Mechanical Ventilation and Its Association with Ocular Surface Disorders among Patients Admitted In Adult Intensive Care Unit of a Tertiary Care Hospital

Abstract: Background: Present study was done to evaluate the Mechanical ventilation and its association with Ocular Surface Disorders among Patients admitted in Adult Intensive Care Unit. Material & Methods: It was a prospective observational study carried in AICU over period of one year by Department of Ophthalmology, Dr. RPGMC Kangra at Tanda. All the patients who were admitted in AICU greater than 48 hours between ages of 18-65 years were included and evaluated for socio-demographic information like age, gender, Mechanical ventilation etc. Thorough ophthalmic examination was also done for ocular surface disorders and analysed using epi info v7 software. Results: A total of 126 patients were included in the study. Mean age of the study participants was 41.8 years. Maximum patients, 23.8% of the patients were in age group of 51 and 60 years followed by 23% between 21 and 30 years and 41 and 50 years each. 64.3% of the patients were males while 35.7% were females. 74 (58.7%) of the patients had ocular surface disorders. In the present study, 66.7% of the patients were on mechanical ventilation at 48 hours. At the end of first week, 63% patients were on mechanical ventilation while at the end of second week, 54.5% patients were on mechanical ventilation. At the end of fourth and fifth week, none of the patients was on mechanical ventilation. In the present study, the association between presence of mechanical ventilation and ocular surface disorders was statistically significant. Conclusion: The present study concluded that the patients who were on mechanical ventilation had significantly higher number of ocular surface disorders.

Key words: Mechanical ventilation, Ocular Surface Disorders, Patients, Adult Intensive Care Unit.

INTRODUCTION

Patients in the 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.\(^2\)\(^,\)\(^3\)

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.\(^4\)

Several studies around the globe as well as in India have reported association between Mechanical ventilation and Ocular Surface Disorders in ICU patients. However, no such study of its kind has been reported from this region. Hence, we planned this study to evaluate the Mechanical ventilation and its association with Ocular Surface Disorders among Patients admitted in Adult Intensive Care Unit.

Aim & Objectives

To evaluate the Mechanical ventilation and its association with Ocular Surface Disorders among Patients admitted in Adult Intensive Care Unit of Dr RPGMC Kangra (Tanda), H.P.
Material and Methods

Study design: It was a prospective observational study

Study area: Department of Ophthalmology, Dr. RPGMC Kangra at Tanda

Study period: After approval by institutional ethical committee (IEC), this study was carried in adult intensive care unit (AICU) at Dr. Rajendra Prasad Government Medical College, Kangra at Tanda (HP) over period of one year.

Study population: This prospective study was carried out in 126 patients, 18-65 years of age in Adult intensive care unit (AICU) at Dr. Rajendra Prasad Government Medical College, Kangra at Tanda (HP).

Inclusion Criteria
1. All patients aged 18-65 years admitted in AICU for a time period >48 hours were included.
2. Prior informed consent was obtained from attendant authorized to do so.

Exclusion criteria
1. Patients who presented with ocular surface disorders prior to admission in AICU.
2. Patients or authorized attendant not willing to participate in the study.

Materials for Eye examination: Following equipments were used for clinical examination-

a) For anterior segment examination
   - Hand held Slit lamp examination

b) Staining procedures
   - Fluorescein staining
   - Rose Bengal staining

c) For Microbiological examination (if and when required)
   - Conjunctival Swab
   - Gram stain
   - KOH mount
   - Culture in Blood Agar, Sabouraud dextrose Agar, Brain Heart Infusion

d) For tear film function
   - Schirmer’s test

e) For intra ocular pressure measurement
   - Schiotz tonometer

f) For posterior segment examination
   - Direct ophthalmoscope (Heine beta 200S ophthalmoscope)
   - Indirect ophthalmoscopy with 20D aspheric lens (If required)

Methodology of data collection: All the patients who were admitted in ICU greater than 48 hours between age of 18-65 years were included in this observational study. All patients who were on mechanical ventilation or on spontaneous ventilation were taken for this study. Mechanically ventilated patients were those patients who are intubated either by Endotracheal tube (ETT) or Tracheostomy tube (TT) and were on mechanical ventilation. Spontaneous breathing patients were patients who were either on room air or on venti mask.

Patients were evaluated with special reference to Demographic information like name, age (in years), gender (male/female), occupation, address. Socioeconomic class was determined using Kuppuswamy' scale, Past history of ocular infection, surgery, trauma., History of any drugs use like amiodarone, tetracycline etc. and Examination finding including general physical examination, pulse, blood pressure.

Thorough ophthalmic examination including Pupil size and reaction, Relative afferent pupillary defect by swinging flash light examination, External eye examination for conditions like presence of lagophthalmos, exophthalmos, buphtalmos & deviation of eyeball, Hand held Slit lamp examination for complete anterior segment evaluation.

Conjunctival swab was obtained pulling down lower lid exposing the conjunctiva. Gently sweep the sterile swab stick along the lower fornix from inner to outer canthus taking care not to touch the eyelids.

Fundus evaluation using direct ophthalmoscope (Heine beta 200S LED) after pupillary dilatation with 1% Tropicamide eye drop twice, instilled 15 minutes apart.

Follow-up of the patients was done on every alternate day or depending upon the ocular surface involvement.

Ethical consideration: The study was approved by IEC at Dr RPGMC Kangra at Tanda. Consent forms were signed and collected from attendants of all the patients, who were included in the study.

Financial disclosure: There was no any additional financial burden on the subjects because of participation in the study. Investigator did not get any financial benefit from any source for this study.

Statistical analysis: Data were entered in to spreadsheet and analysed using SPSS v21. Data were presented as frequency, percentage, mean, and standard deviation (SD). Normality of data was determined by Shapiro Wilk test. Normally distributed quantitative variables were compared using Student t-test. Categorical variables were compared using Chi square test. P value <0.05 was considered statistically significant.

Observations & Results

A total of 126 patients were included in the study. Out of 126 patients, 102 patients were later shifted to
respective wards, 17 patients did not survive while 7 patients were referred to higher centre for further management. The study findings have been presented below:

In the present study, for 78.6% of the patients, duration of stay in AICU was up to one week. For 12.7% of the patients, the hospital stay was between 1 week and 2 weeks. Only 4.8% of the patients were admitted in AICU for more than 3 weeks.

Mean age of the study participants was 41.8 years with a range from 18 years to 65 years. 23.8% of the patients were in age group of 51 and 60 years. 23% of the patients were each aged between 21 and 30 years and 41 and 50 years. 13.5% patients belonged to age-group of 31 to 40 years. 8.8% of the patients were elderly (>60 years). Remaining, 7.9% of the patients aged up to 20 years. In the present study, male to female ratio was 1.8:1. 64.3% of the patients in our study were males while remaining 35.7% of the patients were females.

**Table 1:** Age & Gender distribution of the study participants (n=126).

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤20</td>
<td>10</td>
<td>7.9</td>
</tr>
<tr>
<td>21-30</td>
<td>29</td>
<td>23.0</td>
</tr>
<tr>
<td>31-40</td>
<td>17</td>
<td>13.5</td>
</tr>
<tr>
<td>41-50</td>
<td>29</td>
<td>23.0</td>
</tr>
<tr>
<td>51-60</td>
<td>30</td>
<td>23.8</td>
</tr>
<tr>
<td>60-65</td>
<td>11</td>
<td>8.8</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>81</td>
<td>64.3</td>
</tr>
<tr>
<td>Female</td>
<td>45</td>
<td>35.7</td>
</tr>
<tr>
<td>Total number of patients</td>
<td>126</td>
<td>100%</td>
</tr>
</tbody>
</table>

In the present study, 66.7% of the patients were on mechanical ventilation at 48 hours. At the end of first week, 63% patients were on mechanical ventilation while at the end of second week, 54.5% patients were on mechanical ventilation. At the end of fourth and fifth week, none of the patients was on mechanical ventilation.

**Table 2:** The number of patients who were on mechanical ventilation

<table>
<thead>
<tr>
<th>Time (Week)</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 hours (n=126)</td>
<td>84</td>
<td>42</td>
</tr>
<tr>
<td>1 Week (n=27)</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>2 Week (n=11)</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>3 Week (n=5)</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4 Week (n=2)</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5 Week (n=1)</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

In the present study, the association between presence of mechanical ventilation and ocular surface disorders was statistically significant (P<0.0001)

**Table 3:** Ocular surface disorders in relation with mechanical ventilation.

<table>
<thead>
<tr>
<th>Mechanical ventilation</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (n=84)</td>
<td>67</td>
<td>17</td>
</tr>
<tr>
<td>No (n=42)</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>52</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Critically ill patients frequently have some form of organ failure that may require supportive therapy like mechanical ventilation. In the present study, 66.7% of the patients were on mechanical ventilation at 48 hours. At the end of first week, 63% patients were on mechanical ventilation while at the end of second week, 54.5% patients were on mechanical ventilation. At the end of fourth and fifth week, none of the patients was on mechanical ventilation. Also in our study, there was statistically significant association between presence of mechanical ventilation and ocular surface disorders. Our findings are in concordance with previous studies by Desalu et al., Merceica et al.,

**CONCLUSION**

Our study concluded that the most of the patients admitted in AICU were on mechanical ventilation at the start of treatment and those who were on mechanical ventilation had significantly higher number of ocular surface disorders.
REFERENCES