

# Strabismus Amblyopia in Young Cameroonian at their First Visit at Yaounde Hospital Centre-Essos

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## Abstract

The management of strabismus in Cameroon is not well developed and the average age of first consultation is beyond the age amblyopia reversal. It is with the aim of improving strabismus management that we undertook this prospective and descriptive study which spanned 11 months. The objective was to describe amblyopia in patients with comitant strabismus at their first visit. Data collected included the age at the first visit, past history, refractive error, and the characteristics of strabismus, amblyopia and strabismus-associated factors. Forty patients were included amongst whom there were 21 females and 19 males. The mean age was  $5.5 \pm 4.6$  years, with extremes of 3 months and 24 years. The hospital prevalence of amblyopia was 1.02%. Esotropia was the most common form of strabismus in 52.5 % of cases. In 37.5% of cases, the onset of strabismus was before the age of six months. Amblyopia was present in 63.7% of cases. It was classified as severe in 29.41% of cases, moderate in 21.57% of cases, and mild in 49.02% of cases. Head tilt was present in 27.5% of cases and nystagmus in 25% of cases. In conclusion, the prevalence of amblyopia is high in our milieu with a higher prevalence amongst esotropic patients. The management of strabismus relies on the wearing of the full cycloplegic correction and requires the full cooperation of the parents.

**Keywords:** Strabismus; Amblyopia; Esotropic patients

## Introduction

Strabismus is an ophthalmic syndrome characterized by a deviation from the parallelism of normal gaze and may be associated with a sensory modification primary or secondary to that deviation: amblyopia, suppression, or abnormal retinal connection [1,2]. The worldwide prevalence of strabismus is 0.99-2.6% according to Friedman et al. in Baltimore in 2009 and Matsuo et al. in 2007 in Japan [3,4]. Strabismus is a major cause of amblyopia. Amblyopia is a unilateral or bilateral decrease of best corrected visual acuity caused by stimulus deprivation and or abnormal binocular interaction for which there is no obvious cause found.

Cameroonian prevalence of strabismus was 1.33% by Ebana et al. [5]. The management of strabismus in Cameroon continues to be poorly developed because of lack of specialized infrastructure, ignorance of the population, and social taboos prohibiting the discussion of the subject within families. The average age of the first consultation was beyond the age of amblyopia reversal (13.9 years) as found by Ebana et al. [6]. Ideally, these patients should also have a long follow-up period, which is difficult to achieve for many of them. This study aims to describe amblyopia in patients with comitant strabismus at their first visit to the hospital. The study specifically aims to determine the prevalence of strabismus-induced amblyopia and to describe the characteristics of amblyopia in esotropic and exotropic patients in order to improve the medical care of this disease in our milieu.

## Patients and Methods

We undertook a prospective and descriptive consecutive case series (June 2012- April 2013) that was approved by Yaounde's ethical committee at the Ophthalmology unit at Hospital Centre of Essos.

The inclusion criteria were records of children less than 18 years presenting with comitant strabismus at the first visit.

The exclusion criteria were incomitant strabismus and patients previously treated for strabismus or amblyopia.

The data collected included the age at the first visit, the sex, the past history including family history of strabismus; the initial visual acuity using one of the following tests: preferential looking, Pigassou, Rossano-Weiss, and Monoyer tests; the refractive error after cycloplegia with retinoscopy and autorefraction; the direction and angle of deviation; associated manifest latent nystagmus or compensatory head position; and finally amblyopia and strabismus associated factors (nystagmus, head turn, verticality's factors).

Amblyopia was classified according to Orssaud classification. It was slight if the visual acuity was greater than or equal to 0.5, moderate between 0.1 and 0.4, and deep if it was less than or equal to 0.1.

Data analysis was done with CSPro 3.3, SPSS 16.0, and Microsoft Excel 2007. The comparison tests used were the Student's t-test, the chi squared test, and the ANOVA test.

## Results

We include 40 patients out of 3989 consulted patients, giving a prevalence of strabismus of 1.02%. There were 21 females and 19 males ( $p=0.438$ ) with a sex ratio M/F of 0.9, which was not statistically different. The mean age at consultation was  $5.5 \pm 4.6$  years (age range 3

months to 18 years). The distribution according to age group is shown in Table 1, with most patients falling between 2 and 10 years (n=77.5%). Ocular misalignment was the most common reason for consultation, found in 77.5% of cases (Table 2). In reviewing the past medical history, neonatal resuscitation, oxygen therapy, and CNS disorders were the most prevalent. A family history of strabismus was recorded in 15 children (37.5% of cases); 7 of those cases were identified in the child's ancestors and 8 cases were not in direct hereditary lineage (Table 3).

Many cases of strabismus occurred at the age of six months to three years (47.5%) and early strabismus (before the age of 6 months) was seen in 15 patients (37.5%), with 30 % (n=12) due to esotropia and 7.5 % (n=3) due to exotropia. The mean age of onset of strabismus was 19.7 months ± 23.8 (Table 4).

| Age Group (years) | Subjects (n) | Percentage (%) |
|-------------------|--------------|----------------|
| <2 years          | 6            | 15.0           |
| <b>2-5 years</b>  | <b>18</b>    | <b>45.0</b>    |
| <b>6-10 years</b> | <b>13</b>    | <b>32.5</b>    |
| 11-15 years       | 1            | 2.5            |
| 16-18 years       | 2            | 5.0            |
| Total             | 40           | 100,0          |

**Table 1:** Distribution according to age group.

|  | Subjects | Percentage (%) |
|--|----------|----------------|
| Ocular misalignment                    | 31       | 77.5           |
| Low visual acuity                      | 10       | 25             |
| Doesn't follow the light               | 1        | 2.5            |
| Referred by a pediatrician or a doctor | 5        | 12.5           |

**Table 2:** Reason for consultation.

Ocular misalignment was the most common reason for consultation in 77.5% of cases.

| Medical history         | Subjects | Percentage(%) |
|-------------------------|----------|---------------|
| Prematurity             | 3        | 7.5           |
| Acute foetal distress   | 4        | 10            |
| Neonatal resuscitation  | 7        | 17.5          |
| Seizures                | 6        | 15            |
| Neonatal oxygenotherapy | 9        | 22.5          |
| CNS disorders*          | 8        | 20            |
| Measles                 | 2        | 5             |
| Club foot               | 1        | 2.5           |

\* Central nervous system disorders: Méningocele (1 case), Epilepsiy (2 cases), Hemiplegia (2 cases), cerebral atrophy and psychomotor retardation (3 cases).

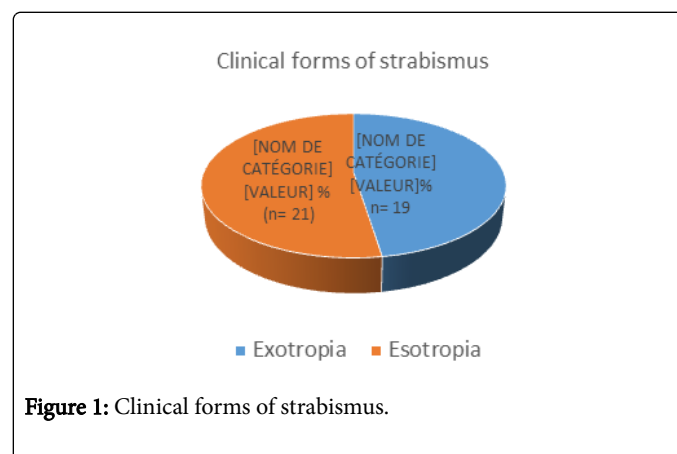
**Table 3:** Past medical history of patients.

The Family history of strabismus was recorded in 15 children (37.5% of cases) (7 cases in child's ancestors and 8 cases not in direct hereditary lineage).

| Age of onset of strabismus | Number | Percentage |
|----------------------------|--------|------------|
| <6 month                   | 15     | 37.5       |
| 6 month- 3 years           | 19     | 47.5       |
| >3 years                   | 6      | 15         |
| Total                      | 40     | 100        |

**Table 4:** Distribution according to the age of onset of strabismus.

### Clinical forms of strabismus



**Figure 1:** Clinical forms of strabismus.

Esotropia was the more prevalent form of strabismus, found in 21 patients (52.1%) (Figure 1) and exotropia was seen in 19 patients (48%). The mean angle of deviation was 37 ± 18 PD. The mean age (in years) and type of strabismus: The mean age of patients with exotropia (7.2 years) was greater than those with esotropia (3.9 years). This difference was statistically significant (P=0.02) (Table 5).

**Amblyopia and strabismus:** Amblyopia was present in 63.7% of cases (51 eyes) as shown in (Figure 2). There was a significant correlation between the type of strabismus and amblyopia: p=0.00 (chi squared test). Amblyopia was more present in esotropia with 83.3 % (n=35) of patients affected than in exotropia with 42.1 % (n=16) (Figures 3 and 4). Amblyopia was deep in 29.4% of cases (n=15 eyes), moderate in 21.6 % (n=11 eyes) and slight in 49.0% (n=25 eyes).

| Type of strabismus | Number | Mean Age | Range | P*    |
|--------------------|--------|----------|-------|-------|
| Esotropia          | 21     | 3.9      | 2.3   | 0.020 |
| Exotropia          | 19     | 7.2      | 5.8   |       |
| Total              | 40     | 5.5      | 4.6   |       |

**Table 5:** The mean age (Year) and type of strabismus.

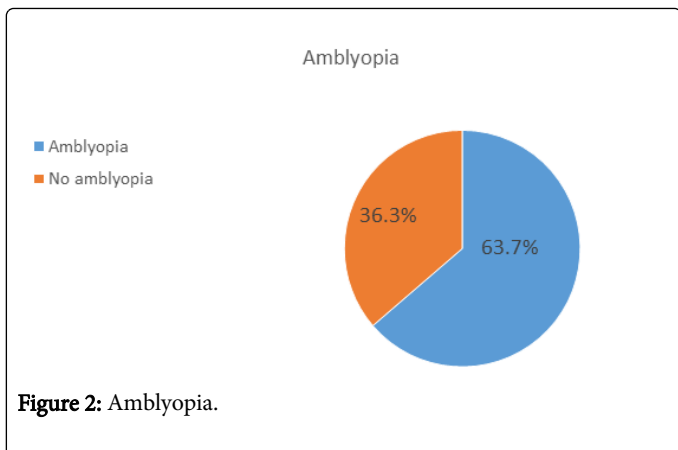


Figure 2: Amblyopia.

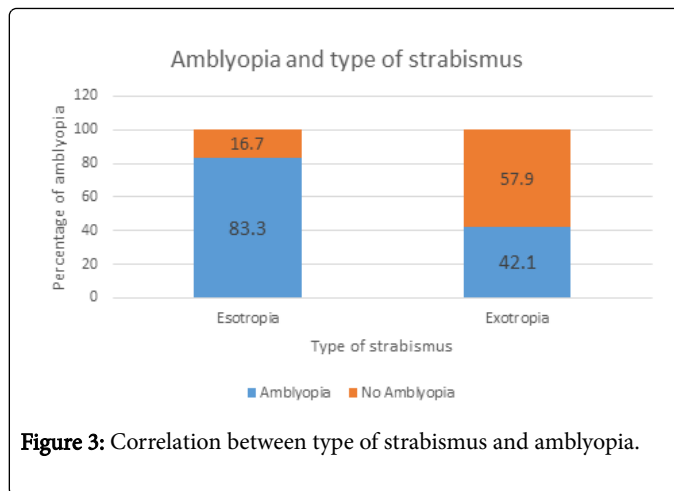


Figure 3: Correlation between type of strabismus and amblyopia.

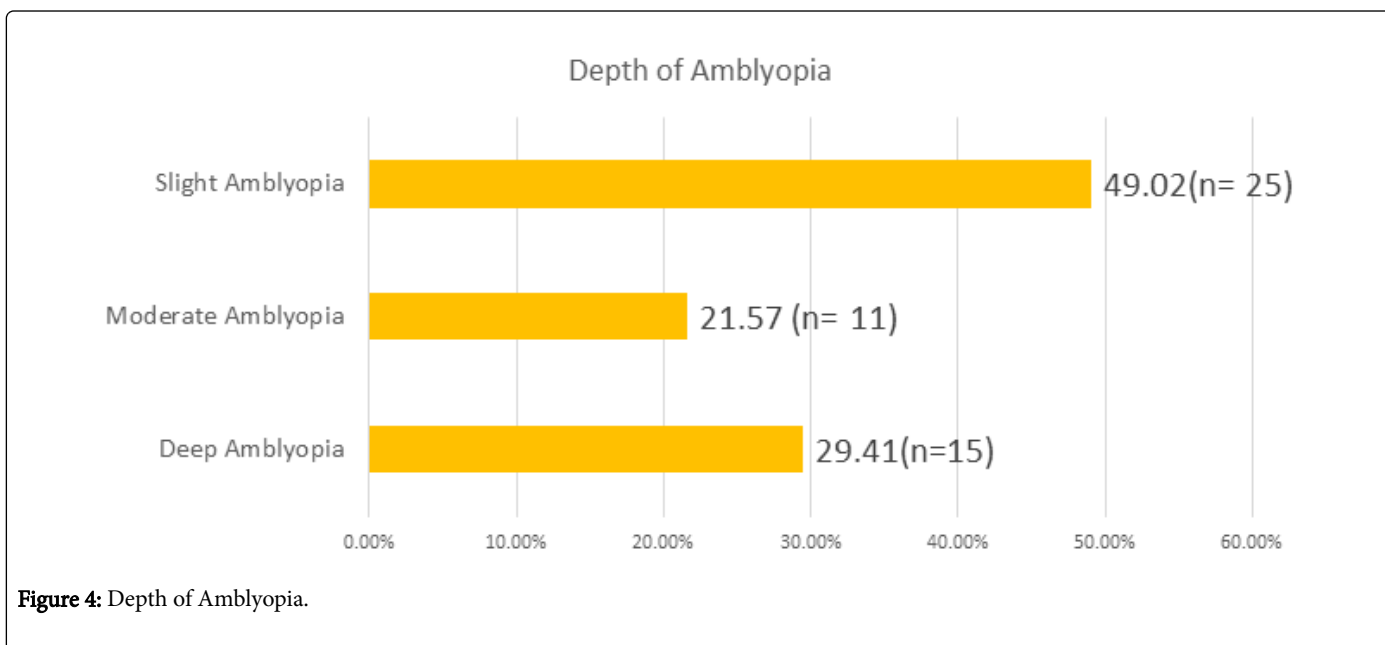


Figure 4: Depth of Amblyopia.

There is a significant correlation between the type of strabismus and amblyopia:  $p=0.00$  (test du Khi-deux). Amblyopia was more present in esotropia.

## Discussion

The prevalence of strabismus among our population in this study was 1.01%. Ebana et al. found a similar prevalence in Cameroon of 1.22% [5]. On the other hand, Friedman et al. in the USA reported a prevalence of 1.61% [3]. Worldwide, the prevalence of strabismus varies between 0.99% and 2.6 % [3,7,8]. The prevalence of strabismus in our milieu is not low as stated above, as Ebana, Friedman, and the worldwide data is all consistent but our prevalence compared to the rest of the world is accurate. The subject is apparently not as taboo as feared and the most affected patients are actually coming to hospital to present themselves for treatment. This wouldn't indicate an improvement over the time, since Ebana found the same thing 20 years ago, but it may tell Cameroonian ophthalmologists that they are seeing all the patients that need treatment, they just need parents to bring their children in at a younger age. However, the way it could remain a

taboo, if all patients with strabismus were coming to medical attention in Yaounde, we could have expected our prevalence to be higher than 1.01%. There was no statistical difference between male and female. The mean age of consultation in our study was  $5.5 \pm 4.6$  years, younger than the mean age found by Ebana et al. in 2005 of 13.97 years  $\pm 12.21$  [9]. Marrakchi et al. in Tunisia reported a similar finding of 6 years and 11 months [10]. This is due to the fact that our hospital sees mostly patients and families who have medical insurance, and there is awareness among the local population about strabismus with time.

In the past medical history, perinatal and neonatal neurologic disorders were prevalent (Table 3). They are associated with a high risk of developing strabismus. The collaborative perinatal project has found an association between strabismus and neurologic disorders with an odd ratio of 3.03 for esotropia and exotropia [11]. It is also associated with neonatal resuscitation, neonatal oxygen therapy, seizure and prematurity. These are more prevalent in our milieu and could be due to TORCHes congenital infections, or maybe there is a "normal" strabismus population that still isn't presenting to the hospital, but only the "sick" strabismus patients. This might explain the fact that the

social taboo is still in effect, keeping the “healthy” strabismus patient from coming in, but children who are known by others to be sick have no need to pretend they don’t have strabismus because they have already been labeled by the community as “sick”. May be if the taboo weren’t in place, the prevalence of strabismus in Yaounde would be closer to the 3% reported in some studies around the world.

In the Millennium cohort study, 15.4% of children with cerebral palsy and 9.1% of children with a mental disorder or a behavioral disorder presented with strabismus [7].

A family history of strabismus was recorded in 15 children (37.5% of cases). Audren et al. has reported similar findings, with 33% of all cases having a family history, and 20% of specifically early onset strabismus patients having a family history [12]. Ebana et al. has reported 28.72% having a family history, which is lower than our results [13]. The statistic variability can be explained by the difference in survey protocol and by the larger size of his study population. Hereditary traits of strabismus justify having ophthalmologic screening examinations of children that have at least one family member suffering from strabismus.

Strabismus was found in 37.5% of our patients before the age of 6 months. In these young children, 57.14% (n=12) had esotropia and 15.78% (n=3) had exotropia. Similar findings were reported by Tinley et al. in South Africa with 53% having infantile esotropia [14]. Mohny et al. in 2001 reported a rate of 25% of congenital esotropia patients exhibiting amblyopia [15]. According to literature, amblyopia occurs in 10-40% of infantile strabismus [12].

The mean age of our patients with exotropia (7.2 years) was greater than those with esotropia (3.9 years). This difference was statistically significant (p=0.020). The severity and the time before occurrence of amblyopia vary according to the type of strabismus and the age of onset. Presumably, the onset of amblyopia occurred subsequent to the development of strabismus. Therefore, patients in our population with esotropia should be suspected more strongly and re-examined more frequently for the development of amblyopia than patients with exotropia.” However, in reality, every patient with strabismus should be meticulously examined for amblyopia, regardless of whether they have exotropia or esotropia.

Amblyopia was present in 51 eyes (63.7% of cases). There is a significant correlation between the type of strabismus and amblyopia: p=0.00 (chi squared test). Chia et al. in 2007 in Singapore found a rate of amblyopia in children less than 16 years of 50% in esotropia and 20% in exotropia. Amblyopia was more present in esotropia. It is known that children with exotropia are able to alternate their fixation [16]. Some children with esotropia have alternating fixation, too. But children with exotropia are more likely to have times when they have fusion, which is important.

## Conclusion

The prevalence of amblyopia is high in our milieu with 63.7% with a higher prevalence amongst esotropic patients.

The management of strabismus relies on the wearing of the full cycloplegic correction, the treatment of amblyopia, and possible surgical intervention, and requires the full cooperation of the parents. Amblyopia has to be corrected first through patching and/or atropine, but if you then do surgery on those who need it, they can regain fusion and at least some stereopsis.

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