

Intraocular Pressure Changes in Patients Using Intra Nasal Steroids for Treatment of Allergic Rhinitis in a Tertiary Hospital in Nigeria

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Abstract

Purpose: To determine intraocular pressure (IOP) changes in patients treated for Allergic rhinitis in a tertiary hospital in Nigeria.

Methodology: This was a prospective study conducted in the Ophthalmology and Ear, Nose and Throat clinic of the University of Port Harcourt Teaching Hospital, the study comprised 40 patients on intra nasal steroids for the treatment of allergic rhinitis in the Ear, Nose and Throat clinic of the hospital and 40 controls. Patients on other forms of steroids as well as risk factors for glaucoma were excluded. Participants had their intra ocular pressure measured once a month over 3 months. Data analysis was performed using the IBM statistical Package of Social Sciences (SPSS) version 21.

Results: There were 160 eyes of 80 subjects in this study comprising 42 males and 38 females (M: F = 1.11:1). The mean IOP in the treated group was 13.50 ± 2.06 right eye and 13.70 ± 2.29 mmHg left eye at baseline rising to 19.83 ± 4.36 right eye and 21.05 ± 4.66 mmHg left eye respectively (p = 0.0001) after 90 days of treatment. Statistical significance was set at 0.05.

Conclusions: This study shows a statistically significant relationship between duration of intranasal steroid use and elevation of intraocular pressure. It is important clinicians consider this as a possible cause of ocular hypertension.

Keywords: Allergic Rhinitis; Intra Nasal Steroids; Intra Ocular Pressure

Background

The effects of systemic steroids on intraocular pressure (IOP) are well known but that of inhaled steroids are still evolving [1]. Allergic rhinitis is a chronic condition and most patients require long term steroid therapy. Intranasal steroids are very effective in control of these allergic nasal symptoms and may even alleviate ocular allergic symptoms [2].

Ocular hypertension and glaucoma are well-known complications of long term steroid use [3]. It is therefore pertinent to follow up patients on steroids for ocular side effects. The aim of the study was to assess the intraocular pressure in a cohort of patients on treatment for allergic rhinitis and ascertain if there was any clinically significant association between inhaled corticosteroids and intraocular pressure. To our knowledge this is the first of its kind in our environment and will provide much needed data.

Methodology

This was a prospective study conducted in the Ophthalmology and Ear, Nose and Throat clinic of the University of Port Harcourt Teaching Hospital, all participants gave a verbal consent and it was explained that they were at liberty to exit from the study at any

point. Ethical clearance was obtained from the institution review board. The study comprised 40 patients on intra nasal steroids for the treatment of allergic rhinitis in the Ear, Nose and Throat clinic of the hospital and 40 controls who were mainly students and staff. Patients on other forms of steroids as well as those with risk factors for glaucoma, patients under 18 years were excluded. Participants had a comprehensive eye examination as well as their intra ocular pressure measured at baseline using Perkins applanation tonometer; then once a month for 3 months. Analysis of data was performed using IBM Statistical Package of Social Sciences version 21. Means and standard deviation were used to summarize numerical data while categorical data were presented as frequencies and proportions. Categorical data were compared between the two groups in the study using Chi square statistics. The differences in means between the two groups were compared using independent t –test. Friedman ANOVA test was used to compare significant differences in mean IOP across time periods among the cases. Statistical significance was set at an alpha level of 0.05.

Results

The study comprised of 40 patients who received intra-nasal spray and 40 controls making a total of 80 patients. The mean age of patients with intra-nasal spray and control groups were 22.48 ± 3.79 years and 23.40 ± 2.63 years respectively (t = 1.268; p-value = 0.208).

Study pop	No	Sex	M:F	Age range	Mean Age
Intra nasal steroids	40	M = 21 F = 19	1.11:1	18 - 39 years	22.48 ± 3.79 years
Controls	40	M = 21 F = 19	1.11:1	18 - 39 years	23.40 ± 2.63 years

Table 1: Demographics of study population

Variables	Groups		Total N = 80 n (%)
	Intra-nasal spray N = 40 n (%)	Control N = 40 n (%)	
Age category			
< 20 years	11 (27.5)	4 (10.0)	15 (18.8)
20 - 29 years	27 (67.5)	35 (87.5)	62 (77.5)
30 - 39 years	2 (5.0)	1 (2.5)	3 (3.8)
	Fisher’s Exact = 4.629; p-value = 0.072		
Sex			
Male	21 (52.5)	21 (52.5)	42 (52.5)
Female	19 (47.5)	19 (47.5)	38 (47.5)
	Chi-square = 0.000; p-value = 1.000		

Table 2: Age and sex characteristics of patients in the two groups.

Time period	Groups		t	p-value
	Intra-nasal spray Mean IOP ± SD	Control Mean IOP ± SD		
Baseline				
Right	13.50 ± 2.06	13.50 ± 1.80	0.000	1.000
Left	13.70 ± 2.29	14.15 ± 2.19	0.898	0.372
1-month follow-up				
Right	14.40 ± 2.32	14.10 ± 2.02	0.617	0.539
Left	15.50 ± 3.10	14.73 ± 2.24	1.282	0.204
2-month follow-up				
Right	16.73 ± 3.20	15.00 ± 1.81	2.965	0.004*
Left	18.33 ± 4.07	15.45 ± 2.13	3.964	0.001*
3-month follow-up				
Right	19.83 ± 4.36	15.25 ± 1.85	6.115	0.0001*
Left	21.05 ± 4.66	15.70 ± 2.20	6.564	0.0001*

Table 3: Comparison of IOP (mmHg) findings between intra-nasal spray recipients and controls at different time periods. SD: Standard Deviation; *: Statistically significant.

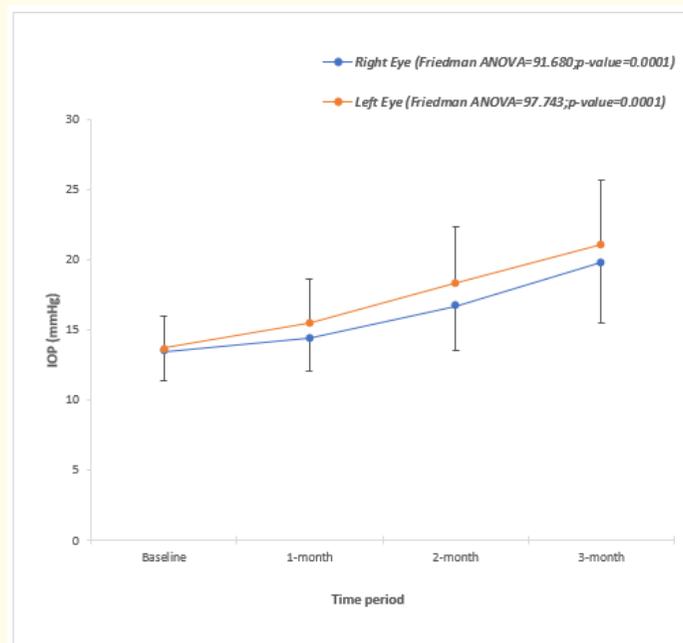


Figure 1: Comparison of IOP changes across time period in the right and left eyes of patients receiving intra-nasal spray.

Discussion

Steroid inhalers have since been linked to raised intra ocular pressure and consequently glaucoma. A 40% increase in incidence of ocular hypertension and glaucoma was noted in adults who required 14 to 35 puffs of steroid inhaler to control their asthma [4]. Use of steroids have been found to be associated with exacerbation of glaucomatous state and the presence of γ -globulin and plasma cells in the trabecular meshwork of glaucomatous eyes have suggested an immunogenic component [5].

Several theories have been postulated as possible mechanisms for increased intra ocular pressure with steroids.

They increase the expression of proteins within the trabecular meshwork leading to increased resistance to aqueous outflow [6], Inhibition of phagocytotic activity of the trabecular endothelial cells leading to accumulation of debris [7], alteration of trabecular cell morphology [8], decreased synthesis of prostaglandin which regulate aqueous egress [9], increased expression of trabecular meshwork induced glucocorticoid response (TIGR) gene at locus GLCIA [10].

The pressure inducing effects of glucocorticoids is directly proportional to its potency and duration of use [6,11,12]. In general, the effects of IOP elevation are evident in the first few weeks of therapy and after discontinuation IOP usually normalizes in 1 - 4 weeks.

There is contradictory literature regarding inhaler/nasal steroid usage and its effect on intra ocular pressure (IOP).

In 1993 Dreyer first reported elevation of IOP in patients with inhaled steroids [13], Bui, *et al.* [14] also reported statistically significant elevation of IOP but in glaucoma patients, other studies [15-18] however did not report any elevation in IOP after 6 weeks to 18 months of follow-up in patients using intranasal steroids.

A Meta -analysis of 2,226 patients from 10 randomized controlled trials showed that the use of intra nasal steroids was not associated with a significant risk of elevating IOP at 12 months [19].

Shroff, *et al.* [1], Mitchell, *et al.* [20], in their study found that the mean IOP in patients using inhaled steroids was significantly higher than that of controls though there was no statistically significant correlation between the duration of use and elevation of IOP. Alsaadi MM, *et al.* [21] in a study amongst pediatric patients found a weak association between IOP and intra nasal steroid use. Mohd., *et al.* [22] reported a statistically significant elevation of IOP with intranasal steroid use and this was also related to duration of use which was similar to our findings.

Studies have revealed that one third of the general population, are high steroid responders with IOP increase of more than 15mmHg or IOP higher than 31 mmHg [23]. Peak IOP increase tends to occur after 6 weeks. There are no studies in our environment concerning intra nasal steroid use or steroid response but a study done to access the effect of topical administration on intra ocular pressure revealed an IOP increase of 5 mmHg in participants after 4 weeks of instillation [24].

Patients who are likely to be steroid responders include Primary Open Angle Glaucoma patients or their relatives, normal tension glaucoma patients, children less than 6 years of age, Type-1 Diabetic patient, previous steroid responders [25]. These patients would need to have their medications adjusted accordingly.

Conclusion

Intranasal corticosteroids are a gold standard in treatment of allergic rhinitis. A direct relationship exists between steroids and intra ocular pressure but to date there is a lot of conflicting information on the relationship between intranasal steroids and intra ocular pressure. Our study found a positive relationship between the use of intra nasal steroids and elevated intra ocular pressure and this was also related to the duration of use. We recommend patients on long term intra-nasal steroids be monitored closely for IOP elevation.

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