

# Profile of Amblyopia at the Pediatric Ophthalmology Clinic of Menilik II Hospital, Addis Ababa

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## Abstract

**Background-** Amblyopia is one of the common causes of childhood and adult visual impairment. Its prevalence is usually underestimated, often because of lack of awareness.

**Objective:** To assess the magnitude and clinical profile of amblyopia among children presenting at the pediatric ophthalmology clinic of Menilik II Hospital in Addis Ababa.

**Methods:** The study was hospital-based and cross-sectional by design, and data were collected during the period of January to June 2007. Visual acuity, refractive status and fixation patterns were assessed and included in the examinations of clinical profiles of children with amblyopia presenting to a Pediatric Ophthalmology clinic in Menilik II Hospital. .

**Results:** Out of a total of 2,020 children examined during the study period, 183 (9.1%) were amblyopic. Among these 91 (49.7%) were males and 92 (50.3%) were females. The mean age at presentation was  $6.9 \pm 3.0$  years. Strabismic amblyopia was the most common subtype seen in 39.3% (n=72) of children. Fifty (27.3%) children had combined amblyopia. One hundred thirteen (61.7%) of the amblyopic children had hypermetropic refractive error and 22 (12.0%) had myopia.

**Conclusion:** Lack of community or preschool vision screening was the main cause to pick up amblyopic children for timely management of late presentations and significant visual impairment associated with the condition. [*Ethiop.J.Health Dev.* 2008; 22(2):201-205]

## Introduction

Amblyopia has been defined as a unilateral or bilateral decrease of visual acuity caused by deprivation of pattern vision or abnormal binocular interaction. Even though no cause can be detected by physical examination of the eye, some cases are reversible by therapeutic measures (1).

Clinically, amblyopia is defined by one or more lines difference in visual acuity between the eyes (2). Amblyopia is one of the common causes of childhood (2, 3, 4, 5) and adult visual impairment (6-8).

The causes of amblyopia include strabismus, anisometropia, high-refractive errors, and opacities of the ocular media, or a combination of two or more etiologies in the same patient. In spite of different causes, the basic mechanisms in all cases are either abnormal binocular interaction between eyes or from deprivation in one or both eyes (9-11).

The upper limit of the critical time when children are most vulnerable to amblyopic disorders is around 8 years in humans (9, 10, 11). Visual loss due to amblyopia can be permanent if corrective measures are not taken in time (8). The burden of disability due to this problem can become massive when one takes into account the duration of life with visual disability (12, 13). Amblyopia and associated strabismus can also result in devastating psychosocial and economic burdens (7-8). Therefore, follow up measures and proper treatment of the problem in either of the eyes is very important.

Taking this significant problem into consideration and limited studies done in Africa and particularly in Ethiopia, we conducted a hospital-based study to assess the extent and the clinical profile of amblyopia among children less than the age of 15 years presenting at a national referral eye hospital.

## Methods

This was a hospital-based cross sectional study conducted from January- June 2007. All children less than 15 years of age who were diagnosed with amblyopia at the Pediatric Ophthalmology Clinic in Menilik II Hospital, Addis Ababa, Ethiopia were included in the study.

**Examination Procedures:** All consecutive patients during the study period who were diagnosed as having amblyopia were included. The assessment included a detailed history related to the age of onset as noticed by the parent or guardians, age of presentation to the hospital, and any previous modality of treatment taken.

Ocular examinations like assessment of the uncorrected visual acuity (UCVA) and best-corrected spectacle VA (BCSVA) with the help of Snellen's visual acuity chart in children 4 years of age and above were included. In children less than 4 years of age fixation pattern using corneal light reflex i.e. CSM method was used for the study [C (central) S (steady) M (maintained)].

Assessment of ocular alignment, ocular motility and associated deviation, latent nystagmus (if any), and slit

lamp examination for the assessment of any anterior segment pathology was performed. The crowding phenomenon was not tested. A detailed fundus examination was done to rule out any posterior segment pathology. Cycloplegic refraction under cyclopentolate was performed. Investigators recorded all relevant data daily using a format prepared for this purpose. The collected data were cleaned, entered and analyzed using EPI INFO Version 2002 software.

#### Operational Definitions;

**Amblyopia:** This can be defined in two ways; 1) A difference in the best-corrected visual acuity (BCVA) between the two eyes of two or more Snellen's lines in the absence of any organic lesion that could result in visual reduction. 2) A BCVA of less than 6/12 bilaterally on the Snellen's chart in the absence of any organic lesion that could result in a decrease in vision.

**Strabismic amblyopia:** Amblyopia in the presence of a heterotropia at distance or near fixation in the absence of any anisometropia.

**Anisometropic amblyopia:** Includes patients who had amblyopia in the presence of anisometropia that is 1.5 D or greater in spherical equivalent, or a 1.5 D or greater difference in astigmatism between the eyes in the absence of any measurable heterotropia at distance or near.

**Combined amblyopia:** Includes either patients with a heterotropia at distance or near along with anisometropia of 1.5D or more in spherical equivalent or a 1.5 D or more difference in astigmatism in any meridian between the eyes.

**Sensory deprivation amblyopia:** This group included

patients with a known documented cause of sensory deprivation (ptosis, cataract, or media opacity) with no primary heterotropias or refractive errors that could be causally related to the amblyopia.

**Ametropic amblyopia:** Patients with refractive errors of more than 1.5 D spherical equivalent in both eyes resulting in subnormal vision in one or both eyes and no associated strabismus or any other ocular pathology were classified under this category.

**Meridional amblyopia:** Patients with regular astigmatism  $\geq 1.5$  D of astigmatism in any meridian or those with irregular astigmatism in both eyes, resulting in a decrease in vision in one or both eyes and no associated strabismus or anisometropia were classified as having meridional amblyopia.

#### Results

A total of 2,020 children were examined from January to June 2007 in pediatric ophthalmology clinic of Menilik II Hospital. Among the 2,020 children examined during the specified period, 183 amblyopic children below the age of 15 years were identified, resulting in a proportion of 9.1%.

The demographic and clinical profiles of the amblyopic children were evaluated. Accordingly, the average age at presentation of the amblyopic children was  $6.9 \pm 3.0$  years with a median age of 7.0 years. There were 91 (49.7%) male and 92 (50.3%) female amblyopic children (Table 1). Ninety-three (50.8%) children had taken previous treatment for amblyopia in the form of conventional occlusion (patching). One hundred thirty two (72.1%) children lived in Addis Ababa, while the rest (27.9%) came from other parts of Ethiopia.

Table 1: Age at presentation and gender distribution of children with amblyopia, Menilik II Hospital (January - June 2007)

Causes	$\leq 4$ years (41)		4-10 years (116)		10-14 years (26)		Total	
	M	F	M	F	M	F	M	F
Strabismic A	7 (9.7)	14 (19.4)	19 (26.4)	25 (34.7)	3 (4.2)	4 (5.6)	29 (40.3)	43 (59.7)
Combined A	5 (10.0)	9 (18.0)	19 (38.0)	9 (18.0)	4 (8.0)	4 (8.0)	28 (56.0)	22 (44.0)
Ametropic A	2 (8.0)	3 (12.0)	9 (36.0)	8 (32.0)	1 (4.0)	2 (8.0)	12 (48.0)	13 (52.0)
Sensory Deprive. A	0	0	10 (41.7)	8 (33.3)	3 (12.5)	3 (12.5)	13 (54.2)	11 (45.8)
Anisometropic A	1 (9.1)	0	5 (45.5)	3 (27.3)	2 (18.2)	0	8 (72.7)	3 (27.3)
Meridional A	0	0	1 (100.0)	0	0	0	1 (100.0)	0
<b>Sub Total</b>	<b>15 (8.2)</b>	<b>26 (14.2)</b>	<b>63 (34.4)</b>	<b>53 (29.0)</b>	<b>13 (7.1)</b>	<b>13 (7.1)</b>	<b>91 (49.7)</b>	<b>92 (50.3)</b>
<b>Total</b>		<b>41 (100.0)</b>		<b>116 (100.0)</b>		<b>26 (100.0)</b>		<b>183 (100.0)</b>

A=amblyopia

Eighty children had amblyopia in the right eye and 81 children in the left eye, while 22 (12.0%) children had bilateral amblyopia. The total number of amblyopic eyes examined was 205. Out of 183 amblyopic children, 72 (39.3%) had strabismic amblyopia, 50 (27.3%) had

combined amblyopia, 25 (13.7%) had ametropic amblyopia, 24 (13.1%) had sensory deprivation amblyopia (cataract and ptosis), 11 (6.0%) had anisometropic amblyopia and 1(0.01%) had meridional amblyopia. (Tables 2, 3, 4).

Table 2: Visual acuity in amblyopic eye, Menilik II Hospital (January - June 2007)

Causes	6/36-6/18	3/60-6/60	<3/60	U-CSM	Total
Strabismic A...	35(48.6)	12(16.7)	17(23.6)	8(11.1)	<b>72(39.3)</b>
Combined A <sup>α</sup>	20(40.8)	11(22.4)	12(24.4)	6(12.2)	<b>50(27.3)</b>
Ametropic A <sup>α</sup>	14(58.3)	7(29.2)	2(4.8)	1(4.2)	<b>25(13.7)</b>
Sens. Depriv A <sup>α</sup>	11(47.8)	3(13.0)	<b>9(39.1)</b>	0	<b>24(13.1)</b>
Anisometropic A	<b>6(54.5)</b>	<b>4(36.4)</b>	1(0.1)	0	<b>11(6.0)</b>
Meridional A	1(100)	0	0	0	<b>1(0.01)</b>
<b>Total</b>	<b>87(48.3)</b>	<b>37(20.6)</b>	<b>41(22.8)</b>	<b>15(8.3)</b>	<b>183(100)</b>

<sup>α</sup>=Each has a child with V/A of 6/12.

Figures in parenthesis indicate percentages.

The average age of presentation of children with amblyopia was  $6.2 \pm 3.2$  years for combined amblyopia,  $6.8 \pm 2.9$  years for strabismic amblyopia,  $7.4 \pm 3.9$  years for anisometropic amblyopia and  $7.5 \pm 3.1$  years for sensory deprivation amblyopia. The median age for strabismic amblyopia was 7 years while it was 5 years for combined and anisometropic amblyopia. (Table 1).

The problem of amblyopia was detected during evaluation of strabismus among 127 (69.4%) of the cases. On the other hand, 35 (14.2%) of the children presented with poor vision, 10 (5.5%) presented with squint and poor vision, 6 (3.3%) presented with leucocoria and 5 (2.7%) presented with ptosis. Nineteen (10.4%) of the children had cataract, 12(63.2%) bilateral and 7 (26.8%) unilateral.

Table 3: Refractive Status of the Amblyopic eye Menilik II Hospital (January - June 2007)

Causes	Hyperopia (N, %)	Myopia (N, %)	Emmetropia (N, %)	Total (N, %)
Strabismic A	46(63.9)	1(1.4)	25(34.7)	<b>72(39.3)</b>
Combined A	42(84.0)	6(8.0)	2(4.0)	<b>50(27.3)</b>
Ametropic A	15(60.0)	10(40.0)	0	<b>25(13.7)</b>
Sens. Deprive. A	2(8.3)	2(8.3)	20(83.3)	<b>24(13.1)</b>
Anisometropic A	8(72.7)	2(18.2)	1(9.1)	<b>11(6.0)</b>
<b>Total</b>	<b>113(61.7)</b>	<b>22(12.0)</b>	<b>48(26.2)</b>	<b>182(100)</b>

Fifteen (8.3%) of the children were very young and V/A was measured by fixation pattern. Assessment was done based on the Snellen's acuity chart for the remaining 168 (91.7%) children. It was a problem to maintain the equivalence of V/A in the two groups assessed by two different methods. Children with ametropic and anisometropic amblyopia had better BCVA. Children with sensory deprivation amblyopia had poor BCVA (Table 2).

had cycloplegic refraction results of +1 to +5 Diopter sphere, while 19 (16.8%) of the children had  $\geq +6D$ . Of 22 myopic children, eleven (52.4%) had high myopia ( $\geq 6D$ ) and 10 (47.6%) of the children had  $< 6D$  retinoscopy findings (Table 3).

One hundred twenty eight (69.9%) of the children had strabismus. Esotropia was the most common deviation seen (101=78.9%) followed by exotropia (26= 20.3%) (Table 4).

The refractive status of the amblyopic eyes was categorized as follows. Ninety (83.2%) of the children

Table 4: Profile of strabismus in patients with amblyopia Menilik II Hospital (January - June 2007)

Causes	No strabismus	Esotropia	Exotropia	Total
Strabismic A <sup>α</sup>	-	51(71.8)	20(28.2)	<b>71(39.0)</b>
Combined A	-	47(94.0)	3(6.0)	<b>50(27.5)</b>
Ametropic A	25(100.0)	-	-	<b>25(13.7)</b>
Sens deprive. A	18(75.0)	3(12.5)	3(12.5)	<b>24(13.2)</b>
Anisometropic A	11(100.0)	-	-	<b>11(6.0)</b>
Meridional A	1(100.0)	0	0	<b>1(0.01)</b>
<b>Total</b>	<b>55(30.2)</b>	<b>101(55.5)</b>	<b>26(14.3)</b>	<b>182(100.0)</b>

<sup>α</sup>=one child had isolated vertical deviation.

## Discussion

Amblyopia is one of the most common causes of visual impairment in children with a prevalence varying between 0.2% and 12% depending on the subsets of the population studied (2). In the current study, 9.1% of the

examined children during the study period had amblyopia. There are no similar hospital based studies in Ethiopia or Africa or elsewhere to compare with. The amblyopia studies done are school screening and community based studies.

The main cause of amblyopia varies between studies, depending on the characteristics of the study sample and how amblyopia is defined. However, in our study causes of amblyopia were strabismus in 39.3%, combined in 27.3% and anisometropia in 6.0% of the cases. Ametropic and sensory deprivation amblyopia comprised 13.7% and 13.1% of the cases respectively. In a comparative study done in India, of a total of 733 eyes, 37.38% had strabismic amblyopia, 22.1% had anisometropic amblyopia, 18.44% had combined amblyopia, 12.88% had ametropic amblyopia, and 5.56% had meridional amblyopia, and the remaining 7.63% patients had sensory deprivation amblyopia (16).

Among the important issues identified in this study is the relatively old age at presentation ( $6.9 \pm 3.2$  years) to a specialty clinic, irrespective of the subtype of amblyopia. In India the average age of the patients at presentation was  $7.97 \pm 6.18$  years (16). It is known that therapeutic measures for amblyopia are less effective after seven to eight years. This may be due to poor knowledge of parents about amblyopia and absence of school screening in Ethiopia which needs attention in the future.

The BCVA in the amblyopic eye showed a significant association with the diagnosed subtype of amblyopia with anisometropic and ametropic amblyopia having the best visual acuities at presentation while deprivational amblyopia had the poorest as seen in other study (16).

In this study, 113 (61.7 %) patients had a hypermetropic refractive error while it was 51.65% in the Indian study. Forty eight (26.2%) patients had no significant refractive errors as compared to 14.38% of those in the Indian study (16).

One hundred twenty eight (69.9%) amblyopic children had strabismus in this study, but only 62.2% in the Indian study. Esodeviation was the most common type in both our and the Indian study with 78.9% and 56.47% respectively (16).

Timely diagnosis and treatment is likely to reduce the prevalence of amblyopia as it has been seen in many other countries that have taken up mass education and visual screening at community levels (4, 7, 11, 12, 14, 15, and 16).

Finally, even though the present study suffers from selection bias, as the data were hospital based, the findings may be helpful in stimulating to conduct further population and school based studies. Visual acuity test for preschool children was also a drawback.

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