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Original research article

A descriptive cross-sectional study of dry eye disease in patients with glaucoma receiving topical antiglaucoma drugs in a tertiary care facility

[1]Madhuri G Patil, [2]K. Neelima, [3]Dr. K. Vijaya Sree

[1,2,3]Assistant Professor, Department of Ophthalmology, Kamineni Academy of Medical Sciences and Research, L.B. Nagar, Hyderabad, Telangana, India

Corresponding Author:
Madhuri G Patil

Abstract

Background and Objectives: Dryness, grittiness, burning, itching, and fluctuating vision are just a few of the symptoms of dry eye disease, a disorder of the tears and ocular surface. Long-term use of topical glaucoma medications increases the prevalence of dry eye disease symptoms. This study's objective was to identify the prevalence of dry eye condition in glaucoma patients using topical glaucoma medications in a tertiary care centre.

Methods: After getting ethical approval from the Institutional Review Committee, a descriptive cross-sectional study was carried out among glaucoma patients in a tertiary care centre using topical anti-glaucoma medications. A standard ocular surface disease index questionnaire was used to collect the data. If the ocular surface disease index score was 13 or higher, a clinical diagnosis of dry eye disease was made. A point estimate and a 95% Confidence Interval were the two outcomes.

Results: 150 (75%) of the 200 glaucoma patients had dry eye disease (range: 66.43-77.57, 95% Confidence Interval). There were 42 (28%), 59 (37.3%) and 52 (35%) individuals who had mild, moderate and severe symptoms, respectively. Itching and irritation were the most common dry eye symptoms, appearing in 53 patients (35.3%), followed by discomfort in the eye in 42 patients (28%) and redness in 33 patients (22%).

Conclusion: The prevalence of above condition was higher in one study than in other clinical trials conducted in comparable centre, which is particularly worrying and calls for a stronger emphasis on addressing both concurrent glaucoma and dry eye illness.

Keywords: Glaucoma, anti-glaucoma agent, dry eye disease, ocular surface illness index

Introduction

In addition to an increase in the osmolarity of the tear film and inflammation of the ocular surface, dry eye disease (DED), is a multifactorial tear disorder, is characterised by an inability to produce enough tears to moisten the ocular surface. The prevalence of DED increases with age, the quantity, and length of topical glaucoma treatments [1, 2, 3].

The estimated prevalence of glaucoma is about 0.7 to 0.75. The treatment involves topical medications including prostaglandin analogues (bimatoprost, travoprost), beta-blockers (timolol), carbonic anhydrase inhibitors (dorzolamide, brinzolamide) and adrenergic agonists (brimonidine). Antiglaucoma medications are not the only reason to cause dry eye, but the preservative used in antiglaucoma medication are main source of dry eye in glaucoma therapy. The common preservative particular benzalkonium chloride (BAK), have the potential to cause chronic ocular surface irritation. DED may make it more difficult for patients to take their glaucoma drugs as directed, which may result in the failure of the therapy and lower patient quality of life [4, 5, 6].

This study's main objective was to identify the prevalence of dry eye disease in glaucoma patients taking topical antiglaucoma drugs in a tertiary care centre [6].

Material and Methods

This was descriptive cross-sectional research done from May 2022 to April 2023 among glaucoma patients in the outpatient of glaucoma department at Department of Ophthalmology, Kamineni Academy of Medical Sciences and Research, L. B. Nagar, Hyderabad, Telangana, India. The Institutional Review Committee gave its blessing in terms of ethics. Additionally, for the aim of gathering their data, the glaucoma patients' explicit written consent was obtained. The informed consent, both in writing and verbally, of the qualified parties was obtained [7, 8].

The study included glaucoma patients who had undergone at least three months of treatment with one or more topical medications to lower intraocular pressure before returning to the glaucoma OP for the follow-up. Patients with recent infections of the eye, anomalies of the eyelids, immune-suppressing

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illnesses, and any lesions on the ocular surface were excluded. The sociodemographic characteristics of the participants, their use of topical glaucoma drugs, and their experiences with dry eye symptoms such itching, gritty feeling, burning sensation, impaired vision, and redness were all gathered using a structured questionnaire format. Symptoms were dryness, redness of eye, burning sensation, visual disturbance, difficulty in reading or working, photophobia [9, 10].

Inclusion criteria

1. Glaucoma patients who had undergone at least three months of treatment with one or more topical medications to lower intraocular pressure before returning to the glaucoma OP for the follow-up.

Exclusion criteria

1. Patients with recent infections of the eye, anomalies of the eyelids, immune-suppressing illnesses, and any lesions on the ocular surface were excluded.

The prevalence of dry eye disease was assessed using a face-to-face interview and a standard Ocular Surface Illness Index (OSDI) questionnaire. The score is sensitive and specific in separating patients with dry eye symptoms from healthy people. The OSDI is a reliable instrument for quickly assessing the symptoms and severity of dry eye disease (normal, mild, moderate, and severe), as well as how it has affected the patient's ability to see during the past week. Prior to the actual study, the questionnaire was pretested on 5% of the sample size; however, these results were not included in the final analysis [11, 12].
The questionnaire was also translated into Hindi for the benefit of the participants. Questions on visual function, ocular symptoms, and environmental triggers are included in the 12-item OSDI questionnaire. Each question receives a rating ranging from 0 to 4.
An experienced optometrist assisted in filling out the questionnaire. Then, a formula was used to determine the final OSDI score. The OSDI score for each participant was graded on a scale from 0 to 100. An OSDI score of 13 indicated the presence of DED in a clinically significant manner. The individuals were further broken down into three categories based on OSDI scores: mild symptoms (13-22), moderate symptoms (23-32), and severe symptoms (33-100). IBM SPSS Statistics 20.0 was used for the data analysis. A 95% CI and a point estimate were included in the calculations [13, 14].

Results

Table 1: Patients with glaucoma's prevalence of dry eye illness as measured by the OSDI score (n= 150)

OSDI score (Severity of symptoms)	n (%)
OSDI score 13-22 (Mild symptoms)	42 (28)
OSDI score 23-32 (Moderate symptoms)	56 (37.3)
OSDI score 33-100 (Severe symptoms)	52 (35)

Table 2: Characteristics of people with dry eye condition (n= 150)

Variables	**n (%)**
Age	
18-39 years	23 (15.3)
40-59 years	59 (39.3)
60 years	68 (45.3)
Gender	
Male	90 (60)
Female	60 (40)
Education status	
Illiterate	70 (46.6)
Primary level	30 (20)
Secondary level	45 (30)
Undergraduate level	5 (3.3)
Occupation	
Housewife	47 (31.3)
Farmer	35 (23.3)
Employed	39 (26)
Unemployed	29 (19.3)
Number of topical medications used	
Single	11 (7.3)
Two or more	139 (92.7)

Table 3: Patients with dry eye condition are prescribed topical glaucoma medications (n= 150)

Drugs	**Preservatives used (w/v)***	**n (%)**
Brimonidine + timolol maleate	0.01% BAK†	115 (76.6)

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Dorzolamide	0.0075% BAK	85 (56.6)
Bimatoprost	0.02% BAK	65 (43.3)
Timolol maleate	0.01% BAK	19 (12.6)
Brimonidine tartrate	0.005% SOC‡	10 (6.6)
Brinzolamide + brimonidine	0.02% BAK	1 (0.6)
Travoprost + timolol	0.01% BAK	1 (0.6)

Table 4: Conditions that cause dry eyes (n=150)

Dry eye symptoms	**n (%)**
Itching and Irritation	53 (35.3)
Pain in eye	42 (28)
Redness in eye	33 (22)
Blurred and poor vision	15 (10)
Grittiness	5 (3.3)
Burning sensation	2 (1.3)

Discussion

The first line of glaucoma treatment is always topical anti-glaucoma medication. The cornea and conjunctiva may be altered by chronic use of certain medications, which could result in dry eye syndrome. The current study discovered that DED was widespread in 72.000% of glaucoma patients, despite the fact that the incidence of dry eye has been expected to be around 25% out of 1599 patients attending the Ophthalmology outpatient department. Treatment for prolonged topical intraocular pressure lowering medication has a negative impact on the ocular surface [15, 16].

The higher prevalence of DED in our study can be attributed to a number of additional factors. The participants in the current study were glaucoma patients who visited the glaucoma unit. Due to the symptoms or indicators of DED, a referral tertiary eye hospital receives the majority of its patients from other institutions. Another factor might be the average age of our patients, which is 54.39 years old, and the fact that dry eye is more common in older persons. The prevalence was similar in earlier studies conducted in Ethiopia and Japan, where it was 76.00% and 73.50%, respectively [16, 17].

Compared to other research, where the prevalence of DED in glaucoma patients was 54.30%, 42.10%, and 45.10%, respectively, our study's findings were different. Since DED was defined using various criteria and measurement methods, the findings of these investigations may differ from one another. The disparity in prevalence may be explained by the fact that the Glaucoma Symptom Scale rather than the OSDI questionnaire was utilized in the Rossi investigation. The outcomes could be impacted by changes in the climate, environmental factors like pollution, or different sample groups. Patients in wealthy nations are also more likely to have access to drugs free of preservatives, implying they will have fewer symptoms of dry eye [18, 19].

About 31.10 percent of the participants in this study were housewives. Farmers make up about 23.90% of the population and work hard in difficult conditions. They put up with the stifling heat, sun, wind, and dust. It is also impossible to ignore how much pesticide and fertiliser exposure raises the possibility of DED in farmers. The most often administered topical glaucoma medication was brimonidine and timolol maleate fixed-dose combination (FDC), followed by dorzolamide. In vein, a study carried out in an Indian tertiary care hospital revealed that timolol and brimonidine, followed by dorzolamide, were the most often administered FDCs. The bulk of the DED symptoms encountered by the participants in the current study were moderate to severe dry eye symptoms, which were present in 72.22% of the study's participants. The quantity of IOP-lowering drugs taken is one of the most significant indicators of DED severity. 88.30% of the individuals in the current study utilised two or more topical antiglaucoma medications to reduce intraocular pressure [20, 21].

BAK, a preservative present in the majority of drugs, has been associated with DED symptoms in patients, according to a number of further research carried out in various clinical centre. BAK has negative effects on the conjunctiva and cornea, including increased prevalence of dry eye symptoms, subclinical inflammation, malfunction of the corneal epithelial barrier, instability of the tear film, and subclinical inflammation. Most of the glaucoma patients in the current study took more than two BAK-containing drugs, which increased the concentration of preservatives overall and may be linked to DED symptoms. Only a few investigations have shown that active medicines cause DEDs rather than excipients used as preservatives. Because of this, the majority of research revealed that reducing DED symptoms might be achieved by taking drugs without preservatives [22].

Itching, irritation, redness, eye pain, and impaired vision were the most frequent DED symptoms described by the majority of patients in the current study, while grittiness and burning sensations were recorded by a small number of patients. Another earlier study that supports ours found comparable results about uncomfortable side effects in patients using anti-glaucoma medications. This research had several restrictions. Participants were few and their performances lasted only a brief time. Second, the prevalence of DED was only determined using a questionnaire method; the results would have been more significant had they included additional criteria such tear break-up time and the Schirmer test [22].

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Conclusion

Comparing this study to others done in comparable environments, we found a higher prevalence of dry eye disease among glaucoma patients receiving topical anti-glaucoma medications. To ensure that patients continue taking their glaucoma medication as directed, an ophthalmologist should be aware of this and address any symptoms of dry eye that they notice in their patients.

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Conflict of interest: None.

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