



## PREVALENCE OF REFRACTIVE ERRORS IN THE PEOPLE OF SOUTH KASHMIR VISITING A TERTIARY CARE HOSPITAL.

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**ABSTRACT** **Aim:** To report the prevalence of refractive errors in persons 40 years and older visiting a tertiary care hospital in south kashmir. **Method and Material:** The present study was a hospital based prospective study. The sample studied consisted of 1500 consecutive patients aged 40 and above. The refractive status of the participants was measured with an auto refractometer and then the final prescription was tested with subjective refraction using a Snellen test chart in order to achieve 6/6 visual acuity. Aphakic eyes or eyes undergone cataract surgery, were excluded from analysis. Also eyes found to be  $< \pm 0.50$  Ds or having mixed astigmatism  $\pm 0.25$  Dc were considered to be emmetropic having 6/6 or 6/6 (-) visual acuity. **Results:** Prevalence rates were determined for myopia 45.4%, hypermetropia 19.8%, and emmetropia 34.8%. Myopia was categorized as low myopia ( $-0.50$  D to  $-3.00$  D) with 31.6% prevalence, as moderate myopia ( $-3.00$  D to  $-6.00$  D) with 12.6% prevalence and high myopia ( $> -6.00$  D) with 1.2% prevalence. Hypermetropia categorized as low hypermetropia ( $+0.50$  D to  $+2.00$  D) with 12.4% prevalence, as moderate hypermetropia ( $+2.00$  D to  $+4.00$  D) with 5.9% prevalence and high hypermetropia ( $> +4.00$  D) with 1.5%. **Conclusions:** Refractive errors affect approximately 65% of the population (40 years or older) in the people of south kashmir visiting a tertiary care hospital.

**KEYWORDS :** Refractive errors, myopia, hypermetropia, emmetropia, prevalence

### INTRODUCTION

Blindness is one of the most significant social problems in India with uncorrected refractive errors as the second major cause of blindness and low vision.<sup>[1-6]</sup> Refractive error may be defined as a state in which the optical system of the non-accommodating eye fails to bring parallel rays of light to focus on the fovea. In myopia the optical system of the eye brings parallel rays of light into focus anterior to the fovea while in hyperopia the optical system of the eye brings parallel rays of light into focus posterior to the fovea, both resulting in blurred vision.<sup>[1-7]</sup>

It should be noticed that in mild to moderate hyperopia, blurred vision can be overcome by accommodation in youth and early adulthood, with the result that low degrees of hyperopia often are not noticed until the onset of presbyopia in middle adulthood. Myopia results in blurred vision at all ages. Most usually all types of ametropias can be corrected with spectacles, contact lenses, or refractive surgery.<sup>[1-7]</sup>

Previous ophthalmic epidemiological studies have demonstrated a variability in refractive error between different ethnic groups. The majority of the early studies have been conducted in European or American populations<sup>[1-13]</sup> but recently, large-scale population-based studies have provided data about refractive errors in certain Asian regions.<sup>[14-22]</sup> These studies have generally found high rates of myopia across Asia.<sup>[21-22]</sup> The aim of the present study was to estimate and determine the prevalence of refractive errors in persons 40 years and older.

**AIMS AND OBJECTIVES:** The study was conducted in the department of ophthalmology Government Medical College Anantnag to estimate the prevalence of refractive errors in persons 40 years and older.

### MATERIALS AND METHODS:

The present study was a hospital based prospective study conducted in the department of ophthalmology GMC Anantnag during the period January 2019 to January 2020. A total of 1500 participants (633 men 42% and 867 women 58%) took part in the study. As part of our standardized examination, an automated objective refraction test was performed on each participant with an Auto Refractometer. Visual acuity was then measured with a Snellen test chart at 6 meters under standard lighting conditions, and measured initially using any corrective spectacles the participants were currently using. The study was conducted between January 2019 to January 2020. All subjects underwent a complete ophthalmic examination, including detailed history of ophthalmic and systemic problems, best corrected visual acuity according to the modified Early Treatment Diabetic Retinopathy Study (ETDRS) chart, applanation tonometry, gonioscopy, grading of lens opacities using the Lens Opacities

Classification System (LOCS) II, fundus examination, and random blood sugar estimation. Monocular visual acuity was determined with current spectacle prescription if any. The best corrected visual acuity was ascertained and recorded. Refraction data are based on subjective refractions. Only the right eye of each subject was considered.

Emmetropia was defined as a spherical equivalent between  $-0.25$  and  $+0.25$  diopter sphere [DS]. Myopia was defined as a spherical equivalent less than  $-0.50$  DS and a spherical equivalent less than  $-6.00$  DS was classified as high myopia. Hyperopia was defined as a spherical equivalent greater than  $+0.50$  DS.<sup>[1-7]</sup> Astigmatic correction was prescribed in the minus cylinder format, and astigmatism was defined as a cylindrical error less than  $-0.50$  diopter cylinder (DC) in any axis. Astigmatism was defined as with the rule if the axis lay between  $15^\circ$  on either side of the horizontal meridian, against the rule if the axis lay between  $15^\circ$  on either side of the vertical meridian, and oblique if the axis lay between  $15^\circ$  and  $75^\circ$  or between  $105^\circ$  and  $165^\circ$ .<sup>[1-7]</sup> Significance was assigned at  $P < 0.05$  level for all parameters.

### RESULTS

Among the randomly selected 1500 subjects, all were residents of south Kashmir. The gender ratio (men to women) was 633/867 (42% men and 58% women) for participants. The mean age of the participants was  $53.1 \pm 10.2$  years. The age distribution amongst the sample-population was 40-49 years 37%, 50-59 years 31%, 60-69 years 25%, >70 years 7% (Figure 1). The age distribution amongst men of the sample-population was 40-49 years 38%, 50-59 years 33%, 60-69 years 24%, >70 years 5% (Figure 1). The age distribution amongst the women of the sample-population was 40-49 years 37%, 50-59 years 31%, 60-69 years 25%, >70 years 7% (Figure 1).

Taking in to account the results for the entire sample-population, the mean refractive error (Spherical Equivalent) in the right and left eyes averaged  $-0.6907$  D  $\pm$  1.9369 and  $-0.7458$  D  $\pm$  1.9855, respectively.

The distribution curve of spherical refractive error was normally distributed but was slightly skewed to the myopic end. Because the spherical equivalent was highly correlated between the right and left eyes, only the results from the right eyes are taken into account and presented to the rest of the statistical analysis. In the entire study population prevalence rates were determined for myopia 45.4%, hypermetropia 19.8%, and emmetropia 34.8%. (Figure 2.)

In the entire study population prevalence rates of astigmatism were determined in 61.60% of the population (Figure 3), the mean astigmatic error in the right eye averaged  $0.7297$  D  $\pm$  0.4172. It is understood that refractive errors prevalence differs as age increases where participants become more hyperopic especially after 70 years old.

Myopia was categorized as low myopia (-0.50 D to -3.00 D) with 31.6% prevalence, as moderate myopia (-3.00 D to -6.00 D) with 12.6% prevalence and high myopia (>-6.00 D) with 1.2% prevalence. Hypermetropia categorized as low hypermetropia (+0.50 D to +2.00 D) with 12.4% prevalence, as moderate hypermetropia (+2.00 D to +4.00 D) with 5.9% prevalence and high hypermetropia (> +4.00 D) with 1.5%. (Figure 4.)

**DISCUSSION**

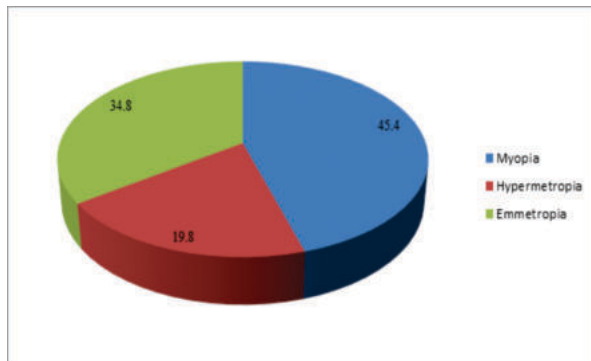
This study provides the first population-based data on the prevalence and distribution of refractive errors in persons 40 years and older in the people of south kashmir visiting a tertiary care hospital. Also provides an opportunity to compare the prevalence of refractive errors with other ethnic populations in similarly aged elderly groups. The mean refractive error (Spherical Equivalent) for both eyes checked averaged 0.7182 D myopic which was same as the mean astigmatic error 0.7297 D. Refractive errors affect approximately 65% of the population (40 years or older) in the people of south kashmir visiting a tertiary care hospital. The frequency for myopia was 45.4%, hypermetropia 19.8%, and emmetropia 34.8%. The prevalences of myopia increased significantly with age. This association between myopia and age almost disappeared after adjustment for nuclear sclerosis, indicating that nuclear sclerosis is responsible for the increase in myopia with age.<sup>[23]</sup> and in the black population in Barbados<sup>[27]</sup> have reported a similar trend of increasing myopia with age, and also have found that nuclear sclerosis is associated with myopia. Environmental influences (near work,<sup>[28]</sup> night lighting,<sup>[29]</sup> and UV exposure<sup>[30]</sup>) and racial differences in the tropical countries such as India and the West Indies may be responsible for early ageing of the crystalline lens and associated myopia. In the present study the age groups between 50 to 69 years old, for both genders, had results within the confidence limits of the entire population, while for the age group of 40 to 49 years old the participants were more myopic again for both genders (males were 2% more than women). For the elderly group of people over 70 years old the results presented a remarkable shift to the hyperopic side reducing the percentages of myopia approximately half of the result for the entire population. The other study from urban India by Dandona et al.<sup>[2]</sup> showed a similar prevalence of myopia in the 40- to 49-year age group, with a lower prevalence of myopia and a higher prevalence of hyperopia in every older age group.

**Conclusions**

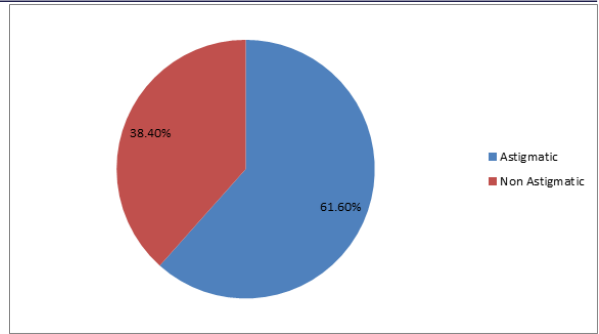
The results indicate that refractive errors affect approximately more than half of the population (40 years or older) in the people of south kashmir. Myopia prevailed in 45.4%, with the majority being low ( $\leq -2.00$ ), while hypermetropia prevailed in 19.8%, also with the majority being low ( $\leq +2.00$ ) of the entire sample population. Refractive errors prevalence differs with age, where hypermetropia prevails especially after 70 years old. Also the results showed that there is no significant difference between the two genders. These data on the prevalence of refractive errors can be useful for the planning of refractive eye-care services.

**Figure 1. Distribution of age and gender amongst the sample population**

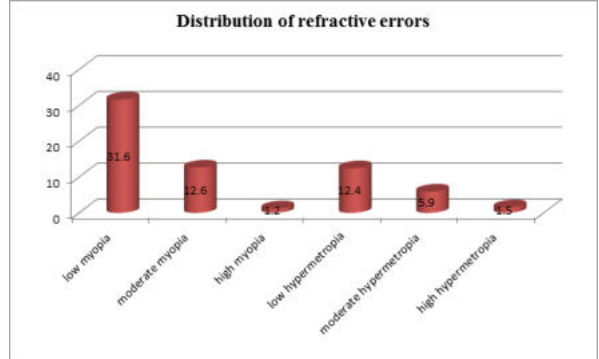
Age	Men	Women	Total
40-49	241	321	562(37%)
50-59	209	269	478(31%)
60-69	152	217	369(25%)
>70	31	60	91(7%)



**Figure 2. Distribution of hypermetropia, emmetropia and myopia in the sample-population.**



**Figure 3. Prevalence of astigmatism in the entire population-study.**



**Figure 4. Distribution of the refractive error Spherical equivalent in the whole sample-population according to low myopia (-0.50 D to -2.00 D), moderate myopia (-2.00 D to -6.00 D), high myopia (>-6.00 D), low hypermetropia (+0.50 D to +2.00 D), moderate hypermetropia (+2.00 D to +4.00 D) and high hypermetropia (> +4.00 D).**

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