



**ORIGINAL RESEARCH PAPER**

**Ocular Trauma**

**CORRELATION BETWEEN MECHANICAL EYE INJURY IN ADULTS AND OCULAR TRAUMA SCORE**

**KEY WORDS:** OTS (Ocular Trauma Score)  
Mechanical ocular injury  
Bett's classification

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**ABSTRACT**

**Objective:** To correlate the visual outcome with OTS (Ocular Trauma Score) at the end of 3 months. **Material And Methods:** In this prospective observational study, 150 adult patients with mechanical ocular injury were followed up at 3 months and analysed. **Results:** 81 % of male and 19 % of female were affected hence there is male preponderance with male: female ratio 4.1: 1. Predominant age group was 31 – 40 with mean age being 37.63 years. Road traffic accidents (RTA) (n=64, 42.66 %) was found to be the leading cause of mechanical ocular injury. Most common type of injury encountered was closed globe injury (n=129, 86%). There was significant association between visual acuity on follow up with OTS as per Pearson Chi-square test and also there was significant correlation between them as per Spearman Correlation (Ordinal by Ordinal). (chi-square = 315.010 and p-value = <0.001) (Spearman correlation = + 0.686 and p-value = < 0.001). This implies that visual outcome in patients with OTS grade 3, OTS grade 4 and OTS grade 5 was better than in OTS grade 1 and OTS grade 2. **Conclusion:** It was observed that ocular trauma score played an important role in prognosticating the visual outcome of patients.

**INTRODUCTION**

Ocular trauma is a major cause of monocular visual impairment and blindness worldwide. Various studies have documented higher prevalence of ocular trauma among people in the most productive life period. The incidence of ocular trauma in India ranges from 2.5% to 10.6%.<sup>(1)</sup>

The impact of ocular trauma in terms of need for medical care, loss of income and cost of rehabilitation services points towards the need for strengthening of preventive measures. Mass awareness regarding potential risk factors and agents causing injury can prevent number of ocular hazards.

Anatomically, Ocular trauma can be divided into anterior segment trauma, posterior segment trauma and adnexal trauma. Anterior segment blunt trauma is usually among the milder forms of trauma.<sup>(2)</sup> Anterior segment of the eye being relatively exposed, commonly bears the brunt of both direct and transmitted contusional forces.

Non-penetrating corneal and ocular surface injury usually respond to conservative management. Penetrating injury generally result in poor visual outcome compared to blunt injury.<sup>(3)</sup> Posterior segment involvement adversely affect visual result. The outcome is generally not good in the patients who have grossly reduced visual acuity on presentation. Sequelae of trauma can have detrimental effect on the visual outcome.

**Birmingham Eye Trauma Terminology System (BETTS)** has led to standardization of nomenclature and classification of ocular trauma.<sup>(4)</sup> **The visual outcome in ocular trauma depends on causative agents, the types and modes of ocular injuries.** Thus, the prediction of visual outcome is difficult at the time of trauma. The **Ocular Trauma Score (OTS)** has been proposed for predicting the visual outcome depending on the visual acuity and nature of trauma.<sup>(5)</sup>

**Methodology:**

A protocol of the study was submitted to Human ethical research committee (HERC) for approval before the study was carried out.

Written consent for participation was obtained on a predetermined proforma. Detailed history of trauma was elicited regarding modes, types, severity and extent of injury.

Complete ocular examination of all participants was done , including best corrected initial visual acuity testing , extra ocular movements , ocular adnexa examination , pupillary reaction, slit lamp bio-microscopy and fundus examination.

All injuries to the eye were classified according to the BETTS Classification. RAW Scores and Ocular Trauma Score was calculated at presentation.

**Method for deriving Ocular Trauma Score:**

1. An initial raw score (A) on the basis of the visual acuity was calculated.

<b>Initial raw score (based on visual acuity) :</b>	
NPL	60
PL OR HM	70
1/200 to 19/200	80
20/200 to 20/50	90
≥ 20/40	100

<b>Equivalent snellen (imperial)</b>	<b>Equivalent snellen (metric)</b>
20/200	6/60
20/125	6/36
20/80	6/24
20/60	6/18
20/50	6/15
20/40	6/12
20/30	6/9
20/20	6/6

2. From this initial score , points for following factors were subtracted:

<b>Factors</b>	<b>Points (in minus)</b>
B. Globe rupture	(-23)
C. Endophthalmitis	(-17)
D. Perforating injury	(-14)
E. Retinal detachment	(-11)
F. Relative Afferent Pupillary Defect – RAPD	(-10)

**OTS SCORE = Initial raw score (A) – Absolute value of sum of score of the associated factors ( B+C+D+E+F) (whichever present)**

Once the OTS score sum was calculated, the relevant OTS

category was found. For each OTS category the estimated probability of the follow-up visual acuity was checked as per the reference nomogram.

Reference table of estimated probability of follow-up visual acuity as per OTS:

Raw score sum	OTS categories	NPL	PL/HM	1/200 – 19/200	20/200 – 20/50	≥20/40
0 – 44	1	73%	17%	7%	2%	1%
45 – 65	2	28%	26%	18%	13%	15%
66 – 80	3	2%	11%	15%	28%	44%
81 – 91	4	1%	2%	2%	21%	74%
92 – 100	5	0%	1%	2%	5%	92%

**Follow up plan:**

On the basis of the type and severity of ocular injuries as well as visual acuity at presentation, patients were followed up at 7 days, 1 months and 3 months. Best corrected visual acuity (BCVA) on follow up was documented.

**Statistical Analysis:**

Data were entered in MS Excel (version 2013) and analysed with Statistical Package for Social Scientists (SPSS) software version 21.

**RESULTS**

81 % of male and 19 % of female were affected hence there is male preponderance with male: female ratio 4.1: 1. Predominant age group was 31 – 40 with mean age being 37.63 years. Road traffic accidents (RTA) (n=64, 42.66 %) was found to be the leading cause of mechanical ocular injury. Most common type of injury encountered was closed globe injury (n=129, 86%).

The correlation between visual acuity on follow up and OTS was seen as follow:

**Table : Observed Visual Acuity On Follow Up And OTS**

SUM OF RAW POINTS	OTS	VISUAL ACUITY ON FOLLOW UP					
		NLP N (%)	LP/HM N (%)	1MFC-6MFC N (%)	6/60-6/18 N (%)	> 6/12 N (%)	TOTAL
0-44	OTS 1	4 (2.7%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (2.7%)
45-65	OTS 2	0 (0%)	16 (10.7%)	0 (0%)	3 (2%)	0 (0%)	19 (12.7%)
66-80	OTS 3	0 (0%)	0 (0%)	10 (6.7%)	1 (0.7%)	23 (35.3%)	34 (22.7%)
81-91	OTS 4	0 (0%)	0 (0%)	4 (2.7%)	0 (0%)	49 (32.7%)	53 (35.3%)
92-100	OTS 5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	40 (26.7%)	40 (26.7%)

- Association between Visual acuity on follow up with OTS were tested using **Pearson Chi-Square test** which was found to be **significant**. (chi-square = 315.010 and p-value = <0.001)
- Correlation was tested using **Spearman correlation** (Ordinal by Ordinal) was found to be **significant positive correlation**. (Spearman correlation = + 0.686 and p-value = <0.001)
- This implies that visual outcome in patients with OTS grade 3, OTS grade 4 and OTS grade 5 was better than in OTS grade 1 and OTS grade 2.

**CONCLUSION AND DISCUSSION**

In present study entitled “A study of clinical profile of mechanical eye injury in adults and its analysis by ocular

trauma score”, it was observed that ocular trauma score played an important role in prognosticating the visual outcome of patients. The study determined the nature and severity of mechanical ocular injury using Bett's standard. The study established RTA as the most common cause for mechanical ocular injury and this urge for strict safety rules and awareness. This study made it evident that the earning age group was more prone to sustain trauma, which necessitates to take various steps and occupational protocols in order to prevent it. Statistical analysis revealed that OTS grade 4 and OTS grade 5 had better visual outcome. The principal theoretical implication of the study was to predict the visual outcome and explain prognosis of the injury to the patient on the basis of standardized OTS.

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**Conflict Of Interest** Nil.

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