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Dry Eyes and Glaucoma: A Report of Sixty Eyes

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Abstract **Original Research Article**

Introduction: Glaucoma is an optic neuropathy defined by optic disc cupping, characteristic visual field defects, and often an increase in intraocular pressure. It remains a leading cause of irreversible blindness, with an estimated 60.5 million people affected worldwide. It is a chronic disease that frequently requires long-term treatment with topical ocular hypotensive eyedrops. The use of antiglaucoma medications has been associated with dry eye. Another reason for the correlation between glaucoma and dry eyes, is that prevalence for both increases with age. ***Patients and methods*:** Sixty eyes of 30 patients with medically treated primary open-angle glaucoma (POAG) were included in this study. Dry eye syndrome was searched with Schirmer test (less than 10 mm in 5 minutes) and tear break-up time (BUT: less than 10 seconds). ***Results*:** Forty-eight eyes medically treated primary open-angle glaucoma (80%) present dry eye syndrome, this is consistent with previously published literature. All the POAG patients with dry eyes, were medically treated with preserved glaucoma eye drop. They were compliant to their treatment, thinking their vision is blurry because their glaucoma is getting worse and they're dealing with what they think is irreversible. After solving the dry eye syndrome, we effect a control of the Visual Field test, we can say that dry eye's treatment can significantly improve reliability and visual field index of glaucoma patients undergoing visual field examination. ***Conclusion*:** this study shows that dry eye syndrome associated with glaucoma might lead to ocular discomfort and low-quality retinal images which can decreased compliance of treatment, and deteriorate the Visual field test results. Protecting the integrity of the ocular surface while treating ocular conditions like glaucoma is necessary.

Keywords: Dry eye, glaucoma, primary open-angle glaucoma, Visual field test.

INTRODUCTION

Glaucoma is an optic neuropathy defined by optic disc cupping, characteristic visual field defects, and often an increase in intraocular pressure. It remains a leading cause of irreversible blindness, with an estimated 60.5 million people affected worldwide [1].

It is a chronic disease that frequently requires long-term treatment with topical ocular hypotensive eyedrops. The use of antiglaucoma medications has been associated with dry eye [2]. Another reason for the correlation between glaucoma and dry eyes, is that prevalence for both increases with age.

One of the functions of a precorneal tear film layer is to provide a smooth optical surface, which is essential for the maintenance of high-quality retinal images and vision. Any deterioration of the tear film may cause an irregular surface of cornea and a decrease in visual acuity and contrast sensitivity that might deteriorate the Visual Field test (VF), the mainstream for assessment of functional glaucomatous loss and progressive damage [3].

The co-existence of glaucoma and dry eye will negatively influence treatment and the course of disease. Dry eye symptoms will cause discomfort and lower patients' compliance, thus reducing the effectiveness of therapy [4].

Therefore, it is important to diagnose and treat dry eye to assess glaucoma functional loss and to improve adherence and success rate of glaucoma therapy and.

PATIENTS AND METHODS

Sixty eyes of 30 patients with medically treated primary open-angle glaucoma were included in this study. A diagnosis of POAG was established when characteristic glaucomatous optic nerve head changes

(rim thinning, excavation, and/or retinal nerve fiber layer defects) and VF defects, were detected on 2 consecutive tests and open drainage angles by gonioscopy.

Patients who were only on prostaglandin analogues, b-blockers, or the combination of these 2 classes of medication were included.

Exclusion criteria were artificial eye drop usage, visual acuity < 20/40, history of ocular surgery, contact lens wear, and the use of 3 anti-glaucomatous medications or more.

Dry eye syndrome was searched with Schirmer test (less than 10 mm in 5 minutes) and tear break-up time (BUT: less than 10 seconds).

RESULTS

Forty-eight eyes medically treated primary open-angle glaucoma (80%) present dry eye syndrome which was graded on the basis of severity (figure 1).

All the POAG patients with dry eyes were medically treated with preserved glaucoma eye drop. They were compliant to their treatment, thinking their vision is blurry because their glaucoma is getting worse and they're dealing with what they think is irreversible.

To treat the ocular surface disease, we used preservative free artificial tears and we saved the same glaucoma eye drops.

After solving the dry eye syndrome, we affect a control of the Visual Field test. No differences could be found in pattern standard deviation (PSD) values, fixation losses, false-positive errors, and false-negative errors after the treatment, whereas there were significant improvements in test duration and mean deviation (MD) (**Table 1**).

So, we can say that dry eye's treatment can significantly improve reliability and visual field index of glaucoma patients undergoing visual field examination.

DISCUSSION

Population based studies show a 15% prevalence of dry eye symptoms [6]. In contrast, dry eye symptoms have been reported in a higher frequency among glaucoma patients seen in general ophthalmic clinics (39–60%) [6]. In our study, 80% of patients reported dry eye signs, this is consistent with previously published literature.

The Intraocular pressure (IOP), ocular perfusion and tear production are regulated by autonomic nervous system. Dysfunction of the autonomic nervous system results in disturbance of IOP and basal tear production [8].

In normal population, aging leads to pathological changes of lacrimal duct such as periductal fibrosis, interacinar fibrosis, loss of paraductal blood vessel and acinar cell atrophy. Those pathological changes account for disturbance in tear dynamics and is a primary disease referred as age-related dry eye [9]. Decreased tear production usually occurs in accordance with increased age, particularly after entering the sixth decade [10].

Another problem faced by glaucoma patients is the long-term use of multiple topical medications that mostly contain Benzalkonium chloride (BAK), the most commonly found preservative in antiglaucoma medications, has been shown to decrease the stability of the precorneal tear film due to a deterrent effect on the lipid layer and to a reduction in the density of goblet cells [11].

Furthermore, the presence of dry eye symptoms was associated with decreased compliance in previous studies [12]. In our cases, the patients were compliant to their treatment, thinking their vision is blurry because their glaucoma and they're dealing with that.

Healthy, regular corneal surface is an important requirement for patients who need to perform VF examinations, which, in turn, influence glaucoma treatment decisions.

Previous studies have shown that VF test parameters are adversely influenced by corneal surface irregularities such as those detected in the setting of dry eye, [3,13] and that artificial tears reduce the symptoms of foreign body sensation and improve visual quality by establishing a regular, optically superior corneal surface.

So, it is recommended that patients with glaucoma with dry eye be treated with artificial tears before VF testing to obtain accurate VF results to really graduate the level of glaucoma and adapt the treatment.

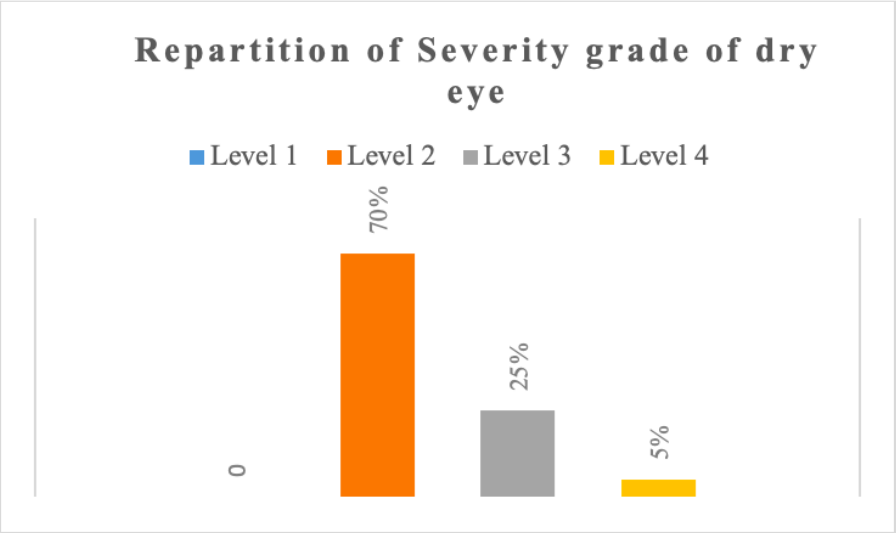

Fig-1: Repartition of severity grade of dry eye basis on the basic scheme of the Delphi Panel [5].

Table-1: Comparison of the baseline visual field parameters between patients with glaucoma and dry eye before and after treatment

Glaucoma VF Parameters	Glaucoma With Dry Eye		
	Before Treatment	After Treatment	P
Test duration (min)	5 +/- 1.0	4.1 +/- 0.8	<0.001
False-positive errors (%)	2 +/- 2.4	1 +/- 1.3	0.102
False-negative errors (%)	3 +/- 3.9	1.5 +/-2.7	0.052
Fixation losses (%)	1.5 +/-3.9	1.3 +/- 3.3	0.739
Mean deviation	4.8 +/- 4.6	4.1 +/- 4.3	0.009
Pattern standard deviation	3.5 +/- 3.0	3.2 +/- 2.9	0.09

CONCLUSION

Dry eye syndrome associated with glaucoma might lead to ocular discomfort and low-quality retinal images which can decreased compliance of treatment, and deteriorate the VF test results.

Protecting the integrity of the ocular surface while treating ocular conditions like glaucoma is necessary. Eye drops with additional ocular-surface-protective properties should become a part of an ophthalmologist's armamentarium for patients at risk for ocular surface diseases requiring long-term treatment with drops.

The development of preservative-free antiglaucoma medications or medications with less toxic preservatives is likely to benefit patients, reducing ocular surface changes and possibly improving their quality of life [14].

Conflicts of interest

The authors do not declare any conflict of interest.

REFERENCES

1. Quigley, H.A., Broman, A.T. (2006). The number of people with glaucoma worldwide in 2010 and 2020. *Br. J. Ophthalmol*, *90*, 262–267. [PubMed] [Google Scholar]
2. Fechtner, R. D., Godfrey, D. G., Budenz, D., Stewart, J. A., Stewart, W. C., & Jasek, M. C. (2010). Prevalence of ocular surface complaints in patients with glaucoma using topical intraocular pressure-lowering medications. *Cornea*, *29*(6), 618-621.
3. Tutt, R., Bradley, A., Begley, C., & Thibos, L. N. (2000). Optical and visual impact of tear break-up in human eyes. *Investigative ophthalmology & visual science*, *41*(13), 4117-4123.
4. Pisella, P. J., Pouliquen, P., & Baudouin, C. (2002). Prevalence of ocular symptoms and signs with preserved and preservative free glaucoma medication. *British Journal of Ophthalmology*, *86*(4), 418-423.
5. Behrens, A., Doyle, J. J., Stern, L., Chuck, R. S., McDonnell, P. J., Azar, D. T., ... & Yiu, S. C. (2006). Dysfunctional tear syndrome: a Delphi approach to treatment recommendations. *Cornea*, *25*(8), 900-907.
6. Moss, S. E., Klein, R., & Klein, B. E. (2000). Prevalence of and risk factors for dry eye syndrome. *Archives of ophthalmology*, *118*(9), 1264-1268.
7. Rossi, G. C. M., Tinelli, C., Pasinetti, G. M., Milano, G., & Bianchi, P. E. (2009). Dry eye

syndrome-related quality of life in glaucoma patients. *European journal of ophthalmology*, *19*(4), 572-579.

8. Kuppens, E. V., VAN BEST, J. A., Sterk, C. C., & DE KEIZER, R. J. (1995). Decreased basal tear turnover in patients with untreated primary open-angle glaucoma. *American journal of ophthalmology*, *120*(1), 41-46.
9. The definition and classification of dry eye disease: report of the definition and classification subcommittee of the International dry eye workshop. (2007). Ocul Surf. 2007; 5:75-92
10. Gayton, J. L. (2009). Etiology, prevalence, and treatment of dry eye disease. *Clinical ophthalmology (Auckland, NZ)*, *3*, 405.
11. Erb, C., Gast, U., & Schremmer, D. (2008). German register for glaucoma patients with dry eye. I. Basic outcome with respect to dry eye. *Graefe's archive for clinical and experimental ophthalmology*, *246*(11), 1593-1601.
12. Stringham, J., Ashkenazy, N., Galor, A., & Wellik, S. R. (2018). Barriers to glaucoma medication compliance among veterans: dry eye symptoms and anxiety disorders. *Eye & contact lens*, *44*(1), 50.
13. Rieger, G. (1992). The importance of the precorneal tear film for the quality of optical imaging. *British journal of ophthalmology*, *76*(3), 157-158.
14. Ammar, D. A., Noecker, R. J., & Kahook, M. Y. (2010). Effects of benzalkonium chloride-preserved, polyquad-preserved, and sofZia-preserved topical glaucoma medications on human ocular epithelial cells. *Advances in therapy*, *27*(11), 837-845.