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A Study On Effect Of Artificial Tears Of Different Viscosity On Keratometry Readings In Cataract Patients

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ABSTRACT

Background: To study the effect of high viscosity and low viscosity artificial tears on keratometry readings in cataract patients. **Materials and Methods** :An observational study assessing the effect of high viscosity and low viscosity artificial tears on keratometry readings in cataract patients. **Results:** Significant mean difference is noted in keratometry readings before and after instillation of high viscosity and low viscosity tears but the high viscosity group shows more significant mean difference compared to low viscosity group. **Conclusion**: The keratometry readings were substantially influenced by tear film stabilizing eye drops prior to keratometry measurements. The effect is stronger and lasts longer when the eye drops have a higher viscosity.

KEYWORDS: Artificial tears, cataract, keratometry

I. INTRODUCTION

Artificial tears are lubricating eye drops used to treat ocular surface discomfort and dryness[1]. Artificial tears are used to supplement a patient's naturally produced tears and promote eye lubrication by replicating the properties of the tear film[2]. Preparations may include carboxymethyl cellulose, polyvinyl alcohol, hydroxypropyl methylcellulose (also known as HPMC or hypromellose), hydroxypropyl cellulose, and hyaluronic acid.

A keratometer, often known as an ophthalmometer, measures the anterior corneal curvature as well as the axis and extent of astigmatism[3]. The procedure of taking these measurements is known as keratometry. A keratometer is useful in determining the K reading, which is a crucial part of the SRK formula used to calculate IOL power[4]. Corneal imperfections such as abrasions, erosions, epithelial defects, etc., will prevent a proper keratometry reading due to uneven astigmatism[5]. Keratometry is an important measurement in cataract surgery because measurement errors correspond 1:1 to refractive results. If you are 1.00 D off in your K measurements, you will experience a 1.00 D refractive surprise. If your K is incorrect, you will experience an unanticipated refractive surprise post-operatively.

The purpose of the current study was to assess the effect of artificial tears of different viscosity on keratometry readings in cataract patients

II. Material and method

It was an observational study conducted for a period of 2 months i.e.,from December 2023 to February 2024 on cataract patients who gave informed consent and fulfilled the inclusion and exclusion criteria.The study was conducted at the Department of Ophthalmology, Alluri Sita Ramaraju Academy of Medical Sciences, Eluru, Andhra Pradesh.The initiation of the study was preceded by obtaining permission from higher authorities and clearence from the Institutional Ethics Committee.

2.1 Sample size

Total 90 patients meeting the inclusion and exclusion criteria were divided into three groups

Group A -30 patients [HIGH VISCOSITY ARTIFICIAL TEARS]

Group B – 30 patients [LOW VISCOSITY ARTIFICIAL TEARS]

Group c – 30 patients [CONTROLS]

2.2 Inclusion criteria

Patients with bilateral cataract without any ocular surface diseases are included

2.3 Exclusion criteria

Eyes with corneal pathology

History of trauma and ocular surgery

Corneal or conjunctival infections

All the patients underwent routine ophthalmic examination along with keratometry readings [K1 & K2] of both eyes with ARK (TOPCON KR 800) before instillation of artificial tears and after 5 minutes of instillation of artificial tears and the changes in keratometric readings are noted. No artificial tears were instilled in the control group they were just instructed to blink and close their eyes in between measurements and the readings were noted initially and after 5 minutes

III. Statistical Analysis

The statistical data was entered in Microsoft excel and analysed using SPSS software (Trial version). The results were presented in the form of tables. Descriptive statistics were used to summarise the demographic data and paired t test was used to compare within the group before and after instillation of artificial tears and ANOVA test was used to compare between the groups.

A P-value <0.05 is considered to be statistically significant.

IV. RESULTS

Descriptive Statistics							
Groups		N	Mean	Median	SD	Minimum	Maximum
High (Initial)	RE (K1)	30	43.8	43.4	1.78	40.8	47.0
	RE (K2)		44.3	43.8	1.62	41.3	48.8
	LE (K1)		43.9	43.9	1.50	40.8	46.5
	LE (K2)		44.6	44.6	1.75	42.0	48.3
High(After 5 Min)	RE (K1)	30	44.2	43.8	1.72	41.0	47.3
	RE (K2)		44.7	44.4	1.67	41.4	48.8
	LE (K1)		44.1	44.0	1.56	41.8	46.8
	LE (K2)		45.0	44.8	1.83	42.3	48.5
Low (Initial)	RE (K1)	30	43.9	43.6	1.50	41.5	46.8
	RE (K2)		43.8	43.6	2.02	40.3	47.5
	LE (K1)		44.4	44.5	1.34	42.5	47.0
	LE (K2)		44.5	44.1	1.88	41.8	48.3
Low (After 5 Min)	RE (K1)	30	44.0	43.8	1.56	41.5	47.0
	RE (K2)		44.1	43.9	2.01	40.8	47.5
	LE (K1)		44.5	44.5	1.31	42.5	47.0
	LE (K2)		44.6	44.1	1.88	41.5	48.3
Control (Initial)	RE (K1)	30	43.6	43.5	1.60	41.3	46.8
	RE (K2)		43.7	43.3	1.84	41.3	47.5
	LE (K1)		44.1	44.3	1.53	42.0	47.0
	LE (K2)		44.3	43.8	1.89	41.8	48.3
Control (After 5 Min)	RE (K1)	30	43.8	43.5	1.64	41.5	46.8
	RE (K2)		44.0	43.6	2.01	41.3	47.8
	LE (K1)		44.3	44.5	1.62	42.3	47.0
	LE (K2)		44.6	43.8	2.04	41.5	48.5

Table 1: Descriptive statistics

Table 1 shows significant mean difference in keratometry readings before and after instillation in high viscosity artificial tears group

Paired Samples T-Test									
								95% Confidence Interval	
Group			statistic	df	p	Mean difference	SE difference	Lower	Upper
High	RE (K1)A	AFRE (K1)A	-5.71	29.0	<.001	-0.367	0.0643	-0.498	-0.23526
	RE (K2)A	AFRE (K2)A	-10.61	29.0	<.001	-1.500	0.1413	-1.789	-1.21097
	LE (K1)A	AFLE (K1)A	-2.79	29.0	0.009	-0.225	0.0807	-0.390	-0.05991
	LE (K2)A	AFLE (K2)A	-2.08	29.0	0.046	-0.400	0.1920	-0.793	-0.00730
Low	RE (K1)B	AFRE (K1)B	-12.58	29.0	<.001	-2.142	0.1702	-2.490	-1.79351
	RE (K2)B	AFRE (K2)B	-10.83	29.0	<.001	-1.625	0.1501	-1.932	-1.31807
	LE (K1)B	AFLE (K1)B	-2.56	29.0	0.016	-0.100	0.0390	-0.180	-0.02018
	LE (K2)B	AFLE (K2)B	-6.71	29.0	<.001	-1.175	0.1750	-1.533	-0.81708
Control	RE (K1)C	AFRE (K1)C	-2.20	29.0	0.036	-0.192	0.0870	-0.370	-0.01373
	RE (K2)C	AFRE (K2)C	-2.05	29.0	0.049	-0.258	0.1260	-0.516	-6.50e-4
	LE (K1)C	AFLE (K1)C	-3.44	29.0	0.002	-0.233	0.0677	-0.372	-0.09480
	LE (K2)C	AFLE (K2)C	-1.91	29.0	0.066	-0.242	0.1266	-0.501	0.01718

Table 2: Paired sample T-Test

Table 2 shows a significant mean difference in keratometry readings before and after instillation of high viscosity and low viscosity tears but the high viscosity group shows more significant mean difference compared to low viscosity group.

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
HighA	120	5365	44.70833	3.028711		
LowA	120	5331	44.425	2.62458		
Control A	120	5299.5	44.1625	3.388288		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	17.88472	2	8.942361	2.967079	0.042724	3.021012
Within Groups	1075.948	357	3.01386			
Total	1093.833	359				

Table 3 showing a significant mean difference between high viscosity group and control group and also low viscosity group and control group.The difference is more between high viscosity and control group(0.54) while compared to low viscosity and control group (0.26).

V. Discussion

Cataract surgery is a successful procedure for eyesight restoration. The market is highly competitive, offering highly accurate equipment and intraocular lenses and promises of dispensability of spectacles following surgery. To achieve optimal results, preoperative examination, formula selection, and intraocular lens selection must be accurate . This is particularly true with multifocal IOLs as they have a deeper field of focus. Basic examination, such as adequate biometry, are often overlooked. Accurate keratometry measurements are vital for validating results[6]. We investigated the readings of keratometry obtained by the automated refractive keratometer of an automated biometry device in normal and cataract patients and the effect of adding artificial tears of different viscosities. Significant changes in keratometry readings after instillation of both low and high viscosity eye drops were observed. Both High and low viscosity eye drops were determined to be powerful influencing factors. But the significant difference is observed in high viscosity group.Other studies by Epitropoulos AT[7] stated that statistically significantly more subjects with hyperosmolar tears showed poor repeatability of K values.This study did not consider measurements more than 5 min after instillation of eye drops. Therefore, a prolonged influence can only be assumed. In several studies differences were significant after 5 minutes and longer[8]

VI. Conclusion

To conclude tear film stabilizing eye drops prior to keratometry measurements influenced K readings significantly. Hence the higher the viscosity of the eye drops ,the stronger is the influence and the longer its persistence.

REFERENCES

[1]."Keratoconjunctivitis, Sicca". eMedicine. WebMD, Inc. 2006-04-21. Archived from the original on 16 October 2006. Retrieved 2006-11-12

[2].Perry, Henry D.; Donnenfeld, Eric D. (December 2003). "Medications for dry eye syndrome: a drug-therapy review". Managed Care (Langhorne, Pa.). 12 (12 Suppl): 26–32. ISSN 1062-3388. PMID 14723111

[3].Cordero I. Verifying the calibration of a manual one-position keratometer. Community Eye Health. 2013;26(84):77.

[4].Lawless M, Jiang JY, Hodge C, Sutton G, Roberts TV, Barrett G. Total keratometry in intraocular lens power calculations in eyes with previous laser refractive surgery. Clin Exp Ophthalmol. 2020 Aug;48(6):749-756.

[5].Roh HC, Chuck RS, Lee JK, Park CY. The effect of corneal irregularity on astigmatism measurement by automated versus ray tracing keratometry. Medicine (Baltimore). 2015 Apr;94(13):e677.

[6].Sheard R. Optimising biometry for best outcomes in cataract surgery. Eye (Lond). 2014 Feb;28(2):118-25.

[7].Epitropoulos AT, Matossian C, Berdy GJ, Malhotra RP, Potvin R. Effect of tear osmolarity on repeatability of keratometry for cataract surgery planning. J Cataract Refract Surg. 2015

[8].Ishioka, M., Kato, N., Takano, Y., Shimazaki, J., & Tsubota, K. (2009). The quantitative detection of blurring of vision after eyedrop instillation using a functional visual acuity system. Acta Ophthalmologica, 87