



Original Article

Significance of Prescribing Astigmatic Correction in Young Patients having Low Astigmatism with Near Vision Complaints

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ABSTRACT

Astigmatism causes increased difficulty in reading performance like book reading, mobile usage and computer work. **Objective:** The primary objective was to find out the significance of prescribing astigmatic correction in young patients having low astigmatism with near vision complaints and secondary objective was to find out the most common type of astigmatism affecting near vision. **Methods:** This was a multicentered, prospective cohort study conducted from April 2022 to Sep 2022. A total of 64 subjects of both genders were selected through non-probability convenient sampling technique. Patients with age between 15-30 years having low astigmatism (0.25-0.75D) with near vision complaints were included. Any amount of astigmatism was corrected with appropriate glasses and subjects were asked for a follow up fortnightly. Follow up improvement in symptoms were recorded and compared with earlier complaints by applying chi square test using SPSS version 23.0. **Results:** A total of 64 subjects were enrolled in the study. The mean age of patients was 22.44 years including 27 (42%) males and 37 (58%) females. The most common symptom was Eye Strain found in 53 (83%) of the patients. Most common type of astigmatism was Against the Rule astigmatism. 62 (96%) patients improved to 6/6 in both eyes. On follow up, improvement in symptoms was noted and compared with symptoms before the usage of glasses. **Conclusions:** The study concluded that the treatment for near vision complaints in young patients is prescribing them with proper cylindrical / astigmatic correction in the form of eye glasses.

INTRODUCTION

Refractive error is a condition in which optical system of the eye is unable to bring incident parallel rays of light to focus on fovea. It is evident that without appropriate optical correction, millions of children are losing educational opportunities and elders are excluded from effective working, facing severe economic and social burden. Persons and community are pushed in a vicious cycle of

poverty and disability because of this health issue [1, 2]. Uncorrected refractive errors are leading cause of visual impairment worldwide and the second major cause of blindness [3]. Globally, there are about 2.3 billion people who have refractive error. Of these, only 1.8 billion can get eye care services which are affordable to them. Children are more susceptible to refractive errors, because

uncorrected refractive error can result dramatically on their learning process and educational needs [4]. Refractive errors can be managed by prescribing proper optical correction. If not treated in childhood, it may develop into amblyopia, which can lead to blindness. The refractive correction can be done by spectacles, contact lenses, or refractive surgery. The most commonly used correction method is prescribing glasses. Therefore, spectacles are treatment of choice for refractive error [5]. Astigmatism is derived from a Greek word "a" meaning absence and "stigma" meaning point. Astigmatism is known for more than 200 years [6]. It is a refractive error in which incident parallel rays of light are not focused on retina when accommodation is at rest. When rays of light are refracted by astigmatic cornea, they are not focused on a single point, therefore images from the retina of different objects at far and near are blurred and may seem to be elongated and out of focus [7]. Astigmatism causes increased difficulty in reading performance like book reading, mobile usage and computer work. It has been found that at Smaller reading material induced against the rule astigmatism was causing more strain on Visual acuity and reading than did with the rule astigmatism [8]. Most of the people having normal Visual acuity suffer from different near vision symptoms such as decreased near vision, visual fatigue, discomfort, asthenopia tiredness, loss of concentration and eye strain while performing their routine near vision activities [9]. Asthenopia is often understood as distress arising from excessive use of the eyes [10-12]. The most commonly presenting complaint of asthenopia is eyestrain which is most commonly associated with near work like reading, sewing and computer work. Other associated symptoms are headache, eye ache, irritation, stinging eyes and grittiness [13]. Asthenopia, also called as eye strain is major symptom most commonly affecting the mobile user, computer users and students [14-16]. Asthenopic features involve the following conditions like glare [17, 18]; accommodation inability & reduction in amplitude of accommodation; uncorrected refractive error [19, 20]; presbyopia [21, 22]; improper contrast [23, 24]; abnormalities of binocular single vision such as esophoria and convergence insufficiency [24-26]; poor gaze direction [25]; shaky computer images [26] and dry eye [27]. Previously few studies have been conducted regarding the influence of astigmatism on near work, reading difficulties, asthenopic symptoms, effect of uncorrected refractive errors and causes of asthenopic symptoms. This study is specially designed at a clinical setup to find out the impact of prescribing low astigmatic correction in young adults having near vision complaints.

METHODS

This was a multicentered, prospective cohort study with repeated measures design. A total of 64 subjects of both genders were selected through non-probability convenient sampling technique and were examined at Eye OPDs of Sheikh Zayed Hospital Rahim yar khan, and services Hospital Lahore, after taking relevant informed consent. The duration of study was 6 months after approval of Ethical committee. Patients with age between 15-30 years having low astigmatism (0.25-0.75D) and with near vision complaints were included in the study. Visual acuity was recorded using Snellen Visual acuity box and any amount of astigmatism was corrected with appropriate glasses and subjects were asked for a follow up fortnightly. The data were recorded on proforma designed for this purpose. Follow up improvement in symptoms were recorded and compared with earlier complaints by applying chi square test using SPSS version 23.0.

RESULTS

A total of 64 subjects were enrolled in the study. The mean age of patients was 22.44 years including 27 (42%) males and 37(58%) females. The most common symptom was Eye Strain found in 53 (83%) of the patients. Majority of the patients were having visual acuity 6/9 in their right eyes 30 (47%) and in left eyes 33 (52%). 12 (19%) of the patients was having reduced near visual acuity (N8). The most common type of astigmatism was Against the Rule astigmatism which was found in 34 (53%) patients in right eye while 31 (48%) in left eye. Similarly, patients having With the Rule astigmatism were 24 (38%) in right eye and 23 (36%) in left eye. Whereas, Oblique Astigmatism was found in the patients 6 (9%) in right eye and 10 (16%) in left eye. 62 (96%) patients were improved to 6/6 in both eyes while 1 (2%) were improved to 6/9 while 1 (2%) were improved to best corrected visual acuity of 6/12 after cylindrical correction. 31 (48%) patients were having 0.75D of astigmatism in 25D of astigmatism in right eye and 1 (2%) in left eye. On follow up, improvement in symptoms was noted and compared with symptoms before the usage of glasses by applying chi square test. It was observed that out of 53 patients having Eye Strain, 50 (94%) showed improvement in Eye Strain ($p=0.004$), out of 42 patients having Headache, 38 (90%) showed improvement in Headache ($p=0.001$), all 16 (100%) patients having Near Vision Difficulty, improved right eye and 28 (44%) in left eye while, 31 (48%) patients were having 0.5D of astigmatism in right eye and 35 (54%) in left eye. Whereas, 2 (4%) patients were having 0. ($p=0.000$), out of 20 patients having Difficulty in Computer Usage, 18 (90%) showed improvement in Computer Usage ($p=0.001$) and out of 33 patients having difficulty in Mobile Usage, 27 (82%) showed improvement in Mobile Usage ($p=0.04$). Table 1 shows that of 64 patients, 27(42%) were males and 37(58%)

were females 27(42%) were in the age group 15-20 years, 14 (22%) were in the age group 21-25 years and 23 (36%) were in the age group 26-30 years.

Table 1: Gender & Age group

Variables	No. of Patients
Gender	
Male	24
Female	37
Age Group	
15-20	27
21-25	14
26-30	23

Table 2 shows variety of symptoms in subjects. Eye strain was the most common symptom found in 53 (83%) subjects.

Table 2: Correlative Complaints

Complaint	No. of Patients
Eye Strain	53
Headache	42
Near Vision Difficulty	16
Difficulty in Computer	20
Mobile Usage	33

Table 3 shows different types of astigmatism in patients. The most common type of astigmatism was Against the Rule astigmatism which was found in 34 (53%) patients in right eye while 31 (48%) in left eye. Similarly, patients having With the Rule astigmatism were 24 (38%) in right eye and 23 (36%) in left eye. Whereas, Oblique Astigmatism was found in the patients 6 (9%) in right eye and 10 (16%) in left eye.

Table 3: Types of Astigmatism

Parameter	Right Eye	Left Eye
ATR	34	31
OA	6	10
WTR	24	23

Table 4 shows improvement in patients after wearing astigmatic correction.

Table 4: Improvement in Symptoms after Wearing Glasses

Complaint	Total No. of Patients	No. of Patients Improved	Not Improved	Sig.
Eye Strain	53	50	3	0.003
Near Vision Difficulty	16	16	0	0.000
Near Visual Acuity	12	11	1	0.002
Difficulty in Computer Usage	20	18	2	0.002
Difficulty in Mobile Usage	33	27	06	0.04

Figure 1 shows that 31 (48%) patients were having 0.75D of astigmatism in right eye and 28 (44%) in left eye. While, 31 (48%) patients were having 0.5D of astigmatism in right eye and 35 (54%) in left eye. Whereas, 2 (4%) patients were having 0.25D of astigmatism in right eye and 1 (2%) in left eye.

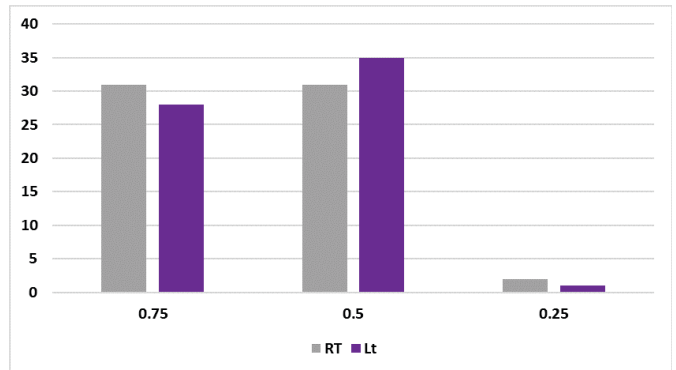


Figure 1: Refractive Status

DISCUSSION

Astigmatism is one of the major form of refractive errors which affects almost 20% of school going children [28]. In Native American or Asian community level of astigmatism is higher in children [29, 30-32]. 46% of the correctable visual impairment is due to astigmatism of ≥ 1 diopter cylinder [33]. With the advent of modern gadgets like mobile phone and computer, etc. visual burden on eyes has increased manifolds as study has also been shifted largely on these gadgets in addition to games and entertainment applications. Young adults going to colleges or universities involved in extensive near work experience different symptoms like eye strain, headache, eye ache, fatigue, difficulty in reading, usage of computer and mobile. This may largely be due to uncorrected astigmatism or dry eyes. It is unknown that how much influence do uncorrected astigmatic refractive errors cause on the visual tasks performed by young adults such as performing near vision activity like reading or in the class room. Eye care professionals also face an important question of prescribing the minimum amount of astigmatic correction. This may largely be due to the fact that the effect of uncorrected astigmatism on visual performance varies with power and axis of astigmatism [34]. The available guidelines regarding the correction of astigmatism suggest that the astigmatism of >1.00 diopter cylinder reducing the visual acuity to $<6/12$ must be corrected [35-37]. On the other hand, some researchers suggests that low astigmatism even of 0.5 DC should be corrected considering axis and power of astigmatism if asthenopic symptoms are present [38-39]. Near vision functions like reading text, reading speed, using mobile or computer are largely affected by low astigmatism of 1 diopter cylinder also causing decrease in visual acuity. In this study, young adults of age 15-30 years having low astigmatism with near vision complaints were included who were having symptoms of eye strain, headache, difficulty in reading, computer usage & mobile phone usage low astigmatism of 0.75 DC or less. Patients were examined by performing

visual acuity, subjective refraction and were advised glasses for cylindrical correct. The most common symptom was eye strain which was found in 53 (83%) of the patients. Most of the patients were having visual acuity reduced to 6/9. The most common type of astigmatism was against the rule astigmatism which was found in almost 50% of the patients. This is similar to a study conducted by Wills *et al.*, which showed that against the rule astigmatism significantly affects reading speed and near vision tasks [9]. Patients were reviewed after 15 days and improvement in symptoms were noted. It was remarkable to note that majority of the patients (96%) were having improved visual acuity to 6/6 with cylindrical correction. Similarly, astigmatism of 0.5DC was most common (51%). On follow up significant improvement in symptoms was noted in patients using cylindrical correction / glasses advised to them. This is similar to the study conducted by Rosenfield *et al.*, who concluded that correction of small amount of astigmatic errors is necessary to prevent patients from near vision difficulties and asthenopic symptoms while doing computer work [40].

CONCLUSIONS

This study concluded that young patients age 15-30 years having low astigmatism experience near vision complaints. These patients do not fall in the age of presbyopia rather their symptoms like eye strain, headache, difficulty in reading, computer usage and mobile phone usage are due to astigmatic changes which can be rectified by prescribing proper cylindrical / astigmatic corrections. On the basis of findings of this preliminary research, it can be concluded that the treatment for near vision complaints in young patients is prescribing them with proper cylindrical / astigmatic correction in the form of eye glasses. Moreover, it was found that Against the Rule Astigmatism was the most common type of astigmatism causing asthenopic symptoms. It is therefore derived that low astigmatism is a cause of ocular discomfort and should not be treated lightly, rather it should be managed at earliest.

Authors Contribution

Conceptualization: AAK

Methodology: NK, MKW

Formal analysis: RNI

Writing-review and editing: FR, MAC

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

- [1] Koroye-Egbe A, Ovenseri-Ogbomo G, Adio AO. Refractive error status in Bayelsa state, Nigeria. *Nigerian Journal of Ophthalmology*. 2010 Jul; 18(2): 57-61. doi: 10.4314/njo.v18i2.70764.
- [2] Pateras E. Prevalence of refractive errors amongst adults, located at the north suburbs of Athens-Greece. *Health Science Journal*. 2012 Jan; 6(1): 102.
- [3] Fricke TR, Holden BA, Wilson DA, Schlenker G, Naidoo KS, Resnikoff S, *et al.* Global cost of correcting vision impairment from uncorrected refractive error. *Bulletin of the World Health Organization*. 2012 Oct; 90: 728-38. doi: 10.2471/BLT.12.104034.
- [4] Yingyong P. Refractive errors survey in primary school children (6-12 year old) in 2 provinces: Bangkok and Nakhonpathom (one year result). *Medical journal of the Medical Association of Thailand*. 2010 Oct; 93(10): 1205.
- [5] Dandona R and Dandona L. Refractive error blindness. *Bulletin of the World Health Organization*. 2001; 79(3): 237-43.
- [6] Harris WF. Astigmatism. *Ophthalmic and Physiological Optics*. 2000 Jan; 20(1): 11-30. doi: 10.1016/S0275-5408(99)00040-X.
- [7] American Academy of Ophthalmology Refractive Management/Intervention Panel. Preferred Practice Pattern® Guidelines. Refractive Errors & Refractive Surgery. San Francisco, CA: American Academy of Ophthalmology; 2007. [Last cited: 1st Jan 2024]. Available at: <http://www.aao.org/ppp>.
- [8] Abrams D. *Duke-Elder's practice of refraction*. Butterworth-Heinemann; 1998.
- [9] Wills J, Gillett R, Eastwell E, Abraham R, Coffey K, Webber A, *et al.* Effect of simulated astigmatic refractive error on reading performance in the young. *Optometry and vision science*. 2012 Mar; 89(3): 271-6. doi: 10.1097/OPX.0b013e3182429c6b.
- [10] Sheedy JE. The physiology of eyestrain. *Journal of Modern Optics*. 2007 Jun; 54(9): 1333-41. doi: 10.1080/09500340600855460.
- [11] Grosvenor Tand Grosvenor TP. *Primary care optometry*. Elsevier Health Sciences; 2007.
- [12] Feldman F and Cooper, J. Assessing the reliability and validity of an asthenopia questionnaire. *American Optometric Association*; 2014.
- [13] Sheedy JE, Hayes J, Engle AJ. Is all asthenopia the same?. *Optometry and Vision Science*. 2003 Nov; 80(11): 732-9. doi: 10.1097/00006324-200311000-00008.
- [14] Schapero M, Cline D, Hofstetter HW. *Dictionary of Visual Science*, 4th ed. Butterworth-Heinemann; 1997.

- [15] Sheedy JE. Vision problems at video display terminals: a survey of optometrists. *Journal of the American Optometric Association*. 1992 Oct; 63(10): 687-92.
- [16] Nilsen E and Salibello C. Survey of US optometrists regarding prevalence and treatment of visual stress symptoms. *Advances in Human Factors/Ergonomics*. 1997 Aug; 663-6.
- [17] Guth SK. Prentice memorial lecture: the science of seeing—a search for criteria. *Optometry and Vision Science*. 1981 Oct; 58(10): 870-85. doi: 10.1097/00006324-198110000-00014.
- [18] Sheedy JE and Saladin JJ. Phoria, vergence, and fixation disparity in oculomotor problems. *American Journal of Optometry and Physiological Optics*. 1977 Jul 1; 54(7): 474-8. doi: 10.1097/00006324-197707000-00008.
- [19] Sheedy JE and Saladin JJ. Association of symptoms with measures of oculomotor deficiencies. *American Journal of Optometry and Physiological Optics*. 1978 Oct; 55(10): 670-6. doi: 10.1097/00006324-197810000-00002.
- [20] Grisham DJ. Visual therapy results for convergence insufficiency: a literature review. *Optometry and Vision Science*. 1988 Jun; 65(6): 448-54. doi: 10.1097/00006324-198806000-00004.
- [21] Hennessey D, Iosue RA, Rouse MW. Relation of symptoms to accommodative infacility of school-aged children. *Optometry and Vision Science*. 1984 Mar; 61(3): 177-83. doi: 10.1097/00006324-198403000-00005.
- [22] Levine S, Ciuffreda KJ, Selenow A, Flax N. Clinical assessment of accommodative facility in symptomatic and asymptomatic individuals. *Journal of the American Optometric Association*. 1985 Apr; 56(4): 286-90.
- [23] Jaschinski-Kruza W and Schweflinghaus W. Relations between dark accommodation and psychosomatic symptoms. *Ophthalmic and Physiological Optics*. 1992 Jan; 12: 103-5. doi: 10.1111/j.1475-1313.1992.tb00260.x.
- [24] Wiggins NP and Daum KM. Visual discomfort and astigmatic refractive errors in VDT use. *Journal of the American Optometric Association*. 1991 Sep; 62(9): 680-4.
- [25] Wiggins NP, Daum KM, Snyder CA. Effects of residual astigmatism in contact lens wear on visual discomfort in VDT use. *Journal of the American Optometric Association*. 1992 Mar; 63(3): 177-81.
- [26] Bachman WG. Computer-specific spectacle lens design preference of presbyopic operators. *Journal of Occupational Medicine*. 1992 Oct; 34: 1023-7.
- [27] Butzon SP, Sheedy JE, Nilsen E. The efficacy of computer glasses in reduction of computer worker symptoms. *Optometry (St. Louis, Mo.)*. 2002 Apr; 73(4): 221-30.
- [28] Sheedy JE and McCarthy M. Reading performance and visual comfort with scale to grey compared with black-and-white scanned print. *Displays*. 1994 Jan; 15(1): 27-30. doi: 10.1016/0141-9382(94)90040-X.
- [29] Sheedy JE, Kang JM, Ota WT. Vertical eye gaze position: effect on task performance and visual comfort. *Diagnosing and treating computer-related vision problems*. Boston: Butterworth-Heinemann. 2002: 190.
- [30] Wilkins AJ, Nimmo-Smith I, Slater AI, Bedocs L. Fluorescent lighting, headaches and eyestrain. *Lighting Research & Technology*. 1989 Mar; 21(1): 11-8. doi: 10.1177/096032718902100102.
- [31] Toda I, Fujishima H, Tsubota K. Ocular fatigue is the major symptom of dry eye. *Acta Ophthalmologica*. 1993 Jun; 71(3): 347-52. doi: 10.1111/j.1755-3768.1993.tb07146.x.
- [32] Robaei D, Rose K, Kifley A, Mitchell P. Patterns of spectacle use in young Australian school children: findings from a population-based study. *Journal of American Association for Pediatric Ophthalmology and Strabismus*. 2005 Dec; 9(6): 579-83. doi: 10.1016/j.jaapos.2005.07.005.
- [33] He M, Huang W, Zheng Y, Huang L, Ellwein LB. Refractive error and visual impairment in school children in rural southern China. *Ophthalmology*. 2007 Feb; 114(2): 374-82. doi: 10.1016/j.opht.2006.08.020.
- [34] Fuller JR, Baxter LA, Harun S, Levy IS. Astigmatism in Bangladeshi and white school entrants in East London: a prospective comparative study. *Eye*. 1995 Nov; 9(6): 794-6. doi: 10.1038/eye.1995.196.
- [35] Garber JM. High corneal astigmatism in Navajo school children and its effect on classroom performance. *Journal of the American Optometric Association*. 1981 Jul; 52(7): 583-6.
- [36] Shih YF, Hsiao CK, Tung YL, LIN LL, Chen CJ, Hung T. The prevalence of astigmatism in Taiwan schoolchildren. *Optometry and Vision Science*. 2004 Feb; 81(2): 94-8. doi: 10.1097/00006324-200402000-00007.
- [37] He M, Zeng J, Liu Y, Xu J, Pokharel GP, Ellwein LB. Refractive error and visual impairment in urban children in southern China. *Investigative Ophthalmology & Visual Science*. 2004 Mar; 45(3): 793-9. doi: 10.1167/iovs.03-1051.
- [38] Robaei D, Rose K, Ojaimi E, Kifley A, Huynh S, Mitchell P. Visual acuity and the causes of visual loss in a

population-based sample of 6-year-old Australian children. *Ophthalmology*. 2005 Jul; 112(7): 1275-82. doi: 10.1016/j.ophtha.2005.01.052.

- [39] Wolffsohn JS, Bhogal G, Shah S. Effect of uncorrected astigmatism on vision. *Journal of Cataract & Refractive Surgery*. 2011 Mar; 37(3): 454-60. doi: 10.1016/j.jcrs.2010.09.022.
- [40] Rosenfield M, Hue JE, Huang RR, Bababekova Y. The effects of induced oblique astigmatism on symptoms and reading performance while viewing a computer screen. *Ophthalmic and Physiological Optics*. 2012 Mar; 32(2): 142-8. doi: 10.1111/j.1475-1313.2011.00887.x.