# Prevalence of Refractive Errors and the Extent of Correction Possible with Conservative Methods, among Patients Visiting a Tertiary Care Hospital in South Kerala

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## ABSTRACT

**Introduction:** World Health Organisation estimates that in 2010, 285 million people were visually impaired, of which 39 million were blind. Myopia is the commonest refractive error followed by hypermetropia. Many conservative and surgical modalities are available in correcting the refractive errors, each with varying efficacy and safety. This study was planned to find out the prevalence of refractive errors and the extent of correction possible with conservative methods.

**Material and Methods:** A hospital based cross sectional study was done in the months of November-December 2015, among patients attending the ophthalmology Out Patient Department (OPD) of Pushpagiri Medical College Hospital, Thiruvalla, Kerala, India. A total of 60 patients attending the ophthalmology OPD were included in the study. All the participants who were included in the study had refractive errors and were candidates for correction using conservative methods.

**Results:** Around 40% of the participants complained of decreased vision while 16.7% had recurrent bouts of headache as the presenting problem. Most of the patients had an uncorrected far vision between 6/6 and 6/24. The visual acuity achieved post correction was satisfactory in the case of most participants. Around 35% of the participants had a corrected visual acuity of 6/6 in both eyes, and around 45% had a corrected acuity between 6/6 and 6/12 in both eyes.

**Conclusion:** The symptoms which were found during the course of the study were similar to that reported in literature too. In our study, sub-optimal correction of visual acuity has been reported only in less than 20% of the participants, and therefore the probability of progression of the problem is minimised in a vast majority of the patients. Studies have shown that the measures like topical Atropine or Pirenzepine are effective in slowing the rate of progression of disease by over ninety percent. But none of these measures have been adopted for patients accessing care at this institution. So there is an urgent need to optimize the utilization of such measures to minimize the risk of the disease.


**Keywords:** Refraction, Ocular, Myopia/physiopathology, Visual Acuity/physiology, Eyeglasses

## INTRODUCTION

Refractive errors are the leading cause of visual impairment throughout the world as illustrated in the WHO record. According to WHO in 2010, 285 million people were visually impaired, of which 39 million were blind. 120 million cases are reported to be due to uncorrected refractive error and about 19 million children are visually impaired due to refractive errors.[1]

Visual acuity is measured using autorefraction in all patients attending the outpatient department typically of a tertiary care centre. The various abnormalities which are detected during this procedure vary from myopia to hyperopia along with astigmatism. The power in diopter during the screening can be classified using the refractive error assessed. The values typically below -0.5 diopters (D) would be called myopia in spherical equivalent and astigmatism would be present if the cylinder value is at least 0.75 D in either eye.[2]

Studies have shown the prevalence and magnitude of refractive errors in the population. Above the age of 40 years there occurs some changes in the crystalline lens, which leads to change in the refractive status of the person. Genetic and environmental influences are said to play a additional role in it.[3-6]

When age groups as wide as 5 to 90 years are surveyed, about 10% of the patients could be identified as having refractive error. Myopia would be the commonest refractive error followed by hypermetropia. Males would predominate among myopic and females predominate among hypermetropics. The majority of spherical errors could be less than or equal to 2 D.

This study was planned to find out the prevalence of refractive errors and the extent of correction possible with conservative methods in the patients attending Ophthalmology Outpatient Department in Pushpagiri Institute of Medical Sciences and Research Centre, Tiruvalla, a tertiary care hospital in Kerala, India.

## MATERIAL AND METHODS

A hospital based cross sectional study was done in the months of November-December 2015, among patients attending the ophthalmology Out Patient Department (OPD) of Pushpagiri Medical College Hospital, Thiruvalla, Kerala, India. Pushpagiri Medical College Hospital is a large tertiary care teaching hospital with more than 1200 beds and the ophthalmology department runs post-graduate courses. The hospital caters to patients from 3 districts of south and central Kerala state, mainly from lower and middle socio economic strata.

A total of 60 patients attending the ophthalmology OPD were included in the study, after obtaining written informed consent. All the participants who were included in the study had refractive errors and were candidates for correction using conservative methods. All the patients with history of Radial Keratotomy, Photorefractive Keratectomy or Laser-Assisted in

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Situ Keratomileusis (LASIK) were excluded from the study. Refractive error was assessed, without cycloplegia, in both eyes of all participants using an autorefractor. Various qualitative variables were tally marked and tabulated.

## STATISTICAL ANALYSIS

The data was digitised and analysed using Epi-info 7.0, a free statistical package brought out by Centers for Disease Control, Atlanta, USA. The quantitative variables were categorized and tabulated using descriptive statistics.

## RESULTS

A total of 60 participants, aged 6 to 97 years, were included in the study. Age groups were classified on a functional basis. The highest group of was between 16-45 years of age as shown in Table-1. There were more females in the study group than males. Around 40% of the participants complained of decreased vision while 16.7% had recurrent bouts of headache. About 10% of the participants had associated hypertension and diabetes as co-morbid conditions.

Sizeable proportion of people came with a Snellen's reading of 6/6 which indicated the presence of additional refractive issues as mentioned in the correction estimates. Most of the patients had an uncorrected far vision between 6/6 and 6/24 (table-2).

Both spherical and cylindrical deformities were corrected conservatively. In spherical deformity corrections, -0.5 to +1D were most commonly used, followed by more than +1D. In cylindrical deformity corrections, <-1D and -0.5 to +1D were used most commonly. Cylindrical deformities made conservative correction, as observed in Table-3.

The visual acuity achieved post correction was satisfactory in the case of most participants. Around 35% of the participants had a corrected visual acuity of 6/6 in both eyes, and around 45% had a corrected acuity between 6/6 and 6/12 in both eyes. Only a minuscule number of participants had a corrected visual acuity less than 6/60, as seen in Table-4.

## DISCUSSION

Age and gender plays an important role in refractive errors. Studies have shown that the prevalence of Myopia increases with age in people aged less than 15 years and decrease in people who are above 15 years. The rate of hypermetropia showed a significant increase with age in individuals aged above 15 years.[7] The prevalence of myopia, hypermetropia and astigmatism, showed significant differences with gender. Some studies have shown that gender differences vary so widely that they recommend gender standardised prevalence rates when estimating overall prevalence of refractive errors.[8]

The symptoms which were found during the course of the study were similar to that reported in literature too. Decreased vision and headache were the most common symptoms reported in our study, with some participants having redness, watering, irritation and eye pain. National Institutes of Health (NIH) data also shows that headache, eye strain, squinting and decreased vision are the primary symptoms of myopia.[9] Other studies have also shown that these symptoms affect the quality of life in the patients, especially in the elderly age group.[10]

Myopia is a problem which has been observed to worsen over the years, with the patients requiring increased level of correction through stronger optical means. It has been shown that under correction of the refractive error is not an effective means to slow the progression of myopia. Rather, under correction will increase the rate of worsening of the problem, even though under correction is a technique which has been practised historically.[11] In our study, sub-optimal correction of visual acuity has been reported only in less than 20% of the participants, and therefore the probability of progression of the problem is minimised in a vast majority of the patients. Other studies have shown that the measures like topical Atropine or Pirenzepine are effective in slowing the rate of progression of disease by over ninety

| Variables | Frequency | Percentage |
|---|---|---|
| Age Group (yrs) | | |
| 6-15 | 8 | 13.3 |
| 16-45 | 22 | 36.7 |
| 46-60 | 18 | 30.0 |
| 61-97 | 12 | 20.0 |
| Gender | | |
| Male | 22 | 36.7 |
| Female | 38 | 63.3 |
| Symptoms | | |
| Headache | 10 | 16.7 |
| Decreased vision | 24 | 40.0 |
| Redness | 2 | 3.3 |
| Watering | 4 | 6.7 |
| Irritation | 4 | 6.7 |
| Pain | 1 | 1.7 |
| Co-morbidity | | |
| Diabetes | 7 | 11.7 |
| Hypertension | 5 | 8.3 |

**Table-1:** Baseline demographic and clinical characteristics

| Visual Acuity (Far) | Right (%) | Left (%) |
|---|---|---|
| ≤6/6 | 11 (21.5%) | 11 (21.1%) |
| ≤6/12 | 13 (25.4%) | 15 (28.8%) |
| ≤6/24 | 12 (23.5%) | 11 (21.1%) |
| ≤6/60 | 8 (15.6%) | 6 (11.5%) |
| 6/60 or more | 7 (13.7%) | 9 (17.3%) |

**Table-2:** Far vision among the participants

| Correction (Spherical) | Right (%) | Left (%) |
|---|---|---|
| <-1.0 | 5 (13.1%) | 7 (19.4%) |
| -0.5 to -1.0 | 4 (10.5%) | 4 (11.1%) |
| -0.5 to +1.00 | 22 (57.8%) | 21 (58.3%) |
| More than +1.00 | 7 (18.4%) | 4 (11.1%) |
| Correction (Cylindrical) | Right (%) | Left (%) |
| <-1.0 | 17 (37.7%) | 11 (30.5%) |
| -0.5 to -1.0 | 10 (22.2%) | 8 (22.2%) |
| -0.5 to +1.00 | 15 (33.3%) | 14 (38.8%) |
| More than +1.00 | 3 (6.67%) | 3 (8.3%) |

**Table-3:** Cylindrical and Spherical Correction required by the participants

| Visual Acuity (Far) | Right (%) | Left (%) |
|---|---|---|
| 6/6 | 18 (40.9%) | 15 (34.1%) |
| ≤6/12 | 20 (45.4%) | 20 (45.4%) |
| ≤6/24 | 5 (11.3%) | 3 (6.8%) |
| ≤6/60 | 1 (2.2%) | 4 (9.1%) |
| 6/60 or more | 0 | 2 (4.5%) |

**Table-4:** Far vision among participants, after correction

percent.[12] But none of these measures have been adopted for patients accessing care at the institution in which the study was carried out. This finding calls for measures to sensitise the practising ophthalmologists about newer modalities in the field of refractive errors.

## CONCLUSION

Most of the participants had a visual acuity of less than 6/24 on presentation to the hospital, and over 80% of them achieved a vision better than 6/12 only with conservative measures. But there is an urgent need to find out the reasons behind under correction in the rest of the patients, and also sensitise the practising ophthalmologists about newer modalities to slow the progression of disease.

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