

To Study the Correlation of Limbal Ischemia and Size of Epithelial Defect in Chemical Injury

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Abstract: *Chemical injury to the eye can irreversibly damage the limbal stem cells leading to corneal vascularization and scarring. Once blinding stem cell injury occurs these eyes require complex reconstructive procedures. Accurate assessment of limbal ischemia is difficult not only because limbal ischemia may be superficial and not correlate with the amount of the surviving limbal stem cells but also because apparently healthy limbus may slough off during subsequent post injury period. Although the clinical assessment is the gold standard in defining limbal ischemia, the reliability of clinical assessment remains questionable. This study correlates the limbal ischemia and size of epithelial defect in chemical injury.*

Keywords: Cornea, limbal ischemia, epithelial defect, correlation, chemical injury

1. Introduction

Chemical injuries to the eye account for 11.5 percent to 22.1 percent of all ocular traumas. Two-thirds of these injuries occur in young males, and youngsters under 1-2 years are especially vulnerable.^{1,4} The great majority of occupational injuries arise as a consequence of industrial accidents. A small percentage of injuries occur at home or as a result of an attack. Alkali compounds are more widely found in construction materials and cleaning products, and they cause more damage than acid accidents.^{1,4}

Chemical injury to the eyes can irreversibly damage the limbal stem cells leading to chronic corneal vascularization and scarring. Once blinding limbal stem cell deficiency develops, these eyes then require complex reconstructive procedures for visual rehabilitation. It is well recognized that appropriate management in the acute stage of ocular injury is crucial to preventing long-term visual morbidity¹. One of the key factors that play a decisive role in the management of acute ocular injury is the presence and extent of limbal ischemia². However, an accurate clinical assessment of limbal ischemia is difficult not only because limbal ischemia may be superficial and not correlate with the amount of surviving limbal stem cells but also because apparently healthy limbus may slough off during subsequent post-injury period^{3,4}.

Currently, there are no standard criteria to diagnose limbal ischemia. Clinicians rely on the subjective appearance of the vascularity and color of the limbus and peri-limbal region and compare that with a mental image of a healthy eye. Unlike the retina, fluorescein or indocyanine green angiography of the ocular surface is neither available nor practiced as a tool to definitively diagnose limbal ischemia^{5,7}. Therefore, although clinical assessment still is the gold standard in defining limbal ischemia, the reliability of clinical assessment itself remains questionable. This study is correlates the limbal ischemia and size of epithelial defect in chemical injuries.⁽⁸⁻¹⁰⁾

Aims and Objectives

To check the relation of limbal ischemia with size of epithelial defect.

2. Methodology

The OPD based study was conducted in OPD of Upgraded department of ophthalmology, LLRM Medical College. The study was carried out from June 2021 to June 2022. The study population comprised of randomly selected patient with chemical injury coming to routine OPD and emergency of Department of Ophthalmology, LLRM Medical College, Meerut.

Inclusion criteria

- Patients with chemical injury to the eyes
- Patients irrespective of age and sex
- Voluntarily given consent to participate in the study

Exclusion criteria

- Pre-existing ocular pathology.
- Patients who were not willing to participate

All the patients with chemical injury who visited OPD of Upgraded department of Ophthalmology and emergency during the time period of JUNE 2021 to JUNE 2022 and fell under the inclusion criteria were included in the study. Thus the sample size derived is 150.

3. Results

Table 1: Distribution of study population according to Age (n=150)

Age	Frequency	Percent
3-10 years	4	2.7%
11-20 years	13	8.7%
21-30 years	48	32.0%
31-40 years	44	29.3%
41-50 years	24	16.0%
Above 50 years	17	11.3%
TOTAL	150	100%

Among 150 participants with chemical injury, majority of the study population belonged to 21-30 years (32.0%) followed by 31-40 years (29.3%)

Table 2: Distribution of study population according to Gender (n=150)

Gender	Frequency	Percent
Male	88	58.7%
Female	62	41.3%
Total	150	100.0%

Among 150 study population, most of them were 88 (58.7%) males whereas 62 (41.3%) were females.

Table 15: Distribution of study population according to the size of corneal epithelial defect in association with limbal ischemia

Size of corneal epithelial defect	No limbal ischemia	<1/3 limbal ischemia	1/3-1/2 limbal ischemia	>1/2 limbal ischemia	P value	Total
< 2mm	40 (55.5%)	32 (44.4%)	0 (0%)	0 (0%)	>0.05	72
2-3mm	12 (57.21%)	9 (72.8%)	0 (0%)	0 (0%)	>0.05	21
4mm	0 (0%)	1 (4.05%)	19 (86.3%)	2 (9.09%)	<0.05	22
>4mm	2 (5.7%)	6 (17.1%)	4 (11.4%)	23 (65.7%)	>0.05	35

Out of 150 study participants maximum (48%) participants had less than 2mm corneal defect followed by participants (23.3%) having epithelial damage of >4mm. Out of 35 participants having >4mm epithelial damage maximum (66%) of participants were having >1/2 limbal ischemia. It was observed that more participants having less than 2mm of corneal epithelial defects were having no limbal ischemia and as epithelial damage increases limbal ischemia also increased in most of the participants.

4. Discussion

Study was conducted by Naveen et al in 2013¹¹ and stated that the improvement in limbal ischemia in the study at the end of one week post-operative period was as follows. 16 (80%) eyes had improvement in limbal vascularisation of < or = 6 clock hours, 4 (20%) eyes had improvement >6 clock hours. 9 (69.3%) out of 13 eyes with grade IV injury did not have residual ischemia at the end of one week. In 5 eyes with grade V injuries 2 eyes had residual limbal ischemia of 2 clock hours and in 3 patients, of more than 3 clock hours. In one eye with grade VI injury the residual limbal ischemia was 6 clock hours.⁽¹¹⁻¹⁴⁾

At the end of one month, in 13 eyes grade IV injuries, improvement in visual acuity = or >3 lines was seen in 8 (61.5%) patients, 4 eyes had visual acuity improvement of <3 lines, and one eye had no improvement in visual acuity due to development of cataract. In the present study it was found that poor prognosis is associated with the following;

- 75-100% Conjunctival involvement
- 5th and 6th grade of injury
- Limbal involvement >9 to 12 clock hours
- >1/2 limbal ischemia
- Advanced haze with difficult view of Anterior chamber and opaque cornea.

5. Conclusion

It was observed that more participants having less than 2mm of corneal epithelial defects were having no limbal ischemia and as epithelial damage increases limbal ischemia also increased in most of the participants.

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