



Original Article

Prevalence of Refractive Error in Nystagmus Patients**A**uthor's Affiliation

Zaryab Mazhar

Iqra Shakeel

Correspondence Author:

Correspondence to:
Iqra Shakeel Optometrist
College of Ophthalmology &
Allied Vision Sciences (COAVS).

Purpose: To assess the prevalence of refractive errors in nystagmus patients.

Methodology: Cross-sectional descriptive study was conducted Thirty five patients with nystagmus were taken and refractive error was observed. In this study, refractive status of nystagmus patients is observed by doing retinoscopy, i.e. cycloplegic and non-cycloplegic retinoscopy. Cycloplegic refraction is done in 91.43% and the results were observed. Cycloplegic retinoscopy is an acceptable option for children with nystagmus, and may be more efficacious than the non-cycloplegic retinoscopy. It is found that astigmatism is more common in nystagmus patients. 100% nystagmus patients were having astigmatism. Astigmatism is categorized into myopic astigmatism with the range of (-1.0DC to -3.00DC), hyperopic astigmatism with the range of (+0.75DC to +2.0DC) and mixed astigmatism with the range of (± 1.00 to ± 3.50 DC).

Results: 17.14% patients were having hyperopic astigmatism, 25.71% were having mixed astigmatism and 57.14% were having myopic astigmatism. So astigmatism is more common in nystagmus patients and myopic astigmatism is being the most common of refractive error in nystagmus patients.

Conclusion: Astigmatism is more common refractive error in nystagmus patients. Myopic astigmatism is the most common refractive error in Nystagmus patients.

Introduction:

Nystagmus is involuntary, symmetrical, synchronous, repetitive, oscillatory movement of one or both eyes in a horizontal, vertical or rotatory manner. It is also known by other terms such as "jerky eyes" or "dancing eyes". Classification of nystagmus is done on the basis of eye movements. For example whether they oscillate like a pendulum (pendular) or whether they have a fast component or a slow component and also whether the movement is in horizontal direction or vertical¹.

People with nystagmus may present with an abnormal head or body posture similar to those with a squint. This is best seen while watching television etc so that they can get an optimum position or view².

Nystagmus can also be described as congenital, acquired, physiological or pathological³.

Congenital nystagmus is one which is present by birth or in early life (before six months of age). If it is after infancy i.e. after six months of age and in later life, it is said to be acquired⁴.

The eye has a total refractive power of 63 diopters of which the major part (about 43 D) is at the corneal interface whereas a minor part (23 D) is attributed to the lens⁴.

Axial length of the eye is about 23.5 mm. In a normal eye parallel rays of light from infinity come to a point focus directly on the retina. This condition is called Emmetropia and eye is called Emmetropic eye. Ametropia, on the other hand, is a status of the eye whereby the image is not focused exactly on the retina, due to a discrepancy between the size and refractive powers of the eye. It may focus either in front or behind the retina. There are different ametropias, myopia, hypermetropia and astigmatism⁵.

If the axial length of the eye is increased then parallel rays of light from a distant object come to a focus before reaching the retina. The rays from near objects however are focused on the retina. This condition is called myopia or Nearsightedness and the myope cannot see distant objects clearly while nearer objects appear clear. Conversely, if the eyeball is too short, parallel rays of light from a distant object do not focus on the retina but behind it. This condition is called far sightedness or hyperopia. In hyperopia, sometimes the focusing problem can be overcome to some extent by using one's own accommodation. In another type of refractive error called Astigmatism the rays of light are not focussed on a single point on the retina but some rays are focused in front, some behind and some on the retina depending on the type of astigmatism This occurs due to different refractive power of the eye in different meridians. Astigmatism may be corneal or lenticular depending on the site where refractive power is at fault.

Uncorrected refractive errors particularly

astigmatism can cause decreased vision and if left uncorrected could significantly affect patients' performance at work or school and even affect quality of life in later years⁶.

Astigmatism is classified on the **basis of axis of the principal meridians** depending on whether principal axes are perpendicular to each other or not i.e. regular and irregular (also called Murdoch syndrome); and on the **basis of focusing of the principal meridians** i.e. simple (one point is on retina and other in front or behind the retina), compound (both focal points are either in front of or behind the retina) and mixed (one focal is in front of the retina and other is behind)⁷. Astigmatism is further divided into "**with-the-rule astigmatism**", "**against-the-rule astigmatism**" and "**oblique astigmatism**"⁸.

Ametropias can usually be corrected with eyeglasses, contact lenses or refractive surgery but if not corrected earlier may result in amblyopia. Occasionally nystagmus may occur due to ametropia arising in childhood⁹. This study was done to determine the most common refractive error in nystagmus patients.

Methods:

A cross-sectional study was done on 35 patients presenting at eye OPD Mayo Hospital, having nystagmus. Age, gender, family and ocular history, visual acuity and refractive error status were analyzed. Patients with nystagmus and their refractive error status were considered as dependant variables. Data were collected by examining patients who reported with nystagmus. Instruments/equipments to be used in examining the patients were Snellen visual acuity chart, retinoscope, trial box, occluder, pin hole and torch.

Results:

Out of 35 nystagmus patients 94.29% patients were with congenital nystagmus and 5.71% patients with acquired nystagmus. (figure no.1). Cycloplegic retinoscopy was done in 91.43% nystagmus patients and in 8.57% nystagmus patients non-cycloplegic retinoscopy was done (figure no.2). All 35 nystagmus patients refracted had astigmatism, i.e. 100% astigmatism. Thus, astigmatism was a universal refractive error in nystagmus patients (figure no.3). Out of all the 35 nystagmus patients, 57.14% were with myopic astigmatism, 25.71% with mixed astigmatism and 17.14% were with hyperopic astigmatism. Thus, myopic astigmatism was most common in nystagmus patients (figure no.4). Of all the 35 nystagmus patients, 91.43% had horizontal nystagmus and 8.57% were having vertical nystagmus. (figure no.5).

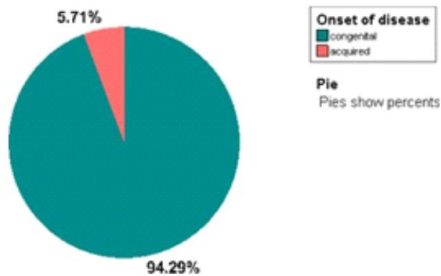


Figure no.1: Type of Astigmatism

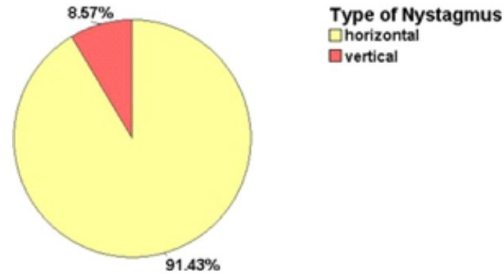


Figure no.5: Type of Nystagmus

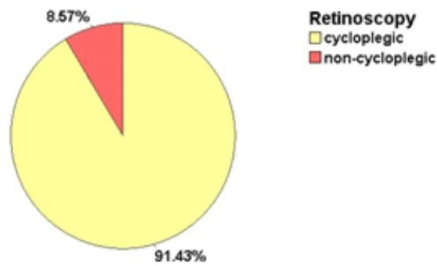


Figure no.2: Retinoscopy

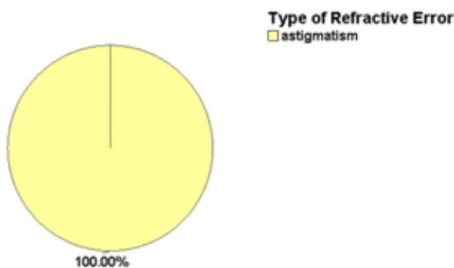


Figure no. 3: Type of Refractive error

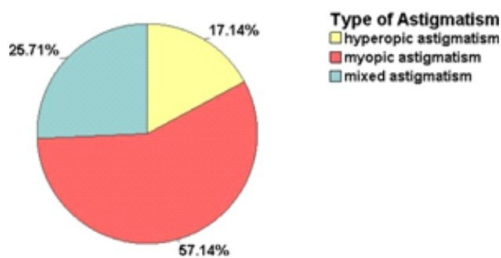


Figure no.4: Type of Astigmatism

Discussion:

Prevalence of refractive error was studied in nystagmus patients. 35 nystagmus patients were studied to evaluate which type of refractive error is more common in nystagmus patients. All nystagmus patients had astigmatism. In this study, refractive status of nystagmus patients was observed by retinoscopy, i.e. cycloplegic and non-cycloplegic retinoscopy. Cycloplegic refraction was done in 91.43% and the results were observed.

It was found that astigmatism is more common in nystagmus patients. 100% nystagmus patients were having astigmatism. To achieve more precise results astigmatism is categorized into myopic astigmatism with the range of (-1.0DC to -3.00DC), hyperopic astigmatism with the range of (+0.75DC to +2.0DC) and mixed astigmatism with the range of (+1.00 to +3.50DC).17.14% patients were having hyperopic astigmatism, 25.71% were having mixed astigmatism and 57.14% were having myopic astigmatism. So astigmatism is more common in nystagmus patients and myopic astigmatism is being the most common of refractive error in nystagmus patients.

There is evidence in the literature about high prevalence of with the rule astigmatism in infantile nystagmus patients as reported by Wang et al. There is also evidence about little emmetropization in children and in fact increase in magnitude in first eight years of life.⁷

In another study, conducted by Dickinson et al., refractive status of individuals with congenital nystagmus was assessed. There was a greater than normal incidence of high spectacle astigmatism. It was predominantly with-the-rule and corneal astigmatism in origin. Several differences in methodology and subject selection could be causes of the observed differences.¹¹

Conclusion:

The most common type of refractive error in nystagmus patients is astigmatism and among astigmatism, myopic astigmatism is most common.

**References:**

1. Kavanagh KT, Babin, RW. Definitions and Types of Nystagmus and Calculations, *Ear & Hearing*: 1986 June;7(3):157-166.
2. Porro G, van der Linden D, van Nieuwenhuizen O, Wttebol-Post D, Role of Visual Dysfunction in Postural Control in Children With Cerebral Palsy. *Neural Plast* 2005;12(2-3):205-210.
3. Smith HC, Riesenman FR. Unusual forms of nystagmus with a review of literature. *Arch Ophthalmol*, January 1945;33(1):13-15.
4. Bhardwaj V, Rajeshbhai GP. Axial Length, Anterior Chamber Depth-A Study in Different Age Groups and Refractive Errors, *J Clin Diagn Res*. 2013 Oct; 7(10): 2211–2212.
5. Negrel AD, Maul E, Pokharel GP, Zhao J, Ellwein LB. Refractive Error Study in Children: sampling and measurement methods for a multi-country survey. *Am J Ophthalmol*. 2000 Apr;129(4):421–426.
6. Wolffsohn JS, Bhogal G, Shah S. Effect of uncorrected astigmatism on vision. *J Cataract Refract Surg*. 2011 Mar 37(3):454-60.
7. Wang J, Wyatt LM, Felius J, Stager DR Jr, Stager DR Sr, Birch EE, Bedell HE. Onset and progression of with-the-rule astigmatism in children with infantile nystagmus syndrome. *Invest Ophthalmol Vis Sci*. 2010 Jan; 51(1):594-601.
8. Nathan J, Kiely PM, Crewther SG, Crewther DP. Astigmatism occurring in association with pediatric eye disease. *Am J Optom Physiol Opt*. 1986 Jul;63(7):497-504.
9. Daoud YJ, Hutchinson A, Wallace DK., Song J, Kim T. Refractive Surgery in Children: Treatment Options, Outcomes, and Controversies, *AM J Ophthalmol*. 2009 Apr;147(4):573–582.
10. Zheng GY, Du J, Nie XL, Zhang JS, Lie SB, Zhu XL, et al. Contrast sensitivity and higher order aberrations in patients with astigmatism *Chin Med J (Engl)*. 2007 May;120(10):882-5.
11. Dickinson CM, Abadi RV. Corneal topography of humans with congenital nystagmus. *Ophthalmic Physiol Opt*. 1984;4(1):3-13.