BMH MEDICAL JOURNAL

BMH Medical Journal 2016;3(2):32-36 **Research Article**

Role of Refractive Errors in Inducing Asthenopic Symptoms Among Spectacle Corrected Ammetropes

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Abstract

Refractive errors are a major cause of asthenopic symptoms in young age group.

Aim and objectives: This study tries to ascertain the prevalence of refractive errors in a cohort of subjects with spectacle corrected ammetropia and to elucidate the relation between the type, severity and subcategories of refractive errors in such a group.

Design: Descriptive cross sectional study

Methods: This is a prospective analysis of cases with asthenopia and coexistant significant refractive errors warranting use of spectacles. Best corrected visual acuity of 20/20 was ensured. Retinoscopy readings after complete cycloplegia were noted. Spherical equivalent was calculated from the absolute retinoscopy reading. Ammetropia not fully corrected with spectacles, history of migraine, headache not related to constant near work, symptoms less than three months duration, associated accomodation-convergence anomalies and latent squints were excluded.

Results: The study group included thirty five patients. The mean age was 23.48 years; SD 6.97. There were 15 males and 20 females. Twenty seven patients had bilateral symptoms (77.14%). Thirty six subjects (58.08%) had a spherical equivalent between 0.25D to 0.75D. The refractive errors included myopia (n-10), hypermetropia (n-26) and astigmatism (n-26). Near work associated headache was observed in 39 patients (62.86%). 46.15% of the cases with near work related headache had uncorrected astigmatism.

Conclusion: Asthenopic symptoms are frequent and significant among spectacle corrected ammetropes. Lower degrees of refractive errors are more symptomatic. Hypermetropia and astigmatism constitute the major causative factors.

Keywords: asthenopia, refractive error, streak retinoscopy, emmetropia, ammetropia

Introduction

Asthenopia refers to a sense of strain and fatigue on sustained use of eyes. It is characterized by ocular or periocular discomfort, heaviness of eyelids, sleepiness, tired eyes, brow ache or headache. These symptoms are associated with prolonged ocular use following constant and sustained near work. This is accounted by strain on the accommodation convergence system. Symptoms of asthenopia are variable. The causes include uncorrected and under corrected refractive errors, disorders of muscle balance and accommodation & convergence anomalies.

Material and methods

This is a prospective analysis of cases with asthenopia and coexistant significant refractive errors (ammetropia) warranting use of spectacles. The study period was six months. The work was approved by the institutional ethics committee. All consecutive cases were included. Asthenopic symptoms were enquired. Those with one or more symptoms in either or both eyes during constant near work, for a period of at least three months were selected. Best corrected visual acuity of 20/20 was ensured. Retinoscopy readings after complete cycloplegia were noted. Spherical equivalent was calculated from the absolute retinoscopy reading. Ammetropia not fully corrected with spectacles, history of migraine, headache not related to constant near work, symptoms less than three months duration, associated accomodation-convergence anomalies and latent squints were excluded.

Results

The study group included thirty five patients. The age group ranged from 18 to 40 years. The mean age was 23.48 years; SD 6.97. Eighteen cases (51.42%) belonged to the age group 20 to 30 years. There were 15 males and 20 females. Twenty seven patients had bilateral symptoms (77.14%). Among eight cases, the symptoms were unilateral. Thus a total of 62 eyes were included. The spherical equivalent (spherical power in diopters D + 1/2 cylindrical power in D if present) ranged from 0.25D to 2.25D. Thirty six subjects (58.08%) had a spherical equivalent between 0.25D to 0.75 D. Fifteen cases (24.20%) had a spherical equivalent of 0.75D to 1.25 D and nine cases (14.51%) had 1.25 to 1.75D. One patient each had an error less than 0.25D and more than 1.75 D. The refractive errors included myopia (n-10), hypermetropia (n-26) and astigmatism (n-26). Near work associated headache was observed in 39 patients (62.86%). 46.15% of the cases with near work related headache had uncorrected astigmatism. However 12.82 % of those with headache had simple myopia. The distribution of cases based on the symptoms and refractive errors is given in **Table 1**.

Table 1: The distribution of cases based on the symptoms

Symptoms	No of eyes N= 62		Myopia		Hypermetropia		Astigmatism	
	n	%	n	%	n	%	n	%
Near work related headache	39	62.90	5	12.82	16	41.02	18	46.15
Photophobia	28	45.16	8	28.57	11	39.28	9	32.14
Watering	32	51.61	8	25	8	25	16	50
Diplopia	10	16.19	0	0	4	40	6	60
Eye pain	14	22.58	1	7.14	10	71.42	3	21.42
itching	7	11.29	2	28.57	4	57.14	1	14.21

Those with astigmatism were further sub grouped into 'with the rule', 'against the rule' and oblique astigmatism. The distribution was as follows (**Figure 1**).

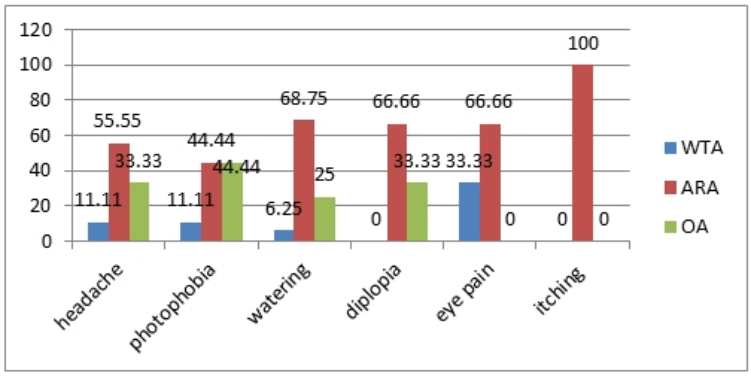

Figure 1: histogram comparing symptoms with the type of astigmatism
WTR- with the rule astigmatism; ATR- against the rule astigmatism; OA- oblique astigmatism

Among these, further evaluation based on the spherical equivalent was also done (**Figure 2**).

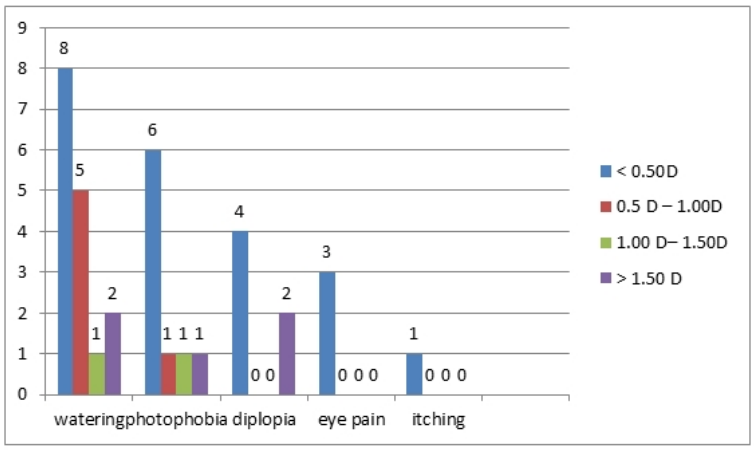

Figure 2: comparison of symptoms with the degree of refractive error

The eyes with astigmatism were divided into groups with simple myopic astigmatism, simple hypermetropic astigmatism, compound myopic astigmatism, compound hypermetropic astigmatism and mixed astigmatism. The distribution of cases is given in **Figure 3**.

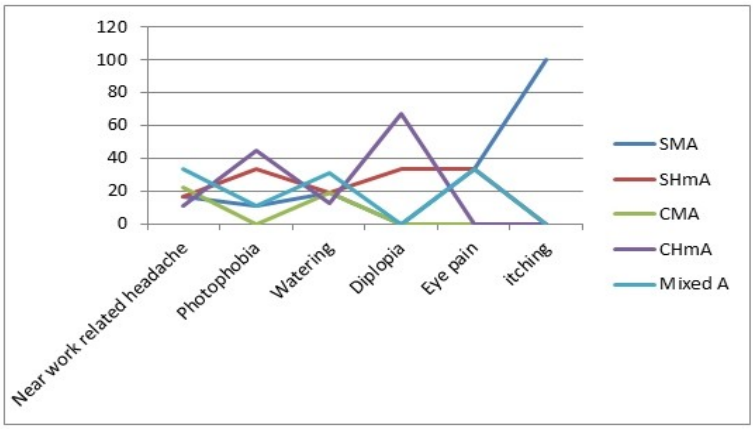

Figure 3: Comparison of symptoms with the type of astigmatism (%)

Discussion

Disabling asthenopic symptoms are associated with uncorrected or under corrected refractive errors, accommodation convergence anomalies and muscle imbalances [1]. The difficulties range from mild ocular discomfort to varying severities of headaches. Apart from pain in and around eyes, it encompasses easy fatiguability, heaviness of lids, sleepiness after near work, photophobia, diplopia,

watering, itching and redness [2]. The symptoms are dependent on the accommodative effort or the strain taken by the subject to screw up the eyes to obtain a pinhole effect.

Asthenopia is observed to be associated with small to moderate degrees of refractive errors. The limit among each type of refractive ocular condition is not defined. Often symptoms of asthenopia are considered as a poor marker of ocular changes especially in young children [3]. Most of the studies in literature try to evaluate association of headache especially among young adults and children with refractive errors [4-7]. Studies purely dealing with asthenopic symptoms are limited. Ambiguity exists in quantifying or qualifying the manifestations under the general term asthenopia. Often the symptoms fluctuate based on the sustained visual need for extended periods. The age of the subject, gender, occupation and socioeconomic background also determines the assessment of refractive errors as a causative factor behind aesthenopia.

Near work related headache was the most common symptom in our study. Bilateral symptoms were frequent. Majority had less than 0.75D refractive power. Hypermetropia and astigmatism were the chief causes of asthenopic symptoms. However myopia was also found as a causative factor in a minority. This contradicts the concept that myopes do not develop aesthenopia. Akinci et al also has made similar observation. Amongst the refractive errors, uncorrected astigmatism was the major cause for near work related headache. Ocular pain and photophobia were more among hypermetropes. Watering and diplopia were the major complaints among astigmatism.

Varied symptoms occurred in 'against the rule' (ATR) astigmatism while eye pain was the chief complaint amongst 'with the rule' (WTR) astigmatism. Photophobia followed by headache occurred frequently among subjects with 'against the rule' (ATR) astigmatism.

Headache was the common difficulty among those with spherical equivalent less than 0.05D. As the degree of refractive error increased watering and diplopia was found to be more. Similar relation was noted when the spherical equivalent was compared with symptoms among those with subtypes of astigmatism.

Near work related headache was more appreciated among mixed astigmatism. Photophobia and diplopia was more common among compound hypermetropic astigmatism. Simple and Compound myopic astigmatism fared equally except for increased frequency of rubbing of the eyes among cases with simple myopic astigmatism. Similar observations were made by Akinci et al [5].

Small size of the data limiting statistical power, absence of uniform number of cases within each subgroups, inability to assess symptom relief after constant and regular spectacle wear owing to the cross-sectional design of the work, absence of a homogenous pattern in assessment of refractive errors and retrospective nature of data collection were the main limitations of the study.

Conclusion

Asthenopic symptoms can be myriad. Lower degrees of refractive errors are more symptomatic. Hypermetropia and astigmatism constitute major causative factors. All subgroups of astigmatism are problematic. Quantifying aesthenopia among individuals with fully correctable refractive errors remains an enigma.

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