

## RESEARCH COMMUNICATION

# Clinical profile of amblyopic children at a Philippine tertiary hospital

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**ABSTRACT****Objective:** To describe the clinical profile of patients with amblyopia seen at a Philippine tertiary hospital.**Methodology:** This was a cross-sectional study utilizing a chart review of children ages 6 months to 18 years old diagnosed with amblyopia at a Philippine tertiary hospital. Records with complete entry of history and ocular examinations were included. Verbal children with best-corrected visual acuity in both eyes of less than 6/15 or a 2 line difference between eyes were considered amblyopic. Response to alternate occlusion or refixation patterns was used as a basis for diagnosing amblyopia in pre-verbal children. Patients with visual deprivation amblyopia such as from cataract who had undergone lens extraction and optical correction were included.**Results:** There were 334 patients included in the study. The mean age was 5±3 years with 52% being male. Deprivation type of amblyopia was present in 192 (58%) patients, strabismic type in 81 (24%), and refractive type in 61 (18%). No sex predilection was observed. Majority of the patients were 3-6 years old on initial consult. Cataract was the most common cause of deprivation amblyopia affecting 127 (66%) patients. Strabismic amblyopia was present in 58 patients with 74% being esotropic. Anisometropic refractive amblyopia was more common at 37 (58%) than isometropic refractive amblyopia.**Conclusion:** Visual deprivation amblyopia was the most common cause of amblyopia in a Philippine tertiary hospital.**Keywords:** amblyopia, deprivation, cataract, anisometropia, strabismus

## Introduction

Amblyopia is defined as poor vision in one or both eyes which cannot be accounted directly to the effect of any organic disorder of the eye or visual pathways [1]. It is a developmental condition wherein any form of visual disturbance introduced during the visual system maturation can cause delay in the normal development of a child's vision. The etiology of amblyopia includes strabismus, refractive errors, and visual deprivation [2]. Amblyopia is among the top causes of visual impairment in children and adolescents [3]. Pooled prevalence from a meta-analysis was 1.44% with Africa having the lowest at 0.72% and Europe having 2.90% [3,4]. Etiology differs between countries. However, there is no data on the causes of amblyopia in the Philippines. As such, this study aimed to determine them in a Philippine tertiary hospital which sees a significant number of children with amblyopia. Patients with amblyopia benefit from early detection and treatment which are well-studied and proven effective [2]. Knowing the clinical profile, especially the most common causes of amblyopia

locally, can assist pediatric ophthalmologists and policymakers in screening for and managing amblyopia.

## Methodology

This study has been approved by the University of the Philippines Manila Research Ethics Board. All children ages 6 months old to 18 years diagnosed with amblyopia at the Division of Pediatric Ophthalmology and Strabismus of the Department of Ophthalmology at a Philippine tertiary hospital were included in this study. Records with complete data on history, visual acuity, full cycloplegic refraction, ocular alignment, eye preference, slit lamp examination, and indirect ophthalmoscopy were included. A diagnosis of amblyopia was given if there was a difference in visual acuity of greater than two lines between the eyes; or if both eyes had an acuity of below 6/15 despite correction of refractive errors for verbal children using the Snellen or age-appropriate visual acuity chart. In pre-verbal

children or those aged less than 2 years old whose vision cannot be evaluated by a visual acuity chart, response to alternate occlusion or re-fixation patterns with the best correction was used as basis for diagnosing amblyopia. Patients with visual deprivation type of amblyopia such as cataract who had undergone intervention and were given the best correction were included in the study. Patients with more than one cause of amblyopia (e.g. strabismus with refractive errors) were excluded. Data were summarized and tabulated using Microsoft Excel version 2016 (Microsoft Corporation, Redmond, WA, USA).

## Results

Of the 1018 charts reviewed, 334 were included in the study. Charts with incomplete data and patients with combined

form of amblyopia were excluded. The mean age was  $5 \pm 3$  years and 173 (52%) patients were male. For age distribution, 32% of the patients were 6 months to 2 years old, 36% were 3 to 6 years old, 27% were 7 to 12 years old, and 5% were 13 to 18 years old. Blurring of vision was the most common cause to consult at 60%, strabismus at 33%, abnormal head position and squinting at 1% each, and other reasons for 5%.

The best-corrected visual acuity of the patients is summarized in Table 1. One hundred fifty-nine (48%) children had hyperopia, 51 (15%) had myopia, 8 (2%) had astigmatism, and 116 (35%) had combined refractive errors (Table 2). The most common hyperopic refractions were +1.50 to +3.00 diopters (D) found in 92 (58%) children with hyperopia which were also the most common in hyperopic children less than 2 years old. Thirty-seven

**Table 1. Best Corrected Visual Acuity (BCVA) of Patients by Age**

| BCVA         | Age            |             |             |               | Total<br>N (%) |
|--------------|----------------|-------------|-------------|---------------|----------------|
|              | 6 mons-2 years | 3 – 6 years | 7 -12 years | 13 – 18 years |                |
|              | N (%)          | N (%)       | N (%)       | N (%)         |                |
| Dazzle - CSM | 103            | 32          | 0           | 0             | 135 (40%)      |
| LP - CF      | 1              | 23          | 15          | 4             | 43 (13%)       |
| 2/60-5/60    | 0              | 8           | 9           | 2             | 19 (6%)        |
| 6/60-6/21    | 3              | 24          | 41          | 9             | 77 (23%)       |
| 6/18-6/15    | 2              | 33          | 24          | 1             | 60 (18%)       |
| Total        | 109 (32%)      | 120 (36%)   | 89 (27%)    | 16 (5%)       | 334 (100%)     |

Best Corrected Visual Acuity (BCVA); CSM- central, steady, maintained; LP- light projection; CF- counting fingers

**Table 2. Error of Refraction of Patients by Age**

| Error of Refraction  | Age       |           |           |          | Total<br>N (%)   |
|----------------------|-----------|-----------|-----------|----------|------------------|
|                      | 0.5-2     | 3 – 6     | 7 -12     | 13 – 18  |                  |
|                      | N (%)     | N (%)     | N (%)     | N (%)    |                  |
| <b>Hyperopia</b>     | <b>75</b> | <b>57</b> | <b>25</b> | <b>2</b> | <b>159 (48%)</b> |
| +1.50 to +3.50       | 41        | 35        | 14        | 2        | 92               |
| +3.75 to +5.50       | 4         | 7         | 0         | 0        | 11               |
| +5.75 to +6.50       | 1         | 2         | 2         | 0        | 5                |
| +6.75 to +8.50       | 2         | 2         | 1         | 0        | 5                |
| +8.75 to +10.50      | 5         | 2         | 2         | 0        | 9                |
| > +10.50             | 22        | 9         | 6         | 0        | 37               |
| <b>Myopia</b>        | <b>16</b> | <b>14</b> | <b>18</b> | <b>3</b> | <b>51 (15%)</b>  |
| -2.00 to -3.00       | 8         | 7         | 8         | 2        | 25               |
| -3.25 to -4.00       | 2         | 1         | 0         | 0        | 3                |
| -4.25 to -5.00       | 0         | 1         | 3         | 0        | 4                |
| -5.25 to -7.00       | 2         | 2         | 0         | 0        | 4                |
| -7.25 to -10.00      | 2         | 1         | 4         | 0        | 7                |
| > -10.00             | 2         | 2         | 3         | 1        | 8                |
| <b>Astigmatism</b>   | <b>1</b>  | <b>2</b>  | <b>5</b>  | <b>0</b> | <b>8 (2%)</b>    |
| -3.25 to -4.00 x 90  | 0         | 1         | 0         | 0        | 1                |
| -1.50 to -3.00 x 180 | 1         | 1         | 4         | 0        | 6                |
| -4.25 to -5.00 x 180 | 0         | 0         | 1         | 0        | 1                |
| Combined             | 14        | 47        | 44        | 11       | 116 (35%)        |
| Total                | 106 (32%) | 120 (36%) | 92 (27%)  | 16 (5%)  | 334 (100%)       |

(23%) hyperopic patients had refractions of  $> +10.00$  D and were most common among subjects less than 2 years old. The most common myopic refraction was  $-2.00$  to  $-3.00$  D found in twenty-five (49%) patients. Eight (16%) myopic patients had refraction of  $> -10.00$  D (Table 2). Six (75%) patients had with-the-rule astigmatism ranging from  $-1.50$  D to  $-3.00$  D (Table 2).

The most common cause of amblyopia in 58% of the patients was deprivation (Table 3). Patients aged 6 months to 2 years were the most commonly affected by deprivation at 39%. with lens opacity as the most common cause of deprivation in 66% of the patients. This was followed by strabismus with patients belonging to the 3-6 years group being most affected at 46%. Esotropia was more common than exotropia at 74% as a cause of strabismic amblyopia. Refractive amblyopia was the least common at 18% with anisometropia being more common than isometropia as a cause of refractive amblyopia at 57%.

## Discussion

This was the first study that determined the clinical profiles of Filipino children with amblyopia to the researchers' knowledge. It determined the most common cause of amblyopia in the Philippines and is also among the largest published case series on amblyopia. Deprivation was the most common cause of amblyopia among the children seen in a Philippine tertiary hospital included in this study. This may be due to the study being hospital-based. Most of the amblyopic

patients being seen in hospitals are those with surgical causes such as lens and corneal opacities as opposed to error of refraction which can be addressed in optical shops. Cataract was the primary diagnosis in 38% of all the amblyopic children included in this study. Cataract causes deprivation amblyopia when diagnosed late which is often the case among the patients of the institution.

This made the causes of amblyopia in the institution different from those of other countries. In Ethiopia and India which are also developing countries, strabismus was the most common cause of amblyopia at 39% and 37%, respectively [5,6]. In Pakistan, more children were seen to have amblyopia from anisometropia at 75% followed by strabismus [7]. In the United States, the causes were strabismus in 82%, anisometropia in 5%, and combined mechanism in 13% among children under three years of age with amblyopia [8]. Similar findings were seen for 3-7 year-old patients where the proportion of amblyopia attributable to strabismus was significantly higher, while both anisometropia and combined mechanism amblyopia were significantly less common [8]. In the United Kingdom, strabismus was the cause at 45%, combined strabismus and anisometropia at 35%, anisometropia alone at 17%, and deprivation at 3% [9].

Strabismus was the second most common cause of amblyopia in this study. Most of the patients had esotropia similar to studies done in Southern China (64%) but was different from Eastern China where exotropia was the most

**Table 3. Etiology of Amblyopia by Age**

| Etiology of amblyopia | Age in years     |                  |                 |                | Total<br>N (%)    |
|-----------------------|------------------|------------------|-----------------|----------------|-------------------|
|                       | 0.5-2            | 3 – 6            | 7 -12           | 13 – 18        |                   |
|                       | N (%)            | N (%)            | N (%)           | N (%)          |                   |
| <b>Refractive</b>     | <b>8</b>         | <b>19</b>        | <b>29</b>       | <b>5</b>       | <b>61 (18%)</b>   |
| Isometropia           | 1                | 5                | 15              | 5              | 26                |
| Anisometropia         | 7                | 14               | 14              | 0              | 35                |
| <b>Strabismus</b>     | <b>23</b>        | <b>37</b>        | <b>17</b>       | <b>3</b>       | <b>80 (24%)</b>   |
| Esotropia             | 17               | 28               | 12              | 2              | 59                |
| Exotropia             | 6                | 9                | 5               | 1              | 21                |
| <b>Deprivation</b>    | <b>75</b>        | <b>64</b>        | <b>46</b>       | <b>8</b>       | <b>193 (58%)</b>  |
| Lens/Cataract         | 45               | 45               | 33              | 5              | 128               |
| Lid/Ptosis            | 4                | 1                | 1               | 0              | 6                 |
| Lid/Conjunctival Mass | 1                | 1                | 1               | 0              | 3                 |
| Cornea                | 6                | 11               | 3               | 1              | 21                |
| Vitreous              | 3                | 1                | 2               | 1              | 7                 |
| Retina                | 11               | 3                | 3               | 1              | 18                |
| Optic Nerve           | 5                | 3                | 2               | 0              | 10                |
| <b>Total</b>          | <b>106 (32%)</b> | <b>120 (36%)</b> | <b>92 (27%)</b> | <b>16 (5%)</b> | <b>334 (100%)</b> |

common (58%) [10,11]. More children with a refractive type of amblyopia in this study have anisometropia at 58% similar to studies done in Southern and Eastern China [10,11]. Refractive error may be the least common cause of amblyopia in this study because children with refractive errors are often managed by general ophthalmologists and optometrists.

This study was not able to determine the laterality of amblyopia due to logistical concerns. The results are also limited by the retrospective nature of the study. Similarly, this is a hospital- and ophthalmology department-based study. Most of the patients seen have surgical causes of amblyopia such as cataracts and corneal pathologies. This may explain why deprivation was the most common cause of amblyopia. The study also excluded patients with amblyopia from combined causes limiting the analysis to just 33% of the overall amblyopic patients of the division. This highlights the need for a population-based study on amblyopia despite the difficulty considering the current COVID-19 pandemic. A population-based study similar to the other studies cited is recommended to be conducted in the Philippines to determine amblyopia prevalence given that a large proportion of the Filipino population is from the pediatric group. With the implementation of Republic Act No. 11358 or the National Vision Screening Act, conducting a population-based study would be imperative [12].

## Conclusion

Deprivation was the most common cause of amblyopia among the patients seen in a Philippine tertiary hospital followed by strabismus. This is different from other studies on amblyopia but can be due to the hospital-setting of the study.

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