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

Faisal Rashid², Muhammad Ajmal Chaudhary¹, Nasrullah Khan¹, Rana Naveed Iqbal¹, Mustafa Khalid Waheed² and Asad Aslam Khan¹

¹Department of Ophthalmology, Services Institute of Medical sciences, Services Hospital, Lahore, Pakistan
²Department of Ophthalmology, Sheikh Zayed Medical College/ Sheikh Zayed Hospital, Rahim Yar Khan, Pakistan
³Lahore Medical & Dental College, Lahore, Pakistan
⁴College of Ophthalmology & Allied Vision Sciences (COAVS), King Edward Medical University/ Mayo Hospital, Lahore, Pakistan

ARTICLE INFO

Key Words:
Low Astigmatism, Near Vision, Eye Strain, Headache, Cylindrical Correction

How to Cite:

*Corresponding Author:
Faisal Rashid
Department of Ophthalmology, Services Institute of Medical sciences, Services Hospital, Lahore, Pakistan
optometristfaisalrasheed@gmail.com

Received Date: 23rd November, 2023
Acceptance Date: 13th December, 2023
Published Date: 31st December, 2023

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 eyeglasses.

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 eye strain 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 a 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 [24-28]; 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. 82 (96%) patients were improved to 6/6 in both eyes while 12(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 12(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

<table>
<thead>
<tr>
<th>Variables</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24</td>
</tr>
<tr>
<td>Female</td>
<td>37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>15–20</td>
<td>27</td>
</tr>
<tr>
<td>21–25</td>
<td>14</td>
</tr>
<tr>
<td>26–30</td>
<td>23</td>
</tr>
</tbody>
</table>

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

Table 2: Correlative Complaints

<table>
<thead>
<tr>
<th>Complaint</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Strain</td>
<td>53</td>
</tr>
<tr>
<td>Headache</td>
<td>42</td>
</tr>
<tr>
<td>Near Vision Difficulty</td>
<td>16</td>
</tr>
<tr>
<td>Difficulty in Computer</td>
<td>20</td>
</tr>
<tr>
<td>Mobile Usage</td>
<td>33</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Right Eye</th>
<th>Left Eye</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATR</td>
<td>34</td>
<td>31</td>
</tr>
<tr>
<td>OA</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>WTR</td>
<td>24</td>
<td>23</td>
</tr>
</tbody>
</table>

Table 4 shows improvement in patients after wearing astigmatic correction.

Table 4: Improvement in Symptoms after Wearing Glasses

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Total No. of Patients</th>
<th>No. of Patients Improved</th>
<th>Not Improved</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Strain</td>
<td>53</td>
<td>50</td>
<td>3</td>
<td>0.003</td>
</tr>
<tr>
<td>Near Vision Difficulty</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0.000</td>
</tr>
<tr>
<td>Near Visual Acuity</td>
<td>12</td>
<td>11</td>
<td>1</td>
<td>0.002</td>
</tr>
<tr>
<td>Difficulty in Computer Usage</td>
<td>20</td>
<td>18</td>
<td>2</td>
<td>0.002</td>
</tr>
<tr>
<td>Difficulty in Mobile Usage</td>
<td>33</td>
<td>27</td>
<td>6</td>
<td>0.04</td>
</tr>
</tbody>
</table>

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.

Astigmatism is one of the major forms 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 suggest 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 (61%). 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.

**Source of Funding**

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

**References**


[38] Robaei D, Rose K, Ojaimi E, Kifley A, Huynh S, Mitchell P. Visual acuity and the causes of visual loss in a
