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*Research article*

# Analysis on ocular biometric parameters in adult cataract surgery

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## Abstract

***Introduction:*** *Biometrics are crucial in calculating IOL power for best refractive advantage in cataract surgery. Regional data provides insights on corneal astigmatism and facilitates forecasts but data for Sri Lankan population is lacking.*

***Objective:*** *To identify ocular biometry characteristics in Sri Lankans and compare with other populations.*

***Method:*** *A cross-sectional retrospective study assessed ocular biometry characteristics in consecutive cataract surgery candidates at a tertiary unit in National Eye Hospital of Sri Lanka between February and August 2021. Data from 237 eyes in 237 candidates of age over 40 and under 80 years were analysed. Data on Keratometry(K), axial length(AL) and IOL power were statistically analysed through SPSS software. Sample was divided as: age between 40-60 years and 60-80years. Descriptive statistics and unpaired t-test to compare means between groups were utilised.*

***Results:*** *Mean Age was 62.71±7.89 years. Mean AL was 23.11±1.11mm (range 21.00-30.56)mm with majority between 22-24mm(72.6%). Mean K was 44.25±1.57mm. IOL powers most used were between 23-25D (46.3%) (range 4D,28D). Mean astigmatism was 0.82±0.78D and 26.6%, 5.9% and 1.3% had over 1.0D, 2.0D and 3.0D respectively.*

***Discussion:*** *In males mean K was lower (43.80±1.62 vs 44.61±1.44) (p=0.00) and AL was longer (23.31±1.20 vs 22.94±1.01) (p=0.013). The older age group had shorter AL (p=0.006) and higher astigmatism(p=0.049). AL in our sample was shorter than Caucasians but comparable with other South Asian studies. Astigmatism prevalence was lower than other studies.*

***Conclusion:*** *This study gives an insight of ocular biometrics, corneal astigmatism and common IOL powers in this sample. A larger sample size study may project figures for entire Sri Lankan population.*


**Key words:** biometry, keratometry, corneal astigmatism

## Introduction

Cataract is one of the commonest surgical procedures performed on aging individuals. It is approximated that 10 million surgeries are done yearly worldwide with 100 to 6000 operations per million population per year.[1] While replacing a cataractous lens, it has potential to serve the added benefit as a lens based refractive surgery by correction of refractive errors and minimizing spectacle dependence.

The advancement of surgery and IOL related technology has made significant strides in achieving better postoperative visual outcomes. For the purpose of calculating the ideal IOL power that can provide the best refractive advantage, it is crucial for calculation of biometrics including axial length, corneal power to be accurate. This is particularly imperative in minimizing postoperative astigmatism in the use of toric IOLs.

Identifying the distribution of biometric characteristics in the country setting can help provides insights on corneal astigmatism prevalence as well as help manufacturers in planning and ophthalmologists in improving quality of surgical outcomes with regard to IOL selection.

Several large studies analyse biometric data and corneal astigmatism prevalence of Caucasian population including in preoperative cataract surgery candidates. Except for some studies in Chinese individuals there is a paucity of data for Asian populations with only a few studies to date. Data for Sri Lankan population is lacking.

## Objective

To identify ocular biometry characteristics distribution in adult candidates for cataract surgery in Sri Lanka and compare with existing studies in other populations.

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## Method

A cross-sectional retrospective study assessed ocular biometry characteristics in cataract surgery candidates at a tertiary care unit in National Eye Hospital of Sri Lanka between February and August 2021. Due to the retrospective nature of the study, the need for informed consent was waived.

Data from 237 eyes in 237 candidates of age between 40 and 80 years were analysed. Data on Keratometry (K), axial length (AL) and IOL power were collected. Data was stored into Microsoft Excel spreadsheets and subsequently converted to files in SPSS software for statistical analysis.

Sample was divided as: age between 40-60 years and 60-80 years. Descriptive statistics were analysed. Continuous variables were expressed as mean ± standard deviation for data in a normal distribution. Values were considered statistically significant when P value was less than 0.05. Unpaired t-test was used to compare means of characteristics between gender and the two age groups.

## Results

In our sample 104 eyes (43.9%) were left with 133 (56.1%) right eyes. Mean age was 62.71±7.89 years. The distribution of age group is shown in Table 1.

**Table 1. Distribution of age groups**

| | *Number (percentage)* |
|---|---|
| 40-59 age group | 79 (33.3%) |
| 60-79 age group | 158 (66.7%) |

Mean AL was 23.11±1.11mm with a range beween 21.00 to 30.56mm with majority between 22-24mm (72.6%) as shown in Table 2.

**Table 2. Distribution of axial length**

| *Axial Length* | *Number (percentage)* |
|---|---|
| <22 | 23 (9.7%) |
| 22-23 | 95 (40.1%) |
| 23-24 | 77 (32.5%) |
| 24-25 | 22 (9.3%) |
| >25 | 7 (3.0%) |

Mean K was 44.25 ± 1.57mm. Majority between 43-45 (49.8%). 5.9% were less than 42mm and 3.8% over 47 as shown in Table 3.

**Table 3. Distribution of mean K value**

| *Mean K* | *Number (percentage)* |
|---|---|
| <42 | 14 (5.9%) |
| 42-43 | 39 (16.5%) |
| 43-44 | 54 (22.8%) |
| 44-45 | 64 (27.0%) |
| 45-46 | 39 (16.5%) |
| 46-47 | 18 (7.6%) |
| >47 | 9 (3.8%) |

As shown in Table 4, IOL powers most used were between 23 and 25 D (46.3%) with lowest being 4 D and highest power of 28 D.

**Table 4. Distribution of selected IOL powers**

| *IOL power* | *Number (percentage)* |
|---|---|
| <20 | 6 (2.5%) |
| 20-21 | 31 (13.1%) |
| 21-22 | 32 (13.5%) |
| 22-23 | 43 (18.1%) |
| 23-24 | 44 (18.6%) |
| 24-25 | 43 (18.1%) |
| 25-26 | 20 (8.4%) |
| >26 | 10 4.2% |

The distribution of astigmatism is shown in Table 5. Mean astigmatism was 0.82 ± 0.78D with 26.6%, 5.9% and 1.3% over 1.0 D, 2.0 D and 3.0 D astigmatism respectively.

**Table 5. Distribution of astigmatism**

| *Astigmatism* | *Number (percentage)* |
|---|---|
| <0.5 D | 79 (33.3%) |
| 0.5-1 D | 95 (40.1%) |
| 1-2 D | 49 (20.7%) |
| 2-3 D | 11 (4.6%) |
| >3 D | 3 (1.3%) |

## Discussion

Mean K was lower in males (43.80±1.62) than females (44.61±1.44) (p=0.00). AL in males were longer (23.31±1.20) than females (22.94± 1.01) (p=0.013) as seen in Table 6. This was similar to observations in previous studies in other populations. There was no significant astigmatism difference in gender (p=0.507). In the older age group AL was shorter (p=0.006) and astigmatism was higher (p=0.049). No significant difference in Mean K in age groups as seen in Table 7.

**Table 6. Comparison by gender**

| | *Male* | *Female* |
|---|---|---|
| AL | 23.31 ± 1.20 | 22.94 ± 1.01 |
| Mean K | 43.80 ± 1.62 | 44.61 ± 1.44 |
| Astigmatism | 0.85 ± 0.77 | 0.79 ± 0.77 |

AL in our sample was shorter than Caucasian populations but comparable with other South Asian studies. Mean K values were slightly higher than Caucasian study populations but comparable with other South Asian studies.

**Table 7. Comparison between age groups**

| | *40 -59 years group* | *60-79 years group* |
|---|---|---|
| AL | 23.39 ± 1.09 | 22.96 ± 1.10 |
| Mean K | 44.01 ± 1.62 | 44.35 ± 1.54 |
| Astigmatism | 0.67 ± 0.68 | 0.88 ± 0.81 |

## Limitations

Small sample size was a significant limitation as this is a preliminary analysis of an ongoing study. Additional data that was not collected including technique of biometry measurement, axis of K values, Target refraction data if available would have provided opportunity for more meaningful analysis.

## Conclusion

This study gives an insight of ocular biometrics, corneal astigmatism and common IOL powers in this sample. A larger sample size study may project figures for entire Sri Lankan population.

### Reference

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