



Effect of CXL in Keratoconus patients

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Abstract

Objective: In this study our main goal is to evaluate the effect of CXL in Keratoconus patients in Bangladesh.

Method: This retrospective observational type of study was conducted among 80 patients who fulfilled criteria from tertiary medical college and hospital from February 2019 to February 2020.

Results: During the study, 60% patients were male, which was 20% higher than female. Also, skin allergies in (26%), symptomatic ocular allergies in (22%), and asthma in (14%) patients. Only (6%) patients had positive family history of keratoconus. The mean preoperative spherical refractive error was -1.46 ± 2.31 diopters, the mean cylinder was -3.70 ± 1.81 diopters and mean spherical equivalent (SE) was -3.24 ± 2.44 diopters. Postoperatively the mean sphere was -1.35 ± 2.22 diopters, the mean cylinder was -3.11 ± 1.86 diopters and the mean SE was -2.91 ± 2.40 diopters.

Conclusion: From our study we can conclude that, CXL improves visual acuity and reduces maximal keratometry values in KC patients effectively as in younger patients. It also could be considered as a promising first line treatment for most patients with progressive KCN.

Keywords: Keratoconus (KCN), corneal collagen cross linking (CXL), corneal condition.

Introduction

Keratoconus is a relatively common ectatic corneal condition causing significant visual disability. It is characterized by progressive irregular myopic astigmatism with central corneal thinning and protrusion.¹ Keratoconus affects both eyes in the majority of cases but may be markedly asymmetric. It is a corneal ectasia that typically progresses in young adults, but the rate of progression slows with increasing age.

The Collaborative Longitudinal Evaluation of Keratoconus (CLEK) Group has presented findings related to keratoconus in a large cohort of

patients from diverse ethnicities in the USA.² Similarly the Dundee University Group has published a longitudinal study on a more homogenous population from Scotland.⁴ However, characteristics of keratoconus in Asian populations seem to vary from those reported from other ethnic groups. In a population-based cohort analysis, the Central India Eye and Medical Study reported the prevalence of keratoconus in central India to be 1.4%.⁵ The incidence of keratoconus has been shown to range from 1 in 4,000 to 5,100 persons per year in Asian populations.

Several studies support the role of corneal collagen cross-linking (CXL), which is a therapeutic procedure aiming at increasing the corneal stiffness in the keratoconus eyes; however, there is a paucity of long-term data. According to some studies long term efficacy and safety of CXL are uncertain; indeed, there are few publications with more than 5 years of follow up.^{3,4}

In this study our main goal is to evaluate the effect of CXL in Keratoconus patients in Bangladesh.

Objective

General Objective

- To assess the effect of CXL in Keratoconus patients in Bangladesh.

Specific Objective

- To detect clinical characteristics of the patients
- To identify correlation between keratometric readings and slitlamp findings in patients.

Methodology

Type of study	retrospective observational study
Place of study	Tertiary medical college and hospital.
Study period	February 2019 to February 2020.
Study population	80 patients included in the study who were fulfilled criteria.
Sampling technique	Purposive

Study Procedure

During the study. Face to face interview of the participants were conducted with the semi-structured, pre-tested questionnaire. The interview was conducted anonymously and privately as much as possible. Before preceding the data collection, the detail of the study was explicitly explained to each eligible respondent and informed written consents from the respondents were obtained.

Data Analysis

Data were entered in the template of Statistical program, SPSS-15 after necessary editing and coding. Descriptive statistics were generated for socio-demographic variables and were presented with relative frequency.

Results

In table-1 shows age distribution of patients where most of the patients belong to 31-40 years age group, 50%. The following table is given below in detail:

Table-1: Age distribution of patients

Age group in years	Percentage
(>20) years	37%
(21-30) years	50%
(31 - 40) years	9%
>40 years	4%
Total=	100%

In figure-1 shows distribution of patients according to the gender where 60% patients were male, which was 20% higher than female. The following figure is given below in detail:

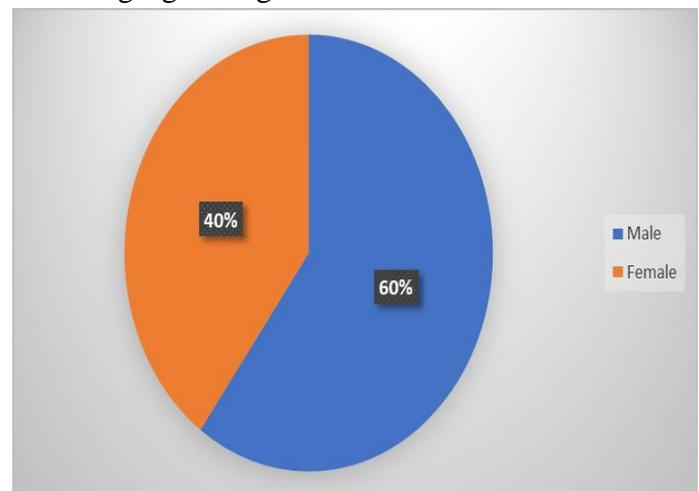


Figure-1: Distribution of patients according to the gender.

In table-2 shows clinical characteristics of the patients where no patient had history of cardiac or joint problems. There were skin allergies in (26%), symptomatic ocular allergies in (22%), and asthma in (14%) patients. Only (6%) patients had positive family history of keratoconus. The following table is given below in detail:

Table-2: Clinical characteristics of the patients

Age group in years	Percentage
History of cardiac or joint problems.	0%
Skin allergies	26%
Symptomatic ocular allergies	22%
Asthma	14%
Family history of keratoconus	6%

In table-3 shows correlation between keratometric readings and slit lamp findings in eyes with keratoconus. The most frequently observed corneal sign was Fleischer’s ring (81%). Only 7% of patients had cones but no other corneal signs. Vogt’s striae and corneal scarring were found to be more prevalent with increasing severity of the disease. The following table is given below in detail:

Table-3: Correlation between keratometric readings and slitlamp findings in eyes with keratoconus.

Disease severity	Fleischer’s ring (%)	Vogt’s striae (%)	Corneal scarring (%)
Mild (<45D)	18/66 (27.27)	12/66 (18.18)	2/66 (3.03)
Moderate (45–52D)	239/396 (60.35)	186/396 (46.96)	48/396 (12.12)
Advanced (>52D)	63/86 (73.25)	60/86 (69.76)	26/86 (30.23)

In table-4 shows comparison of baseline and last follow-up clinical characteristics of keratoconic eyes patients after corneal collagen crosslinking (CXL) with a follow-up period of 50 months. The mean preoperative spherical refractive error was -1.46 ± 2.31 diopters, the mean cylinder was -3.70 ± 1.81 diopters and mean spherical equivalent (SE) was -3.24 ± 2.44 diopters. Postoperatively the mean sphere was -1.35 ± 2.22 diopters, the mean cylinder was -3.11 ± 1.86 diopters and the mean SE was -2.91 ± 2.40 diopters. The following table is given below in detail:

Table-4: Comparison of baseline and last follow-up clinical characteristics of keratoconic eyes patients after corneal collagen cross linking (CXL)

Parameter	Before CXL Mean \pm SD	Last follow-up after CXL Mean \pm SD	P value
UCVA	0.27 \pm 0.21	0.37 \pm 0.24	0.0008
BCVA	0.88 \pm 0.17	0.92 \pm 0.15	0.35
Kmin	43.83 \pm 2.61	44.16 \pm 2.51	0.046
Kmax	49.01 \pm 3.74	48.95 \pm 4.15	0.0226
Kmean	47.18 \pm 2.36	44.6 \pm 2.37	0.048
Sphere	-1.47 \pm 2.31	-1.35 \pm 2.22	0.7203
Cylinder	-3.71 \pm 1.81	-3.11 \pm 1.86	0.0144
CCT	468.90 \pm 42.61	450.88 \pm 52.87	0.0025
SE	-3.24 \pm 2.44	-2.91 \pm 2.40	0.2217

Discussion

In one study reported that, there was a higher percentage of male subjects indicating a trend toward earlier diagnosis in this gender. Mean age at the time of diagnosis of keratoconus is typically in the second decade of life.⁶

In our series, most of the patients belong to 31-40 years age group, 48%. Also, 57% patients were male, which was 14% higher than female. Which was quite similar to other study.⁷

One study reported that, younger age at diagnosis could mean that the condition has earlier onset and faster progression in Asian populations reflecting variability of the disease process.⁸

Similar to the other studies, there were very few patients over 40 years of age in our series.⁶⁻⁷ Keratoconus patients demonstrate a period of stability 8 to 12 years after diagnosis, thus, most of them may seek care with local ophthalmologists/contact lens practitioners.⁵

The mean preoperative spherical refractive error was -1.46 ± 2.31 diopters, the mean cylinder was -3.70 ± 1.81 diopters and mean spherical equivalent (SE) was -3.24 ± 2.44 diopters. Postoperatively the mean sphere was -1.35 ± 2.22 diopters, the mean cylinder was -3.11 ± 1.86 diopters and the mean SE was -2.91 ± 2.40 diopters. In one study found an improvement in Sim K values by -0.62 D after 18 months in treated group ($p < 0.001$).⁹ Another study

documented a decrease in K max by an average of -2.57 D in their cohort of patients.¹⁰

Another study reported significant improvement of -0.15 Log MAR in BSCVA at 36 months. They did not detect any change in spherical equivalent or cylindrical component of the subjective refraction. They also reported an improvement in Kmax by a mean of -0.74D after 12 months in cross linked group and progression by a mean of +1.28D.¹¹

In one study KC patients undergoing CXL, age ≥ 35 years had no effect on the changes of BCVA (-0.02 (95% CI -0.13 to 0.09); $P=0.757$) or K_{max} (0.58 (95%CI -0.51 to 1.68); $P=0.294$) as compared with patients <35 years of age even when correcting for potential confounders such as BCVA better than 20/25 and preoperative maximum K readings >58.00 Dpt.¹²

Conclusion

From our study we can conclude that, CXL improves visual acuity and reduces maximal keratometry values in KC patients effectively as in younger patients. It also could be considered as a promising first line treatment for most patients with progressive KCN.

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