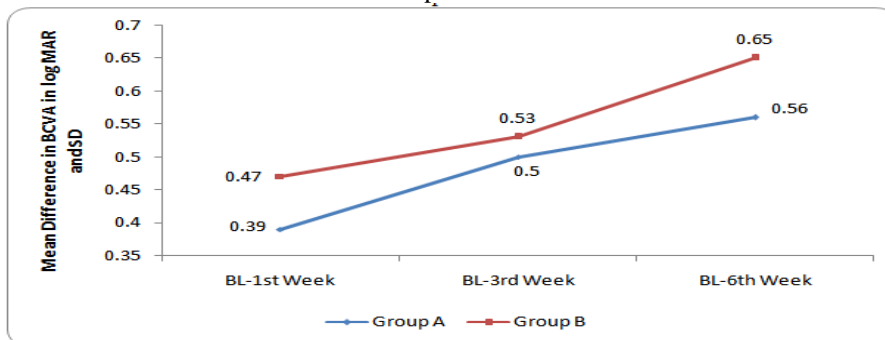


Table 8A: Comparison of patients according to IOP in mmHg By Student's unpaired t test

	Group A (n=54)	Group B (n=46)	t-value	p-value
Baseline	13.53±1.76	13.54±2.41	0.01	0.98,NS
First Week	15.87±1.77	17.36±2.16	3.81	0.0001,S
Third Week	14.22±1.73	15.17±1.84	2.65	0.009,S
Sixth Week	13.20±1.59	13.91±1.90	2.02	0.045,S

Table no 8A: shows comparison of repeated measurement of IOP in mmHg of group A and group B by Student's unpaired t test.

Graph 8A: Comparison of patients according to IOP in mmHg by Student's unpaired t test.

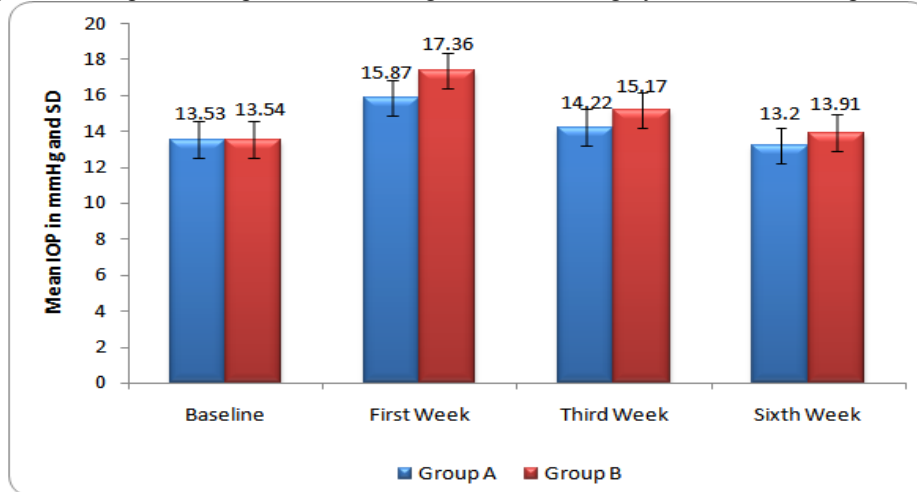


Table 8B: Comparison of patients according to mean difference in IOP in mmHg from baseline by Student's unpaired t test

	Group A (n=54)	Group B (n=46)	t-value	p-value
First Week	2.33±0.67	3.82±0.82	9.96	0.0001,S
Third Week	0.68±0.54	1.63±1.08	5.64	0.0001,S
Sixth Week	0.33±0.61	0.36±0.99	4.31	0.0001,S

Table 8B shows comparison of patients according to mean difference from baseline of group A and group B by Student's unpaired t test in IOP in mmHg

Graph 8B: Comparison of patients according to mean difference in IOP in mmHg from baseline by Student's unpaired t test

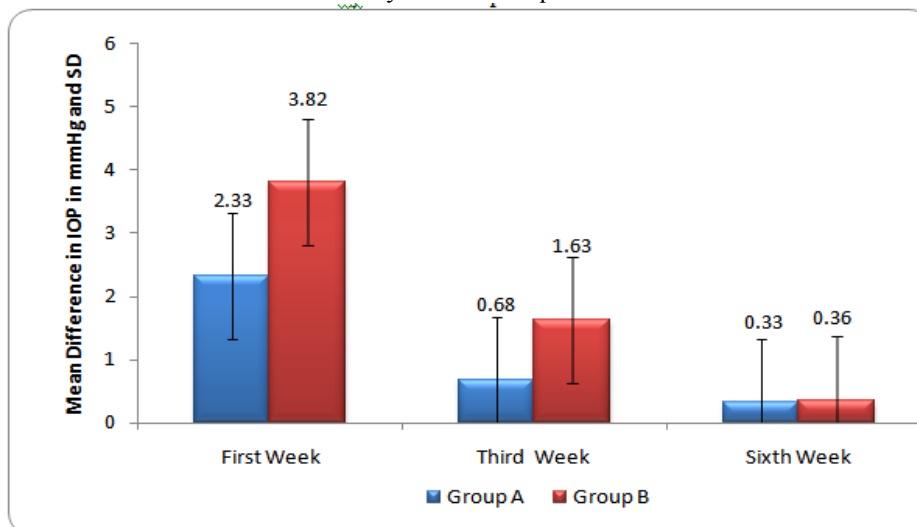


Table 9B: Comparison of patients according to mean difference in IOP in mmHg from baseline by Paired Samples Test

		Paired Differences					t	df	p-value
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Group A	BL-1 Week	2.33	0.67	0.09	2.14	2.51	25.48	53	0.0001,S
	BL-3 Week	0.68	0.54	0.07	0.53	0.83	9.26	53	0.0001,S
	BL-6 Week	0.33	0.61	0.08	0.16	0.50	3.98	53	0.0001,S
Group B	BL-1 Week	3.82	0.82	0.12	3.58	4.07	31.46	45	0.0001,S
	BL-3 Week	1.63	1.08	0.15	1.30	1.95	10.21	45	0.0001,S
	BL-6 Week	0.36	0.99	0.14	0.07	0.66	2.51	45	0.0001,S

Table 9A: Comparison of IOP in mmHg with baseline in two groups by Student's paired t test

		Mean	N	Std. Deviation	Std. Error Mean	t-value	p-value
Group A	Baseline	13.53	54	1.76	0.24	-	-
	First Week	15.87	54	1.776	0.24	25.48	0.0001,S
	Third Week	14.22	54	1.73	0.23	9.26	0.0001,S
	Sixth Week	13.20	54	1.59	0.21	3.98	0.0001,S
Group B	Baseline	13.54	46	2.41	0.35	-	-
	First Week	17.36	46	2.16	0.31	31.64	0.0001,S
	Third Week	15.17	46	1.84	0.27	10.21	0.0001,S
	Sixth Week	13.91	46	1.90	0.28	2.51	0.016,S

Table no 9A shows comparison of repeated measurement of IOP in mmHg with baseline of group A and group B by Student's paired t test.

Graph 9A: Comparison of IOP in mmHg with baseline in two groups by Student's paired t test

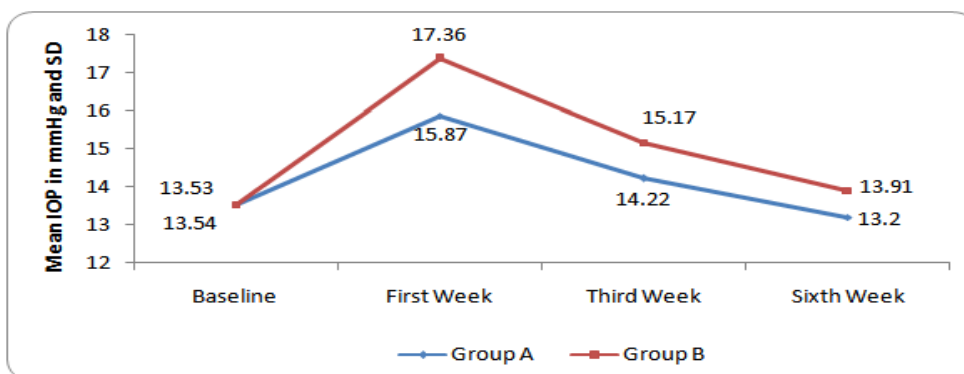


Table no 9B shows comparison of patients according to mean difference in IOP in mmHg from baseline of group A and group B by Paired Samples Test.

Graph 9B: Comparison of patients according to mean difference in IOP in mmHg from baseline by Paired Samples Test

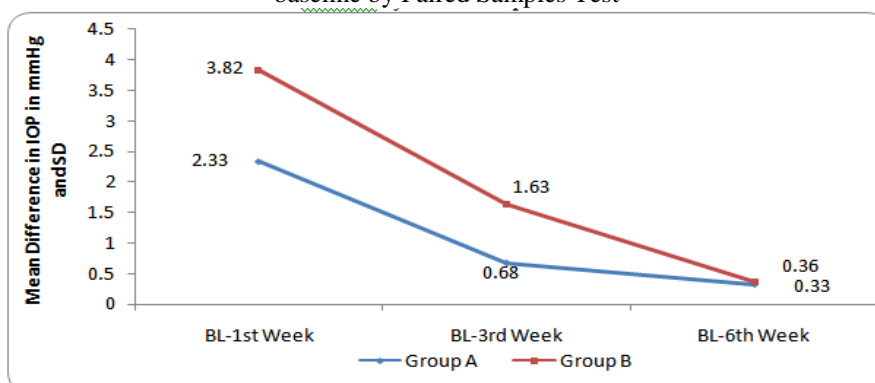


Table 10A: Comparison of patients according to Macular Thickness in μm By Student's unpaired t test

	Group A (n=54)	Group B (n=46)	t-value	p-value
Baseline	247.77 \pm 18.83	256.02 \pm 8.91	2.71	0.008,S
First Week	260.42 \pm 18.29	282.17 \pm 8.68	7.38	0.0001,S
Third Week	250.94 \pm 18.32	259.02 \pm 13.17	2.49	0.001,S
Sixth Week	247.35 \pm 18.68	257.21 \pm 8.88	3.27	0.001,S

Table no 10A shows comparison of repeated measurement of Macular Thickness in μm of group A and group B by Student's unpaired t test.

Graph 10A: Comparison of patients according to Macular Thickness in μm by Student's unpaired t test.

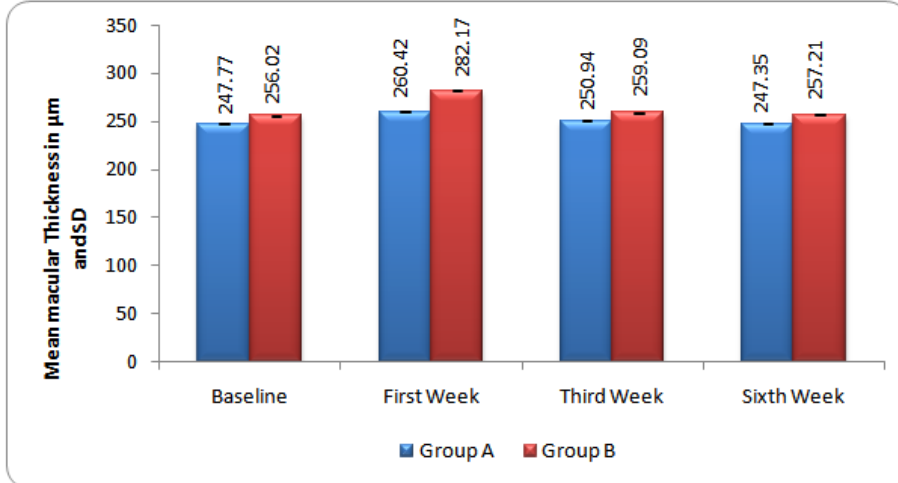


Table 10B: Comparison of patients according to mean difference in Macular Thickness in μm from baseline by Student's unpaired t test

	Group A (n=54)	Group B (n=46)	t-value	p-value
First Week	12.64 \pm 4.59	26.15 \pm 5.35	13.57	0.0001,S
Third Week	3.16 \pm 2.08	3.00 \pm 13.89	0.08	0.93,NS
Sixth Week	0.42 \pm 1.67	1.19 \pm 2.21	4.15	0.0001,S

Table 10B shows comparison of patients according to mean difference in Macular Thickness in μm of group A and group B from baseline by Student's unpaired t test

Graph 10B: Comparison of patients according to mean difference in Macular Thickness in μm from baseline

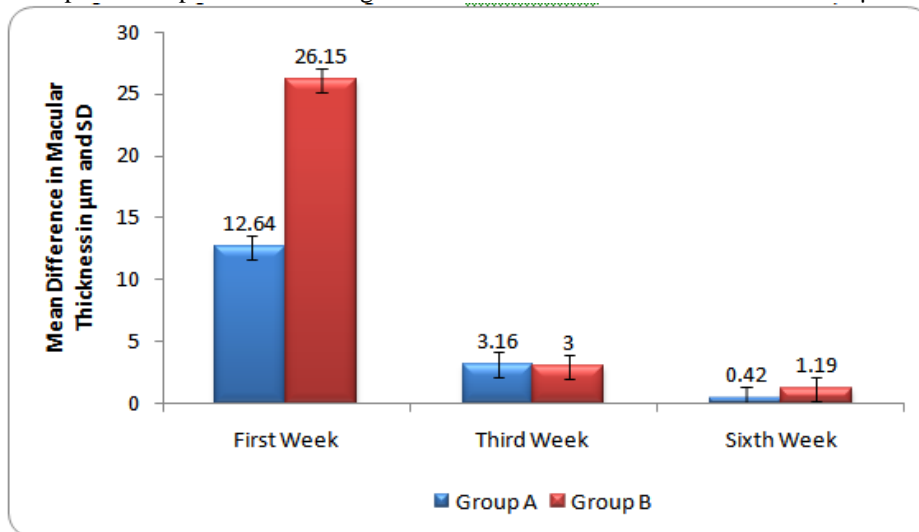
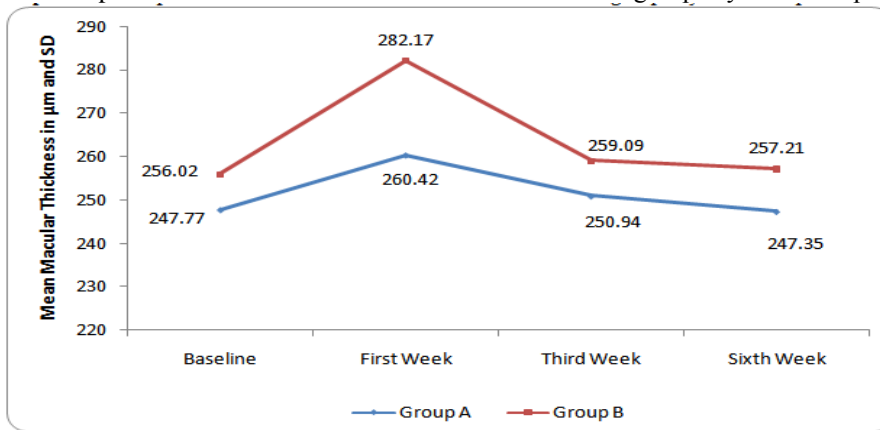


Table 11A: Comparison of Macular Thickness in μm with baseline in two groups by Student's paired t test

		Mean	N	Std. Deviation	Std. Error Mean	t-value	p-value
Group A	Baseline	247.77	54	18.83	2.56	-	-
	First Week	260.42	54	18.29	2.48	20.23	0.0001,S
	Third Week	250.94	54	18.32	2.49	11.13	0.0001,S
	Sixth Week	247.35	54	18.68	2.54	1.96	0.046,S
Group B	Baseline	256.02	46	8.91	1.31	-	-
	First Week	282.17	46	8.68	1.28	33.10	0.0001,S
	Third Week	259.02	46	13.17	1.94	2.06	0.046,S
	Sixth Week	257.21	46	8.88	1.30	3.65	0.001,S

Table no 11A shows comparison of repeated measurement of Macular Thickness in μm of group A and group B with baseline by Student's paired t test.

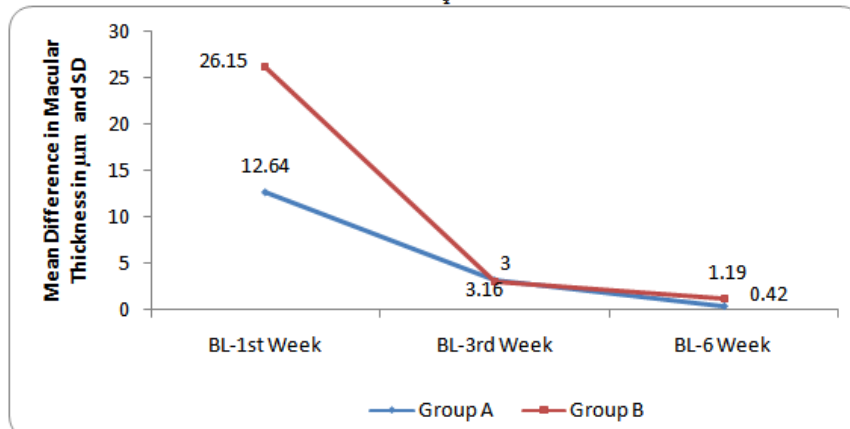
Graph 11A: Comparison of macular thickness with baseline in two groups by Student's paired t test.



		Paired Differences					t	df	p-value
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Group A	BL-1 Week	12.64	4.59	0.62	11.39	13.90	20.23	53	0.0001,S
	BL-3 Week	3.16	2.08	0.28	2.59	3.73	11.13	53	0.0001,S
	BL-6 Week	0.42	1.67	0.22	0.03	0.88	1.96	53	0.046,S
Group B	BL-1 Week	26.15	5.35	0.79	24.56	27.74	33.10	45	0.0001,S
	BL-3 Week	3.00	13.89	2.04	1.12	7.12	2.06	45	0.045,S
	BL-6 Week	1.19	2.21	0.32	0.53	1.85	3.65	45	0.0001,S

Table 11B shows comparison of patients according to mean difference in Macular Thickness in μm of group A and group B from baseline by Paired Samples Test.

Graph 11B: Comparison of patients according to mean difference in Macular Thickness in μm from baseline by Paired Samples Test.



VI. Discussion

In present study it was observed that maximum patients were having interval of more than 5 years. Mean age of the patients in our study was 62.55 out of which 59 were males and 41 were females.

Visual acuity

In present study before Nd: YAG capsulotomy mean visual acuity in group A was 0.57 ± 0.09 log MAR, and in group B was 0.72 ± 0.23 log MAR and on the on 3rd follow-up (6th week) after capsulotomy, the mean visual acuity in group A was 0.006 ± 0.03 log MAR and in group B was 0.06 ± 0.08 log MAR. The difference of which was statistically significant measurements before laser capsulotomy and on the first week, third week and sixth week after laser. (Observation table no-6A) In present study the mean difference in BCVA value in 1st week was 0.39 ± 0.07 log MAR in 'low energy' category (Group A), whereas in 'high energy' category (Group B), the mean rise in BCVA value was 0.47 ± 0.19 log MAR ($p=0.007$). The mean difference in BCVA value in 3rd week was 0.50 ± 0.10 log MAR in 'low energy' category; whereas in 'high energy' category, the mean difference in BCVA value was 0.53 ± 0.20 log MAR ($p=0.26$). The mean difference in BCVA value in 6th week was 0.56 ± 0.09 log MAR in 'low energy' category; whereas in 'high energy' category, the mean difference in BCVA value was 0.65 ± 0.21 log MAR which was statistically significant ($p=0.005$). (Observation table no- 6B) Study conducted by Eyyup Karahan et al.(11), Ari et al. (12), P Sunderraj et al. (13), Firmani M. B. de Senne (14), Zafer Oztas MD (15), Al-Nashar et al. (16), Ozkurt YB (17), Rahul Bhargava, MS et al. (18) statistically correlates with the present study .

IOP

In present study it was observed that IOP was raised in first week in post Nd YAG follow up but returned within normal limit in successive follow-ups, preoperative baseline mean IOP in group A was 13.53 ± 1.76 mmHg, and in group B was 13.54 ± 2.41 mmHg. Postoperative mean IOP on 3rd follow-up IOP in group A was 13.20 ± 1.59 mmHg and in group B was 13.91 ± 1.90 mmHg. (p -value 0.045, S) by student's unpaired t test. (Observation table no- 8A)

In present study the mean rise in IOP value in 1st week was 2.33 ± 0.67 mmHg in 'low energy' category (Group A), whereas in 'high energy' category (Group B), the mean rise in IOP value was 3.82 ± 0.82 mmHg. The mean rise in IOP value in 3rd week was 0.68 ± 0.54 mmHg in 'low energy' category; whereas in 'high energy' category, the mean rise in IOP value was 1.63 ± 1.08 mmHg. The mean rise in IOP value in 6th week was 0.33 ± 0.61 mmHg in 'low energy' category; whereas in 'high energy' category the mean rise in IOP value was 0.36 ± 0.99 mmHg. which was statistically significant ($p < 0.0001$) by student's unpaired t test. (Observation table no- 8B)

Study conducted by Eyyup Karahan et al.(11), Ari et al. (12), Rahul Bhargava MS et al.(18), Muhammad Waseem and Haseeb Ahmed Khan (19), Patil et al. (20), Waseem M and Khan HA (21), Larrañaga-Osuna G and Garza-Cantú D (22), Shashi Jain et al. (23), Arlo C Terry et. al. (24), Kraff et. al. (25), Flohr et. al. (26), Dawood Z et. al.(27), Mahtab AK et. al. (28), MM Channell, H Beckman (29), Mohammad W et.al. (19), Claudia U. Richer et. al.(30), Gantela Sirisha and Nallabantu Lakshmi Chowdary (31), G S Gopinath and K Satish (1), Keates et al. (32), Stark et al. (33), Cobo et al. (34) and Jahn CE (35) had similar results as current study In present study it was observed that IOP was raised in first week in post Nd YAG follow up but returned within normal limit in successive follow-ups.

Macular thickness

In present study preoperative baseline mean Macular Thickness in group A was 247.77 ± 18.83 μ m, and in group B was 256.02 ± 8.91 μ m. Postoperative mean Macular Thickness on 3rd follow-up in group A was 247.35 ± 18.68 μ m and in group B was 257.21 ± 8.88 μ m. (p -value 0.001, S) by student's unpaired t test (Observation table no -10A) The mean change in macular thickness in 1st week was 12.64 ± 4.59 μ m in 'low energy' category (Group A), whereas in 'high energy' category (Group B), the mean change in macular thickness was 26.15 ± 5.35 μ m. The mean change in macular thickness in 3rd week was 3.16 ± 2.08 μ m in 'low energy' category; whereas in 'high energy' category, the mean change in macular thickness was 3.00 ± 13.89 μ m ($p=0.93$). The mean change in macular thickness in 6th week was 0.42 ± 1.67 μ m in 'low energy' category; whereas in 'high energy' category, the mean change in macular thickness was 0.42 ± 1.67 μ m. which was found to be statistically significant ($p < 0.0001$) by student's unpaired t test. (Observation table no -10B) Study conducted by Eyyup Karahan et al. (11), Ari et al. (12), Wróblewska-Czajka E et al. (36), Altıparmak et al.(37), Yılmaz and Yılmaz (38), Adank AM and Hennekes R (39), (35) had similar results as current study.

Present study failed to observe the RD, CME, PVD ect post laser complications. This was probably because in spite of using energy level more than 3 mJ, we started anti-glaucoma therapy for a period of 15 days to our patients , study duration was small , small sample size and most of our study patients were of the surgical techniques of continuous curvilinear capsulorhexis with in the bag implanted IOLs.

VII. Summary And Conclusion

- The mean difference in BCVA value in 1st week was 0.39 ± 0.07 log MAR in ‘low energy’ category (Group A), whereas in ‘high energy’ (Group B) category, the mean rise in BCVA value was 0.47 ± 0.19 log MAR ($p=0.007$). The mean difference in BCVA value in 3rd week was 0.50 ± 0.10 log MAR in ‘low energy’ category; whereas in ‘high energy’ category, the mean difference in BCVA value was 0.53 ± 0.20 log MAR ($p=0.26$). The mean difference in BCVA value in 6th week was 0.56 ± 0.09 log MAR in ‘low energy’ category; whereas in ‘high energy’ category, the mean difference in BCVA value was 0.65 ± 0.21 log MAR which was statistically significant ($p=0.005$).
- The mean rise in IOP value in 1st week was 2.33 ± 0.67 mmHg in ‘low energy’ category (Group A), whereas in ‘high energy’ category (Group B), the mean rise in IOP value was 3.82 ± 0.82 mmHg. The mean rise in IOP value in 3rd week was 0.68 ± 0.54 mmHg in ‘low energy’ category; whereas in ‘high energy’ category, the mean rise in IOP value was 1.63 ± 1.08 mmHg. The mean rise in IOP value in 6th week was 0.33 ± 0.61 mmHg in ‘low energy’ category; whereas in ‘high energy’ category, the mean rise in IOP value was 0.36 ± 0.99 mmHg which was statistically significant ($p < 0.0001$).
- The mean change in macular thickness in 1st week was 12.64 ± 4.59 μ m in ‘low energy’ category (Group A), whereas in ‘high energy’ category (Group B), the mean change in macular thickness was 26.15 ± 5.35 μ m. The mean change in macular thickness in 3rd week was 3.16 ± 2.08 μ m in ‘low energy’ category; whereas in ‘high energy’ category, the mean change in macular thickness was 3.00 ± 13.89 μ m ($p=0.93$). The mean change in macular thickness in 6th week was 0.42 ± 1.67 μ m in ‘low energy’ category; whereas in ‘high energy’ category, the mean change in macular thickness was 0.42 ± 1.67 μ m. which was statistically significant ($p < 0.0001$).
- It was difficult to compare different studies due to different techniques of cataract surgery and different intraocular lens implant materials, their designs and the thickness of PCO. However, the present results have sufficient grounds to suggest that energy level of Nd: YAG laser was certainly one of the key factors in the elevation the IOP. No serious complications, such as retinal detachment or endophthalmitis, were detected in our study patients in 6 week period.
- We found that visual acuity after doing Nd: YAG capsulotomy in patients of PSA with PCO is quite satisfactory.
- Outcomes and effects of Nd: YAG laser capsulotomy used for posterior capsular opacification depends on several factors, including size of capsulotomy, the amount of energy and intraocular lens design.
- Increase in IOP and macular thickness is inevitable after Nd: YAG laser capsulotomy, except for severity and duration changes regarding the amount of total energy used during the procedure.
- We found use of anti-glaucomatous and anti-inflammatory agents after the Nd: YAG laser capsulotomy and 15 days postoperatively is effective to prevent an acute and serious rise in IOP. Using a total energy level less than 3 mJ seems to be safe and effective.
- OCT is diagnostic as well as therapeutic tool to diagnose change in macular thickness after Nd: YAG laser, also Nd: YAG laser is the most modern tool to treat posterior capsular opacification with high success rate.

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