

## ORIGINAL RESEARCH

# A Study On Ocular Surface Disorders In Intensive Care Unit Patients

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### ABSTRACT

This study aimed to evaluate the Prevalance of ocular surface disorders in patients admitted in intensive care units of GMCH, Guwahati. The inclusion Criteria encompasses the patients admitted in intensive care unit and risk factors responsible for predisposing ocular surface disorder in these admitted patients.

Conducted at RIO, GMCH, this study spanned from January 2023 to December 2023, involving a thorough ocular examination, including history taking, extraocular examination, intraocular examination of anterior segment bedside and fundus examination including staining of ocular surface being done. Follow ups of stable patients done in OPD and Diagnostic Clinic of RIO for proper slit lamp examination and other diagnostic evaluation.

Study drew insights from referenced existing literature, such as studies by Grixti, M. Sadri, J. Edgar, and A. V. Datta, N. Joyce, J. McHugh, P.Alexander, A. Kalhor, and A. Ionides, Nelson, J.D., Havener, V.R., Cameron, J.D. Notable findings included Maximum no. of cases noted in age group of 60 years and above. Pattern of symptoms are almost similar to other studies. Peak incidence was found to occur on 2<sup>nd</sup> to 8<sup>th</sup> day of admission in ICU. **Conclusion** highlighted untreated neglected case can lead to dreaded complications and permanent visual loss, so early clinical diagnosis and appropriate treatment measures are very important to keep the disease under control.

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### INTRODUCTION

Ocular surface disorders are a group of conditions characterized by the disruption of the ocular surface integrity, resulting from damage or deficiency to any of the components of the ocular surface. The anatomical ocular surface is composed of the conjunctival mucosa that lines the globe and palpebral surfaces, the corneoscleral limbus, the corneal epithelium and the tear film. It is however, dependent on adjacent structures such as anterior lamellae of the lids, the lashes and the lacrimal system for normal function. Each of these is covered by a stratified, squamous, non-keratinising epithelium at the surface of the eye. These epithelia sit on a basement membrane and are connected by an identical complex to an underlying connective tissue stroma. Functionally, all three regions of the epithelium support the tear film and protect against fluid loss and pathogen entrance. The connective tissue of all three regions serves not only as a structural support but also as a conduit for fluids and nutrients. It also houses support cells that provide maintenance of

the matrix and overlying epithelium. The role of the ocular surface is to maintain the optical clarity of the cornea by regulating the hydration of the cornea and conjunctiva and to protect the globe from mechanical, toxic and infectious trauma. Additionally, the ocular surface provides for free movement of the globe to assist in visual tracking. Several anatomical and physiologic specializations have evolved in the ocular surface and its adnexal tissues to facilitate their unique functions. In the event of a breakdown in the defense mechanisms, the ocular surface and adnexal tissues have developed unique repair responses that heal the injury with minimal effect on optical clarity. With chronic or severe damage, however, the ocular surface responds aggressively to ensure survival of the eye. Such vigorous responses can result in permanent distortion of the ocular surface anatomy and degradation of the optical Clarity of the cornea. Tear film constituents are lipid, aqueous and mucin baths the surface. The components of the tear film, blinking and lid closure are responsible for tear film stability. Lid

closure and lid blinking constitutes the hydro-dynamic factors responsible for maintenance of a stable precorneal tear film. The former prevents evaporation of tears across the surfaces and guides the tears into the nasolacrimal passages. Although many patients present themselves complaining the symptoms associated with the ocular surface disorders, diagnosing the specific cause of the condition in each patient requires thorough investigations. Patients in the intensive care unit (ICU) often have impaired ocular protective mechanisms as a result of mechanical ventilation, and decreased level of consciousness. Such patients are at increased risk of ocular surface disorders, which, if not resolved, can result in serious visual impairment. The most prevalent ocular disorders identified in ICU patients are Exposure Keratopathy, Dry Eye and microbial Keratitis, Corneal Abrasion. The proper diagnosis and adequate treatment is important as early as possible, to minimize the sight threatening corneal and other complications.

#### MATERIALS AND METHODS

The study conducted for a period of 12 months from January 2023 to December 2023. It was a Hospital based Prospective Observational study conducted In Regional Institute of Ophthalmology, Gauhati Medical College

and Hospital, Guwahati. A total of 100 patients were included in this study. A detailed history and examination was done in all cases fulfilling the criteria after taking informed consent from the patient or the attendant.

Ophthalmological evaluation consist of the following:

- 1) Proper detailed history about systemic condition for which patient is admitted In ICU and inquire about ophthalmic symptom that patient is suffering since admission in ICU.
- 2) Thorough Ocular Examination under diffuse light of torch.
- 3) Schirmer's Strip testing for dry eye condition.
- 4) Fluorescein staining of cornea.
- 5) Fundus Examination by Heine Direct Ophthalmoscope.

The results were statistically analysed.

#### INCLUSION CRITERIA

- 1) Patients admitted in intensive care unit in GMCH, Guwahati.
- 2) Risk factors causing ocular surface diseases.

#### RESULTS AND OBSERVATION

100 patients were examined in this study.

**Table 1: Age Distribution**

AGE GROUP	NO. OF CASES	PERCENTAGE
0-9	6	6%
10-19	8	8%
20-29	9	9%
30-39	12	12%
40-49	13	13%
50-59	19	19%
60 and above	33	33%
TOTAL	100	100%

**Table 2: Risk Factors in ICU patients associated with ocular surface disorder**

RISK FACTORS	NO. OF CASES	PERCENTAGE
Continuous Sedation	83	83%
Muscle Relaxation	78	78%
Air Conditioning	100	100%
Age >60years	33	33%
ICU stay >5days	76	76%

**Table 3: Presenting Symptoms**

SYMPTOMS	NO. OF CASES	PERCENTAGE
Lacrimation	70	70%
Redness	80	80%
Mucopurulent Discharge	24	24%
Chemosis	13	13%
Lagophthalmos	18	18%



**Table 4: Distribution of Peak Incidence of Occurance of Symptoms**

DAY OF PRESENTATION	NO. OF CASES	PERCENTAGE
0-1	5	5%
2-4	6	6%
5-8	76	76%
9-15	13	13%
Total	100	100%



**Table 5: Types of ocular Surface Disorders**

TYPE OF OCULAR SURFACE DISORDER	NO. OF CASES	PERCENTAGE
Dry Eye Disease	46	46%
Conjunctivitis	23	23%
Exposure Keratopathy	18	18%
Corneal Abrasion	9	9%
Microbial Keratitis	4	4%
Total	100	100%



28 Patients followed up in OPD and Diagnostic Clinic of RIO, GMCH after being discharged from ICU.

**Table 6: Age Distribution Of follow up Patients**

AGE DISTRIBUTION	NO. OF CASES	PERCENTAGE
0-9	1	3.57%
10-19	3	10.7%
20-29	8	28.5%
30-39	10	35.7%
40-49	4	14.2%
50-59	2	7.14%
TOTAL	28	100%

**Table 7: Type of Ocular Surface Disorder Presented By followed up Patients**

OCULAR SURFACE DISORDERS	NO. OF CASES	PERCENTAGE
DRY EYE DISEASE	16	57.14%
CONJUNCTIVITIS	1	3.57%
EXPOSURE KERATOPATHY	7	25%
CORNEAL ABRASION	1	3.57%
MICROBIAL KERATITIS	3	10.71%
TOTAL	28	100%

**REASON OF OCULAR SURFACE DISORDERS IN ICU PATIENTS**

Patients in the intensive care unit (ICU) often have impaired ocular protective mechanisms as a result of metabolic derangements, multiple organ dysfunction, mechanical ventilation, and decreased level of consciousness. Such patients are at increased risk of ocular surface disorders, which, if not resolved, can result in serious visual impairment<sup>1,2</sup>. Moreover, in the ICU setting, the medical staff is primarily concerned with stabilization of vital bodily functions, including the cardiovascular, respiratory, and neurological status. Sedated ICU patients are incapable of protecting their

eyes and may be unable to convey ophthalmological complaints. Because ICU staff members may lack awareness of the risk of injury and fail to perform regular ocular screening, ophthalmological disorders may go unrecognized<sup>3,4,5</sup>.

**DISCUSSION**

1. In this study, Maximum no. of cases noted in age group of 60 years and above 33%, similar to study done by **A. Grixiti<sup>6</sup>, M. Sadri<sup>6</sup>, J. Edgar<sup>6</sup>, and A. V. Datta<sup>6</sup>**.
2. In our study, we found that maximum no. of patients are having dry eye disease 46%.

3. Pattern of symptoms are almost similar to other studies.
4. Peak incidence was found to occur on 2<sup>nd</sup> to 8<sup>th</sup> day of admission in ICU 76%, almost similar to as reported by N. Joyce<sup>7</sup> in his study.
5. The incidence increased with sedation, paralysis, severity of illness, and longer ICU stay.
6. Mean Schirmers test results were  $7 \pm 5$  mm/5 min in the right eyes and  $7 \pm 6$  mm/5 min in the left eyes. In right eyes, Schirmers test results were  $\leq 5$  mm in 8 eyes, 6–10 mm in 14 eyes, 11–15 mm in 24 eyes and  $>15$  mm in 54 eyes. In left eyes, Schirmers test results were  $\leq 5$  mm in 9 eyes, 6–10 mm in 12 eyes, 11–15 mm in 25 eyes and  $>15$  mm in 54 eyes.
7. Fluorescein staining of corneal surface was done and it came out to be positive in 62 eyes confirmed by cobalt blue filter in direct ophthalmoscopy, done bedside.
8. 28 patients were followed up in OPD and diagnostic clinic for further evaluation and majority of them belong to age group of 30–39 years of age (35.7%) and 16 of them had Dry Eye disease at the time of presentation (57.14%).
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## CONCLUSION

1. Ocular surface disorders are not uncommon in critically ill patients.
2. An untreated neglected case can lead to dreaded complications and permanent visual loss, so early clinical diagnosis and appropriate treatment measures are very important to keep the disease under control.
3. The standard eye care in ICU patients must include ocular lubrication with artificial tear drops and ointments, and topical antibiotics when needed.
4. Ophthalmic consultations need to be routinely done in ICU subjects who are hospitalized for more than one week.
5. In case of lagophthalmos, monitoring of eyelid closure needs to be carefully performed as incomplete closure which may lead to dreaded complications.

**CONFLICT OF INTEREST: NIL**

**FINANCIAL SUPPORT: NIL**

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