

Research Article

Prevalence of Refractive Errors in Rural Areas

Sachin¹ and Raj Kumar^{2*}

¹M. Optom. Scholar, Department of Optometry, Chandigarh University, NH-95 Chandigarh-Ludhiana highway, Mohali, Punjab, India.

^{2*}Associate Professor, Department of Optometry, School of Medical and Allied Sciences, Galgotias University, Greater Noida, Plot No 17A, GB. Nagar, India.

Corresponding Author: Raj Kumar. Department of Optometry, School of Medical and Allied Sciences, Galgotias University, Greater Noida, Plot No 17A, GB. Nagar, India.

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Abstract

Purpose: To analyse the prevalence of refractive errors in rural areas. To assess the adequacy of the optometrist/ophthalmic surveillance for the betterment of life in society

Methods: This is an Observational, retrospective study conducted on 1000 patients of rural area Kharar, Mohali in the Eye Clinical Camps during 2021 to 2023 at Gharuan (students, labours, job persons, housewives, etc.). Vision check, and subjective refraction did by the optometrist with the help of auto refractometer and appropriate lenses in the trial frame using the Log-MAR chart. Data confidentiality was maintained. The data was analyzed by using software MS EXCEL and software IBM SPSS Statistics 29.0.

Result: Total 1000 random patients (male=553, female=447) of age from 10-50 years were screened for refractive errors and only 808 patients (male=445, female=363) were included for the study. Myopia and Hyperopia were considered when subjective refraction $> -0.50D$ spherical equivalent & $> +0.50D$ spherical equivalent respectively in one or both eyes of patients. Astigmatism was also considered when subjective refraction $\geq 0.5D$ cylinder in one or both eyes. Emmetropia was considered when subjective refraction $\leq 0.5D$ spherical and cylinder in both eyes. Astigmatism prevalence was found to be 20.6% (n=167). Myopia and Hyperopia were found to be 18.8% (n=152) and 8.04% (n=65) respectively. The emmetropic patients were 52.47% (n=424). Distribution of male and female patients (n,%) according to their refractive error, Astigmatism was more prevalent in male patients (n=89, 53.3%) than female patients (n=78, 46.7%), Myopia was more prevalent in female patients (n=78, 51.3%) than male patients (n=74, 48.68%), Hyperopic was also more prevalent in female patients (n= 33, 50.76%) than male patients (n=32, 49.23%), and emmetropic (no refractive error) male patients (n=250, 59%) and female patients (n=174, 41%). In male patients (n=445) the prevalence of astigmatism (n=89, 20%) than other refractive errors (myopia =74, 16.62% and hyperopic =32, 7.2%) and in female patients (n=363) the amount of myopia (78, 21.5%) and astigmatism (78, 21.5%) was similar and hyperopic was (33, 9.1%). The total number of patients from age 10-18 years was 145 (male=72, female=73) from 808 total patients. The myopia (n=54, 37.24%) was more prevalent than astigmatism (n=25, 17.24%). The emmetropic patients with no refractive error were (n=66, 45.5%). While we compare the data of male and female patients (age 10-18 years), the Myopia was more prevalent in male patients (n=29, 53.7%) than the female patients (n=25, 46.3%) but in astigmatism condition, astigmatism was more prevalent in female patients (n=15, 60%) than the male patients (n=10, 40%). Emmetropic patients were (male=33, female=33). The Prevalence of amblyopic patients (n=8, 1%) with a sample size of (male= 445, female= 363). The prevalence of amblyopia is relatively low at 1% in this population, the refractive error increased with increasing age. Glasses were prescribed to the patients with refractive error and also advised the patients to must visit hospitals if they have any other issues.

Conclusion: Refractive error is a serious health concern and its prevalence is rising with time and the negligence of the eye health care will invite a big problem in future. Spectacles and contact lenses are very good options to treat the major refractive error issue. If we organize some activities, awareness camps to influence people regarding eye health care, these can lead to a healthy society.

Keywords: Refractive Error, Eye Clinical Camps, Myopia, Hyperopia, Emmetropia, Prevalence and Astigmatism.

1. Introduction

Refractive error is a common eye disease that affects people of all ages and genders. Refractive errors will occur when the light not properly focused on the retina (eg. Myopia / Hyperopia / Astigmatism). These problems can be corrected with the help of glasses, contact lenses or refractive surgery, but if these are untreated, they can lead to vision loss or blindness in the patient.

This study aims to identify the potential impact of the intervention in rural area Gharuan village by determining the impact of refractive errors in rural areas, we will help the patients to provide better solutions and treatment. Gharuan is a rural area village in SAS Nagar District of Punjab has a population of 6302 from 1254 families This is a cross sectional study to collect the data of 1000 random patients of age between 10 to 50 years and only eligible patients were included in the study [01]. The detailed demographic data along with ocular findings, systemic health findings, and socioeconomic status were collected for analysis. The results of this study can be used to develop effective ideas to improve services of eye care in rural areas and by raising the awareness of the eye health care and improving access to care, the quality of life in rural areas can be improved.

Around the world approximately 2.2 billion people suffer from vision impairment and blindness, about 1 billion people have a vision impairment that could have been prevented or has yet to be addressed. According to the World Health Organization (WHO), there are 123.7 million people worldwide who suffer from moderate to severe distance vision impairment or blindness due to uncorrected refractive error, cataracts (65-2 million), glaucoma (6.9 million), corneal opacities (4.2 million), diabetic retinopathy (3 million), and trachoma (2 million), as well as 826 million people who suffer from near vision impairment due to untreated presbyopia.

According to geographical variations, low- and middle-income countries have around four times the prevalence of distant vision impairment as compared to high-income regions. Rapid growth in population and ageing will increase the risk of vision impairment. There is also a lack of knowledge and awareness about refractive error that prevents timely treatment.

A lot of the problem will occur late reporting of the problem, it is due to widespread ignorance of the consequences and risk factors of refractive error. The objective of this study to determine the prevalence of refractive errors in rural area patients and to identify the causes of avoidable blindness in the given area; besides aimed to calculate the no. of new diagnoses of refractive error and to quantify the types of refractive error visited in camp and clinic; e.g myopic, hyper-

2. Methods

An Observational and retrospective study was conducted in District Mohali (Punjab, INDIA) for checking the prevalence of refractive errors among the village peoples.

Study Population

Total 1000 random patients of age from 10-50 years were screened for refractive errors and only 808 patients are eligible for the study. All information of the patients was confidentially maintained. Patients with retinal disease, optic nerve disease, one eyed pt., any trauma in eyes (foreign body, swelling, conjunctivitis) were excluded.

Eye Examination

The eye examinations for checking the refractive error were performed by an optometrist and all the detailed demographic data along with ocular findings, systemic health findings, socioeconomic status were collected for analysis. Vision check, and subjective refraction was done by the optometrist with the help of auto refractometer and appropriate lenses in the trial frame using the Log-MAR chart placed at 4m distance. Myopia and Hyperopia were considered when subjective refraction $> -0.50D$ spherical equivalent & $> +0.50D$ spherical equivalent respectively in one or both eyes of patients, when subjective refraction $> 0.5D$ cylinder in one or both eyes, astigmatism was taken into account. Emmetropia was considered when subjective refraction $\leq 0.5D$ spherical and cylinder in both eyes.

2.1. Data Analysis

The spreadsheet programme MS Excel was used to record the data. Descriptive statistics were elaborated in the form of frequencies and percentages for categorical variables. Various graphs were used for showing each parameter. With the help of Microsoft Excel and IBM SPSS Statistics 29.0 (Statistical Package for the Social Sciences version 29.0) data were analyzed.

3. Result

Total 1000 random patients (male=553, female=447) of age from 10-50 years were screened for refractive errors and only 808 patients (male=445, female=363) were included for the study. Myopia and Hypermetropia were considered when subjective refraction $> -0.50D$ spherical equivalent & $> +0.50D$ spherical equivalent respectively in one or both eyes of patients. Astigmatism was also considered when subjective refraction $\geq 0.5D$ cylinder in one or both eyes. Emmetropia was considered when subjective refraction $\leq 0.5D$ spherical and cylinder in both eyes. Astigmatism prevalence was found to be 20.66% (n=167). Myopia and Hypermetropia were found to be 18.81% (n=152) and 8.04% (n=65) respectively. The emmetropic patients were 52.47% (n=424).

Distribution of patients according to their gender

Table 1: Total number of male and female patients

GENDER	NO. OF PATIENTS	NO. OF PATIENTS (ELIGIBLE FOR STUDY)
Male	553	445
Female	447	363
Total	1000	808

Table 1 shows the total number of patients according to their gender (male & female) and 1st column shows the total patients on which study was conducted and 2nd column shows the eligible number of patients which were included in study.

Number of patients (n) according to their refractive error

Table 2: Distribution of patients (n) according to their refractive error

REFRACTIVE ERROR	NO. OF PATIENTS (N)
Myopia	152
Hyperopia	65
Astigmatism	167
Emmetropia(no refractive error)	424
Total	= 808

Table 2 shows the distribution of number of patients(n) according to their refractive error findings (myopia=152, hyperopia=65, astigmatism=167 & emmetropia means no refractive error =424)

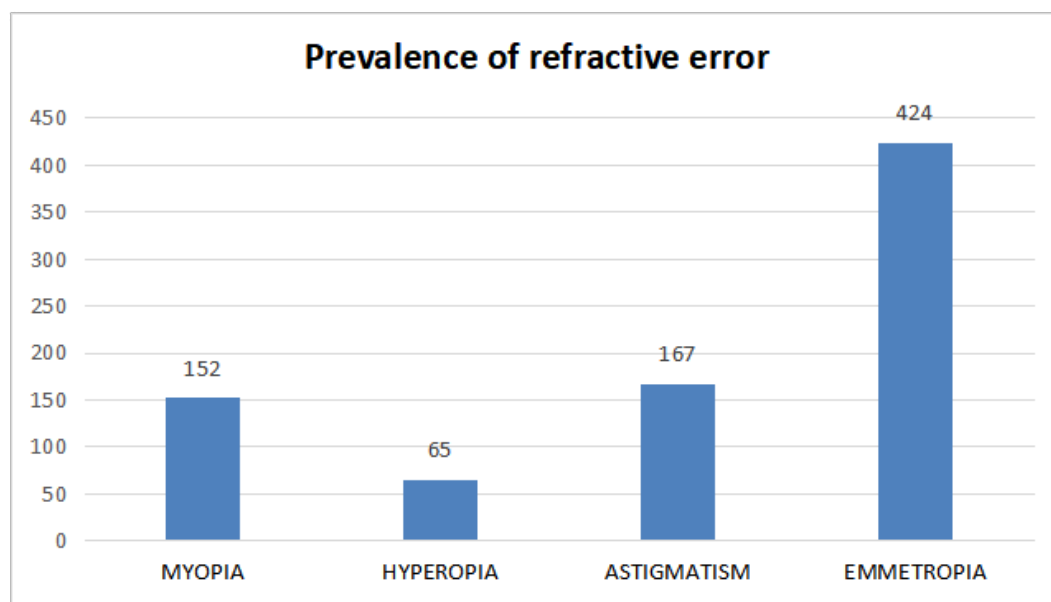


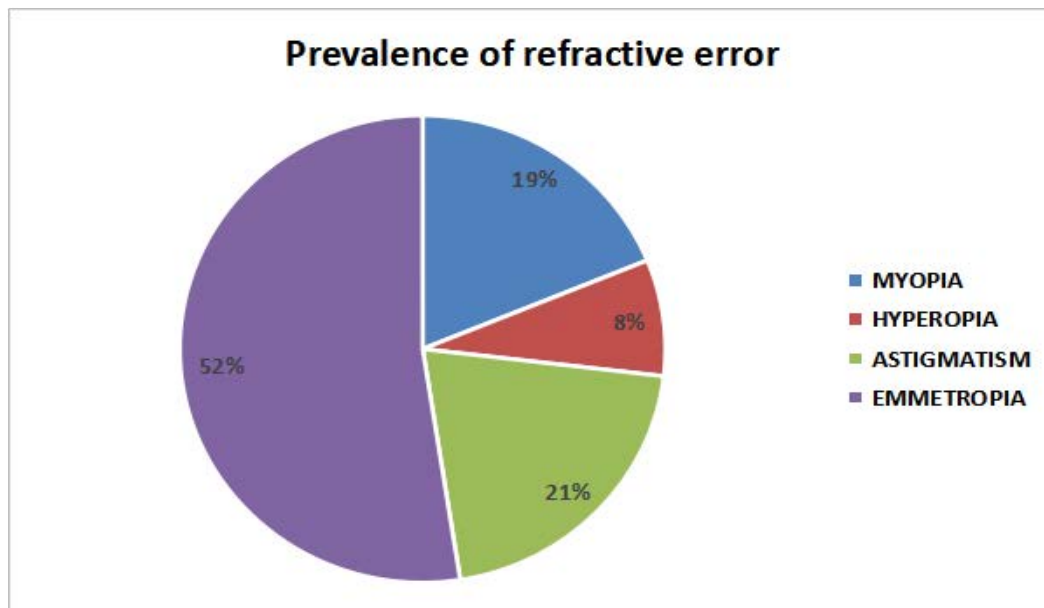
Figure 1: Prevalence of refractive error

Figure 1 shows the graphical representation of the prevalence of refractive errors with number of patients(n).

Table 3: Percentage (%) of patients according to refractive error

REFRACTIVE ERROR	NO. OF PATIENTS (%)
Myopia	18.81%
Hyperopia	8.04 %
Astigmatism	20.66%
Emmetropia(no refractive error)	52.47%

Table 3 and Figure 2 shows the distribution of patients in percentage (%) according to their refractive error findings (myopia = 18.81%, hyperopia = 8.04% , astigmatism = 20.66% & emmetropia means no refractive error =52.47%)

**Figure 2:** Graphical representation Prevalence of refractive error (%)**Distribution of male (n) and female (n) patients according to their refractive error****Table 4:- Distribution of number of male & female patients (n) is according to their refractive error findings.**

REFRACTIVE ERROR	MALE (N)	FEMALE(N)	TOTAL
Myopia	74	78	152
Hyperopia	32	33	65
Astigmatism	89	78	167
Emmetropia (no refractive error)	250	174	424
Total	445	363	=808

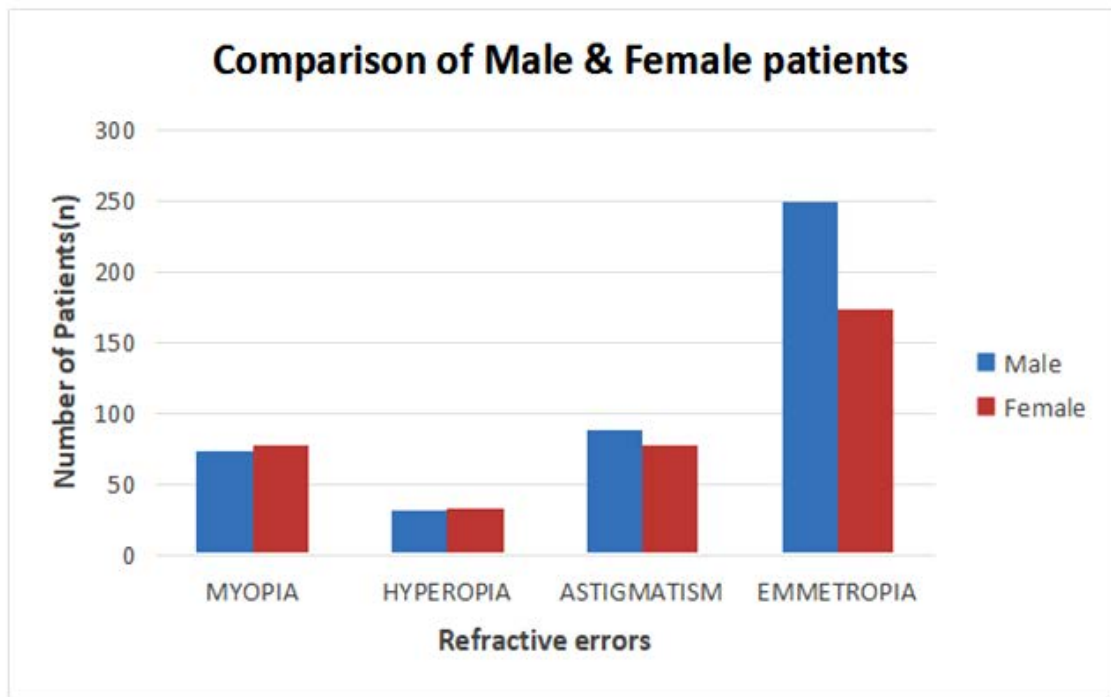


Figure 3: Comparison between number of male (n) and female (n) patients.

Table 4 and Figure 3 shows Distribution of male(445) and female patients(363) (n, %) according to their refractive error, Astigmatism was more prevalent in male patients(n=89, 53.3%) than female patients (n=78, 46.7%), Myopia was more prevalent in female patients(n=78, 51.3%) than male

patients (n=74, 48.68%), Hyperopia was also more prevalent in female patients(n= 33, 50.76%) than male patients (n=32, 49.23%), and emmetropic (no refractive error) male patients (n=250, 59%) and female patients (n=174, 41%).

Prevalence of refractive errors in male and female patients

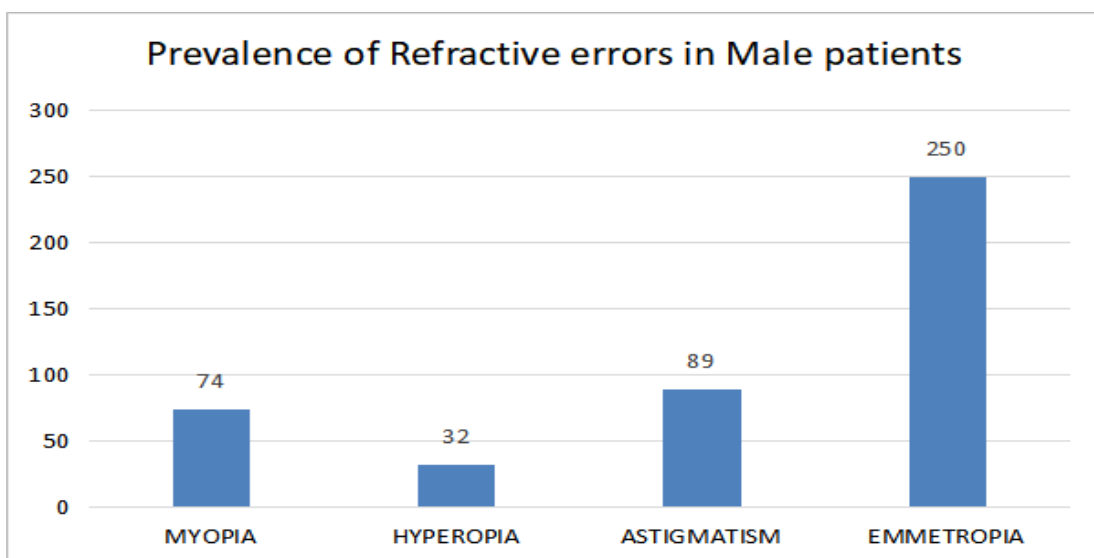


Figure 4: Prevalence of refractive errors in Male patients

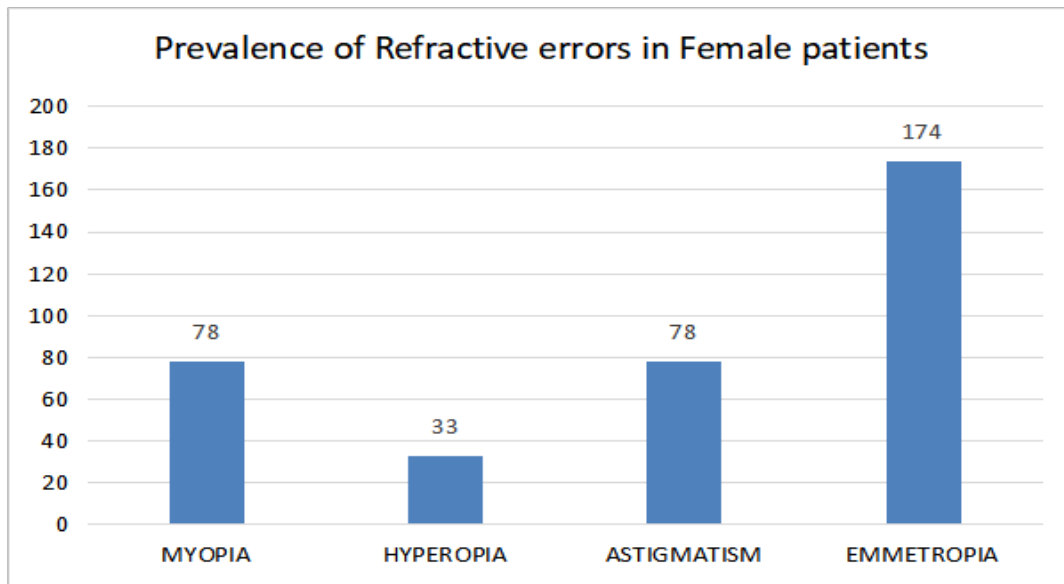


Figure 5: Prevalence of refractive errors in Female patients

Table 4 shows in male patients (445) the prevalence of astigmatism (89, 20%) than other refractive errors (myopia =74, 16.62% and hyperopia =32, 7.2%)(Figure 4)and in female patients(363) the amount of myopia(78, 21.5%) and astigmatism (78, 21.5%) was similar and hyperopia was (33, 9.1%) (Figure 5).

Finding Prevalence of refractive errors from age 10-18 years

Table 5: Shows the no. of patients (n) from age10-18 years

REFRACTIVE ERROR	NO. OF PATIENTS (N)
Myopia	54
Astigmatism	25
Emmetropia(no refractive error)	66
Total	145

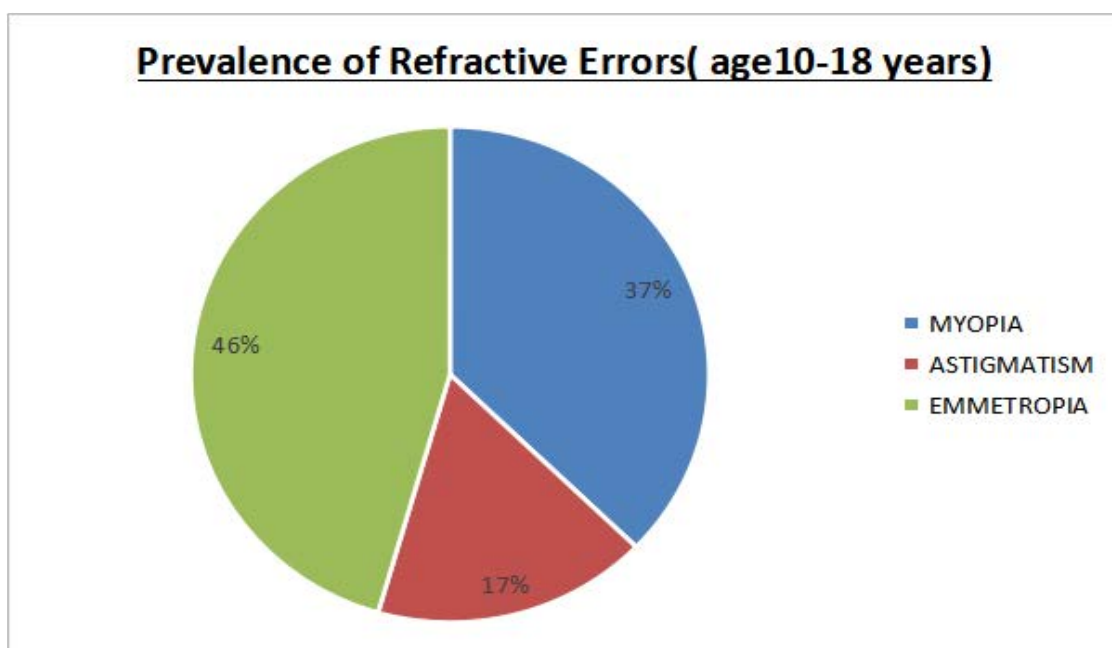


Figure 6: Prevalence of refractive errors (%) from age 10-18 years

Table 5 and Figure 6 shows the Prevalence of Myopia from the age 10-18 years, the total number of patients from age 10-18 years was 145 from 808 total patients. Myopia (n=54, 37.24%) was more prevalent than astigmatism (n=25,

17.24%). No other refractive error was present in those patients. The emmetropic patients with no refractive error were (n=66, 45.5%).

Prevalence of refractive errors in male (n) and female (n) patients (age 10-18 years)

Table 6: Distribution of male (n) and female (n) patients according to their refractive errors (age 10-18 years).

REFRACTIVE ERROR	MALE(N)	FEMALE(N)	TOTAL
Myopia	29	25	54
Astigmatism	10	15	25
Emmetropia	33	33	66
Total	72	73	=145

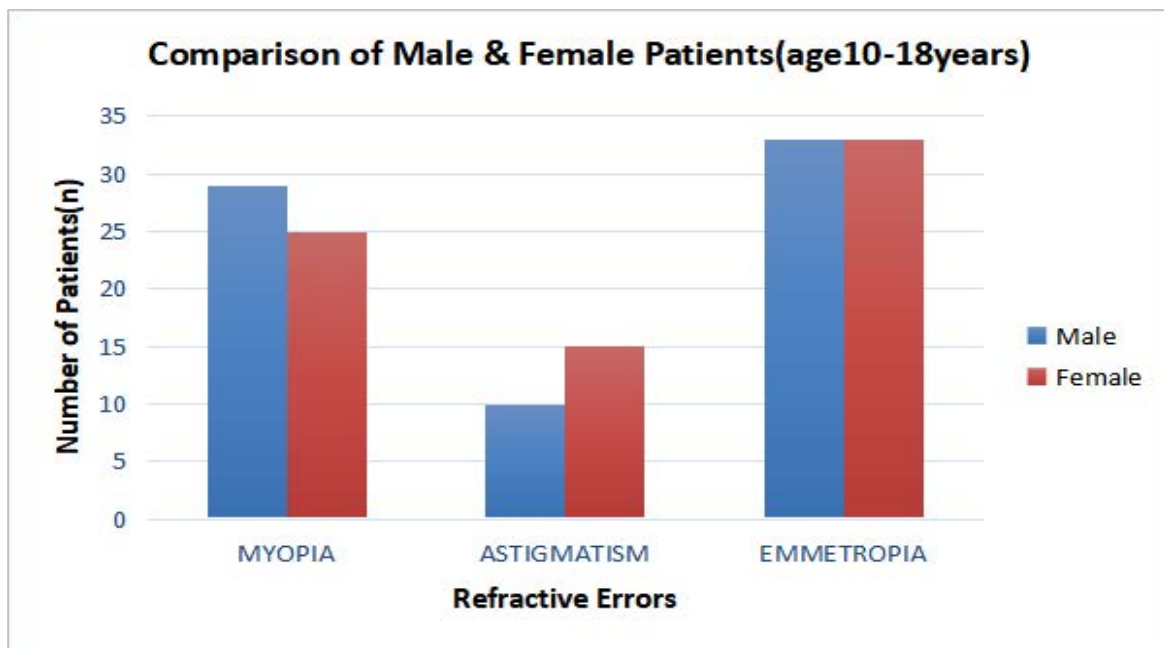


Figure 7: Comparison of refractive errors in male (n) and female (n) patients

Table 6 and Figure 7 shows the distribution of male(n) and female (n) patients(age 10-18 years) according to their refractive errors and the total number of male and female patients were 72 and 73 respectively and from table 5 we already knew myopia was more prevalent but according to gender, in male patients Myopia was more prevalent (n= 29, 40.27%) than the astigmatism (n= 10, 13.88%) and the emmetropic male patients were (n=33, 45.83%). Also, in female patients the myopia was more prevalent (n=25, 34.24%) than the astigmatism (n=15, 20.54%) and the emmetropic female patients were (n= 33, 45.2%).

If we compare the data of male and female patients (age 10-18 years), the Myopia was more prevalent in male patients

(n=29, 53.7%) than the female patients (n=25, 46.3%) but in astigmatism condition, astigmatism was more prevalent in female patients (n=15, 60%) than the male patients (n=10, 40%).

Prevalence of Amblyopic (lazy eye)

Table 7: No. of Amblyopia patients

	NO. OF PATIENTS(N)
Total Patients	808
Amblyopic	8

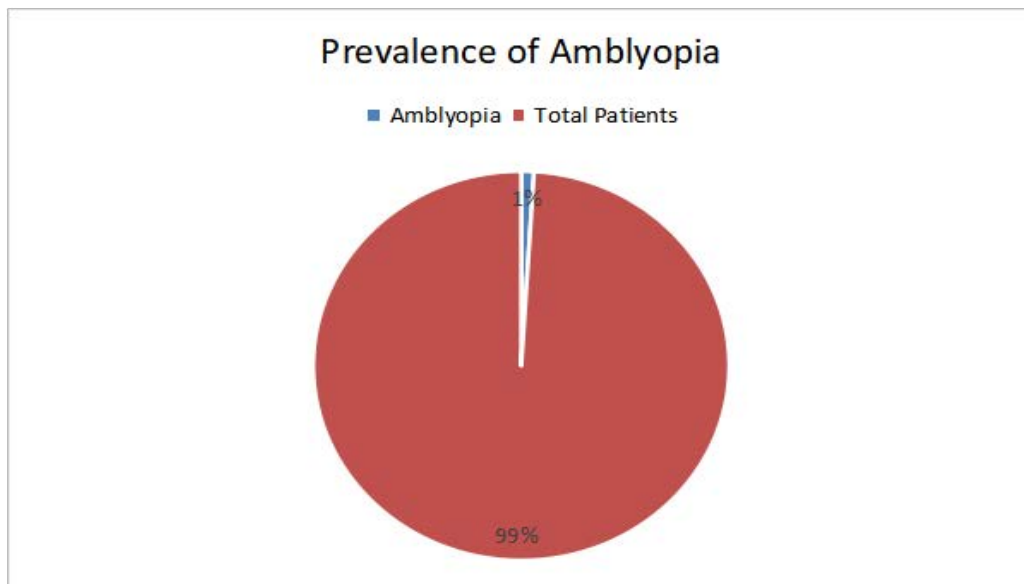


Figure 8: Prevalence of Amblyopia

Table 7 and Figure 8 shows the Prevalence of amblyopic patients (n=8, 1%) with a sample size of (male= 445, female= 363) . Amblyopia was only 1% in this community, which was relatively low.

Table 8: Prevalence of amblyopia in male and female patients

Gender	Amblyopia
Male	6
Female	2
Total	8

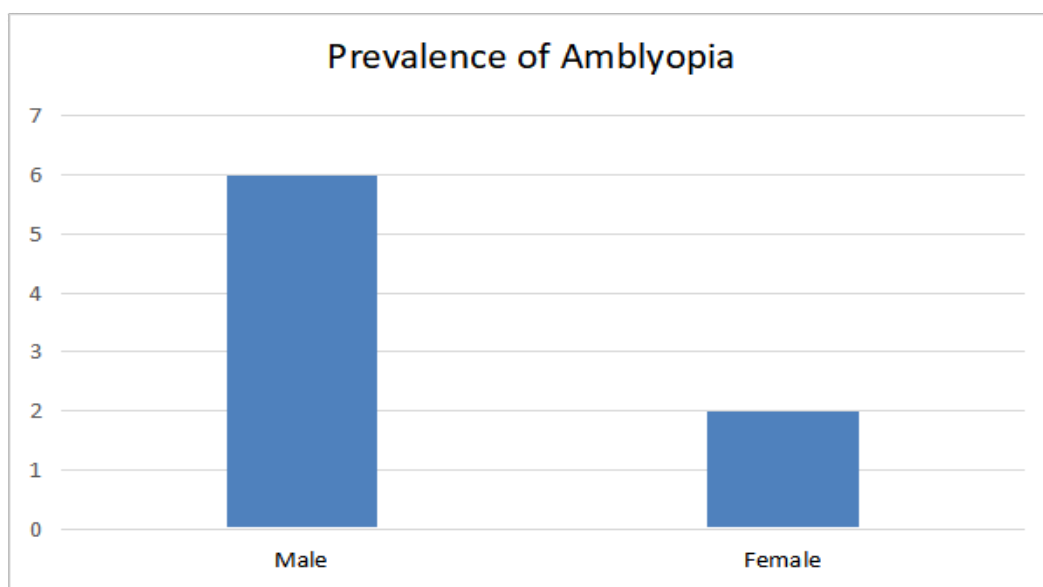


Figure 9: Comparison of male and female amblyopic patients

Table 7 and Figure 9 shows the number of amblyopic patients (n=8, 1%) and amblyopia is more prevalent in male (n=6, 1.34%) than female patients (n=2, 0.55%).

also advised the patients to must visit hospitals if they have any health issues.

4. Discussion

The refractive error increased with increasing age. Glasses were prescribed to the patients with refractive error and

Eye is a sensory organ which allows us to see the world. When light enters the eye and falls on the retina , the optic

nerve sends visual information to the brain. The problem of vision impairment mainly occurs due to refractive error because in rural areas as mostly people ignore the problems of eyes such as blurring of vision, redness or using powered glasses or contact lenses without consulting an authorized optometrist. People use the laptop screens continuously without taking any break. Due to this they face many problems like convergence insufficiency, dryness, headache, refractive errors, pre-presbyopia, et Amblyopiatic.

Amblyopiatic.

In this study, we tried to find out the prevalence of refractive errors in rural areas (Kharar, Mohali) and after diagnosing the problem in eyes we counsel the patients and also try to spread awareness about eye health care. In this study astigmatism was more prevalent in age 10-50 years (n=808) but when we look at the age group from 10-18 years (n=145) the myopia was more prevalent. We prescribed the glasses and told them to use the spectacles continuously to decrease the progression of myopia. Many studies show the progression of myopia in school going children is increasing due to changes in their lifestyle and daily routine. They can also go through refractive error correction surgery and they can easily get rid of the glasses. We also found the amblyopia patients from sample size of male= 445 and female= 363 and the preva-

lence of amblyopia (n=8, 1%) and while we do comparison of the male and female (n=6, 1.34% & n=2, 0.55% respectively). The prevalence of amblyopia was relatively low at 1% in this population we can only give the best corrected power but cannot cure their condition. It is important to note, amblyopia puts a significant impact on vision and the daily life of the patient. We give the instruction to village people to observe their small babies or go through regular eye checkups in an interval of time period to avoid such conditions such as amblyopia, refractive error, etc.

We take the age criteria from 10-50 years and presbyopia is an age related condition or pre-presbyopia (near vision power before time) in which patients need the near power glasses to get the clear vision and sometimes due to cataract surgery the near vision power is also necessary.

Table 9: Distribution of male and female patients with presbyopia

GENDER	PRESBYOPIA
Male	98
Female	61
Total	159

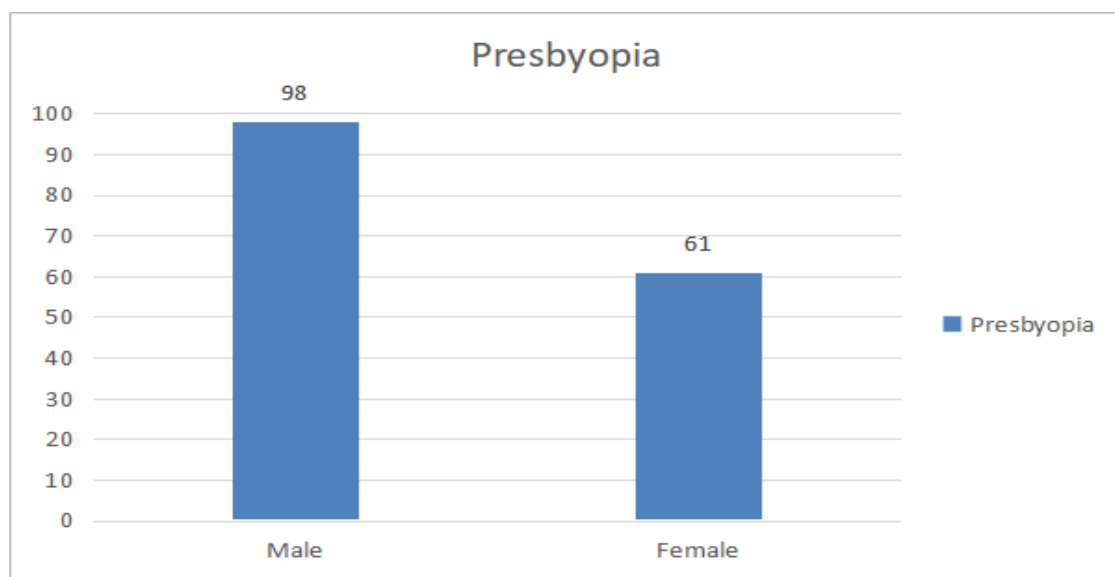


Figure 10: Distribution of male presbyopic patients and female presbyopic patients

Table 9 and Figure 10 shows the distribution of presbyopia patients according to their gender. The total presbyopia patients are 159 (male=98 and female= 61). There were some patients with near vision problems and they were pre-presbyopic (near vision power before age 40). This condition occurs due to their working profile (working on pc or using

mobile for a long time, more near work) or uncorrected hypermetropia or accommodation insufficiency. Some studies show that pre-presbyopia is more prevalent in females than male and in our study also there were only 5 pre-presbyopia patients which are female.

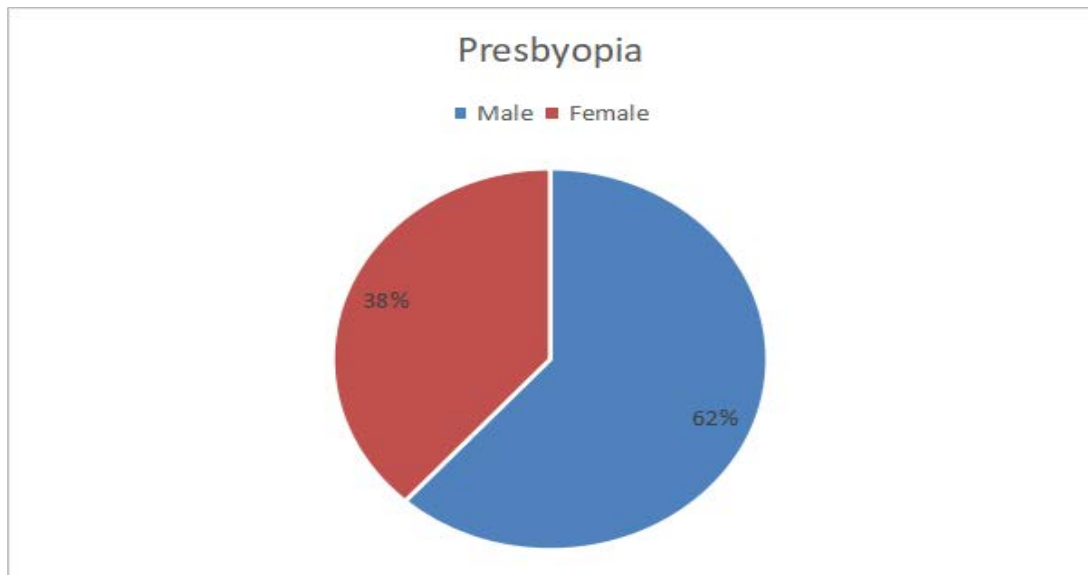


Figure 11: Distribution of male presbyopic patients and female presbyopic patients

With the help of the near powered glasses, they can easily focus on the near objects. If any patient has any other ocular problem in that condition, we can give the best corrected power which helps in focusing the objects. In rural areas, the awareness about eye health care is low. We can tell the patients about the advanced technology in the eye health sector by which many of their eye problems can be easily treated and before going to the problem in the worst condition can easily detect and do the best things required for that problem. We can also visit the schools to check the ocular conditions of students and due to these things can easily find the amblyopic patients and do the needful things for those patients.

In the future, I can do the study on the prevalence of refractive errors in school-age children in rural areas and can compare the rural and urban area patients in Mohali [02-17].

5. Conclusion

Refractive error is a serious health concern and its prevalence is rising with time and the negligence of the eye health care will invite a big problem in future. Spectacles and contact lenses are very good options to treat the major refractive error issue. If we organize some activities, awareness camps to influence people regarding eye health care, these can lead to a healthy society.

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