

## Analysis of association between type of amblyopia and gender at a tertiary care hospital in Karachi

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### Abstract

**Objective:** To analyse the frequency of different types of amblyopia and its association with gender.

**Methods:** The cross-sectional study was conducted from March 2014 to October 2014 at the Department of Ophthalmology of a tertiary care hospital in Karachi. The patients were classified into different types of amblyopia like anisometropic, strabismic, sensory deprivation and meridional amblyopia. Stratification was done according to age, gender and type of amblyopia by using SPSS version 21.

**Results:** Out of 130 patients, 71 were male and 59 were female. The amblyopia rate determined was anisometropic 69.23%, strabismic amblyopia 21.51% and others 9.23%. The mean age of subjects was 18.02±9 years. Type of amblyopia was independent of gender, and anisometropic amblyopia was the most common type of amblyopia found in both genders.

**Conclusion:** This study found no significant association between gender and types of amblyopia and anisometropic amblyopia was the most common type of amblyopia in the data collected.

**Keywords:** Amblyopia, Anisometropic, Strabismic, Sensory deprivation, Meridional. (JPMA 66: 545; 2016)

### Introduction

Amblyopia, also called lazy eye, is a developmental neurological condition during the early age. In amblyopia, one eye becomes dominant while the other eye becomes lazy and the brain starts to ignore the signals coming from lazy eye and favours the signals of dominant eye (right or left). This ignorance of signals from one eye may lead to vision impairment or in some cases complete blindness from one eye called monocular blindness. In amblyopic condition the doctor/refractionist does not find any organic cause of decreased visual acuity (VA) through physical examination of eye. As amblyopia develops in early childhood it should be diagnosed as early as possible, for which it is recommended that a child must go for a visual examination as soon as he/she reaches the age of three years so that amblyopia can be identified and cured. Anisometropic, strabismic, meridional and ametropic amblyopia are types of amblyopia commonly found in the population. Anisometropia is the type which is most difficult to diagnose because both eyes look normal in physical examination. In anisometropia the brain overpowers the image coming from one eye and focuses on the image coming from the other eye. In this type of amblyopia the refractive power of both eyes is

different. Treatment with glasses, lenses or sometimes patching may be employed to overcome this type of amblyopia. In strabismic amblyopia, one eye deviates towards right or left and both eyes fail to focus on an object. Meridional amblyopia is caused by high astigmatism in one or both eyes. In ametropic amblyopia the visual images are not in focus on the retina and brain is unable to focus on single distant object due to reduced visual acuity (VA).

If amblyopia is not treated it can not only have an economic burden on society but it can also lead to prodigious psychological disorder in the children as well as in adults.<sup>1,2</sup> They are unable to perform some of their daily activities and feel social anxiety while performing group activities. This situation also affects their self-image and lack of interpersonal skills. More anger and outrage are also common in strabismus victims.

The current study was conducted to explore the association between amblyopia and gender in patients visiting a tertiary care hospital in Karachi.

### Patients and Method

The cross-sectional study was conducted at the eye outpatient department (OPD) of a tertiary care hospital in Karachi from March 2014 to October 2014, after ethical permission was obtained from the relevant authorities. Patients who were observed as amblyopic were included and no specific sampling methods or sample size calculation criteria were adopted.

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Primary data noted after informed consent of the subjects included name, gender, age, visual acuity (right, left), refraction and deviation (right, left). In order to maintain anonymity, name was omitted subsequently. Only the information about type of amblyopia, gender and age was considered for the study. Patients having corneal scar, optic nerve (atrophy hypoplasia) disorder, macular disorder, vitreous disorder and those above 40 years of age were excluded.

Standard medical equipment and methods were adopted to diagnose amblyopia type. All the participants had visual acuity testing done by Snellen Chart, refraction by auto-refractors retinoscopy, orthoptic examination with deviation, slit lamp examination of anterior segment of eye, and funduscopy with 90D lens.

As the study did not have any objective regarding treatment, no follow-up with patients was done.

The four types of amblyopia were grouped into three types as anisometric, strabismic and 'other'. The third type contained all the cases that were not either anisometric or strabismic. All the assumptions of chi square test were fulfilled before applying the distribution for the hypothesis that type of amblyopia is independent of gender. There were two major assumptions. One was concerning the sample size and the other was about independence of assumption. As far as the sample size of data was concerned, data size was good enough for the required calculation. As for the second assumption, the data was not correlated and the two variables were independent of each other. Data was collected by the researchers personally, and hence all chances of bias were minimised as much as humanly possible. After collecting the required parameters from the patients, experienced consultants of the field analysed the data and categorized it according to the requirement of the study. SPSS version 21 was used for statistical analysis.

## Results

Of the 146 patients initially enrolled, 16(11%) were

**Table-2:** Prevalence of amblyopia in general population.

| Author                      | Sample size (n) | Prevalence | Age (year) |
|-----------------------------|-----------------|------------|------------|
| Ganekal et al. <sup>4</sup> | 4020            | 1.09%      | 5 to 15    |
| Chia et al. <sup>8</sup>    | 3009            | 1.1%       | 2.5 to 6   |
| Faghihi et al. <sup>5</sup> | 1430            | 2.09%      | 14 to 18   |
| Polling et al. <sup>6</sup> | 591             | 2.1%       | 0.16 to 12 |
| Jing et al. <sup>7</sup>    | 2893            | 2.1%       | 5 to 9     |
| Awan et al. <sup>3</sup>    | 200             | 3%         | 11 to 13   |

excluded as they did not meet the inclusion criteria.

Of the 130(89%) amblyopic patients, 71 were males and 59 were females. The mean age of subjects was 18.02±9. Out of 90 anisometric patients, 40% were females and 60% were males. Out of 28 strabismic patients, 53.6% were females and 46.4% were males. Out of 12 patients belong to the 'other' category, 66.7% were females and 33.3% were males. The most common type of amblyopia was anisometropia (69.23%) and the second most common type was strabismus (21.54%) (Table-1).

There was no significant association between type of amblyopia and gender ( $\chi^2$  (0.05, 2) = 4).

## Discussion

The occurrence rate of amblyopia in the general population is 1-5%.<sup>3</sup> To determine the prevalence and aetiology of amblyopia in school children, Ganekal et al.<sup>4</sup> screened 4020 children of age 5-15 years in India. The prevalence of amblyopia was 1.09%. Faghihi et al.<sup>5</sup> conducted a cross-sectional study in Iran to determine the prevalence of amblyopia in children. Sample size of the study was 1430 and 2.09% prevalence was reported. The study by Polling et al.<sup>6</sup> and Fu et al.<sup>7</sup> showed 2.1% prevalence of amblyopia.

The prevalence of amblyopia was found to be 1.1% in young Singaporean-Chinese children.<sup>8</sup> A total of 200 students of a school in Lahore, Pakistan, were examined for visual impairments and 3% of them were found to be

**Table-1:** Type of amblyopia in sample based on age and gender.

| Age Group (Years) | Gender | Anisometric | Strabismic | Other | Total | Percentage |
|-------------------|--------|-------------|------------|-------|-------|------------|
| ≤10               | Male   | 11          | 5          | 0     | 16    | 26.92%     |
|                   | Female | 8           | 9          | 2     | 19    |            |
| 11-20             | Male   | 14          | 5          | 4     | 23    | 35.38%     |
|                   | Female | 15          | 5          | 3     | 23    |            |
| 21-30             | Male   | 20          | 1          | 0     | 21    | 25.38%     |
|                   | Female | 9           | 1          | 2     | 12    |            |
| 31-40             | Male   | 9           | 2          | 0     | 11    | 12.31%     |
|                   | Female | 4           | 0          | 1     | 5     |            |

amblyopic.<sup>3</sup> From different studies it can be observed that prevalence of amblyopia is around 1.09% to 3% of population of any area. In literature, the most common type of amblyopia is anisometropic (Table-2).

Results from this study clearly depicted that the type of amblyopia was independent of gender. It can affect anyone regardless of gender during their early years of childhood. Moreover, anisometropic amblyopia was found to be the most common type of amblyopia in both genders. The findings of this study are similar to previous studies,<sup>6,7</sup> and in contrast with the study in which the most common type is strabismic.<sup>9</sup> The results are also opposed to a study which concluded that amblyopia is more common in males than females.<sup>10</sup>

Research should be done to explore the causes of this common type of amblyopia and measures should be taken in order to minimise the chances of occurrence in early age as it is highly effective to overcome amblyopia in the early age compared to late age.<sup>11</sup>

Although the most common treatment of amblyopia is patching the good eye, but a lot of different methods are also available. Amblyopia can be cured through medical treatment.<sup>12</sup> Game platform also have been developed to treat amblyopia.<sup>13-16</sup>

Results presented in this work can be helpful for medical professionals as well as the developers which are developing methods to take care of this problem. If video games are adopted to treat amblyopia then the game scenes should be developed which can attract both genders, and amblyopic persons can find it interesting and feel motivated while playing the game. Furthermore, the visual aids manufacturer can take advantage from this work as they can have a general idea about their product design and targeting the age group for which they should manufacture their products.

This study can help the eye department of tertiary care hospitals and other related ophthalmic departments as well in different scenarios. For example, the eye department can find how frequent a specific type of amblyopia is occurring in the local population. The eye department can make suitable arrangements for screening and to cure the specific type of amblyopia. Moreover, the eye department can do further investigation if it finds an irregular incidence of amblyopia in the local population. In the light of results, the eye department may suggest the proper methods which can be adopted to avoid the problem by local population. For example, if amblyopia is more common in males then what type of special care should be adopted by the male

population?

Comparison with earlier studies that had been performed by Awan et al.<sup>3</sup> at Lahore, Pakistan, revealed that meridional amblyopia is the most common type of amblyopia being 1.5% ametropic, while anisometropic and strabismic types of amblyopia were 0.5%. In our study, anisometropia was 69.23%, strabismic was 21.54%, while meridional and sensory deprivation types of amblyopia were 9.23%. This similarity co-relates with the study performed in Iran, which concluded that the prevalence of amblyopia was 2.1% and anisometropia was the most common cause (54.2%) while the prevalence of strabismus was 1.5%.<sup>5</sup>

One frequently agreed upon conclusion in the literature regarding the treatment of anisometropic amblyopia is that the severity of the amblyopia at the onset of treatment is the factor most predictive of outcome. Age at presentation, amount of anisometropia, compliance with or duration of occlusion therapy and other factors much less consistently predict ultimate visual outcomes.<sup>17</sup>

Alternatively stated, early detection and treatment of anisometropia before or early in the development of amblyopia is likely to yield better visual outcomes than current treatment. With the advent of newer technologies, such as photo screening or photo refraction, it is likely that anisometropia will be identified in increasing numbers of patients at younger ages.<sup>16,18</sup>

Early detection of amblyopia and treatment of any refractive error if present can reduce the overall prevalence of anisometropia in our country. Great emphasis should be given on creating awareness through campaigns in day care centres, preschools, school for teachers and among parents that early visual assessment of a child can lead to early detection, prompt diagnosis and treatment of amblyopia in this age group.

In terms of strengths and weaknesses of the current study, sufficient amblyopic population was studied comprising patients of different age groups up to 40 years. This sample provides a strong foundation for our results. Moreover, we have studied population of different age groups having male and female participants. One of the limitations is that we had a very low percentage of sensory deprivation and ametropic amblyopia cases which also affected our chi square calculations and we did not have the demographic background of our patients. In the absence of demographic background, we were unable to conclude about the cause of amblyopia.

It is recommended that the population should be made aware of the amblyopia problem. Proper community

programmes should be promoted in order to make sure that children must undergo proper eye examination in early age. There should also be vision testing examination in pre-primary, kindergarten and in Montessori classes so that if any child is without proper eye examination at home, they should have a visual examination at school.

### Conclusion

There was no significant association between gender and type of amblyopia. Anisometropic amblyopia was the most common type of amblyopia. Future research should involve more tertiary care centres as well as ophthalmic centres of Karachi to obtain more data about amblyopic patients so that the results can be generalised.

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