



Original Article

Adaptation period of different refractive prescriptions in pre presbyopic adults

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Shagufta Parveen,**ABSTRACT:**

AIM: The aim of this study was to highlight the problems encountered in adaptability of glasses by first time user in pre-presbyopic age.

STUDY DESIGN: A Comparative cross sectional (Analytical study) was conducted to find out the adaptation period of different refractive errors in pre presbyopic adult new users. Data was collected using structured questionnaires with 10 questions directed to 64 first time users of spectacle, aged between 18 and 35 years.

RESULTS: The study findings revealed that in Myopic patients, five problems were found statistically significant in adapting to the new prescription; problem with blurred distance vision, problem about walking or moving around, problem about objects appearing further away, complaint of headache and problem about going up stairs or down stairs were all found statistically significant ($p < 0.001$). In Hypermetropic patients, as only pre presbyopic adults were included in this study so the number of hypermetropic patients was only 9 (14.06%) and none of the problems was found statistically significant hence, the prescription was fully adapted in hypermetropic patients during the four weeks' period. In astigmatic patients, all ten problems were found statistically significant in adapting to the new prescription; problem with blurred distance vision was found statistically significant ($p < 0.002$), eye strain was found statistically significant ($p < 0.001$), problem with blurry near vision, problem about walking or moving around, problem about objects being smaller than expected, problem about objects appearing further away, complaint of headache, complaint of nausea, vertigo and anxiety, problem about going upstairs or down stairs and problem about the spectacles being too strong or powerful all were found statistically significant ($p < 0.001$).

CONCLUSION: Pre presbyopic adults having hypermetropia fully adapt to their new spectacle during four weeks, those having myopia face some problems but those having astigmatism do not adapt well to their new glasses during the first four weeks. The problems include blurred distance vision, blurry near vision, problem about walking or moving around, about objects appearing further away, objects being smaller than expected, about going up stairs or down stairs, about the spectacles being too strong or powerful and also have complaint of headache, eyestrain and nausea occasionally.

KEYWORDS: Myopia, Hypermetropia, Astigmatism, Adaptation period.

INTRODUCTION:

In recent years, there has been an increased emphasis in the services of health care on clinical governance and the causes of the adverse reactions. It is perhaps surprising as there have been relatively few studies about non-tolerance and adaptation of refractive prescription. The major goal of this investigation is to determine the adaptation period in pre presbyopic adults who are using glasses for the first time.¹

Refractive error is dysfunction of the eye to focus the light properly. Refractive error has essentially three types; Myopia, Hypermetropia and Astigmatism.

MYOPIA is the common type of refractive error, also called near sightedness in which objects are focused in front of the retina and that is why they are out of focus when they reach the retina. It may be of two types; axial myopia or refractive myopia.²

In myopia, there is problem in seeing distant objects. A person is called myopic or near sighted if he/she can see near objects clearly i.e. is able to read what is in a book but has problem with distance i.e. to see what is on television screen. Myopic patients may have complaint of headache and eyestrain from struggling to see the distant objects clearly. Myopia can be corrected by using eye-glasses. This is uncommon in childhood but can increase slowly in young adults. It increases slowly in frequency to involve approximately 25–50% of young adult population in Western countries, and up to 80% of young adults in South East Asian population.³

HYPERMETROPIA is a second type of refractive error where the eye is too short for its optical power so rays of light are focused behind the retina. It may be of two types; axial hyperopia i.e. the axial length of the eye is too short or refraction hyperopia where the refraction of the eye is insufficient. Hypermetropia is further divided as manifest and latent. Manifest Hypermetropia is corrected with the help of strong convex lenses but the latent one is masked by ciliary muscle tone. The hyperopic patients may have symptoms varying from person to person. They may have complaint of eyestrain, headache, blurred vision and squinting particularly for near objects.⁴

ASTIGMATISM is defined as a type of refractive error which occurs when rays of light do not focus at a single point. In astigmatism, the refractive power of the eye differs depending on which meridian light enters the eye. In Regular astigmatism, the meridians lie at 90° to each other. In regular astigmatism, the refractive power differs from one meridian to the next, and each meridian has a uniform curvature at every point across the entrance pupil. The meridians of greatest and lowest power which are known as the principal meridians are located 90 degrees apart. In Oblique astigmatism, the meridians lie at 90° to each other but not essentially in the horizontal meridian or vertical meridian. In irregular astigmatism, the meridians do not lie at 90° to each other,

which is challenging to correct with lenses.⁵

The Astigmatic patients may have complaint of headache, eyestrain, squinting, distorted vision, blurring at all distances and trouble with driving at night.⁶

In a study done in Pakistan, the Prevalence of uncorrected refractive errors was found to be 23.97% among males and 20% among females. The prevalence of visually disabling refractive errors was 6.89% in males and 5.71% in females. Hypermetropia (10.14%) was found to be the commonest refractive error followed by Myopia (6.00%) and Astigmatism (5.6%). Poor affordability was the commonest barrier to the use of spectacles, followed by unawareness. The prevalence of blindness was 1.96% (1.53% for males and 2.28% in females).⁷

Management of refractive errors is an important task of an eye care professional because they can lead to blindness if left untreated. The main reasons for treating refractive errors are to increase a patient's visual acuity, visual function and visual comfort. It may be necessary to correct a very small error in one patient, whereas another patient may function well with no ill effects when the same very small refractive error is not corrected. Patients with moderate to high refractive errors usually require correction to achieve satisfactory vision. Other reasons for treatment include improving binocular vision (e.g. for driver safety), controlling strabismus (e.g. accommodative esotropia), and, on a societal level, preventing economic productivity loss associated with uncorrected refractive error.⁸ There are many ways to manage refractive errors. The most simple, safe and cost-effective way is by using spectacle lenses or eyeglasses. The eye care professional can recommend suitable lenses to correct the refractive error and give best vision. The various types of spectacle lenses include single vision lenses, progressive lenses, bifocal lenses and trifocal lenses.⁹

Although many practitioners may wish that it is a science, to prescribe glasses is basically an art. This statement indicates that other factors must be considered when prescribing glasses rather than simply seeing the result of refraction in isolation. The concept of practitioners, the power setting of the shows (partial prescription) to help the patient adapt or comfort is discussed in most standard optometric manuals.¹⁰

One of the main tasks of a primary eye care practitioner is to prescribe spectacle lens correction but patients may return because of dissatisfaction with the spectacles. Patients may have complaints about their new glasses due to many possible reasons. One of the reasons of this can be difficulty in adaptation. Poor adaptation and incorrect assessment of refraction represent only a small subset of the possible causes of the dissatisfaction of glasses. When a patient is returned to report problems with their new glasses, it is mandatory to take a complete history including the onset, frequency, severity and the duration of symptoms.¹¹

ADAPTATION is defined as the ability of the eye to adjust to changes in the environment or the observer itself, for example by the disease, treatment, aging or a new prescription.¹²

Adaptation problems occur even with the enhancement in visual acuity provided by the new prescription. Elliott explained this as due to the inevitable magnification or minification effects on retinal image size and the influence of the vestibulo-ocular reflex (VOR). The main reason for the difficulty in adapting to a new prescription is likely changes in magnification, which attribute to spectacle lens form or spectacle type as well as changes in prescription.¹³

There have been only few studies about the adaptation. The time-scale for the adaptation processes has only been slightly calculated. However, it is possible that these adjustments operate for hours, days or weeks.¹⁴

The adaptation period may be affected due to non-tolerance to spectacles, which has two categories. The first category includes dispensing non-tolerance. It refers to errors found either with the glasses, the lenses or the dispensing measurements that the patient finds so hard to accept. These cases need to be seen and corrected by the optician. The second category is prescription non-tolerance which refers to optometric practice and spectacles. It is the prescription that the patient finds so hard to tolerate and returns to the eye care practitioner after few days. These cases need to be seen by the optometrist or refractionist to eliminate the difficulties in adaptation.¹⁵

In new users, the adaptation period varies according to the type of refractive error e.g. in patients with astigmatism, they may take more than one to two weeks to adapt to their new viewing conditions.¹⁶

Adaptation to astigmatism especially to a newly prescribed correction of astigmatism is chiefly related clinically, where the optometrist faces the choice of astigmatism correction by glasses. In a recent study strong after effect after brief periods of adaptation to images blurred with astigmatism was shown indicating that adaptation can be selective to the orientation of astigmatism.¹⁷

There have been relatively few studies about adaptation of refractive prescription. The major goal of this investigation is to determine the adaptation period of different refractive prescription in pre presbyopic adults who are new users of glasses. As from previous studies, it is evident that in new users, the adaptation period varies according to the type of refractive error so this study will help in determination of adaptation period in myopia, hyperopia and astigmatism. Large group of population in Pakistan after refraction do not use glasses regularly because with their new glasses, they face some problems and have complaints therefore patients should be instructed that time is required to adapt to new glasses particularly with astigmatic corrections.¹⁸

There is no report available in the literature on adaptation

period of different refractive errors in Pakistan. Therefore, this study is conducted in new users pre presbyopic adults to determine the:

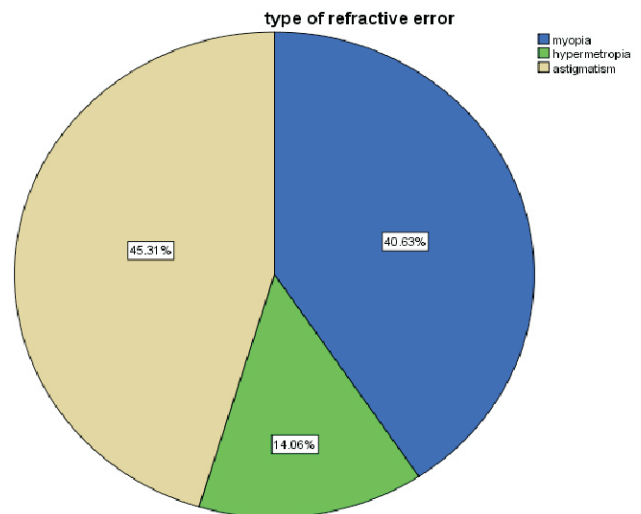
- (i) Adaptation period of different refractive prescription in new users.
- (ii) The association of adaptation period with prescription.

RESEARCH DESIGN AND METHODOLOGY:

A Comparative cross sectional (Analytical study) was conducted to find out the adaptation period of different refractive errors in pre presbyopic adult new users. Refraction was performed and the patients were called for follow up after 4 weeks. Data was collected using structured questionnaires comprising of 10 questions. Study population included 64 new users of glasses both male and female pre presbyopic adults (18-35 years). Data was analyzed using SPSS v22.0. A two tailed 'p' value of less than 0.05 was considered statistically significant. Permission to carry out the study at the sites was given by the Ethical Review Board. The study was conducted in refraction room of Mayo Hospital, Lahore over a three months period from October to December 2016.

RESULTS:

Table 1: Type of Refractive Error:



Distribution of age of patients is presented in the Table. 1

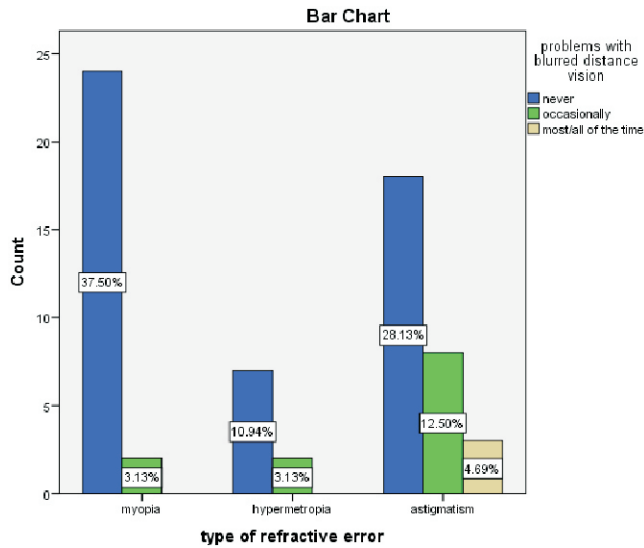
Table 1: Age Group:

Age * type of refractive error

	type of refractive error			Total
	Myopia	Hypermetropia	Astigmatism	
18-20	8	0	5	13
21-23	10	0	9	19
24-26	2	2	4	8
27-29	4	0	1	5
30-32	2	1	5	8
33-35	0	6	5	11
Total	26	9	29	64

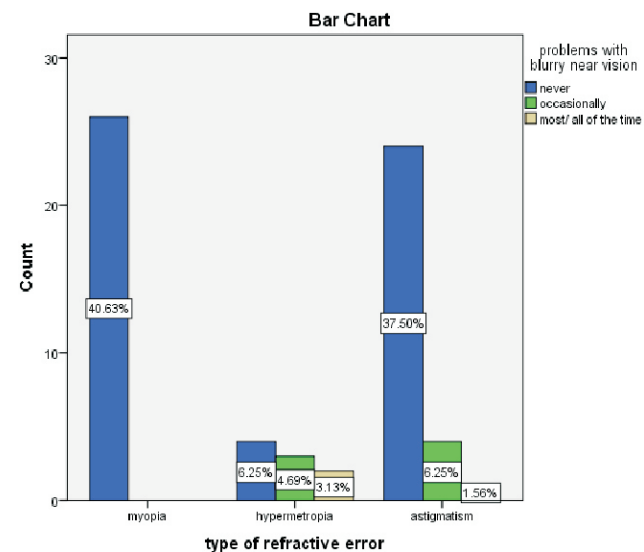
This table shows the different types of refractive errors in pre presbyopic adults i.e. age group 18-35. Out of the total 64 patients who were selected for this study, 26 patients were myopes, 9 patients were hypermetropes and 29 were Astigmatic patients.

Problems with blurred distance vision:



3.13% myopic patients had problem with blurred distance vision occasionally with their new prescription while the rest of 37.50% had never this complaint. 10.94% hypermetropic patients had never complaint of blurred distance vision but 3.13% had this problem occasionally. 28.13% Astigmatic patients had never problems with blurred distance vision while 12.50% had problems occasionally and 4.69% had this complaint most of the time.

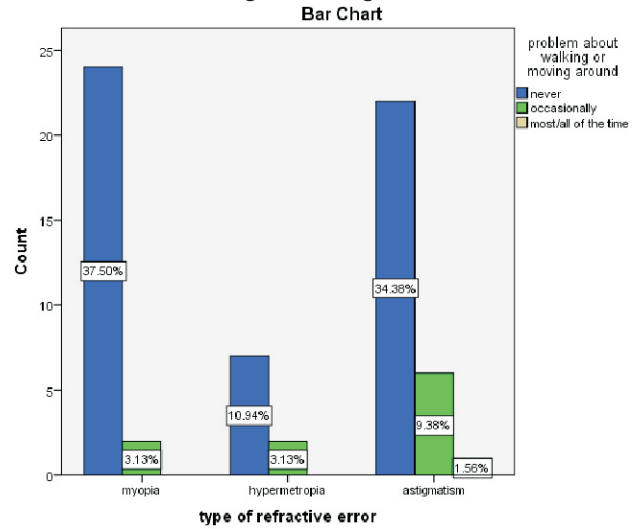
Problems with blurry near vision:



This bar chart shows that all of the 40.63% myopic patients had never problem with blurry near vision with their new prescription. 6.25% hypermetropic patients had no problem

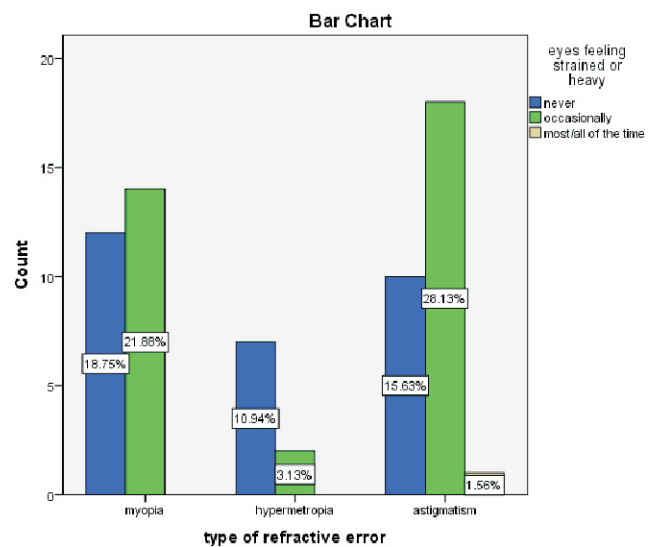
with blurry near vision but 4.69% had this complaint occasionally and 3.13% had problem most of the time. 6.25% Astigmatic patients had problem occasionally and 1.56% had problem most of the time but the rest of 37.50% had never complaint of blurry near vision.

Problem about walking or moving around:



This chart shows that 37.50% myopic patients never had problem about walking or moving around with their new prescription but 3.13% had problems occasionally. 3.13% hypermetropic patients had problem occasionally but the rest 10.94% never had any complaint. 9.38% Astigmatic patients had problems occasionally and 1.56% had problem all of the time but 34.38% never had problem about walking around with their new prescription.

Eye strain:

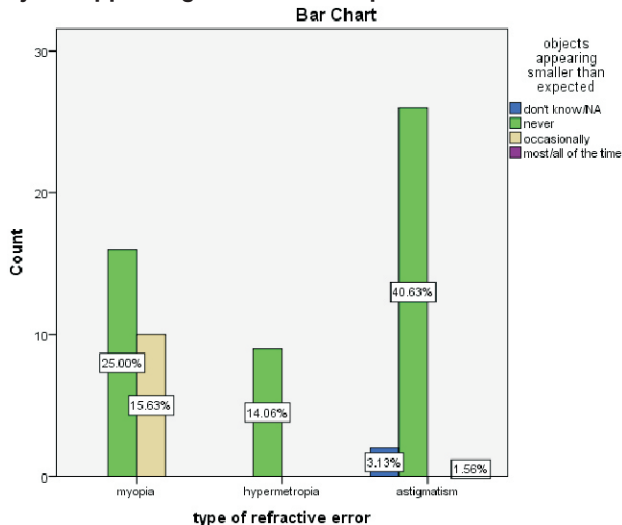


This bar chart shows that 18.75% myopic patients had never problem about eye strain but 21.88% had this problem occasionally with their new prescription. 10.94% hypermetropic patients had never complaint of eyestrain but



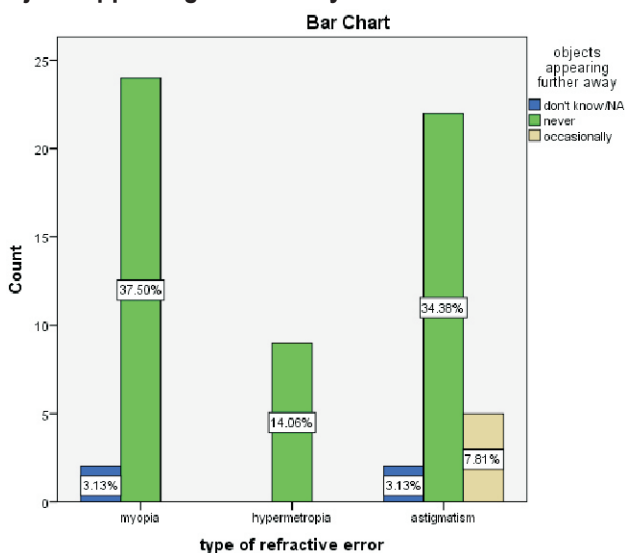
3.13% had this problem occasionally. 28.13% Astigmatic patients had problems occasionally and 1.56% had problems most of the time but the rest of 15.63% had never problems of eye strain.

Objects appearing smaller than expected:



This bar chart shows that 25% myopic patients had never issue about objects appearing smaller than expected with their new prescription but 15.63% had this problem occasionally. Hypermetropic patients had never this issue. 40.63% Astigmatic patients had no complaint of objects appearing smaller than expected but 3.13% had this problem occasionally and 1.56% had problem most of the time.

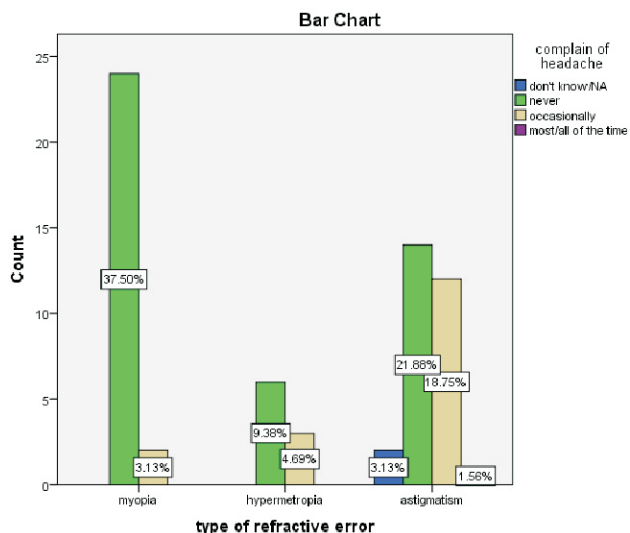
Objects appearing further away:



This chart shows that 37.50% myopic patients had never problem about objects appearing further away with their new prescription and 3.13% did not know. None of the hypermetropic patients had the complaint of objects appearing further away. 34.38% Astigmatic patients had never

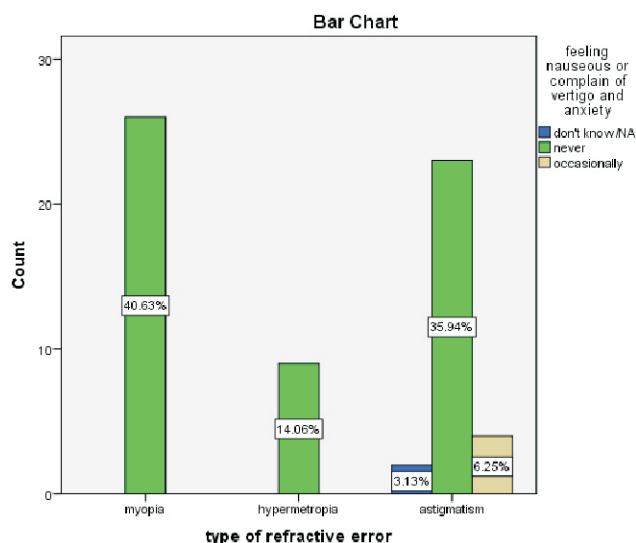
problem about objects appearing further away and 7.81% had this complaint occasionally while 3.13% did not answer.

Complaint of headache:



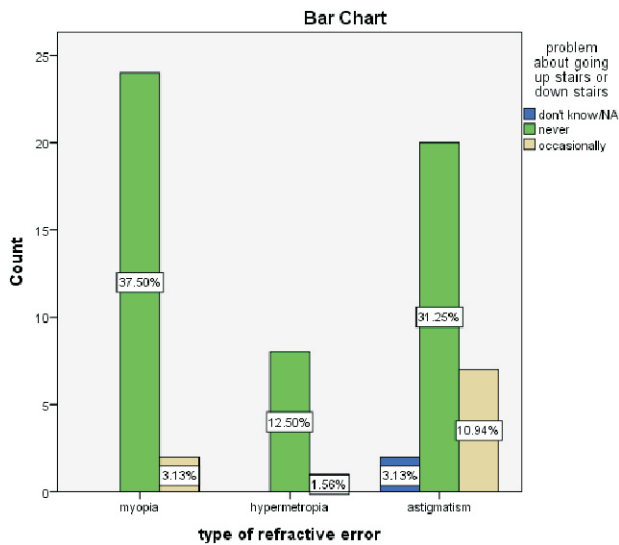
With the new prescription, 3.13% myopic patients had the complaint of headache while 37.50% had no complaint. 9.38% hypermetropic patients had no complaint but 4.69% had headache occasionally. 21.88% Astigmatic patients had no complaint of headache but 18.75% had headache occasionally, 3.13% said they didn't know and 1.56% had this symptom most of the time.

Feeling nauseous or complaint of vertigo and anxiety:



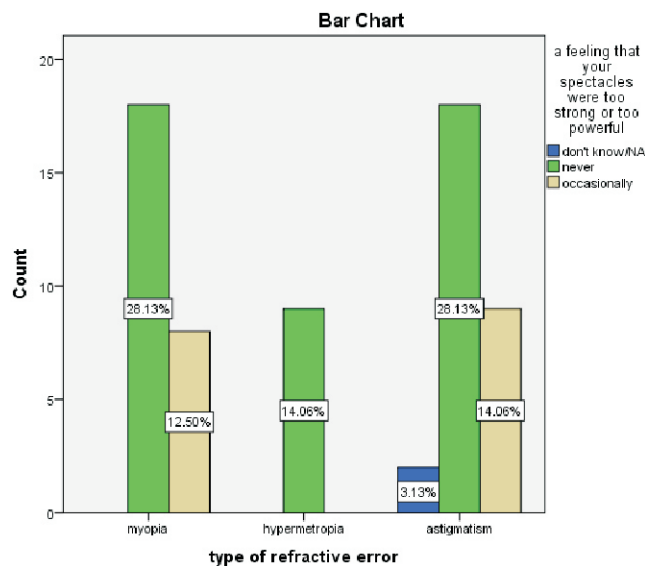
This chart shows that none of the myopic and hypermetropic patients had complaint of nausea, vertigo or anxiety with their new prescription. Only 6.25% Astigmatic patients felt nauseous, 35.94% had no complaint and 3.13% did not answer.

Problem about going upstairs or down stairs:



3.13% myopic patients had the problem about going upstairs or downstairs with the newly prescribed glasses occasionally and 37.50% had no complaint. 12.50% hypermetropic patients had no problem while only 1.56% had this problem occasionally. 31.25% Astigmatic patients had no complaint but 10.94% had this problem occasionally and 3.13% did not respond to this question.

Problem about the spectacles being too strong or powerful:



This chart shows the response of patients about their new spectacles being too strong or too powerful. 28.13% myopic patients had never this complaint but 12.50% had this complaint occasionally. None of the hypermetropes had this issue. 28.13% Astigmatic patients had no complaint but 14.06% had this issue occasionally while 3.13% didn't respond to this question.

MYOPIA:

	problems with blurred distance vision	problem about walking or moving around	eyes feeling strained or heavy	objects appearing smaller than expected	objects appearing further away	complain of headache	problem about going up stairs or down stairs	feeling that your spectacles were too strong or too powerful
Chi-Square	18.615 ^a	18.615 ^a	.154 ^a	1.385 ^a	18.615 ^a	18.615 ^a	18.615 ^a	3.846 ^a
Df	1	1	1	1	1	1	1	1
Asymp. Sig.	0	0	0.695	0.239	0	0	0	0.05

In myopic patients, there were five problems which were found statistically significant in adaptation to the new prescription.

Blurred distance vision: $\chi^2 (1) = 18.615, p < 0.001$

Problem about walking or moving around: $\chi^2 (1) = 18.615, p < 0.001$

Objects appearing further away: $\chi^2 (1) = 18.615, p < 0.001$

Complaint of headache: $\chi^2 (1) = 18.615, p < 0.001$

Problem about going up stairs or down stairs: $\chi^2 (1) = 18.615, p < 0.001$

HYPERMETROPIA:

	problems with blurred distance vision	problems with blurry near vision	problem about walking or moving around	eyes feeling strained or heavy	complain of headache	problem about going up stairs or down stairs
Chi-Square	2.778	0.667	2.778	2.778	1	5.444
Df	1	2	1	1	1	1
Asymp. Sig.	0.096	0.717	0.096	0.096	0.317	0.02

In hypermetropic patients, only one of the problems (going upstairs/downstairs) was found statistically significant and the new prescription was almost fully adapted during the four weeks.

ASTIGMATISM:

	problems with blurred distance vision	problems with blurry near vision	problem about walking or moving around	eyes feeling strained or heavy	objects appearing smaller than expected	objects appearing further away	complain of headache	feeling nauseous or complain of vertigo and anxiety	problem about going up stairs or down stairs	feeling that your spectacles were too strong or too powerful
Chi-Square	12.069 ^a	32.345 ^a	24.897 ^a	14.966 ^a	41.448 ^a	24.069 ^a	18.586 ^b	27.793 ^a	17.982 ^a	13.310 ^a
Df	2	2	2	2	2	2	3	2	2	2
Asymp. Sig.	0.002	0	0	0.001	0	0	0	0	0	0.001

In astigmatic patients, all ten problems were found statistically significant in adaptation to the new prescription.

Blurred distance vision: $\chi^2 (2) = 12.069, p = 0.002$.

Blurry near vision: $\chi^2 (2) = 32.345, p < 0.001$.

Problem about walking or moving around: $\chi^2 (2) = 24.897, p < 0.001$.

Eye strain: $\chi^2 (2) = 14.966, p = 0.001$.

Objects being smaller than expected: $\chi^2 (2) = 41.448, p < 0.001$.

Objects appearing further away: $\chi^2 (2) = 24.069, p < 0.001$.

Complain of headache: $\chi^2 (3) = 18.586, p < 0.001$.

Complain of nausea, vertigo and anxiety: $\chi^2 (2) = 27.793, p < 0.001$.

$p < 0.001$.

Problem about going upstairs or down stairs: $\chi^2(2) = 17.862$, $p < 0.001$.

Problem about the spectacles being too strong or too powerful: $\chi^2(2) = 13.310$, $p < 0.001$.

DISCUSSION:

There have been only few studies on adaptation. The time span for the adaptation process has only been slightly calculated. However, it is possible that these adjustments operate for hours, days or weeks.¹⁴

In a study, it was found that even with a precise refraction 17.5% patients did not adapt to their prescription because of a change in the power of the cylinder. This is a likely result because the power changes of cylinders can cause spatial distortions causing asthenopia in delicate patients. Inability to adapt to more plus in the refraction of the distance was the most common complaint in this category (15.4%). It is not surprising, that some younger patients are unable to relax their accommodation to accept the correction of the distance well more comfortably.¹⁹

It was also reported in a study that in new users, the adaptation period varies according to the type of refractive error for example in patients who have astigmatism, it may take more than one to two weeks to adapt to their new conditions of viewing.¹⁶

The present study was conducted to find the adaptation period of different refractive prescription in pre presbyopic adult new users. Comparative cross sectional study was carried out by taking 64 patients as a study group without discrimination of gender, prescription, type of glasses and excluding those who had other pathological disorders of the eyes, mentally retarded or uncooperative and patients not willing to give their data as well as those unable to come for follow-up.

The patients were asked about ten problems they encountered with their new spectacle during this time period and the following results were obtained;

In myopic patients, five problems were found statistically significant in adapting to the new prescription; blurred distance vision, problem about walking or moving around, objects appearing further away, headache and problem about going up stairs or down stairs ($p < 0.001$).

In hypermetropic patients, as only pre presbyopic adults were included in this study so the number of hypermetropic patients was only 14.06% and one of the problems was found statistically significant hence the prescription was almost fully adapted in hypermetropic patients during the four weeks' time period.

In astigmatic patients, all ten problems were found statistically significant in adapting to the new prescription; problem with blurred distance vision ($p = 0.002$), .Eye strain ($p < 0.001$), blurry near vision, problem about walking or moving around, objects being smaller than expected, objects appearing

further away, headache, nausea, vertigo and anxiety, problem about going upstairs or down stairs and spectacles being too strong or powerful ($p < 0.001$).

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