Research Article

Preferred drug usage among patients attending ophthalmology outpatient department for the treatment of dry eye syndrome in a tertiary care teaching hospital at Dehradun, Uttarakhand

Shaktibala Dutta[1], Mirza Atif Beg[1], Shalu Bawa[1], Saubhagya Sindhu[1], Mohammad Anjoom[1], Sanjeev Kumar Mittal[2], Yogesh Kumar[1], Ankita Negi[1]

[1]Department of Pharmacology, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India.
[2]Department of Ophthalmology, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India.

Correspondence to: Mirza Atif Beg, E-mail: mabeg1997@gmail.com

Received January 19, 2015. Accepted February 12, 2015

Abstract

Background: Prescription auditing studies are a part of drug use studies and are beneficial in clinical practice for rational prescribing of drugs and helpful for minimizing the medication errors. These are an important tool to promote rational prescribing. **Aims and Objectives:** To study the drug-prescribing pattern in patients with dry eye syndrome. **Materials and Methods:** A drug use study was conducted in dry eye patients by the Department of Pharmacology, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, for 1 year. A total of 393 prescriptions were evaluated for prescribing pattern by using WHO drug use indicators. **Results:** Of the 393 prescriptions analyzed, it was found that 852 drugs were prescribed: 484 (56.81%) were artificial tears, 160 (18.78%) non-steroidal anti-inflammatory drugs (NSAIDs), 152 (17.84%) steroids, and 56 (6.57%) belonged to "others" category. Carboxymethyl cellulose, hydoxypropyl cellulose, and polyethylene glycol were the most common artificial tears prescribed. Prescribed NSAIDs included ketorolac, bromofenac, and diclofenac whereas fluromethalone, loteprednol, and difluprednate were the most commonly prescribed steroids for the treatment of dry eye. It was found that 0.7% fixed-dose combinations (FDCs) were prescribed; 2.24 drugs were prescribed per prescription; and 56.10% drugs were prescribed from National Essential Medicine List. **Conclusion:** Artificial tears were the most commonly prescribed drugs for dry eye. A therapeutic audit to provide regular feedback to researchers and prescribers may encourage rational prescribing in dry eye disease.

KEY WORDS: Drug Use; Rational Prescribing; Fixed-Dose Combinations; Therapeutic Audit; Dry Eye Patients

Access this article online	
Website: http://www.njppp.com	Quick Response Code:
DOI: 10.5455/njppp.2015.5.1901201521	

Introduction

Dry eye syndrome is one of the most common problems encountered in ophthalmology practice. It is a multifactorial disease of the ocular surface and tear film, resulting in ocular discomfort, visual disturbances, and tear instability with potential damage to the cornea and conjunctiva.[1,2] Dry eye has been defined as "a disorder of the tear film due to tear deficiency or excessive tear evaporation, which causes damage to the inter-palpebral ocular surface and is associated with symptoms of ocular discomfort" by the National Eye Institute/Industry Workshop

on Clinical Trials in Dry Eyes.[1] The overall prevalence of dry eye syndrome is estimated to be 5%–35%.[3] Various risk factors for dry eye alluded to in literature include air pollution; cigarette smoking; low humidity; high temperature; sunlight exposure; drugs race; ethnicity; female sex; ocular conditions such as blepharitis, meibomian gland dysfunction, and conjunctival disease; presence of systemic conditions including connective tissue diseases, osteoporosis, diabetes mellitus, human immunodeficiency virus (HIV), gout, and thyroid disorders; systemic cancer chemotherapy and medications such as isotretinoin, antidepressants, anxiolytics, β-blockers, diuretics; after corneal, retinal, or ocular oncologic surgery.[4,5] The study of prescribing pattern is a component of medical audit that seeks monitoring, evaluation, and necessary modifications in the prescribing practices of the prescribers to achieve rational and cost-effective medical care.[6] It is necessary to define prescribing pattern and to identify the irrational prescribing habits to drive a remedial message to the prescribers. Therefore, drug use studies, which evaluate and analyze the medical, social, and economic outcomes of the drug therapy, are more meaningful and observe the prescribing attitude of physicians with the aim of providing drugs rationally.[7,8]

Keeping all these facts in consideration, this study was designed to analyze the prescribing patterns of drugs used for treatment of dry eye in a tertiary care teaching hospital at Dehradun, Uttarakhand.

Materials and Method

A prospective drug use study was conducted in dry eye patients by the Department of Pharmacology at Shri Guru Ram Rai Institute of Medical and Health Sciences, for 1 year. Approval of the institutional ethics committee was obtained before the commencement of the study. A total of 393 prescriptions were analyzed to evaluate the prescribing pattern. Prescriptions were assessed using WHO drug indicators such as drug class, dosage form, and fixed-dose combinations (FDCs) and drugs from National Essential Medicine List 2013 (NEML 2013). Frequency of use of medications was charted. The medications were grouped in four major categories: artificial tears, non-steroidal anti-inflammatory drugs (NSAIDs), steroids, and others. The FDCs and the drugs prescribed from NEML were also assessed.

Results

During the entire study period, 393 prescriptions were assessed. There were 228 (58.02%) female and 165 (41.98%) male patients. The mean age of the patients was 45.48 ± 0.85 years. The mean duration of illness in our study was 1.95 ± 0.16 years. The values were expressed in mean ± SEM. Majority of patients belonged to middle socioeconomic status 348 (88.55%), and 45 (11.45%) patients were in lower socioeconomic group. Housewives (156, 39.69%) formed the majority of patients with dry eye symptoms followed by patients in private job (82, 20.87%), government job (48, 12.22%), students (41, 10.43%), and others (66, 16.79%). Comorbid conditions associated with the dry eye symptoms included hypertension in 39 (9.92%), diabetes mellitus in 33 (8.39%), hypothyroidism in 30 (7.63%), rheumatoid arthritis in 3 (0.76%), and bronchial asthma in 3 (0.76%) [Table 1].

A total of 852 drugs were prescribed, out of which 484 (56.81%) were artificial tears, 160 (18.78%) NSAIDs, 152 (17.84%) steroids, and 56 (6.57%) belonged to the "other" category. The other category of drugs comprised antibiotics, antivirals, and vitamins. Out of total 484 artificial tears prescribed, 256 (52.89%) were carboxymethyl cellulose (CMC), 186 (38.43%)

Table 1: Baseline characteristics

Parameters	No. (%)
Females	228 (58.02)
Males	165 (41.98)
Mean age (years)	45.48 ± 0.85
SES	
Middle	348 (88.55)
Poor	45 (11.45)
Profession	
Housewives	156 (39.69)
Private job	82 (20.87)
Government job	48 (12.22)
Students	41 (10.43)
Others	66 (16.79)
Coexisting conditions	
Hypertension	39 (9.92)
Diabetes Mellitus	33 (8.39)
Hypothyroidism	30 (7.63)
Rheumatoid arthritis	3 (0.76)
Bronchial asthma	3 (0.76)

Table 2: Frequency of administration of individual drugs

Drug groups	No. (%)
Artificial tears, 484(56.81%)	
CMC	256 (52.89)
HPC	186 (38.43)
PEG	42 (8.68)
NSAIDs, 160(18.78%)	
Ketorolac	108 (67.5)
Bromofenac	44 (27.5)
Diclofenac	8 (5)
Corticosteroids, 152(17.84%)	
Flurometholone	92 (60.53)
Loteprednol	40 (26.32)
Difluprednate	20(13.16)
Moxifloxacin	28 (70)
Doxycycline	8 (20)
Azithromycin	4 (10)
Vitamin C	10 (17.86)
Acyclovir	6 (10.71)

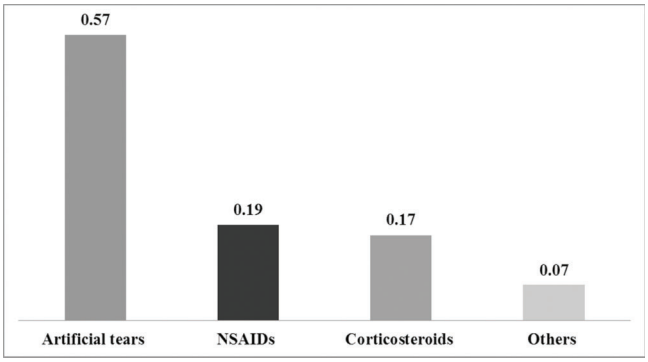

Figure 1: Drugs prescribed per prescription.

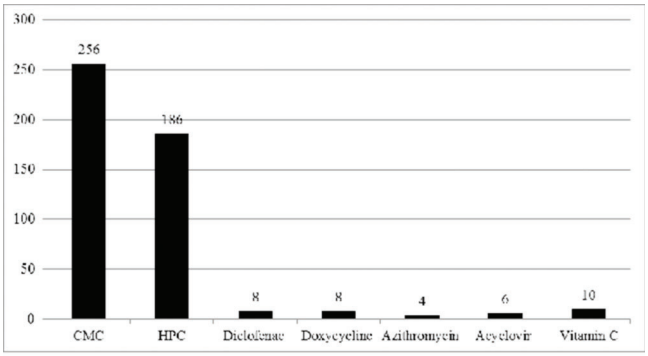

Figure 2: Drugs prescribed from National Essential Medicine List (NEML 2013).

were hydoxypropyl cellulose (HPC), and 42 (8.68%) were polyethylene glycol (PEG). Out of 160 NSAIDs prescribed, ketorolac was prescribed to majority of patients (108; 67.5%) followed by bromofenac (44; 27.5%) and diclofenac (8; 5%). Flurometholone (92; 60.53%) was the most commonly prescribed steroid followed by loteprednol (40; 26.32%), and difluprednate (20; 13.16%). A total of 40 antibiotics were prescribed, of which moxifloxacin (28; 70%) was prescribed the most, followed by doxycycline (8; 20%) and azithromycin (4; 10%). Ten (17.86%) vitamin C tablets were prescribed. Acyclovir (6; 10.71%) was the only antiviral prescribed [Table 2].

FDCs constituted only 0.7% of the total drugs prescribed. The FDC was a two-drug combination of difluprednate and moxifloxacin. The numbers of artificial tears, NSAIDs, corticosteroids, and other drugs prescribed per prescription were 0.57, 0.19, 0.17, and 0.07, respectively [Figure 1]. The average number of drugs prescribed per prescription was 2.24. It was found that 98.12% topical formulations were prescribed and 100% drugs were prescribed by their brand names. Out of total 852 drugs prescribed, 478 (56.10%) drugs were prescribed from NEML 2013 of which 256 (53.56%) were CMC, 186 (38.91%) HPC, 10 (2.10%) vitamin C, 8 (1.67%) diclofenac, 8 (1.67%) doxycycline, 6 (1.25%) acyclovir, and 4 (0.84%) were azithromycin [Figure 2].

Discussion

A prescription-based survey is considered to be one of the most effective methods to assess and evaluate the prescribing attitude of the physicians and dispensing practice of pharmacists.[9] It is also important to consider the recommendations of international bodies on dry eye syndrome that help to improve prescribing practice of the physicians and ultimately, the clinical standards. A continuous supervision is therefore required through such kinds of systematic audit that provide feedback from the physician and help promote rational use of drugs.[10]

This study observed that women (58.02%) had significantly higher prevalence of dry eye symptoms than men (41.98%). The male/female ratio in this study was 1:1.31, which is comparable to previous studies.[11–13] Women are particularly susceptible to dry eye symptoms, especially those receiving estrogen replacement therapy.[14] The average age of patients in the present study was 45.48 ± 0.85 years, reflecting usual age group of disease manifestation. This was comparable to the age of patients in two previous studies where the age group of 41–50 years and 40–49 years showed a relative peak in the prevalence of dry eye symptoms.[11,15] This peak reflects a dry eye state induced by environmental exposure, to which this age group, being the most active occupationally, is exceptionally prone.[11] In our study, housewives (43.33%) consisted of the majority patients who had dry eye symptoms, which is comparable with a previous study.[11]

In the present study, it was observed that most commonly prescribed drugs for dry eye syndrome were artificial tears, NSAIDs, and steroids, which was comparable to the previous studies.[16–18] Previous studies have confirmed the relation of dry eye with the inflammation of ocular surface, which is based on the immune response induced by cytokines, which in turn causes dysfunction or disappearance of cells responsible for tear secretion or retention.[19,20] The coexisting diseases were diabetes mellitus, hypothyroidism, hypertension, rheumatoid arthritis, and bronchial asthma, presence of which was comparable to previous studies.[4,21,22] As the coexisting diseases were of inflammatory origin, the prescription of NSAIDs and steroids seems justified.

Artificial tear lubricant eye drops including CMC and PEG promote the recovery of epithelial barrier function, and the results are also supported by previous studies.[13,23–25] Many previous clinical studies have shown the role of ketorolac 0.4%, bromofenac 0.1%, and other NSAIDs in providing significant improvement in dry eye patients by reducing the number of activated lymphocytes within the conjunctiva.[26–30] Corticosteroids have shown promising results for treating dry eye by increasing goblet cell density and reducing accumulation of inflammatory cells within ocular surface tissues.[31–33] In a study by Akingbehin,[16] it was shown that fluorometholone 0.1% has a substantially lower tendency to raise intraocular pressure than dexamethasone 0.1%. Another study has shown 0.5% loteprednol to be effective in patients with dry eye associated with keratoconjunctivitis sicca.[33]

Average number of drugs per prescription is an important index as it tends to measure the degree of polypharmacy, providing scope for review and educational intervention in prescribing practices.[34] The numbers of artificial tears, NSAIDs, corticosteroids, and other drugs prescribed per prescription in the present study were 0.57, 0.19, 0.17, and 0.07, respectively, which indicates that every patient was not prescribed artificial tears or other drugs. However, the average number of drugs per prescription was 2.24, which showed a restraint on overprescribing and polypharmacy to avoid risk of drug interactions. In our study, all drugs were prescribed by their brand names, which suggests the popularity of brands among the ophthalmologist and the influence of pharmaceutical companies. However, prescribing drugs by generic name makes the treatment low cost and rational as it avoids prescription writing errors and confusion of dispensing of different brand names that sound alike and spell similar.[35] The percentage of drugs prescribed from the NEML was 56.10, which could be related to lack of awareness and unavailability of NEML among ophthalmologists.

Limitations

This study has a few limitations. We might have focused only on the first prescription; this necessarily does not reflect the true clinical situation. We did not record the dose and dosing schedule of the treatment given. Keeping these limitations, caution is to be taken while interpreting the results.

Conclusion

Most of the prescriptions were rational, but further improvement is needed. Further studies focused on the rationale for choice of drug based on demographic data, economic status, associated conditions, and complications would give additional insights into prescribing patterns in dry eye syndrome in India. Rational prescribing requires consideration to dose and duration as well as interaction with other medications. A therapeutic audit with more parameters of analysis to provide regular feedback to researchers and prescribers may encourage rational prescribing in dry eye disease.

References

1. Djalilian AR, Hamrah P, Pflugfeder SC. Dry Eye Eye. In: Krachmer JH, Mannis MJ, Holland EJ (Eds.), *Cornea: Fundamentals, Diagnosis and Management*, 2nd edn, New York: Elsevier Mosby, 2005. pp. 521–40.
2. Diseases of the Conjunctiva. In: Sihota R, Tandon R (Eds.), *Parson's Diseases of the Eye*, 21st edn, India: Elsevier, 2011. pp. 185–6.
3. Epidemiology Subcommittee of the International Dry Eye Work Shop. The epidemiology of dry eye disease: report of the Epidemiology Subcommittee of the International Dry Eye Work Shop. Ocul Surf. 2007;5:93–107.
4. Moss SE, Klein R, Klein BE. Prevalence of and risk factors for dry eye syndrome. Arch Ophthalmol. 2000;118:1264–8.
5. Gayton JL. Etiology, prevalence, and treatment of dry eye disease. Clin Ophthalmol. 2009;3(1):405–12.
6. Gupta N, Sharma D, Garg SK, Bhargava VK. Auditing of prescriptions to study utilization of antimicrobials in tertiary hospital. Indian J Pharmacol. 1997;29:411–5.
7. Kapoor B, Raina RK, Kapoor S. Drug prescribing pattern in a teaching hospital. Indian J Pharmacol. 1985;17:168.
8. Pradhan SC, Shewade DG, Shashindran CH, Bapna JS. Drug utilization studies. Natl Med J India. 1988;1:185.
9. Yuen YH, Chang S, Chong CK, Lee SC, Critchlev JA, Chan JC. Drug utilization in a hospital general medical outpatient clinic with particular reference to antihypertensive and antidiabetic drugs. J Clin Pharm Ther. 1998;23:287–94.
10. Tiwari H, Kumar A, Kulkarni SK. Prescription monitoring of antihypertensive drug utilization at the Panjab University Health Centre in India. Singapore Med J. 2004;45:117–20.
11. Sahai A, Malik P. Dry eye: prevalence and attributable risk factors in a hospital-based population. Indian J Ophthalmol. 2005;53: 87–91.
12. Albietz JM. Prevalence of dry eye subtypes in clinical optometry practice. Optometry Vis Sci. 2000;77:357–63.
13. Kaercher T, Buchholz P, Kimmich F. Treatment of patients with keratoconjunctivitis sicca with optive: results of a multicenter, open-label observational study in Germany. Clin Ophthalmol. 2009;3:33–9.
14. Schaumberg DA, Sullivan DA, Buring JE, Dana MR. Prevalence of dry eye syndrome among US women. Am J Ophthalmol. 2003; 136(2):318–26.
15. Lee AJ, Lee J, Saw SM, Gazzard G, Koh D, Widjaja D, et al. Prevalence and risk factors associated with dry eye symptoms: a population based study in Indonesia. Br J Ophthalmol. 2002;86:1347–51.
16. Akingbehin AO. Comparative study of the intraocular pressure effects of fluorometholone 0.1% versus dexamethasone 0.1%. Br J Ophthalmol. 1983;67:661–3.
17. Sindt CW, Foulks GN. Efficacy of artificial tear emulsion in patients with dry eye associated with meibomian gland dysfunction. Clin Ophthalmol. 2013;7:1713–22.
18. Yanai K, Huang J, Kadonosono K, Uchio E. Corneal sensitivity after topical bromofenac sodium eye drop instillation. Clin Ophthalmol. 2013;7:741–4.
19. Nagelhout TJ, Gamache DA, Roberts L, Brady MT, Yanni JM. Preservation of tear film integrity and inhibition of corneal injury by dexamethasone in a rabbit model of lacrimal gland inflammation-induced dry eye. J Ocu Pharmaco Ther. 2005;21 (2):139–48.
20. Niederkorn JY, Stern ME, Pflugfelder SC, De Paiva CS, Corrales RM, Gao J. Desiccating stress induces T cell-mediated Sjögren's syndrome-like lacrimal keratoconjunctivitis. J Immunol. 2006;176 (7):3950–7.
21. McCarty CA, Bansal AK, Livingston PM, Stanislavsky YL, Taylor HR. The epidemiology of dry eye in Melbourne, Australia. Ophthalmology. 1998;105:1114–19.
22. Gilbard JP. Dry-eye disorders In: Albert DM, Jakobiec FA, Azar DT, Gragoudas ES (Eds.), *Principles and Practice of Ophthalmology*, 2nd edn, New York: WB Saunders, 2000. pp. 982–1001.
23. Latkany R. Dry eyes: etiology and management. Curr Opin Ophthalmol. 2008;19(4):287–91.
24. Cohen S, Martin A, Sall K. Evaluation of clinical outcomes in patients with dry eye disease using lubricant eye drops containing polyethylene glycol or carboxymethyl cellulose. Clin Ophthalmol. 2014;8:157–64.

25. Kim TH, Kang JW, Kim KH, Kang KW, Shin MS, Jung SY, Kim AR. Acupuncture for the treatment of dry eye: a multicentre randomised controlled trial with active comparison intervention (artificial teardrops). PLoS One. 2012;7(5):1–9.
26. Sandoval HP, Fernandez de Castro LE, Vroman DT, Solomon KD. A review of the use of ketorolac tromethamine 0.4% in the treatment of post-surgical inflammation following cataract and refractive surgery. Clin Ophthalmol. 2007;1(4):367–71.
27. Schechter BA. Ketorolac during the induction phase of cyclosporin—a therapy. J Ocul Pharmacol Ther. 2006;22:150–4.
28. Simone JN, Pendelton RA, Jenkins JE. Comparison of the efficacy and safety of ketorolac tromethamine 0.5% and prednisolone acetate 1% after cataract surgery. J Cataract Refract Surg. 1999; 25:699–704.
29. Aragona P, Stilo A, Ferreri F, Mobrici M. Effects of the topical treatment with NSAIDs on corneal sensitivity and ocular surface of Sjogren's syndrome patients. Eye. 2005;19:535–9.
30. Yanai K, Huang J, Kadonosono K, Uchio E. Corneal sensitivity after topical bromofenac sodium eye drop instillation. Clin ophthalmol. 2013;7:741–4.
31. Zoukhri D. Effect of inflammation on lacrimal gland function. Exp Eye Res. 2006;82(5):885–98.
32. Avunduk AM, Avunduk MC, Varnell ED, Kaufman HE. The comparison of efficacies of topical corticosteroids and nonsteroidal anti-inflammatory drops on dry eye patients: a clinical and immune-cytochemical study. Am J Ophthalmol. 2003;136(4): 593–602.
33. Pflugfelder SC, Maskin SL, Anderson B, Chodosh J, Holland EJ, De Paiva CS, et al. A randomized, double-masked, placebo-controlled, multicenter comparison of loteprednol etabonate ophthalmic suspension, 0.5%, and placebo for treatment of keratoconjunctivitis sicca in patients with delayed tear clearance. Am J Ophthalmol. 2004;138(3):444–57.
34. World Health Organization (WHO) and International Network for Rational Use of Drugs. *How to Investigate Drug Use in Health Facilities: Selected Drug Use indicators*, WHO/DAP/93.1. Geneva: WHO, 1993.
35. Nehru M, Kohli K, Kapoor B, Sadhotra P, Chopra V, Sharma R. Drug utilization study in outpatient ophthalmology department of Government Medical College Jammu. JK Science. 2005;7(3):149–51.

How to cite this article: Dutta S, Beg MA, Bawa S, Sindhu S, Anjoom M, Mittal SK, Kumar Y, Negi A. Preferred drug usage among patients attending ophthalmology outpatient department for the treatment of dry eye syndrome in a tertiary care teaching hospital at Dehradun, Uttarakhand. Natl J Physiol Pharm Pharmacol 2015;5:217-221

Source of Support: Nil, **Conflict of Interest:** None declared.