

Prescribing patterns and cost analysis of anti glaucoma medications in a tertiary care teaching hospital

Elfride F. S.¹, Kishore S.R.², Philip S³

¹Dr Elfride Farokh Sanjana, Professor, Department of Ophthalmology, Pondicherry Institute of Medical Sciences, Kalapet, Pondicherry, India, ²Dr. Kishore Sastha Ram V., Lecturer, Department of Pharmacy College of Health Sciences, Mizan Tepi University, SNNPR, Ethiopia, ³Dr. Serin Philip., Medical Claim Officer, Dar al Shifa hospital, Kuwait.

Address for correspondence: Dr Elfride Farokh Sanjana, Email: Elfridesanjana@gmail.com

Abstract

Aim: To study the prescribing patterns and cost analysis of anti glaucoma medications in a tertiary care teaching hospital. **Materials and Methods:** This was a prospective study conducted in 62 patients of either sex who presented in the Department of Ophthalmology with an established diagnosis of glaucoma as per Asia Pacific Glaucoma Guidelines (SEAGIG). A specially designed proforma was used to collect data. Visual acuity with and without correction, intraocular pressure measurement with applanation tonometer which was corrected with pachymetry, stereoscopic evaluation of optic nerve head and Humphrey visual analysis was done to establish the diagnosis of glaucoma. All prescriptions were analyzed for the nature of drugs prescribed, percentage of prescriptions that included mono therapy versus fixed dose combinations, the preferred regimen chosen and switch over amongst the various classes. **Results:** The incidence of glaucoma was maximum in the 5th -6th decades of life. Mean age was 58+/- 13.781, with males 63% and females 11.29%. Both eyes were affected in 49(79.03%) of patients. Risk factors were identified commonly diabetes mellitus and hypertension. Thirty (50%) of patients were on beta blockers, followed by prostaglandin analogues 13(21.6%) and fixed dosed combinations comprising 12(20%) and alpha agonists 5(8.33%). The cost per bottle of monotherapy and fixed drug combinations was analyzed and beta blockers were the most economical drugs in the management of glaucoma. **Conclusion:** Beta blockers remained the first drug of choice followed by prostaglandin analogues. No patient had clinically significant ocular or systemic side effects from beta blockers and it continues to remain a suitable economical option in patients with socioeconomic constraints in contrast to the Western world literature that chooses prostaglandin analogue over beta blockers.

Key words: Beta blockers, Cost analysis, Fixed dose combinations, Prostaglandin analogues

Introduction

Glaucoma refers to a spectrum of ophthalmic disorders characterized by slow progressive degeneration of retinal ganglion cells that leads to permanent deterioration of the visual field and loss in vision. It manifests with functional and structural changes along with increased intraocular pressure which is amenable to medical treatment to minimize disease progression [1,2,3,4]. Glaucoma is classified as primary and secondary and further based on configuration of the angle as open or closed angle. Glaucoma is the third

leading cause of irreversible blindness with an estimated 66.8 million people with visual impairment and 6.7 million blind from glaucoma [5]. India has 11.2 million people over the age of 40 years with glaucoma, and with increased longevity this number is estimated to increase to 16 million by the year 2020 [6].

The Chennai Glaucoma Study, Vellore Eye Survey, Andhra Pradesh Eye Disease Study and The Aravind Comprehensive Eye Survey are all regional landmark population based studies that have well established the prevalence and demographic of Glaucoma in the southern parts of India [6,7,8,9]. A step ladder pattern to

Manuscript received: 04th December 2016
Reviewed: 10th December 2016
Author Corrected: 19th December 2016
Accepted for Publication: 27th December 2016

management of glaucoma is followed with primary intervention being medical management [2].

Management of glaucoma as per SEAGIG Guidelines [10] recommends establishing a diagnosis, followed by a baseline intraocular pressure measurement, setting target intraocular pressure and initiating therapy. With a wide number of anti glaucoma medications available to the ophthalmologist, prescribing patterns show considerable variation, with prostaglandin analogues and beta blockers being the preferred first line of drugs [10].

We aimed to determine prescribing patterns and side effects of various anti glaucoma drugs in our hospital.

Materials and Methods

This was a prospective study done over a period of six months after approval from institutional ethics

Results

Demographic analysis showed mean age group of 58+/- 13.781 years with patients in the range 50-59 (35.48%) having the maximum incidence of glaucoma. Males constituted to 39 (63%) and females 23 (37%) of the patients studied. Amongst the patients included in the study 18(29%) were patients with a known history of glaucoma and 44 (71%) were newly diagnosed patients. Both eyes with asymmetrical involvement was seen in 49 (79.03%) of eyes. Open angle glaucoma constituted to the majority of cases of glaucoma 39(62.90%) followed by secondary glaucoma 15 (24.20%), and primary angle closure glaucoma made up 7(11.29%) of the total patients analyzed.

Diabetes mellitus was the most common systemic association 35(56.45%) of the patients studied, followed by Hypertension 27(43.55%). Target pressure was achieved in 43 (69%) of patients who were managed medically, where as 2 (3%) and 17(28%) of patients required laser and surgical treatment respectively.

Table-1: Distribution of anti glaucoma drugs

Drugs	Patients (60)	Percentage (%)
Beta blockers	30	50
Prostaglandin analogues	13	21.6
Alpha 2 agonists	5	8.33
Fixed dose combinations	12	20

Table-2: Dosing frequency

Frequency	Patients (60)	Percentage (%)
Once daily	13	22
Twice daily	47	78

committee. Sixty two patients of either sex with a well established diagnosis of glaucoma (as per SEAGIG Guidelines) were included in the study [10]. A specially designed proforma was used to collect data which included patient demographics, past medical and medication history, socioeconomic status, and systemic comorbidities. History of previous ocular surgery and present medications for each patient was documented. In patients with known and newly diagnosed glaucoma all prescriptions were analyzed for the names, dose, frequency, duration and class of drug prescribed, percentage of monotherapy versus fixed drug combination and cross over between classes was documented for those patients who did not achieve the target intraocular pressure. Only topical medications were analyzed although tablet acetazolamide was the only oral anti glaucoma medication prescribed. Systemic co morbidities which accounted for risk factors in primary glaucomas were documented.

Table-3: Types of drug regimen

Type	Patients(60)	Percentage (%)
Single drug regimen	47	78.33
Fixed dose regimen	12	20
Triple drug regimen	1	1.67

Table 4: Ocular side effects of beta blockers

Ocular side effects	Number of patients
Hyperemia	5
Burning	4
Stinging	2
Dryness	3
Punctate keratitis	2

Table-5: Cost analysis of anti glaucoma medications per eye/both eyes

Anti glaucoma medication	Single eye	Both eyes
Timolol 0.5% eye drops	Rs 284	Rs 565
Betaxolol 0.5% eye drops	Rs 288	Rs 580
Latanoprost 0.005% eye drops	Rs 2263	Rs 4467
Bimatoprost 0.3% eye drops	Rs 2628	Rs 5212
Brimonidine 0.2% eye drops	Rs 1423	Rs 2847
Dorzolamide+timolol eye drops	Rs 1887	Rs 3766
Bimatoprost +timolol eye drops	Rs 2233	Rs 5621
Latanoprost +timolol eye drops	Rs 2233	Rs 5621
Brimonidine+timolol eye drops	Rs 1660	Rs 3321

Beta blockers were the most commonly prescribed drugs in 30(50%) of the patients, followed by prostaglandin analogues in 13(21.6%), alpha agonists in 5(8.33%) and fixed drug combination in 12 (20%) of patients. (Table.1) Dosing schedule is depicted in Tab 2. Timolol (0.5%) was prescribed in 21 (35%) and betaxolol in 9 (15%) of patients. Latanoprost (0.005%) was prescribed in 2 (3.33%) in comparison to bimatoprost (0.01%) in 11(18.33%) of patients Dorzolamide and timolol was the most commonly prescribed fixed dose combination 6(10%) followed by prostaglandin analogue and timolol and alpha agonist and timolol in 2 (3.33%) each. Single drug regimen was effective in 47(78.33%) of patients. (Table. 3) Hyperemia was the most common side effect in patients on beta blockers (Table 4) and hypertrichosis in 7 patients on prostaglandin analogues. Hyperemia and bitter taste was most commonly encountered side effect in patients

on alpha agonist and dorzolamide respectively. 13 (20.96%) patients were lost to follow up. Cost to the patient per day was calculated by dividing the maximum retail price by the number of drops in each bottle and multiplying this with average number of drops prescribed daily. Costs of anti glaucoma drugs for single and both eyes are depicted in Table 5.

Adequate counseling regarding the nature of the disease, drugs, dosing frequency, storage conditions and nasolacrimal duct occlusion was explained to every patient in an attempt to reduce systemic absorption and improve patient compliance and adherence. The cost of anti glaucoma medication per drop, per bottle, per eye and in both eyes per year were calculated in this study.

Discussion

The socioeconomic burden of glaucoma is large as it is now the second most common cause of irreversible blindness in India only after cataract with a projected estimate of 16 million people blinded by this condition by the year 2020 [6]. Lowering the intraocular pressure is the only method of treating glaucoma at present and this can be achieved in most patients with primary open angle glaucoma.

The demographic pattern which included 63% of male and 37% female with maximum incidence in the 5th-6th decade was not in consistency with results from other population based studies such as the Chennai glaucoma study [6] which showed a female preponderance in the incidence of glaucoma. Forty nine patients (79.03%) of patients had bilateral involvement at presentation.

In our study 39 (62.9%) patients had Primary Open Angle Glaucoma out of which 27(43.55%) were males and 12(19.35%) were females. The Aravind Comprehensive Eye Survey found a higher prevalence of POAG in males (68.75%) than females (31.25%) [9]. Among the causes of secondary glaucoma phacolytic and pseudoexfoliative glaucoma accounted for 5(8.06%) and 4(6.45%) of patients respectively. The Chennai Glaucoma Study reported an incidence of 3.8% pseudoexfoliation in the rural south Indian population [6].

Forty three (69%) of the 62 patients were treated with medical therapy alone. Beta blockers were the most commonly prescribed medication in 30(50%) patients of which 21(35%) received timolol (0.5%) eye drops. This is in agreement with studies by Yadav et al that reported 93.88% predominance of beta blocker prescriptions followed topical carbonic anhydrase inhibitors (15%), prostaglandin analogues (8.88%) and cholinergics (3.33%) [11]. A similar trend of predominance of beta blocker prescription was also seen in studies by Sharma et al [12].

Prostaglandin analogues were the second most commonly prescribed accounting for 13(21.6%) of prescriptions in our study. Yadav et al reported an 8.88% use of PGA in their study where as Sharma et al reported 1% [11,12]. PGA have superior efficacy and safety profile in comparison to other anti glaucoma medications which was demonstrated in a study by Singh et al [13] and western literature conforms to the same fact.

Our study had 12 patients who were on fixed dose combinations, most commonly dorzolamide +timolol because of their ability to achieve a nocturnal and diurnal intraocular pressure lowering similar to the results of a study by Pal et al [14]. Fixed dose combinations have the advantage of better compliance, decreased toxicity and side effects and wash out from the eye and this has been consistently demonstrated in studies by Hwang et al [15] and Yadav et al [11]. FDC were prescribed in 26.66% of prescriptions by Yadav et al and in agreement with our study of dorzolamide + timolol combination being the preferred combination.

Beta blockers were found to be cost effective in comparison to other drugs with the lowest price for timolol eye drops followed by betoxolol. The annual cost for timolol and betoxolol was Rs 565.70 and Rs 580.35 respectively. Beta blockers were the preferred class in our study similar to studies by Yadav et al[11] and Singh et al[12] taking into consideration the socioeconomic status of the patients being treated in all these studies. PGAs' were the most expensive with Bimatoprost between Rs 2555 to Rs 5215 for generic and patent versions respectively. Fixed dose combinations were in between the cost of beta blockers and PGA. The trend is different in western literature where prostaglandin analogues are the first drugs of choice. [16,17]. This can be explained by the socio economic constraints in India .

Conclusion

Beta blockers and prostaglandin analogues are the predominant anti glaucoma medications but with an obvious difference in the prescribing trends across the globe. Beta blockers remain the first line of drug in the medical management of glaucoma and this can be explained and accounted for by the socioeconomic constraints and poor level of literacy in out part of the world in comparison to western literature.

Dr Elfride Farokh Sanjana: Previous affiliation: (when the study was done) Associate Professor, Department of Ophthalmology, Sri Ramachandra Medical College and Research Institute, Chennai –600116

Funding: Nil, **Conflict of interest:** None initiated, **Permission from IRB:** Yes

References

- Joseph T Dipiro. Pharmacotherapy- A pathophysiologic approach . 7th ed. New York. McGraw Hill, 2001.pg 1551-1558
- Allingham R, Shields' text book of glaucoma,5th ed. Lippincot Williams and Willkins.
- Parikh RS, Parikh SR, Navin S, Arun E, Thomas R. Practical approach to medical management of glaucoma.Indian J Ophhalmol.2008.May-Jun;56(3):223-30.DOI:10.4103/0301-4738.40362
- Barbara Wells. Pharmacology 7th ed. Mac Graw Hill. New York. 2009
- George R, Vijaya L. First world glaucoma day. March 6,2008:Tackling challenges in India .Indian J Ophthalmol.2008;56(2):97-8.DOI:10.4103/0301-4738.39111.
- George R, Arvind H, Baskaran M, Ramesh S Ve, Vijaya L. The Chennai Glaucoma study. Indian J Ophthalmol.2010 May-Jun;58(3):243-45.DOI:10.4103/0301-4378.62655.
- Jacob A, Thomas R, Koshi SP, Braganza A, Muliylil J. Prevalence of Primary glaucoma in an urban south Indian population. Indian J Ophthalmol.1998;46(2):81-6.
- Dandona R, Dandona L. Review of findings of Andhra Pradesh eye disease study :policy implications for eye care study . Indian J Ophthalmol.2001Dec;49(4):215-34.
- Nirmalan PK, Katz J, Robin A.L, Krishnadas R, Ramakrishnan R, Thulasiraj RD, Teilsch J. Utilisation of eye care services in rural south India: the Aravind Comprehensive Eye Survey. Br J Ophthalmol 2004.Oct;88(10):1237-41.DOI:10.1136/bjo2004.042606.
- South East Asia Glaucoma Interest Group. <http://www.seagig.org>.
- Yadav AK,Patel V.Drug use in Primary open angle glaucoma.: A prospective study at a tertiary care teaching hospital.Indian J Pharmacol.2013.Mar;45(2):117-20. DOI:10.4103/0253-7613.108279
- Sharma R,Khajuria R, Sharma P, Sadhotra P, Kapoor B, Kohli K ET AL/ Glaucoma therapy: Prescribing pattern and cost analysis. JK Science 2004 Apr-Jun;Vol.6(2):88-92.
- Singh K, Shrivastava A. Medical management of glaucoma: Principles and practice. Indian J Ophthalmol.2011Jan;59(1):S88-92. DOI: 10.4103/0301-4738.73691.
- Magacho L, Reis R, Shetty RK, Santos L.C, Avila MP. Efficay of Latanoprost or Fixed –Combination Latanoprost –Timolol in patients switched from a combination of Timolol and a nonprostaglandin medication. Ophthalmology 2006.Mar;113(3):442-45. DOI:<http://dx.doi.org/10.1016/j.opthta.2005.11.011>
- Varma R, Hwang L J, Grunden J W, Bean GW. Using diurnal intraocular pressure fluctuation to assess the efficacy of fixed-combination latanoprost/timolol versus latanoprost or timolol monotherapy. Br J Ophthalmol.2010 Jan;94(1):80-84. DOI: 10.1136/bjo.2009.162107.
- Carroll SC, Gaskin BJ, Goldberg I, Danesh-Meyer HV. Glaucoma prescribing trends in Austrailia and new Zealand. Clin Exp Ophthalmol.2006 Apr;34(3):213-8. DOI:10.1111/j.1442-9071.2006.01196.x
- Kashiwagi K. Changes in trend of newly prescribed anti glaucoma medications in recent nine years in a Japanese local community. Open Ophthalmol J.2010 Apr;4:7-11.DOI:10.2174/1874364101004010007.

.....
How to cite this article?

Elfride F. S., Kishore S.R., Philip S. Prescribing patterns and cost analysis of anti glaucoma medications in a tertiary care teaching hospital . *Int J Med Res Rev* 2016;4(12):2193-2198.doi:10.17511 /ijmrr. 2016.i12.19.

.....