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Original Article

Comparison between Auto and Manual Keratometer in Patients Visiting Mayo Hospital, Lahore.

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ABSTRACT:

PURPOSE: To compare auto and manual keratometer to find the accuracy between these two instruments in order to measure K-reading for IOL calculation

METHODS: 200 eyes of 100 normal Patients (50 males and 50 females) visiting Mayo Hospital and College of Ophthalmology and Allied Vision Sciences Lahore, of all age groups above 14 years, were examined.

RESULTS: On auto-keratometer mean K was 7.72 ± 0.35 mm (SE = 0.02) and on manual keratometer mean K was 7.75 ± 0.35 mm (SE = 0.02). Auto keratometer measured 0.0273 ± 0.0858 mm less than manual keratometer but Mann Whitney-U test showed no statistically significant difference between auto and manual keratometer (p=0.36).

CONCLUSION: Auto-keratometer measures 0.0273 mm less than manual keratometer. However, there was no significant difference between auto and manual keratometry (p>0.05).

KEYWORDS: Cataract, Auto-keratometer, Manual-Keratometer, corneal curvature

INTRODUCTION:

About 11 million eyes, worldwide, undergo intra ocular lens implantation per year.[1] It is estimated that the number of people with visual impairment is more than 161 million. The cataract is the leading cause of visual impairment.[2, 3] Majority of the patients undergoing cataract surgery or refractive surgery are expecting good after-surgery-visual-acuity, but for this, the accurate examination of patient's ocular parameters which provide information related to IOL power is necessary. Uncorrected readings of the IOL's parameters lead to error in intra ocular lens power.[4, 5]

Cataract is the most common cause of blindness in the world, about 51% cause of blindness is cataract, generally occurs due to aging changes into crystalline lens.[3,6,7] The main factors affecting the IOL's power are keratometry reading and axial length of the eyeball.[8,9] These measurements also used in Littman's formula[10] for other purposes such as calculation optic disc and neuro-retinal rim area[11,12] and retinal nerve fiber layer thickness (RNFL).[13]

The intra ocular lens' power accuracy requires accurate keratometry value.[14] The keratometry reading usually recorded in diopters units.[8] The instrument used to measure keratometry reading is called keratometer. Keratometer measure the curvature of the anterior surface of the cornea in order to record K-reading also known as keratometry reading. The measurement provide information related to steep and flat meridians.[6]

As compared to manual keratometry, the automated keratometry is quicker but has limited number of values. Therefore the manual keratometer is used widely in preoperative cases to fined exact corneal power. Auto-keratometer has shown to be accurate in healthy patients and contact lens wearer.[15] It is clear from the formula of calculating IOL power that a small error in keratometric reading leads towards an error in IOL power. Therefore, it is essential that the technique and instrument used for measuring corneal curvature should accurate.[16]

In this article auto keratometer reading was compared with manual keratometer in order to find difference between them to obtain accurate IOL power.

PATIENTS AND METHODS:

This comparative cross sectional study was conducted at College of Ophthalmology and Allied Vision Sciences (COAVS) and Mayo Hospital Lahore from September to December 2015. Keratometry was done on 200 healthy eyes of 100 patients (50 males and 50 females). Patients of age 15 years and above were included in the study. Vision of all the subjects was checked using a distance Snellen's visual acuity chart. Individuals below 15 years and those who could not give history or unable to perform examination were excluded from the study.

The data were recorded on the Performa, fed on the computer using the SPSS 17.0 software. The results were analyzed and tabulated using the same software.

RESULTS:

The data were arranged in tabulated form as well as graphical and diagrammatic form for the analysis of variables. We selected the individuals of age above 14 years of either sex.

Mean values of K reading recorded on auto keratometer and manual keratometer was compared. Auto keratometer has mean average value of 7.7183 mm and manual keratometer has mean value of 7.7456 mm with standard error 0.02475. Auto keratometer measures 0.0273 mm less than manual keratometer.

Independent Sample Mann-Whitney U test was applied. The difference was not statistically significant (p=0.365).

Table: 1

The table shows the mean average values of auto and manual keratometer with standard deviation and mean standard error.

Descriptive Statistics

Keratometer		N	Minimum	Maximum	Mean		Std. Deviation
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Auto	Average	200	6.48	8.89	7.7	0.02461	0.34806
Manual	Average	200	6.44	9	7.7	0.02475	0.35002

Table: 2

Table of independent Sample Mann-Whitney U test showing the p-value with mean average values.

Keratometer	Mean	Null Hypothesis	Test	Sig.	Decision
Average-Auto K	7.72	Distribution of the Average is same across categories of Keratometer	Independent Sample Mann-Whitney U test	0.37	Retain the null hypothesis
Average-Man K	7.75				

DISCUSSION:

In a similar study, comparison between the accuracy of auto and manual keratometry was under observation. The difference determining the average corneal power in all eyes was less than 0.10 D (manual keratometer = 43.84 D (7.6984 mm), auto-keratometer = 43.93 D (7.6827)). Automated keratometry as compared to manual, however, provide less variability in calculating the IOL power and appeared to be accurate. To strengthen the above mentioned study's result, this study shown similar results too. Auto-keratometer measures 0.0273 mm less than manual keratometer. For further improvement in such instrumental comparative studies, inter-observer K-reading should also include.

CONCLUSION:

On auto-keratometer mean K was 7.72 ± 0.35 mm (SE = 0.02) and on manual keratometer mean K was 7.75 ± mm 0.35 (SE = 0.02). Mann Whitney-U test showed no statistically significant difference between auto and manual keratometer (p=0.36). Auto keratometer measured 0.0273 ± 0.0858 mm less than manual keratometer. There was no significant difference between auto and manual keratometry (p>0.05). However, Auto-keratometer measures 0.0273 mm less than manual keratometer.

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