Incidence of Amblyopia in Strabismic Population

Mian M. Shafique, NaeemUllah, Nadeem H. Butt, Muhammad Khalil, Tayyaba Gul

**Purpose:** To find the incidence and density of amblyopia with reference to the type of squint among the strabismic patients visiting eye department.

**Material and Methods:** This prospective study was started in January 2000 and a total of 177 patients have been dealt with. Both male and female patients of all age groups and all types of squints were included. All the patients underwent standard procedure of assessment including history, examination and investigations to find the type of deviation, amount of the deviation, the presence of amblyopia and the depth of amblyopia. It was then followed by analysis to see the effect of different factors on the depth of amblyopia.

**Results:** Out of 177 patients 94 had uniocular squint (Group-I) and 83 alternating squint (Group-II). Majority of patients in Group-I had some degree of amblyopia (82%). Amblyopia was much less in group-II (18%). All the 106 patients having amblyopia showed at least two lines difference of Snellen’s Acuity between both eyes. Amblyopia is relatively denser in uniocular than alternating strabismus. It is more common and dense in esotropia than exotropia.

**Conclusion:** Strabismic amblyopia is a condition of arrested development of vision due to misalignment of visual axis in the first 5-6 years of life. This can be avoided if it is treated at the right time. Earlier detection and treatment of squint in the amblyogenic years can save the patient from this life long disability.

Strabismic amblyopia is a serious blinding condition, which affects the patients in very early part of their life, due to misalignment of one of the eyes while the other eye remains straight. When a child is born his retina is almost fully developed structurally, but his vision is very poor (6/60) as it has not fully developed functionally. To develop its full function it requires a clear sharp image formed on its center (macula) within 5-6 yrs of age (vision developing age or amblyogenic age). If squint develops within this period, the eye will not be straight or directed towards the object of regard and the image of this object will not be formed on the macula rather it will be formed in the periphery. So there will be no further development of macular vision.

Visual acuity will remain arrested either at 6/60 or it will develop partially to few more lines but it will never become normal (6/6).

There are many causes of amblyopia but strabismus is one major treatable cause not only in other parts of the world but also in our country. In Pakistan no reliable statistical data is available up till now. We have therefore started a study in Lahore, to find out the percentage of amblyopia in strabismic patients of our population. Among the other causes of amblyopia including, anisometropia, high ametropia, and visual
deprivation due to diseases like cataract, are also common. By ruling out all other causes and treating strabismus in early years of life we can prevent the child from such a grave problem, the affects of which are life long.

**MATERIAL AND METHODS**

This study on incidence of strabismic amblyopia was conducted in Department of Ophthalmology Fatima Jinnah Medical College and Sir Ganga Ram Hospital, Lahore from January 2000 to December 2002. Patients of squint attending the eye out patient department were screened for amblyopia. The percentage of amblyopia in strabismic patients and the density of amblyopia in relation to the type of deviation was evaluated. 177 patients of all age groups, both sexes and all types of squint were included.

All the patients who visited the eye department and were found to have squint underwent thorough orthoptic assessment which included history, examination and a series of diagnostic tests. Visual acuity was recorded in all cases applying different test types for different age groups. Gross and slit lamp examination was done to rule out any cause of visual deprivation in anterior segment. Cover tests was an essential to label the type of squint. Ocular movements in six cardinal positions of gaze and convergence helped to detect any restrictive or paralytic element. Prism and alternate cover test and synoptophore were main tools to detect the amount of deviation. For binocular functions and suppression, worth four dot test, Bagolini striated glasses, Frisbee test or synoptophore were applied. Retinoscopy (cycloplegic or non-cycloplegic) was also done in every patient to find out the refractive status of each eye. Ophthalmoscopy, direct or indirect, was always performed to rule out any organic cause of reduced vision in the posterior segment.

All the findings detected by above mentioned series of tests were recorded in a performa which was later on was used for further study.

**RESULTS**

Total number of patients in the study were 177. Age of the patients ranged from 3 years to 40 years. Females were found to be more than males (56% vs. 44%) Fig 1. Two major groups of the patients were uniocular squint in 94 cases (Group-I) while 83 cases had alternating variety of squint (Group-II). Corrected visual acuity was 6/6 in both eyes in 71 cases while amblyopia was recorded in 106 cases (59.9%) (Table 1). 82% of total amblyopes belonged to group- I (uniocular squint) while only 18% were from Group-II (alternating squint).

As far as the density of amblyopia is concerned, mild amblyopia (two lines Snellen’s chart difference) was seen in 30 patients (28.3%), moderate amblyopia (3 lines Snellen’s chart difference) in 51 patients (48.1%) and dense amblyopia (4 or more lines Snellen’s chart difference) in 25 patients (23.6%) (Fig. 2 and Table 2).

![Fig. 1: Sex distribution](image)

![Fig. 2: Density of amblyopia](image)
DISCUSSION

Amblyopia and strabismus are the most common ocular conditions occurring during childhood. Amblyopia is the leading cause of visual loss in childhood. Strabismus is a significant cause of ocular morbidity leading to amblyopia and psychosocial distress. The overall prevalence of amblyopia varies between 1.6 to 3.6% in different regions of the world. Almost all age groups have been studied and the recorded prevalence in children is 3.0%, in untreated adults 3.0% and untreated olds 2.9%. Although it has been recorded low in certain countries but there is no significant difference seen in different racial groups.

Strabismus has been proved to be the most common cause of amblyopia. Other causes are anisometropia, combined strabismus with anisometropia and sensory deprivation. In our study out of 177 strabismic patients 106 had some degree of amblyopia regardless of the type of deviation. So the overall incidence of amblyopia in strabismic population was 59.9% (Table-1).

<table>
<thead>
<tr>
<th>Group</th>
<th>Type of squint</th>
<th>No of Patients</th>
<th>No. of amblyopia Patients</th>
<th>Overall Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Unilateral</td>
<td>94</td>
<td>87</td>
<td>49.1</td>
</tr>
<tr>
<td>II</td>
<td>Alternating</td>
<td>83</td>
<td>19</td>
<td>10.8</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>177</td>
<td>106</td>
<td>59.9</td>
</tr>
</tbody>
</table>

Table-2: Density of Amblyopia

<table>
<thead>
<tr>
<th>Type of strabismus</th>
<th>No of amblyopic Patients</th>
<th>Density of Amblyopia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mild</td>
</tr>
<tr>
<td>Uniocular</td>
<td>87</td>
<td>16</td>
</tr>
<tr>
<td>Alternating</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>106</td>
<td>30</td>
</tr>
</tbody>
</table>

Fig. 3. Left Exotropia with severe amblyopia

It is important to note that the incidence of amblyopia in unilateral squint was found to be higher (49.1%) than alternating squint (10.8%). It is quite clear that those strabismic patients who develop alternation are at 4 times less risk of developing amblyopia than the uniocular squinters. The direction of the deviation definitely has some relation to the development of amblyopia. According to our study the prevalence of amblyopia in esotropia was higher (66%) than its prevalence in exotropia (53.5%). Similar but slightly higher figures are seen in other international research work.
severe or dense if difference of four or more lines between the visual acuity of two eyes. 28.3% of the amblyopes had mild amblyopia, majority of these belonged to alternating squint and more so to exotropia (Fig 5). 48.1% of the amblyopia is moderate and is seen almost equally in uniconal esotropia and exotropia (Fig 6). Remaining 23.6% amblyopia is severe or dense and most of it seen in uniocular esotropia. (Table 3).

Presence of strabismic amblyopia in all age groups in our study indicates the lack of treatment in early

**Table 3: Effect of type of strabismus on density of amblyopia**

<table>
<thead>
<tr>
<th>Type of Squint</th>
<th>No of Patients</th>
<th>No of Amblyopic Patients</th>
<th>Density of Amblyopia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mild</td>
</tr>
<tr>
<td>Esotropia</td>
<td>Uniocular (Rt or Lt)</td>
<td>53</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Alternating</td>
<td>38</td>
<td>12</td>
</tr>
<tr>
<td>Exotropia</td>
<td>Uniocular (Rt or Lt)</td>
<td>41</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Alternating</td>
<td>45</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>177</td>
<td>106</td>
</tr>
</tbody>
</table>

**Fig. 4:** Alternating Exotropia with normal visual acuity

**Fig. 5:** Left Intermittent Exotropia with mild amblyopia
be devised and applied. The best time for screening may be at school entry into the play group.

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Fig. 6: Accommodative esotropia with right moderate amblyopia years of life. Atropine penalisation has been shown to be as effective as occlusion therapy in the treatment of amblyopia\textsuperscript{12-13}. These techniques can only be applied and become useful if the diagnosis of amblyopia is made early in amblyogenic or vision developing age. Early detection of amblyopia and its treatment can reduce the overall prevalence as proved by many studies in different parts of the world\textsuperscript{14-15}. Early screening of visual acuity and strabismus is a real need of our country.

CONCLUSION
Amblyopia due to strabismus is a problem faced in all age groups in our society. To save the future generations from this life time visual disability, an enthusiastic approach to the problem is required, and this must be based on the identification and treatment of strabismus and amblyopia during the sensitive period. A comprehensive screening programme must
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REFERENCES  