

## Commentary: Blindness from glaucoma associated with steroid abuse in children

Corticosteroids, recommended for the therapy of a variety of ocular or systemic diseases can increase intraocular pressure (IOP), even when administered by non-ocular route, and pose significant risk to visual function<sup>[1]</sup> due to glaucomatous disc damage and visual field loss. Corticosteroid-induced ocular hypertensive response and consequent glaucoma have been widely studied and reported in the adults, though little has been known about steroid responsiveness in the pediatric population. Initial reports had indicated IOP response to steroids in children may not be as substantial as is seen in adults, but later studies<sup>[2]</sup> have confirmed that children are even more likely to be susceptible to steroid-induced glaucoma than are adults. More than a fifth<sup>[3,4]</sup> of the children treated with steroids for various indications have been demonstrated to develop steroid-induced glaucoma. Although the incidence of glaucoma is comparable across the various age groups, glaucoma has been found to be more severe, of earlier onset and more rapid in progression<sup>[5,6]</sup> in children, as compared to adults. Although prolonged and sometimes indiscriminate use of steroids causes IOP rise and glaucomatous visual field loss, it is not unknown to encounter significant IOP elevation within hours<sup>[7]</sup> of use. This adverse effect of steroid use may not be reversible<sup>[8]</sup> in certain susceptible individuals. Topical steroids<sup>[3]</sup> usually to manage uveitis or vernal conjunctivitis in children is the most common form of administration of steroids resulting in steroid response or steroid-induced glaucoma.

In a large series of children with glaucoma in a tertiary hospital in India, steroid-induced glaucoma accounted for 4.7%, and two-thirds of these children had significant visual impairment owing to glaucomatous optic neuropathy in either or both eyes.<sup>[9]</sup> Some of the children in the study had been indiscriminately using steroids for close to 8 years, in spite being followed up by ophthalmologists before being diagnosed with advanced glaucoma. Inexpensive drugs such as dexamethasone or betamethasone, dispensed in pharmacies without valid

physician prescriptions were found to be the most common drug used by children that had resulted in advanced glaucomatous visual field loss in this series of children. The cost of many drugs in the topical corticosteroid group has been capped by government regulations in India, which had further facilitated its unregulated use by children for symptomatic relief of ocular allergies without appropriate physician supervision. The sale of topical steroids in India has been estimated to be 20 times that in the United States. Filtering surgery was also indicated in 45% of children with steroid-induced glaucoma, reflecting the advanced and refractory nature of this iatrogenic glaucoma to treatment.

Studies<sup>[3,9]</sup> in the recent past have highlighted the significant role played by injudicious use of corticosteroids in children, especially vernal keratoconjunctivitis, with a considerable proportion of those with acquired childhood glaucoma to be because of steroid induced. Sen *et al.*<sup>[10]</sup> have studied the prevalence of steroid-induced glaucoma in a large cohort of children with vernal keratoconjunctivitis. In total, 15% of the children in their study have been using topical steroids for therapy without physician prescriptions and a little more than 3% of the children had steroid-induced glaucoma. The study not only highlights the visual disability caused by the inadvertent use of steroids in children but also observes that the children and parents were not adequately counseled about the adverse effects of prolonged use of steroids for a seemingly innocuous ocular condition such as allergic conjunctivitis. They were also not adequately educated about periodical monitoring of eye pressures to detect ocular hypertension early for the cessation of therapy with steroids, so that needless vision impairment could be prevented. Most studies have observed a reversal of ocular hypertensive response in children who had minimal or no optic nerve damage, testifying to the fact that there is no permanent alteration of outflow pathways when the condition is detected early and therapy discontinued. Most children on continued therapy with topical steroids for close to two or more years had presented with significant resistance to aqueous outflow and visual impairment from glaucomatous disc damage, necessitating surgical intervention. It is also appalling that a significant proportion of children in most of the studies in India were blind in one or both eyes at the time of

presentation, truly calling for introspection by the ophthalmic fraternity, who have to be accountable and take proactive measures to reverse this disturbing trend.

The worldwide prevalence of childhood blindness ranges from 0.03% in the developed world to as high as 0.12% in developing nations. Glaucoma accounts for 4–5% of childhood blindness. It is probable that steroid-induced glaucoma accounts for a very small proportion of children with significant vision impairment, while the prevalence of glaucoma attributable to use of steroids in children in the general population has not been reported. Low prevalence of steroid-induced glaucoma in the population would imply that it may not qualify to be a crucial public health issue to attract allocation of resources to plan preventive measures. However, a high incidence of glaucoma with insidious blindness and late presentation as in the study reported by Sen *et al.*<sup>[10]</sup> in children using steroids would result in a significant proportion of blind years in those affected and care provider burden. There is no information of the direct economic impact of steroid-induced glaucoma and blindness in children, while childhood blindness accounted for close to USD 22.2 billion<sup>[11]</sup> cumulative loss over a lifetime in India in 1997. Judicious use of steroids and close monitoring of children on therapeutic steroids is hence, highly imperative.

Considering the potential harm of prolonged steroid therapy in children, primary eye care providers need to consider non-steroidal modalities to address the management of vernal keratoconjunctivitis. Tacrolimus and cyclosporine considered as effective steroid sparing therapy need to be considered in the management of allergic disorders of the eye. Although no published literature currently exists on the changing pattern of steroid-induced glaucoma in children with allergic conjunctivitis and uveitis, it is possible that ophthalmologists are increasingly resorting to non-steroid therapy in the management of trivial conditions such as ocular allergies. Ophthalmologists in clinical practice could possibly attest to the fact that steroid-induced glaucoma is probably declining owing to alternative therapies available for allergic keratoconjunctivitis. Nevertheless, new forms of administration of steroids, such as intravitreal steroids for chronic uveitis, inhalational steroids for allergic bronchitis, and topical steroids for dermatological disorders continue to be used in children. Hence, not only ophthalmologists but specialists of related disciplines also need to be sensitized about the possible ocular adverse effects of steroids, which could easily be overlooked by them.

There is an urgent need for educating the public on potential adverse effects of steroids used in any form on the eye. Regulations need to be in place to prevent dispensing of steroids by pharmacists without a valid and approved prescription from the treating physician. Recent, updated prescriptions from physicians need to be made mandatory for dispensing steroids to prevent the practice of over-the-counter sale of these potentially harmful drugs. Physicians of all disciplines need to be sensitized about the ocular adverse effects of steroids and those on chronic therapy require to be monitored for serious complications such as glaucoma by referral to ophthalmologists. All ophthalmologists are also to be educated about frequent IOP monitoring and careful evaluation of the optic nerve head and retinal nerve fiber layer under mydriasis of all children at risk of steroid-induced glaucoma. Steroid-induced glaucoma in children is a complication that is better avoided altogether.

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