

# FREQUENCY OF GLAUCOMA IN CHILDREN WITH VERNAL CONJUNCTIVITIS USING STEROIDS

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## ABSTRACT

**OBJECTIVE:** To determine the frequency of glaucoma in children with vernal conjunctivitis using topical steroids, referred to a tertiary eye care centre.

**DESIGN:** Descriptive case series.

**SETTING:** This study was carried out at department of Ophthalmology, Liaquat University Eye Hospital Hyderabad, Sindh - Pakistan, from July 2002 to December 2004 (Thirty months).

**PATIENTS AND METHODS:** A total of 200 patients with chronic allergic conjunctivitis using topical steroids (Betamethasone, Dexamethasone, Prednisolone) for more than six months were examined. A thorough examination including visual acuity, Goldmann applanation tonometry, Schiotz tonometry, Gonioscopy, slit lamp examination and dilated Ophthalmoscopy were performed.

**RESULTS:** Out of 200 patients examined, fifteen (7.5%) were found having raised intraocular pressure (secondary glaucoma) due to prolonged use of topical steroids. The rise of intraocular pressure was bilateral in three patients (1.5%), and unilateral in twelve patients (6.0%). The topical steroids were discontinued. One patient with vernal conjunctivitis using topical steroids since more than two years developed left optic disc pallor with constriction of visual field, and posterior sub capsular cataract. The intraocular pressure was not controlled by ocular hypotensive agents, and glaucoma filtration surgery was advised.

**CONCLUSION:** This study identifies the risk of intraocular pressure elevation in patients with allergic conjunctivitis, using topical steroids for longer periods. Long term use of topical and systemic steroids produces secondary open angle glaucoma similar to chronic simple glaucoma. We can conclude that Dexamethasone and Prednisolone are possible risk factors for producing glaucoma.

**KEY WORDS:** Vernal conjunctivitis. Corticosteroids. Glaucoma.

## INTRODUCTION

Vernal conjunctivitis (Spring Catarrh) is a recurrent, bilateral, external ocular inflammation affecting children and young adults. It is an allergic disorder in which IgE-mediated mechanism is involved. Conjunctival eosinophils play important role in the histology of vernal Keratoconjunctivitis.<sup>1</sup> The clinical features include recurrent bilateral ocular itching, conjunctival congestion, conjunctival oedema and lid oedema. Topical steroids are used as the first line treatment for ocular allergies since 1940.<sup>2</sup> The topical steroids used for prolonged periods can result into rise of intraocular pressure more than 23 mmHg, and precipitate an attack of glaucoma.<sup>3,4</sup> It is not necessary that all patients using steroids will develop elevated intraocular pressure.<sup>5</sup> The patients using steroids by topical or periocular route are more prone to develop glaucoma than using systemically.<sup>5</sup> The steroids related increase in intraocular pressure (IOP) is due to increased out

flow resistance induced by biochemical and morphological changes in trabecular mesh work cells.<sup>6</sup> The cell changes may be in the trabecular mesh work size, the extra cellular matrix, the cyto-skeleton, cell adhesion as well as cell function.<sup>6</sup> Myocilin, a glycoprotein (TIGR protein) secreted from trabecular meshwork cells, which circulates in the aqueous humor, has also been made responsible for steroid induced glaucoma and primary open angle glaucoma.<sup>7,8</sup> According to another theory, prolonged use of topical steroids for several weeks can significantly inhibit phagocytic activity at the level of trabecular mesh work, leading to the accumulation of extra cellular debris, thus resulting into steroid-induced ocular hypertension.<sup>9</sup> Other ocular side effects due to prolonged use of topical steroids include mydriasis, ptosis, inhibition of corneal epithelial or stromal healing, formation of cataracts, punctate staining, corneal-scleral melting, damage to the optic nerve and defects in visual acuity and visual fields.<sup>10,11</sup>

**PATIENTS AND METHODS**

This study was conducted from July 2002 to December 2004 (Thirty months), at Liaquat University Eye Hospital Hyderabad, Sindh - Pakistan. A total of 200 patients with chronic allergic conjunctivitis, using topical steroids more than six months (Dexamethasone 0.1%, Betamethasone, and Prednisolone acetate) were examined.

**Inclusion Criteria:** Patients within 12 years of age, having no personal or family history of pre existing glaucoma, connective tissue disease, high myopia, and diabetes mellitus.

**Exclusion Criteria:** Patients above 12 years, with corneal Krukenberg, KPs, hetero chromic irides, personal or family history of pre-existing glaucoma, history of ocular trauma and pigment dispersion.

Informed consent was obtained from the patients and/or their parents. Complete ophthalmic examination was carried out, including determination of visual acuity, slit lamp examination, Schiotz tonometry, and applanation tonometry. The applanation tonometry was done on patients above eight years of age. While in patients below eight years, due to their non-cooperation, the intraocular pressure was checked by Schiotz tonometer and Perkin's hand held tonometer, with and without general anesthesia. Perimetry by confrontation and arc methods was performed on patients more than eight years of age. The dilated Ophthalmoscopy was performed on all patients with and without general anesthesia. Automated computerized field analysis generally could not be done because of poor socio economic condition of patients. During this study period, the facilities for automated perimetry were not available in this set up. The examination of angle of anterior chamber (gonioscopy) was done by Goldmann three mirror contact lens on patients above eight years.

**RESULTS**

A total of two hundred patients up to the age of 12 years, suffering from chronic vernal conjunctivitis were screened. Age and sex distribution of patients is presented in **Table I**. All of the affected children were using topical steroids. The clinical ocular findings in all affected children on first visit are summarized in **Table II**. Out of 200 patients, only fifteen (7.5%) were diagnosed having raised intraocular pressure more than

23mmHg. Age and sex distribution of these patients is mentioned in **Table III**. All the fifteen affected patients were already on treatment of topical steroids (Dexamethasone 0.1% and Prednisolone acetate). The duration of treatment with the state of intraocular pressure and overall visual acuity (with and without correction) on their first visit to Liaquat University Eye hospital is mentioned in **Table IV**. The topical steroids to all those patients diagnosed as secondary glaucoma were discontinued, and replaced by mast cell stabilizers and non-steroidal anti-inflammatory medications (topical eye drops). Out of fifteen, four patients were lost to follow up, while remaining eleven fulfilled the follow up criteria of this study which included regular visits to the hospital for examination and intra ocular pressure assessment during treatment. Within three to six weeks of discontinuation of topical steroids, ten out of eleven patients showed a positive response and the intraocular pressure reduced to normal levels i.e. <20 mmHg. The overall visual acuity with and without correction is mentioned in **Table V**. On dilated Ophthalmoscopy, there was no sign of glaucomatous optic disc damage in ten out of eleven patients. One boy of five years age had visual acuity; right eye 6/24 and left eye 6/60 (corrected) with afferent pupillary defect in left eye. Even after discontinuation of topical steroids, the intraocular pressure was 20mmHg right eye and 28 mmHg left eye. The left eye showed marked deterioration of visual fields. The patient had also developed posterior sub capsular lenticular changes in left eye. The ocular hypotensive agents i.e. topical beta blockers 0.5% and topical carbonic anhydrase inhibitors, were prescribed to the patients twice a day and counseling to the parents was done for left eye glaucoma filtration operation.

**TABLE I:  
AGE AND SEX DISTRIBUTION OF CASES (n=200)**

Age in Years	Sex	No. of Patients	Percentage
2 to 4	M	35	17.5%
	F	21	10.5%
5 to 7	M	57	28.5%
	F	33	16.5%
8 to 10	M	24	12.0%
	F	12	06.0%
11 to 12	M	13	06.5%
	F	05	02.5%

**TABLE II:**  
**CLINICAL OCULAR FINDINGS ON FIRST VISIT TO EYE HOSPITAL (n= 200)**

Ocular Findings	No. of Patients	Percentage
Conjunctival chemosis, papillae, Mucus discharge	160	80%
Cobble stone papillae, Trantas dots	33	16.5%
Giant papillae, trantas dots with corneal plaque/shield corneal ulcer	06	03%
Conjunctival papillae, chemosis, Post.sub-capsular cataract, Optic disc pallor	01	0.5%

**TABLE III:**  
**AGE AND SEX DISTRIBUTION OF CHILDREN HAVING GLAUCOMA (n = 15)**

Age in Years	Sex	No. of Patients	Percentage
2 to 4	M	02	13.6 %
	F	01	06.6%
5 to 7	M	01	06.6%
	F	01	06.6%
8 to 10	M	04	26.6%
	F	02	13.6%
11 to 12	M	03	19.8%
	F	01	06.6%

**TABLE IV:**  
**CLINICAL FINDINGS AMONG GLAUCOMA AFFECTED PATIENTS ON THEIR FIRST VISIT AT EYE HOSPITAL (n=15)**

No. of Patients (%)	Duration of Treatment	IOP mmHg	Overall V/A
02 (13.3%)	1 year or so	23 to 26	Cards test +ve
04 (26.6%)	6 to 12 Months	24 to 28	6/18 to 6/12
05 (33.3%)	1 to 2 Years	26 to 30	6/36 to 6/18
04 (26.6%)	2 to 4 Years	28 to 32	6/60 to 6/24

IOP = Intraocular Pressure, V/A= Visual Acuity.

**TABLE V:**  
**INTRAOCULAR PRESSURE AFTER STEROIDS DISCONTINUATION (n =11)**

No. of Patients (%)	Duration of Steroids Discontinuation	IOP mmHg	Overall V/A
06 (54.5%)	3 to 4 Weeks	14 to 17	6/12 to 6/9
04 (36.3%)	4 to 6 Weeks	16 to 19	6/18 to 6/9
01 (9.2%)	upto 6 Weeks	30 to 36	6/24 to 6/60

## DISCUSSION

Steroid induced glaucoma is defined as "An increase in intraocular pressure, greater than 23 mmHg with topically applied or systemically induced steroids".<sup>12,13</sup> There is no gender or racial concern to the steroid responsive elevation of intraocular pressure.<sup>13</sup> Approximately 5% of general population is considered to be the steroid responders.<sup>14,15</sup> In this study, the frequency of steroid induced ocular hypertension was 7.5%, slightly higher. It may be due to unawareness to the steroid induced complication, and vigorous use of topical steroids. Patients suffering from allergic conjunctivitis are frequently prescribed topical steroids by most of the general medical practitioners without routine monitoring of visual acuity, intraocular pressure, and fundus examination.

In this study, most of the patients suffering from vernal conjunctivitis were referred from different primary (rural) and secondary (district) health centers. The steroid induced ocular hypertension can occur in people of all ages.<sup>15</sup> In this study, the registered patients with raised intraocular pressure were between two to twelve years of age. Steroid-induced intraocular pressure elevation rarely occurs within first two weeks of treatment. After this period, intraocular pressure starts rising any time from weeks to years.<sup>16,17</sup> Withdrawal of the steroid usually results in lowering of IOP to normal levels within two to four weeks.<sup>18</sup> In this study, ten out of eleven patients recovered from raised IOP after discontinuation of topical steroids, except one who had extended glaucoma damage and was advised for glaucoma filtration surgery. The predisposing factors for IOP elevation are patients having more than 40 years of age, diabetes mellitus, high myopia and pre-existing open-angle glaucoma.<sup>18,19</sup> In this study, all those patients who were above twelve years, suffering from diabetes mellitus, high myopia and pre-existing glaucoma were not included. Steroid induced ocular hypertension (the steroid response) is associated with the pathophysiology of primary open angle glaucoma.<sup>20</sup> In this study, most of the patients whom the gonioscopy was performed had open angles. The

steroid induced intraocular pressure elevation for prolonged time results in glaucomatous optic atrophy and visual loss even after discontinuation of steroids and the IOP returning to normal levels.<sup>20</sup> In this study, one patient out of eleven, developed optic atrophy and posterior sub capsular lenticular changes. The incidence of IOP response is more frequent to the use of topical Dexamethasone, and less frequent with the Fluorometholones.<sup>21</sup> In our study, all of the patients diagnosed as steroid induced glaucoma, were predominantly using topical Dexamethasone 0.1%. Fluorometholone is considered superior for its avoidance of increased IOP and most side effects, and therefore is given priority for long term use in ocular inflammations.<sup>22</sup> Non-steroidal anti inflammatory drugs (NSAIDs) have been considered better replacement to topical steroids due to their negligible side effects.<sup>23,24</sup> NSAIDs are useful in controlling pain and inflammation without reducing the immune system. These drugs block only cyclo-oxygenase pathways and therefore inhibit the formation of prostaglandins and the subsequent products in this metabolic pathway.<sup>25</sup> Use of inhaled steroids in children suffering from allergic asthma have emerged as another important source of causing secondary open angle glaucoma.<sup>26,27</sup>

## CONCLUSION

This study is quite valuable for the reasons that, many patients who receive steroid therapy by topical or systemic routes for prolonged period, are susceptible to develop ocular hypertension, which if undiagnosed can lead to glaucomatous optic neuropathy and irreversible loss of vision. On discontinuation of steroids, the intraocular pressure returns to the normal levels without producing glaucoma damage. The topical or systemic steroids should be prescribed with great care to avoid such life threatening hazards.

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