



**ORIGINAL RESEARCH PAPER**

**Ophthalmology**

**A GLIMPSE OF GLAUCOMA**

**KEY WORDS:**

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The eye is one of the major sensory organs in our body and the loss of eyesight or vision can engender different forms of mental, physical as well as emotional distress. World Health Organization (WHO) estimated that in 2010, 285 million people are found to be visually impaired out of which 39 million people are blind. Most eye diseases occur in the old age such as cataract, glaucoma, diabetic retinopathy and macular degeneration (Asefa, N. G., 2018). The International Agency for the Prevention of Blindness has stated that "Glaucoma is the second leading cause of blindness and the leading cause of irreversible blindness worldwide". In India, around 12 million cases of glaucoma have been projected, which accounts for about one fifth of the global glaucoma population. The National Blindness survey 2001 established that glaucoma is the third major cause of blindness and confirms to about 5.9% of blindness in India (Saxena, R., 2013).

Glaucoma is a group of diseases which damages the optic nerve and lead to progressive optic neuropathy in turn resulting in vision loss and blindness with raise intraocular pressure being the most common risk factor. Glaucoma differs significantly with race and ethnic characteristics of patients' world over. For instance, the incidence of open angle glaucoma is more in western countries, whereas closed angle glaucoma is more predominant in the population of East Asian countries (ICO Guidelines for Glaucoma Eye Care 2016) Glaucoma can occur congenitally or may be acquired. Glaucoma can present itself spontaneously classified as primary glaucoma or where it can be the result of another eye condition which is the secondary type of glaucoma (McAlinden, C2014). Glaucoma can be broadly classified as either open angle glaucoma or closed-angle glaucoma. The space between the iris and cornea, where the trabecular meshwork is present is referred to as the angle. In open angle glaucoma, the iris lies far away from the cornea such that the trabecular meshwork is wide open and is available for the aqueous humor to flow. But in closed-angle glaucoma, the space between the iris and cornea is constricted which makes the trabecular meshwork shrouded and the flow of the aqueous humor gets delayed (Saxena, R., 2013).

Intraocular pressure, age and family history are the main risk factors for precipitating primary glaucoma whereas secondary glaucoma is due to several other eye diseases such as trauma, pigment dispersion or pseudoexfoliation and use of corticosteroids (Asefa, N. G., 2018). It has been studied that the elevation in the intraocular pressure (IOP) is associated with this disease condition and it is mainly characterised by structural changes to the optic

nerve and visual function (McAlinden, C2014). The frequency of glaucoma indication increases exponentially with age and also the IOP level. The increase in the IOP level in experimental procedure in animals or the iatrogenic elevation of IOP in patients has been found to be the cause for the development of glaucomatous optic neuropathy (Danesh-Meyer, H. V., 2015). It has been indicated that primary glaucoma can occur congenitally through inheritance as a Mendelian autosomal-dominant or recessive trait, but only 3%–5% of these cases follow this phenomenon (Asefa, N. G., 2018). In case of primary open angle glaucoma reported in children and young adults, it is true that it follows the Mendelian traits (Danesh-Meyer, H. V., 2015). Schellack, N., et al. reported that a hereditary feature was seen in case of patients with juvenile open-angle glaucoma (Schellack, N., 2015). Glaucoma can also occur in younger population (Cohen, L. P., 2014). The predominance of childhood glaucoma proves to be a challenging health issue in some developing countries (Mokbel, T. H., 2018).

Two simple mechanisms can be used to explain the underlying pathogenesis of glaucoma. Firstly, the mechanical theory postulates that the increase in the intraocular pressure results in the disruption of the axoplasmic flow in the optic nerve causing the nerve fibers to abbreviate when exiting the eyeball. Secondly, the ischemic theory suggests that because of the vascular compromise stimulated by the raised intraocular pressure, optic nerve head perfusion is reduced. As a consequence of both, it results in retinal ganglion cells death and neuropathy (Saxena, R., 2013). Since retina and optic nerve constitutes a part of the CNS, therefore it might be possible that the pathological changes occurring in the CNS would likely exhibit similar changes in the optic nerve. However, glaucoma was found more of a primary optic neuropathy rather than a primary neurodegeneration process (Danesh-Meyer, H. V., 2015).

In the management of glaucoma, medical as well as surgical interventions are employed. However, potential risk factors should be properly screened before treatment is undertaken. Systemic factors like hypertension, type 2 diabetes mellitus and cardiac disease as well as the level of optic damage and visual defects should be kept in mind while managing a glaucoma patient (Saxena, R., 2013). Alpha agonists e.g. brimonidine and apraclonidine, beta-blockers e.g. timolol, betaxolol and levobunolol and carbonic anhydrase inhibitors e.g. topical brinzolamide and dorzolamide are some drugs which are used in glaucoma. Pilocarpine and carbachol as cholinergic agonists;

latanoprost, bimatoprost and travoprost which are the prostaglandin analogues have also been found to be helpful in lowering the IOP (Schellack, N., 2015). Hyperosmotics such as oral glycerol and intravenous mannitol are also used which dehydrate the vitreous humor and reduce the intraocular pressure. Laser iridotomy, which is one of the most important laser procedures, involves the formation of a hole in the peripheral iris to permit an alternating pathway for aqueous to flow from the posterior chamber to the anterior chamber has also been in use. It prevents papillary block in cases of angle closure glaucoma. Laser trabeculoplasty has also been applicable in case of open-angle glaucoma. In case of surgical treatment, trabeculectomy surgery, where direct drainage of aqueous into the subconjunctival space thereby bypassing the trabecular meshwork, is done by formation of an ostium in the sclera. Drainage devices such as valves or tubes can also be used. Surgery can be done only in cases where non compliance or intolerance to medication is presented (Saxena, R., 2013).

Glaucoma can be a life devastating event when proper care and detection is not available or if the patient is being untreated for a long period. It is important that proper management and monitoring of the patients is done and a regular follow up and medication is encouraged. Prevention of vision loss is one main focus in the management of glaucoma (Schellack, N., 2015). Besides being classified as the third major blindness in India, glaucoma has also been noted in the Vision 2020 Right to Sight India program which further states that glaucoma is of main concern when dealing with blindness in the country. Immense public awareness and education regarding the early detection and prevention of glaucoma is required. Attempts to increase and intensify the need for proper estimation and effective care and screening methods as well as research and management of this disease are needed (Saxena, R., 2013). With Asia being projected as having the largest number of glaucoma cases, hence accurate estimation of critical glaucoma patients, screening and monitoring, required treatment procedure and public involvement as well as future plans to design and evaluate glaucoma cases is suggested (Tham, Y. C., 2014). This article has been written as a prelude to the ongoing study on "Demographic Profile and Prescription audit of patients with glaucoma in a tertiary care hospital" conducted in NEIGRIHMS.

## References

1. Asefa, N. G., Neustaeter, A., Jansonius, N. M., & Snieder, H. (2018). Heritability of glaucoma and glaucoma-related endophenotypes: systematic review and meta-analysis protocol. *BMJ open*, 8(2), e019049.
2. McAlinden, C. (2014). Selective laser trabeculoplasty (SLT) vs other treatment modalities for glaucoma: systematic review. *Eye*, 28(3), 249.
3. Cohen, L. P., & Pasquale, L. R. (2014). Clinical characteristics and current treatment of glaucoma. *Cold Spring Harbor perspectives in medicine*, 4(6), a017236.
4. Schellack, N., & Bezuidenhout, S. (2015). Glaucoma: a brief review. *SA Pharmaceutical Journal*, 82(5), 18-22.
5. Tham, Y. C., Li, X., Wong, T. Y., Quigley, H. A., Aung, T., & Cheng, C. Y. (2014). Global prevalence of glaucoma and projections of glaucoma burden through 2040: a systematic review and meta-analysis. *Ophthalmology*, 121(11), 2081-2090.
6. Danesh-Meyer, H. V., & Levin, L. A. (2015). Glaucoma as a neurodegenerative disease. *Journal of Neuro-Ophthalmology*, 35, S22-S28.
7. ICO Guidelines for Glaucoma Eye Care. International Council of Ophthalmology. February 2016. Available at <http://www.icoph.org/downloads/ICOGlaucomaGuidelines.pdf>
8. Mokbel, T. H., El Hefney, E. M., Hagra, S. M., ALNagdy, A. A., Badawi, A. E., Kasem, M. A., & El Shaer, S. M. (2018). Childhood glaucoma profile in Dakahelia, Egypt: a retrospective study. *International journal of ophthalmology*, 11(4), 674.
9. Saxena, R., Singh, D., & Vashist, P. (2013). Glaucoma: An emerging peril. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*, 38(3), 135.