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Profile of Binocular Visual status of Pediatric Patients Presenting with complaints of Asthenopia

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Abstract

Introduction: Children with asthenopia are found to have various binocular visual problems on clinical examination.

Objective: To determine the accommodative amplitude, fusional vergence, vergence status and refractive status of pediatric patients who presented with symptoms of Asthenopia.

Method: Total 820 pediatric patients who had complaints of asthenopia were enrolled in the study. Clinical examinations including visual acuity assessment, slit lamp biomicroscopy, retinoscopy and binocular vision assessment were done. Patients who required glasses were prescribed with glasses. Patients who needed exercises on Synoptophore were called for follow up and those requiring pencil-push up exercise, Hart chart rock exercises and other vision therapy were advised to do at home.

Result: Eight hundred twenty subjects were enrolled in the study. Among them, 51.85% were female and 48.15% were male. The most common age group presenting with symptoms of asthenopia at the OPD was 11-16 yrs. The most common binocular disorder was fusional insufficiency.

Conclusion: Asthenopia has been associated with deficiencies in fusional vergence, as well as issues with accommodative and convergence insufficiency and refractive errors. It can be inferred that both muscular and refractive factors contributing to asthenopia should not be overlooked, as they can significantly affect children's overall physical and academic growth

Keywords: Asthenopia; Binocular disorders; Convergence; Pediatric; Refractive

Introduction

Asthenopia refers to the feeling of eye strain and weakness or fatigue caused by prolonged use of the eyes (a=not, sthenos= strength, ops=vision).[1] This term encompasses a variety of symptoms related to eye use, including discomfort, blurred vision, double vision, difficulties with focusing, trouble reading, eye strain, fatigue, and headaches. It is frequently reported by patients experiencing accommodation and convergence insufficiency, refractive errors.

Asthenopia is typically reported in relation to near vision. Children experiencing asthenopia often express discomfort, especially when engaged in reading and writing activities. This condition is generally categorized into two primary types: refractive, which includes refractive errors and anisometropia, and muscular, which consists of strabismus and convergence insufficiency. The incidence of asthenopia symptoms is increasing in today's society, where prolonged near work on computers necessitates sustained focus for extended periods, placing a strain on the near vision system.

Recent studies indicate that among schoolchildren, the prevalence of asthenopia is 15.2% in children aged 6 years [1] and 34% in those aged 6 to 10 years [2]

Method

It was a hospital based, cross sectional and descriptive study. Children of age group 6-16 yrs who presented with symptoms of asthenopia at the OPD of a tertiary eye hospital were included with verbal consent of the guardians. Patients with any ocular or systemic pathologies were excluded from the study

A comprehensive ocular and medical history was obtained. Uncorrected visual acuity for distance was assessed using a Snellen chart at six meters. A thorough ophthalmic evaluation was performed, which included a slit lamp examination and an examination with an ophthalmoscope. Cover tests and prism cover tests were conducted for both near and distance vision at 40 centimeters and six meters, respectively. Positive fusional vergence was evaluated with base-out prisms for near and distance vision.

Normal values for near vision were identified as 9/19/10 prism diopters (blur/break/recovery) and 17/21/11 prism diopters (blur/break/recovery) for distance vision. The amount of deviation was evaluated using a prism cover test. The near point of convergence was assessed using the RAF rule. The standard range for convergence was established at 6-9 cm from the eyes. A near point of 12 cm indicated mild convergence insufficiency, while 13-18 cm was classified as moderate insufficiency, and anything 19 cm or greater was considered marked convergence insufficiency. The near point of accommodation was gauged with the RAF rule using a N6 target. Normal accommodation was defined at a distance of 6-9 cm, with mild accommodative deficits occurring at 10-15 cm, moderate deficits at 16-20 cm, and marked deficits at distances greater than 20 cm.

Subjective refraction and retinoscopy were performed. When necessary, cyclo refraction and dynamic retinoscopy were performed. ≥ 4 prism diopters at a distance and ≥ 6 prism diopters at a close distance were considered exophoria. The criteria for esophoria were > 2 prism diopters at a distance and ≥ 4 prism diopters at close range.

Result

Total 820 patients who presented to the OPD with complaints of asthenopia were included in the study. Maximum children were of age group 13-16 years. Male comprised of 48.15% and female comprised of 51.85%.

Table 1: Pattern of refractive error on asthenopic children (N=820)

Type of Refractive Error	Frequency (Percentage)
Simple Hyperopia	164 (20%)
Simple Hyperopic Astigmatism	74(9%)
Compound Hyperopic Astigmatism	49(6%)
Simple Myopic Astigmatism	57(7%)
Compound Myopic Astigmatism	41(5%)
Myopia	90(11%)
Mixed astigmatism	33(4%)
No refractive error	312(38%)
Total	100%

Among the children with refractive error (62%), 20% of the children have simple hyperopia whereas 11% children have myopia. 38% of the children did not have any refractive error.

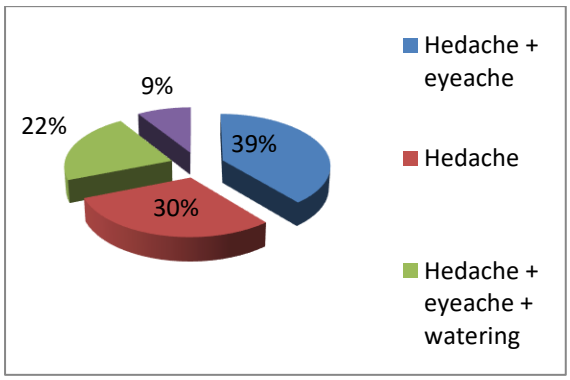

Fig 1: Distribution of patients with their chief complaints

The major symptoms of the children was headache and eyeache which was found in39% of the children whereas 30% have only headache.

Table 2: Distribution of Binocular Disorder N= 820

Binocular Disorder	Percentage
Fusional Insufficiency	32%
Convergence Insufficiency	28%
Convergence + Fusional Insufficiency	16%
Accommodative Disorder	19%
Accommodative + Convergence + Fusion	5%

Among the binocular disorder, the most common was fusional insufficiency which was found in 32% of the cases where as convergence insufficiency was found in 28% of the cases.

Table 3: Prevalence of the type of accommodative dysfunction

N= 820

Degree of accommodative dysfunction	Percentage
Insufficiency	80%
Spasm	4%
Infacility	9%
Fatigue	7%

Among the accommodative dysfunction, accommodative insufficiency was found in 80% of the cases whereas accommodative fatigue was found in 7% of the cases.

Table 4: Type of Deviation

N= 820

Type of deviation	Percentage
Orthophoria	84.96%
Exophoria	11.04%
Esophoria	2.20%
Heterotopia	1.80%

Among the type of deviation, exophoria was found in 11.04% of the cases where as esophoria was found in 2.2% cases.

Discussion

Headache and eye ache was the commonest complaint found in our study which is similar to other studies.[1,2] We found that the refractive error and binocular disorder was associated with asthenopia in many children. The commonest refractive error in the children with complaint of asthenopia was simple hyperopia which is similar to the other studies.[2,3] According to reports, fusional insufficiency is the commonest binocular disorder in children which is found in 32% of the children. This is supported by the another study which also found the fusional insufficiency as the commonest binocular disorder.[3]It was similar to the studies done in different parts of the world.[4-12]Similar to the other study, most common accommodative disorder was accommodative insufficiency (80%).[4] Some of the studies found accommodative infacility as the commonest accommodative disorder which is different from our study.[4-8]

The most common refractive error was simple hyperopia followed by simple myopia which is similar to the various studies.[13-18] But it is different from the other studies which have shown myopia is the commonest refractive error followed by astigmatism.[19-24]

The most common deviation is exophoria on our study which is similar to other studies.[5-8]However, in some studies, esophoria is common which is different from our study.[20-24]

The children with asthenopia were found to have refractive error, binocular disorder and latent deviation as a common finding so they can be interrelated.

Conclusion

Refractive error, accommodative problem, vergence dysfunction, and fusional vergence system deficiencies have all been linked to asthenopia. Therefore, when paediatric patients complain of asthenopia, orthoptic examination is crucial.

Recommendation

Since binocular vision problems are common in the children with asthenopia, all children with complaints of asthenipia need binocular vision examination.

Conflict of interest

No conflict of interest

Financial disclosure

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