www.jmscr.igmpublication.org
Impact Factor 5.84
Index Copernicus Value: 83.27
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v5i5.111

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Pattern of Refractive Errors in Kashmiri Population- A Hospital Based Study

Authors
Dr Mohd Rameez Ganie[1], Prof. Reyaz Ahmad Untoo[2], Dr Imtiyaz Ahmad Lone[3]
[1]Senior Resident, Ophthalmology, SKIMS Medical College Srinagar
[2]Professor and Head, Department of Ophthalmology, and Principal SKIMS Medical College Srinagar
[3]Assistant Professor, Ophthalmology, SKIMS Medical College Srinagar
Corresponding Author
Dr. Mohd Rameez Ganie
Veeri, Bijbehara, Anantnag, Jammu And Kashmir- 192124 Contact No.: 9622649062

ABSTRACT

Introduction: *Refractive error is one of the most common cause of visual impairment around the world and the second leading cause of treatable blindness. Hence knowledge of the pattern of refractive errors would be helpful in planning public health strategies.*

Aims and Objectives: *To determine the pattern of refractive errors in patients attending the outpatient department of Ophthalmology SKIMS MCH SRINAGAR and to determine the socio-demographic factors such as age and sex, and family history influencing the pattern of refractive errors.*

Materials and Methods: *The present hospital-based prospective study was conducted in the Department of Ophthalmology SKIMS Medical College. Patients who had refractive error of at least 0.5 D but not having other diseases in the eye responsible for diminished vision were included for the study.*

Results: *During the study period, 30,444 patients attended the outpatient clinic at the department of ophthalmology. Out of these, 1301 patients were included in the study on the basis of inclusion and exclusion criteria. Among 1301 patients, 566 (43.50 %) were males and 735 (56.50 %) were females. The age of the patients varied between 1 and 70 years. Overall, myopia was the most common refractive error occurring with a frequency of 47.19% in the study population. This was followed by hypermetropia with a frequency of 22.14%; followed by simple myopic astigmatism (17.83%). Males predominated among myopics and females predominated among hypermetropics. The majority of spherical errors was less than or equal to 2 D. Myopia showed an increasing trend up to the 25 years of age, and then decreased progressively. Hypermetropia decreased from an early childhood peak till about 35years of age and then showed an increasing trend. "Astigmatism against the rule" was more common than "astigmatism with the rule", irrespective of age.*

Conclusion: *Refractive errors progressively shift along myopia up to the third decade and change to hypermetropia till the sixth decade. Knowledge of data regarding the pattern of refractive errors may be useful in keeping a ready stock of lenses required to meet the demands of a quick supply of spectacles in the hospital and also for local outreach community programmes.*

Introduction

Anomalies of the optical state of the eye, the refractive errors, are by far the commonest cause of defective vision. In fact, if the small and insignificant errors are taken into account, the existence of normal refraction i.e. emmetropia becomes almost a rare condition. It is the commonest cause of visual impairment around the world and the second leading cause of treatable blindness[(1)]. If left untreated it can result in amblyopia and/or strabismus[(2)].

Uncorrected refractive error has severe social and economic effects on individuals and communities, restricting educational and employment opportunities of otherwise healthy people. The duration of the effect is also significant; refractive error can account for twice as many blind-person years compared to cataract, due to the earlier age of onset [(3)].

Uncorrected refractive errors are an important cause of blindness and visual impairment in many countries (Dandona L et al 1998)[(4)]. In developing countries however, it is often difficult to provide efficient refraction services for a variety of reasons, and this results in a high prevalence of uncorrected refractive errors in these regions. Avoidable blindness and low vision can restrict progress in education, limit motor development in children, affect mobility, limit career opportunities and restrict access to information. It is a burden on the community and its social and income generating services. So there is a priority need to control and prevent these disorders. For this, information about the pattern of refractive errors in the population is essential. It helps in planning effective community programs to deal with the problem.

Aims and Objectives

The present study was done with following aims

1. To determine the pattern of refractive errors in patients attending the outpatient department of Ophthalmology SKIMS MCH SRINAGAR.
2. To determine the socio-demographic factors such as age and sex, and family history influencing the pattern of refractive errors.

Materials and Methods

The present hospital-based prospective study was conducted in the department of Ophthalmology SKIMS Medical College Hospital, Srinagar, which is a tertiary care hospital located in the summer capital of Jammu and Kashmir. Patients who attended the outpatient department of Ophthalmology, SKIMS Medical College Bemina Srinagar during the study period (Jan 2014 to Jan 2015) and had a refractive error of at least 0.5 D were included for the purpose of the study. Patients having other diseases in the eye responsible for diminished vision like any retinopathy, significant cataract, squint, aphakia, pseudophakia, corneal pathologies were excluded from the study.

All the patients who attended the outpatient department with refractive errors (>or=0.5D) and benefited by wearing glasses for distant vision or for relieving asthenopic symptoms or had accommodative strabismus were recorded for the purpose of the study. Data with respect to their socio-demographic parameters, unaided vision, anterior segment examination, fundus examination, vision with best possible visual correction and the visual correction given was retrieved in a structured proforma. All the patients underwent subjective refraction (except for preverbal children where objective correction was given based on retinoscopy, child's age and presence or absence of squint). Cycloplegic refraction was done in preverbal children, uncooperative and mentally retarded patients. Cycloplegic drugs used were 1% cyclopentolate, 1% atropine ointment, and 1% tropicamide. Classification of the patients was done on the basis of final prescription after subjective refraction or retinoscopic correction in case of pre-verbal children.

Myopia was defined as refractive error of -0.5 D or more and high myopia as a diopteric power of -

6.0 D or more. Hypermetropia was defined as a refractive error of at least +0.5 D.Astigmatism "with the rule" was defined as myopic astigmatism at 180 ± 20^0 or hypermetropic astigmatism at 90 ± 20^0 and "against the rule" as myopic astigmatism at 90 ± 20^0 or hypermetropic astigmatism at 180 ± 20^0. Astigmatism at $>20^0$ to $<70^0$ or $>110^0$ to $<160^0$ was considered as oblique astigmatism.

Statistical analysis was done to test the association between demographic variables like age and sex of the patient with the type of refractive error by using chi-square test and other suitable statistical tests.

Among 1301 patients included in the study, 566 (43.50 %) were males and 735 (56.50 %) were females. The age of the patients varied between 1 and 70 years. The mean age of the patients was 34.26±13.41 years.

Myopia was significantly more common in men than women (53.18% in men vs. 42.59% in women). Hypermetropia was more common in women than men (24.76% in women vs. 18.73% in men). Overall, myopia was the most common refractive error occurring with a frequency of 47.19% in the study population. This was followed by hypermetropia with a frequency of 22.14%; followed by simple myopic astigmatism (17.83%).

Results

Table1- Distribution of refractive errors by gender.

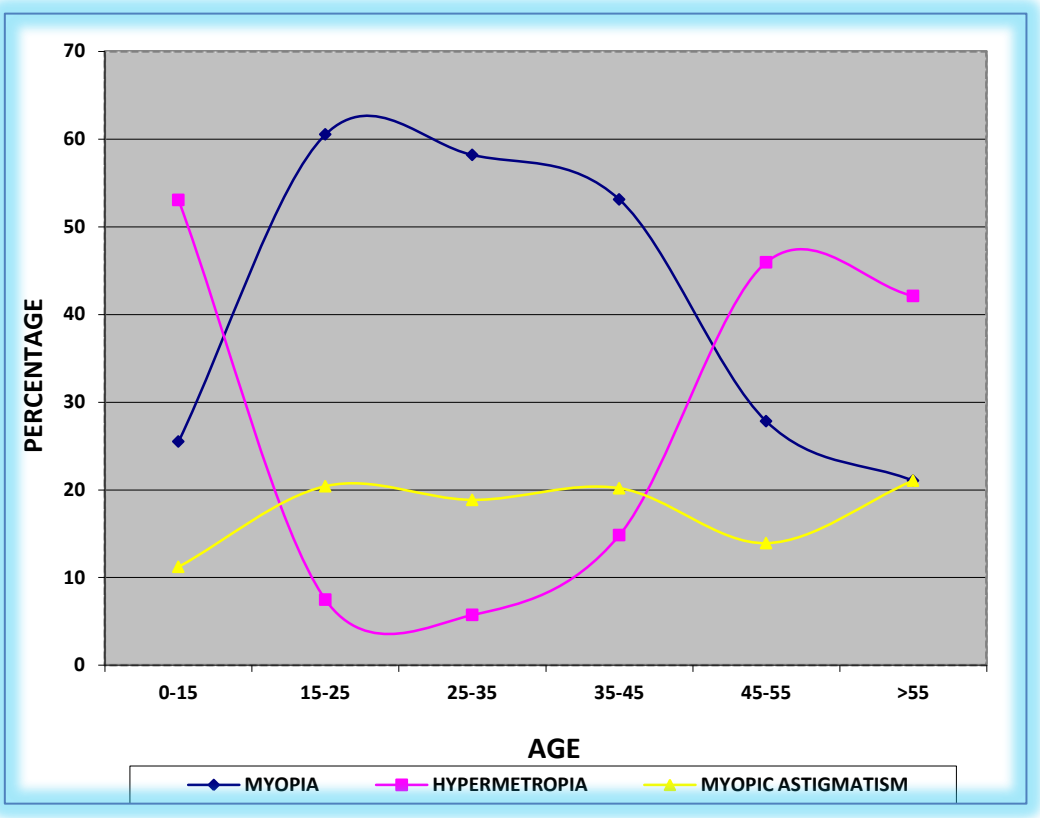
	MALE	*FEMALE*	*TOTAL*
Myopia	**301 (53.18%)**	**313 (42.59%)**	**614 (47.19%)**
Hypermetropia	**106 (18.73%)**	**182 (24.76%)**	**288 (22.14%)**
Myopic astigmatism	**86 (15.19%)**	**146 (19.86%)**	**232 (17.83%)**
Hypermetropic astigmatism	**15 (2.65%)**	**31 (4.22%)**	**46 (3.53%)**
Compound myopic astigmatism	**41 (7.24%)**	**38 (5.17%)**	**79 (6.07%)**
Compound hypermetropic astigmatism	**2 (0.35%)**	**8 (1.09%)**	**10 (0.77%)**
Mixed astigmatism	**1 (0.18%)**	**3 (0.41%)**	**4 (0.31%)**
No error	**14 (2.47%)**	**14 (1.90%)**	**28 (2.15%)**
Total	**566 (100%)**	**735 (100%)**	**1301**

Myopia showed an increasing trend up to the 25 years of age, and then decreased progressively. Hypermetropia decreased from an early childhood peak till about 35years of age and then showed an increasing trend. Myopic astigmatism and other refractive errors showed a fairly constant distribution in all age groups.

Table 2- Distribution of refractive errors by age.

	≤15	*15-25*	*25-35*	*35-45*	*45-55*	*>55*	*TOTAL*
Myopia	**25 (25.51%)**	**178 (60.54%)**	**142 (58.20%)**	**179 (53.12%)**	**86 (27.83%)**	**4 (21.05%**	**614 (47.19%)**
Hypermetropia	**52 (53.06%)**	**22 (7.48%)**	**14 (5.74%)**	**50 (14.84%)**	**142 (45.95%)**	**8 (42.11%)**	**288 (22.14%)**
Myopic Astigmatism	**11 (11.22%)**	**60 (20.41%)**	**46 (18.85%)**	**68 (20.18%)**	**43 (13.92%)**	**4 (21.05%)**	**232 (17.83%)**
Hypermetropic astigmatism	**1 (1.02%)**	**8 (2.72%)**	**9 (3.69%)**	**6 (1.78%)**	**21 (6.80%)**	**1 (5.26%)**	**46 (3.54%)**
Compound myopic astigmatism	**2 (2.04%)**	**16 (5.44%)**	**25 (10.25%)**	**24 (7.12%)**	**11 (3.56%)**	**1 (5.26%)**	**79 (6.07%)**
Compound hypermetropic astigmatism	**3 (3.06%)**	**3 (1.02%)**	**0 (0%)**	**2 (0.59%)**	**2 (0.65%)**	**0 (0%)**	**10 (0.77%)**
Mixed astigmatism	**1 (1.02%)**	**0 (0%)**	**2 (0.82%)**	**0 (0%)**	**1 (0.32%)**	**0 (0%)**	**4 (0.31%)**
No error	**3 (3.06%)**	**7 (2.38%)**	**6 (2.46%)**	**8 (2.3%)**	**3 (0.97%)**	**1 (5.26%)**	**28 (2.15%)**
TOTAL	**98 (100%)**	**294 (100%)**	**244 (100%)**	**337 (100%)**	**309 (100%)**	**19 (100%)**	**1301**

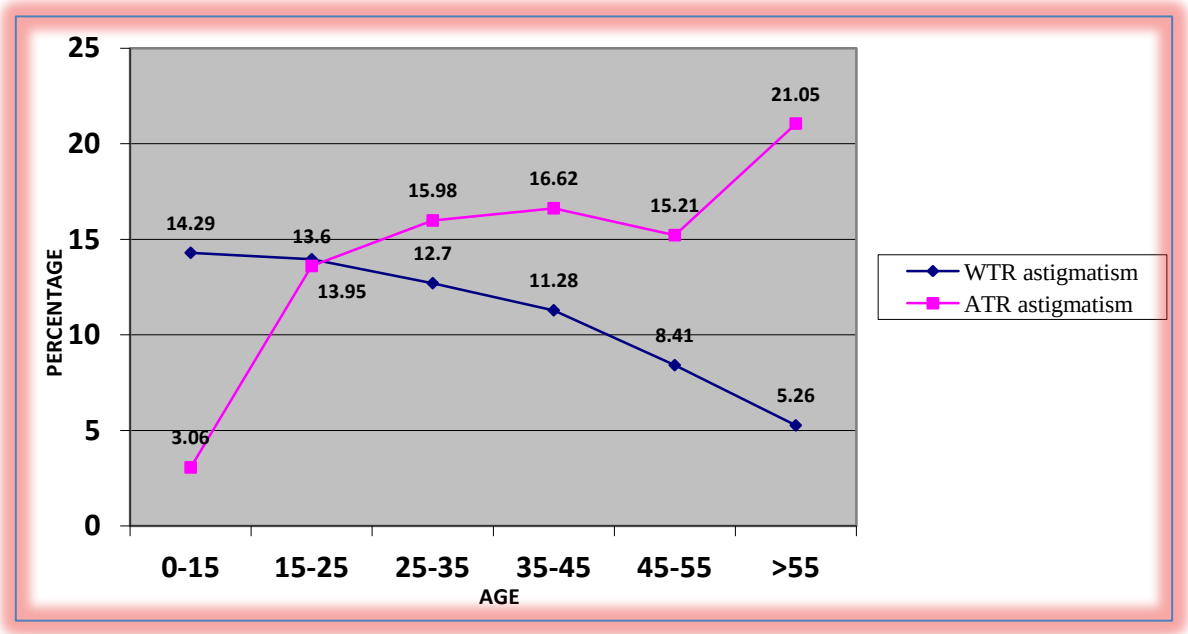
Figure 1- Trend for Myopia, Hypermetropia and Myopic Astigmatism with age



In all types of refractive errors, the amount of refractive error was small (≤ 1D) in most of the cases (62.88%). A total of 43 patients were having high myopia in at least one of the two eyes. (=3.31% of the study population).

In 371 patients with astigmatism, 189 (50.94%) had against the rule astigmatism, 151 (40.70%) had with the rule astigmatism, and 31 (8.36%) had oblique astigmatism (p>0.05). The frequency of against the rule astigmatism increased with age and that of with the rule astigmatism decreased with age.

Figure 2- Trend for with-the-rule and against-the-rule astigmatism.



Both myopia and hypermetropia had a strong correlation with family history. Moderate to high myopia had a highly significant relationship with a positive family history as compared to mild myopia.

The youngest age at which near add was needed was 37 years. The mean age of patients requiring presbyopic correction was 47.96±4.77 years.

Discussion

In our study, females were significantly more than males. The increased number of female patients could be an indication that more female patients present with refractive errors.

Bulk of hypermetropic patients below 40 years are within the <15 age range signifying hyperme-tropic refraction in pre-pubertal age because of shorter eyeballs. The work of T.Bagaiya in Kaduna state Nigeria[5] agrees with this observation. In our study, myopia was found to be the commonest refractive error. Myopia and myopic astigmatism was more common among youngsters below 35 years of age while hypermetropia and hypermetropic astigmatism was more common in those above 40 years of age. Similar findings were reported from Nigeria, Zaire and Israel (Adegbehingbe et al 2003 [6], Kaimbo-Wa-Kaimbo & Missotten, 1996; Rosner & Belkin, 1991). The pattern of shift toward hypermetropia among adults seen in our study is consistent with longitudinal observations in many other population studies (Wu SY et al 2005, Lee KE et al 2002, Prema Raju et al 2004, Dandona R et al 1999). Older persons had shorter axial and vitreous chamber lengths, shallower anterior chambers and thicker lenses than younger individuals in the Los Angeles Latino Eye Study (Shufelt C et al 2005). These differences in biometry were associated with a trend toward greater hypermetropic refractive errors until the age of 70 years. Other possible explanation cited is the decrease in the power of the aging lens, either due to a decrease in the curvature of its surface as it grows throughout life or an increase in the density of the cortex that makes the lens more uniformly refractive (Dandona R et al 1999). One more explanation for this may be that latent hypermetropia becoming manifest when the amplitude of accommodation decreases.

In our study, myopia was common among males while hypermetropia was more common among females. Some of the population-based studies conducted in different parts of world showed similar trends (Wu SY et al 2005, Prema Raju et al 2004, Attebo K et al 1999). Wong TY et al (2001) from Singapore found in their study that after controlling for age, women had shorter axial lengths, shallower anterior chamber depths and shorter vitreous chamber depths than men, which may be the reason for the above finding.

The majority of myopics (79.32%) had a power less than or equal to two dioptres and 15.64 % of the patients had a power >-2 D and <-6 D. Similar findings were seen in other studies (Adegbehingbe BO et al 2003, Nepal BP et al 2003, Shrestha S P 2010). High myopia with power above -6 D in at least one eye was seen in 2.38 % of patients in our study.

Myopic astigmatism (23.90%) was more common than hypermetropic astigmatism (4.12%). The higher frequency of “against the rule astigmatism” seen in our study was also seen in many other studies (Prema et al 2004, Dandona R et al 1999, Cheng C et al 2003, Bourne RR et al 2004,Blue Mountains eye study and the APEDS). A shift towards against-the- rule astigmatism with age as seen in our study has already been documented by Dandona R et al 1999, Prema et al 2004, Bourne RR et al 2004. A decrease in lid tension in old age has been cited as the reason for the increase in “against the rule astigmatism” in the older age group. The positive correlation between family history and occurrence of refractive errors-myopia and hypermetropia implying a genetic component for refractive errors has been previously documented. Sorsby and Leary [7] concluded that all refractive states including myopia are genetically determined and that myopia and hypermetropia can occur in dominant and recessive forms.

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