International Journal of Medicine Research
ISSN: 2455-7404
www.medicinesjournal.com
Volume 3; Issue 4; October 2018; Page No. 31-33

Comparison of three different eye drops and assessment of IOP changes in post-operative cataract patients

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Abstract
Cataract is the leading cause of blindness worldwide and cataract extraction is treatment for the improvement in the quality of life. Corticosteroids are highly effective anti-inflammatory agents, used for the management of inflammation in these patients. This was a prospective, comparative study, which assess the IOP changes with steroid eye drops and quality of life in post-operative cataract patients. The study was conducted on 100 postoperative cataract patients who are on steroid therapy and divided them as two groups. Group A with patient counselling and group B without patient counselling. The result shows that the group with increased intra ocular pressure were found to be in group B than that of group A. The prescribed steroids Dexamethasone 0.1%, loteprednol 0.5% and prednisolone 1% were compared for their effects on intra ocular pressure in these patients. The results shows that dexamethasone and loteprednol were found to be safer than prednisolone. In views of this observation, we concluded that Number of patients with increased IOP were more in Group B without patient counselling than Group A with patient counselling. We also concluded that dexamethasone 0.1% and loteprednol 0.5% are safer than prednisolone for intraocular pressure.

Keywords: intra ocular pressure (IOP), steroid eye drops, trabecular meshwork cells

Introduction
Cataract is the leading cause of blindness worldwide and cataract extraction is the treatment of choice leading to the improvement in the quality of life [1]. Like other types of surgery, cataract surgery induces a surgical inflammatory response. Uncontrolled inflammation may lead to serious side effects. Management of inflammation is thus a mainstay in modern cataract surgery [2].

Steroids and Non steroidal inflammatory drugs (NSAIDs) are used in the prophylaxis and treatment of pain and inflammation associated with cataract surgery, either alone or as combination therapy [3].

Corticosteroids appear to decrease the outflow of aqueous humor by inhibiting the degradation and/or enhancing the deposition of extracellular matrix material within the TM and/or cross-linking of actin fibers between TM cells. The TM accounts for the majority of drainage from the eye; it appears to be this resistance to aqueous outflow (caused by changes to the TM and its extracellular matrix) that eventually leads to an increase in IOP. Although topical ocular corticosteroids are a vital component of the treatment for post-operative inflammation, their prolonged use can produce side effects, such as increased IOP [4].

In general the pressure inducing effect of a topical steroid is proportional to its anti-inflammatory potency. Commonly used, potent corticosteroids like, Dexamethasone and Prednisolone have a significant tendency to induce glaucoma. I.e. increase in intraocular pressure.

Loteprednol/dexamethasone/prednisolone eye drops are the topical steroids used to treat post-surgical inflammation. Prednisolone is considered as gold standard treatment for post-surgical ocular inflammation [5].

This study was planned to identify the importance of patient counselling in improving quality of life of these patients and to compare the effect of various topical steroids on the intraocular pressure in post operative cataract patients.

Materials and Methods
This study was carried out on the patients admitted in Private multispecialty tertiary care teaching hospital in ophthalmology department from January 2017- June 2017. At admission, all the cataract patients, above 55 years of age were assessed. A detailed history was elicited and a thorough clinical examination was done. The data was collected in a prewritten proforma. A written informed consent was obtained from all the patients included in the study. The patients were told that they were free to withdraw from the trial at any time if they wished. Post-operative cataract patients prescribed with steroid eye drops, who came for regular follow up were included in this study. Patients with glaucoma complicated cataract, pathological myopia, and any complication during surgery were excluded from this study. Informed consent was collected from all the study participants. 176 medical records were collected, from that 100 patients were included as per the inclusion criteria. Total patients were divided into 2 groups, Group A: 50 patients with patient counseling and Group B: 50 patients without patient counseling. Both the groups were compared for the changes in IOP with steroid eye drops - during 1st, 3rd and 6th week of post –operative review and 2nd week after the discontinuation of steroid therapy. The obtained cases were analysed for IOP changes with the steroid eye drops and assessed the impact of patient counseling by comparing QOL between two groups. The changes in IOP of these patients were compared with the effect of different steroid eye drops (Dexamethasone-0.1%, Prednisolone-1%, Loteprednol -0.5%) during the treatment period. A patient

education leaflet was designed and printed in Tamil and circulated to the patients regarding postoperative care after cataract surgery.

Results

Comparison of effect of different steroid eye drops on IOP

The effect of three different steroid eye drops on intra ocular pressure were compared. The effect of dexamethasone 0.1%, loteprednol 0.5% and prednisolone were different.

In 100 patients after cataract surgery pain and inflammation treated with dexamethasone 0.1%, loteprednol 0.5% and prednisolone 1%eye drops with tapering of:

1st week 8times/day
2nd week 6times/day
3rd week 5times/day
4th week 4times/day
5th week 3times/day
6th week 2times/day

15 patients were treated with dexamethasone 0.1% and 10 patients were with increased IOP after the use of this steroid eye drop. 36 patients were treated prednisolone 1% and after its use 32 patients were with increased IOP. Loteprednol 0.5% had given to 49 patients but after its use there was only one patient with increased IOP.

Table 1: Number of patients with increased IOP and normal IOP with specific drug are summarized

S. No.	Treatment	Number of patients with increased IOP	Number of patients with normal IOP	Total number of patients treated with specific drug
1.	Dexamethasone (0.1%)	10(66%)	5	15
2.	Prednisolone (1%)	32(89%)	4	36
3.	Loteprednol (0.5%)	1(2%)	48	49

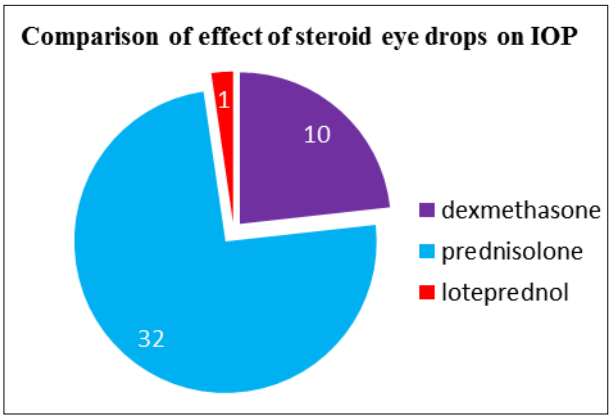

Fig 1: Comparison of Effect of Different Steroid Eye Drops On IOP

The number of patients with increased IOP is less with loteprednol (1/ 49) when compared with dexamethasone (10/15) and prednisolone (32/36).

Steroid response in patients, with patient counseling and without patient counseling

In our study we included 100 patients who completed regular follow up after cataract surgery and comparison done between 2 groups. (Group A) 50 patients with counseling and (Group B) 50 patients without patient counseling and data were collected during 1stweek, 3rd week and 6th week follow up.

IOP changes in patients with patient counseling and without patient counseling during the follow up period are summarized in Table 5 and Table 6.

Table 2: Group a with patient counseling (n=50)

S. No.	Follow Up Time Period	Number of Patients with Increased IOP	Average IOP	Number of Patients with Normal IOP (10-22MMHG)
1.	1st week	8	25	42
2.	3rd week	5	24	45
3.	6th week	4	24	46
4.	After steroid omission	0	0	50

Table 3: Group B without Patient Counseling (n=50)

S. No.	Follow up time period	Number of patients with increased IOP	Average IOP	Number of patients with normal IOP (10-22MMHG)
1.	1st week	10	26	40
2.	3rd week	20	25	20
3.	6th week	5	31	15
4.	After omission of steroid	5	30	45

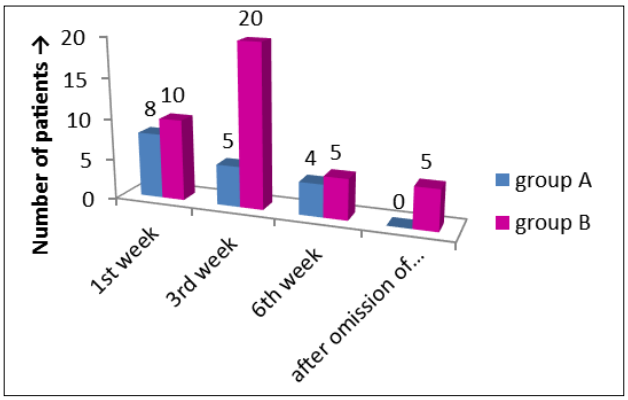

Fig 2: Comparison of Steroid Response In Group A and Group B patients.

There were difference in number of patients with increased IOP between Group A and Group B. Number of patients with increased IOP were more in Group B (40) than that of Group A (17)

Discussion

This study is consisted with earlier studies of ocular hypertension after corticosteroids administration depending on the specific drug, dose frequency of administration and the corticosteroids responsiveness of patients, the risk of corticosteroids include glaucoma can be minimized [6]. Steroids are primarily used after surgery to control inflammation but they also increase IOP in significant number of patients [7]. Among 150 patients taken for the comparative study between prednisolone acetate 1% and diclofenac sodium, IOP were raised in steroid group when eye examination were done on subsequent 7th, 21st, and 42nd days [8]. The study in post operative cataract patients showed that at the end of 6 weeks of steroid therapy 21% patients had persistently raised IOP, dexamethasone and prednisolone are much safer as compared to prednisolone for IOP [5].

Conclusion

This study concluded that there were difference in IOP between Group A and Group B patients. Number of patients with increased IOP was more in Group B than Group A. Quality of life score was better in group A patients than that of group B patients. This shows the impact of patient counseling and proves that inappropriate use of steroid eye drops will lead to increase in IOP. By Comparing the effect of dexamethasone 0.1%, loteprednol 0.5% and prednisolone 1% eye drops on IOP, in postoperative cataract surgery patients, we concluded that dexamethasone 0.1% and loteprednol 0.5% are safer than prednisolone for intraocular pressure. This study shows that loteprednol is more safer than dexamethasone.

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