

## Ocular Surface Disease and Quality of Life in Patients with Glaucoma

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### Abstract

### Original Research Article

**Background:** Glaucoma is a progressive optic neuropathy that is significantly related to Ocular Surface Disease. The ocular surface includes the cornea, conjunctiva, eyelids, and lacrimal glands; hence the ocular surface disease directs damage to the surface layers of the eye. **Methods:** This study is a cross-sectional study, conducted in Anwer Khan Modern Medical College Hospital, Dhaka, at the Department of Ophthalmology. The study was conducted during the period from December 2020- to November 2021. The sample size was 121. **Result:** In the age group 51-61, there were highest participation 33(27.3%) and among the participants males were 62 (51.2%) and females were 59(48.8%). Mean time for glaucoma or ocular hypertension diagnosis(years) was  $8.11 \pm 7.42$ . Open-angle glaucoma was most frequent, 97(95.1%). Mean IOP assessment- Right eye(mmHg) was  $15.87 \pm 3.97$  and Men IOP assessment - Left eye(mmHg) was  $15.84 \pm 3.94$ . Conjunctival hyperemia was controlled in 13(10.8%), mild in 49(40.8%), moderate in 27(22.5%), and severe in 32(26.7%) cases which was quite high. When the OSD grade was severe in ( $>12$  dB) 37(30.6%), the glaucoma stage was also severe ( $>12$  dB) in 27(22.3%) cases. **Conclusion:** Glaucoma had affected millions of patients around the world and chronic use of topical glaucoma medications may negatively impact the patient's ocular surface. There is a strong association between OSD and quality of life in medically treated glaucoma patients.

**Keywords:** Ocular Surface Disease (OSD), Glaucoma, Quality of Life(QoL).

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## INTRODUCTION

Glaucoma is a progressive optic neuropathy which is significantly related with Ocular Surface Disease [1, 2]. The ocular surface includes the cornea, conjunctiva, eyelids and lacrimal glands; hence the ocular surface disease directs damage to the surface layers of the eye. There are many causes ocular surface disease, but the 2 most common ones are dry eye syndrome and blepharitis [3]. According to a report from the World Health Organization, among the 37 million people who are currently blind, 4.5-5 million people are blind due to glaucoma [4]. It is predicted that about 60.5 million people around the world had glaucoma, and it is estimated that the number will raise

more than 79.6 million by the year of 2020 and above, mostly due to the rapidly aging population [5]. The frequency rate of glaucoma increases with the aging population, for example, in persons older than 40 years, 2.4% have glaucoma, and this frequency further increases to 7% among those who are older than 70 [6]. Some studies in this field had found the co-relation between glaucoma and ocular surface disease (OSD) [7-11]. The active ingredients and preservatives used in glaucoma medications can cause chronic inflammation of the ocular surface in patients with glaucoma, which can lead to structural changes in the meibomian gland [12-14]. OSD affects up to 59% of patients with glaucoma [15]. Ocular surface diseases can decrease glaucoma medication compliance and

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quality of life in patients with glaucoma [16, 17]. Rossi *et al.* in their study reported that patients using glaucoma medication had more frequent symptoms of ocular surface disease in comparison with participants not on glaucoma medication [9]. The ocular surface disease can negatively affect a patient’s quality of life. Studies on how changes in ocular surface disease affect the quality of life of patients with glaucoma are relatively limited. Measuring the quality of life is significant in the management of glaucoma patients as it can increase the burden of disease experienced by the patient, it thoroughly evaluates the impact of glaucoma on the patients, and also it can be used to monitor improvement in patients with glaucoma [12-17]. Hence, this study aimed to investigate the ocular surface diseases (OSD) in patients with glaucoma and to evaluate the impact of OSD in the quality of life of those patients.

**OBJECTIVE OF THE STUDY**

To investigate the Ocular Surface Diseases (OSD) in patients with Glaucoma and to evaluate the impact of OSD in the quality of life of those patients.

**MATERIALS AND METHODS**

This study is a cross-sectional study, conducted in Anwar Khan Modern Medical College Hospital, Dhaka, at the department of Ophthalmology. The study was conducted during the period from December 2020- November 2021. The sample size was 121.

**Inclusion criteria**

- The patient having ocular surface disease along with glaucoma.
- The patients who were willing to give consent after knowing the study purpose.

**Exclusion criteria**

- The patients having ocular surface disease but not glaucoma.
- The patients who were not mentally stable.
- The patients who had glaucoma but no ocular surface disease.
- The patients who were not willing to give consent.

Glaucoma patients were stratified by severity of central visual field loss according to the glaucoma staging system (GSS) developed by Nelson and associates.1 They were classified into 3 groups: Mild (unilateral loss of less than half of the visual field), Moderate (unilateral loss of more than half of the visual field, or bilateral loss of less than half of the visual field in each eye), or Severe (bilateral loss of more than half of the visual field in either eye). Treatment data were recorded for each participant. All the information was taken from the hospital authority with due permission. The statistical tool used for this study was SPSS version and MS office version 2019.

**RESULT**

**Table-I: Demographic and Baseline Characteristics of the Respondents**

Demographic and Baseline Characteristics		N=121	Percentage (%)
Age	18-28	4	3.3
	29-39	9	7.4
	40-50	21	17.4
	51-61	33	27.3
	62-72	29	24.0
	73-80	16	13.2
	80+	9	7.4
Gender	Male	62	51.2
	Female	59	48.8

Table I shows the demographic and baseline characteristics of the respondents. In age group 18-28, there were 4(3.3%) cases and followed by in 29-39 were 9(7.4%), in 40-50 were 21(17.4%) in 51-61 were

33(27.3%), in 62-72 were 29(24.0%), in 73-80 were 16(13.2%) and in 80+ were 9(7.4%) cases. Male participants were 62 (51.2%) and female were 59(48.8%).

**Table-II: Clinical History of the Respondents**

Clinical History of the Respondents		N=121	Percentage(%)
Mean time for glaucoma or ocular hypertension diagnosis(years)		8.11±7.42	
Type of glaucoma (primary, N=102)	Open-angle	97	95.1
	angle closure	4	3.9
	Congenital	1	1.0
	Missing	19	
Type of glaucoma (secondary, N=13)	Pigmentary	3	23.1
	Exfoliative	3	23.1
	Others	7	53.8
	Missing	108	
Mean IOP assessment- Right eye(mmHg)		15.87±3.97	
Men IOP assessment - Left eye(mmHg)		15.84±3.94	

Table II represents the clinical history of the respondents. Mean time for glaucoma or ocular hypertension diagnosis (years) was  $8.11 \pm 7.42$ . In assessing the type of glaucoma (primary) it was found that Open-angle glaucoma was most frequent, 97(95.1%) and followed by angle closure 4(3.9%), Congenital 1(1.0%) and in 19 cases this

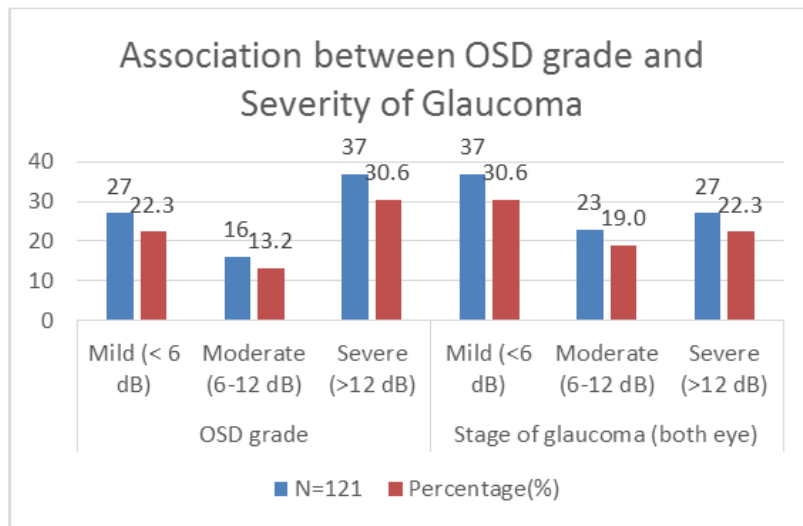
information was missing. Type of glaucoma (secondary) was found in some cases where Pigmentary was in 3(23.1%) cases and followed by Exfoliative in 3(23.1%), Others in 7(53.8%) and data was missing in 108. Mean IOP assessment- Right eye (mmHg) was  $15.87 \pm 3.97$  and Mean IOP assessment - Left eye (mmHg) was  $15.84 \pm 3.94$ .

**Table-III: Symptoms of OSD**

Symptoms	N(Percentage%) or Range			
	No	Mild or >10	Moderate or 5-10	Severe <5
Conjunctival hyperemia	13(10.8%)	49(40.8%)	27(22.5%)	32(26.7%)
Corneal Fluorescein Staining	16(13.3%)	46(38.3%)	29(24.2%)	30(25%)
Conjunctival Fluorescein Staining	20(16.7%)	56(46.7%)	29(24.2%)	16(13.3%)
Eyelid Redness	20(16.7%)	47(39.2%)	28(23.3%)	24(20%)
Lissamine green staining	0-1	2-3	4-5	6-9
Fluorescein Breakup Time (FBUT) in second	9-14	8-5	4-1	Immediate
Break up Time	-	18(15%)	37(30.8%)	67(55%)

Table III shows the symptoms of OSD among the respondents. Conjunctival hyperemia was controlled in 13(10.8%), mild in 49(40.8%), moderate in 27(22.5%) and severe in 32(26.7%) cases which was quite high. Corneal Fluorescein Staining was controlled in 16(13.3%), mild in 46(38.3%), moderate in 29(24.2%) and severe in 30(25%). Conjunctival Fluorescein Staining was controlled in 20(16.7%), mild in 56(46.7%), moderate in 29(24.2%) and severe in 16(13.3%). Eyelid Redness was controlled in

20(16.7%), mild in 47(39.2%), moderate in 28(23.3%) and severe in 24(20%). Lissamine green staining was controlled in range 0-1 where the range of 2-3 was considered mild, 4-5 was moderate and 6-9 counted as severe. Fluorescein Breakup Time (sec) was controlled in 9-14 second, mild in 8-5, moderate in 4-1 and immediate FBUT was marked as severe. Break up Time was not controlled in any cases and it was mild in 18(15%), moderate in 37(30.8%) and severe in 67(55%).



**Fig-I: Association between OSD grade and Severe of Glaucoma**

The Figure I shows the glaucoma severity in relation with OSD grade. When the OSD grade was mild (<6 dB) in 27(22.3%) cases, the glaucoma stage was also mild (<6 dB) in 37(30.6%) cases. Similarly, the OSD grade was moderate (6-12 dB) in 16 (13.2%), the glaucoma stage was also moderate (6-12 dB) in 23(19.0%). When the OSD grade was severe in (>12 dB) 37(30.6%), the glaucoma stage was also severe (>12 dB) in 27(22.3%) cases. This association indicated that with the increasing rate of glaucoma the OSD grade

increase. This situation occurs due to the preservatives and medications used in glaucoma treatment. Benzalkonium chloride (BAK) is frequently used in glaucoma patients which increase the risk for OSD. Besides, BAK has also been proved to have an effect on corneal nerves. In vivo confocal microscopy it was revealed that in glaucoma patients treated with BAK-preserved drops had reduced numbers of sub-basal nerves compared to preservative-free formulations [18].

## DISCUSSION

OSD is a common problem around the world and is highly prevalent among glaucoma patients but it is currently under-recognized and undertreated [18]. Both glaucoma and OSD has severe impact on the quality of life measures [12-17, 20-24]. In age group 18-28, there were 3.3% cases and followed by in 29-39 were 7.4%, in 40-50 were 17.4% in 51-61 were 27.3%, in 62-72 were 24.0%, in 73-80 were 13.2% and in 80+ were 7.4% cases. Male participants were 51.2% and female were 48.8%. [Table I] A similar study in this field was conducted among 793 patients of 10 institution showed that there were 3.2% participants in the age group 18-39 and followed by 7.1% in 40-49, 16.5% in 50-59, 30.8% in 60-69, 27.5% in 70-79 and 14.9% in 80+ age group where the male was 51% and female was 49% [25].

Mean time for glaucoma or ocular hypertension diagnosis (years) was  $8.11 \pm 7.42$ . [Table II] The study of Stalmans *et al.* showed the mean time for glaucoma or ocular hypertension diagnosis (years) was  $8.12 \pm 7.44$  [25]. In assessing the type of glaucoma (primary) it was found that Open-angle glaucoma was most frequent, 95.1% and followed by angle closure 3.9%, Congenital 1.0% and in 19 cases this information was missing. Type of glaucoma (secondary) was found in some cases where Pigmentary was in 23.1% cases and followed by Exfoliative in 23.1%, Others in 53.8% and data was missing in 108 [Table II]. A similar study showed the similar Open-angle glaucoma 95.1% and followed by angle closure 4.8% and Congenital 0.1% where the data from 126 patients were missing under the primary glaucoma and in secondary glaucoma it found the Pigmentary 25%, Exfoliative 23.9%, others 51.1% and 705 data were missing [25]. Mean IOP assessment- Right eye (mmHg) was  $15.87 \pm 3.97$  and Men IOP assessment - Left eye (mmHg) was  $15.84 \pm 3.94$ . [Table II] Similarly, Mean IOP assessment- Right eye (mmHg) was  $16.34 \pm 4.58$  and Men IOP assessment - Left eye (mmHg) was  $16.27 \pm 4.45$  was found in a study [25].

Conjunctival hyperemia was controlled in 10.8%, mild in 40.8%, moderate in 22.5% and severe in 26.7% cases which were quite high. Corneal Fluorescein Staining was controlled in 13.3%, mild in 38.3%, moderate in 24.2% and severe in 25%. Conjunctival Fluorescein Staining was controlled in 16.7%, mild in 46.7%, moderate in 24.2% and severe in 13.3%. Eyelid Redness was controlled in 16.7%, mild in 39.2%, moderate in 23.3% and severe in 20%. [Table III] The study of Dermenoudi *et al.* also classified the symptoms of OSD in controls, mild, moderate and severe where they showed conjunctival hyperemia controlled in 10.30%, mild in 40.50%, moderate in 22.40% and severe in 26.70% cases and followed by corneal fluorescein staining in 12.90%, 37.90%, 24.10% and 25% cases, conjunctival fluorescein staining in 16.40%, 46.60%, 24.10% and 12.90% and eyelid

redness in 16.40%, 40.50%, 23.3% and 19.8% cases [26]. Lissamine green staining was controlled in range 0-1 where the range of 2-3 was considered mild, 4-5 was moderate and 6-9 counted as severe. Fluorescein Breakup Time (sec) was counted controlled in 9-14 second, mild in 8-5, moderate in 4-1 and immediate FBT was marked as severe. Break up Time was not controlled in any cases and it was mild in 15%, moderate in 30.8% and severe in 55%. [Table III] In the study of Mylla Boso *et al.* similar Lissamine green stain in grange was found where the fluorescein breakup time (sec) was counted controlled in 8-15 second, mild in 7-5, moderate in 4-1 and immediate FBT was marked as severe [27]. Break up Time was not controlled in any cases and it was mild in 14.60%, moderate in 30.20% and severe in 55.20% [26].

When the OSD grade was mild (<6 dB) in 22.3% cases, the glaucoma stage was also mild (<6 dB) in 30.6% cases. Similarly, the OSD grade was moderate (6-12 dB) in 13.2%, the glaucoma stage was also moderate (6-12 dB) in 19.0%. When the OSD grade was severe (>12 dB) 30.6%, the glaucoma stage was also severe (>12 dB) in 22.3% cases. [Figure I] Simon *et al.* in their study also found the correlation between the mean GQL-15 score and the glaucoma severity rate, where they found that GQL-15 score decreased significantly with increasing glaucoma severity [28].

## CONCLUSION

Glaucoma had affected millions of patients around the world and chronic use of topical glaucoma medications may negatively impact the patient's ocular surface. There is a strong association between OSD and quality of life in medically treated glaucoma patients. The increasing severity of OSD is associated with worsening of QoL. As OSD was more common in patients with glaucoma hence, the patients with OSD had poorer QoL related to glaucoma than the patients without OSD. However, as a chronic and sight-threatening disease, glaucoma and OSD treatment needs lifetime management and strict compliance. Effective management of glaucoma will lead to improvement OSD not only in long-term visual outcomes, but also in-patient compliance, QOL, and satisfaction with the treatment. Hence, recognizing the pathogenesis OSD, identifying its risk factors and integrating its diagnostic and therapeutic strategies for the management of OSD, train staff and proper guideline may result in improved the treatment procedure.

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