

Prevalence of strabismus and the outcomes of its management among children attending Ruharo Eye Center, South Western Uganda

Ntizahuvye S, Onyango J

Mbarara University of Science and Technology, Department of Ophthalmology, Mbarara, Uganda

Corresponding author: Dr. S. Ntizahuvye. Email: mucoserap@yahoo.fr

ABSTRACT

Background: Strabismus consists of any deviation of binocular alignment and is present in 2 to 4% of the world's child population. Strabismus can be both the cause and the effect of poor binocularity. When it appears in the early years of life, strabismus may lead to states of sensorial adaptation such as retinoic correspondence anomaly and amblyopia given that binocular single vision has a critical role in maintaining alignment. On the other hand, if strabismus arises after binocular vision development, diplopia and image confusion appear, which persist indefinitely or until motor alteration is corrected.

Aim: To determine prevalence of strabismus and outcomes of its management among children attending Ruharo Eye Center, South western, Uganda from January 2014 to December 2015.

Methods: In this retrospective descriptive study, medical records of all strabismus patients aged below 16 years seen at Ruharo Eye Center, South western, Uganda from January 2014 to December 2015, were reviewed. Information was collected on demographic characteristics, refractive errors, types of strabismus, management and outcomes.

Results: A total of 8,665 children were seen at REC during the period from January 2014 to December 2015. Of these, 125 children had strabismus thus a prevalence of 1.4%. There were 56 males (44%) and 69 females (55%) with mean age of 14 years, from 4 months to 15 years. Twenty nine children (23.2%) had amblyopia and eighty six children (68.8%) had refractive errors of more than 0.5 diopter. Patients with hypermetropia were 45 (36.0%), myopia 38 (30.4%) and astigmatism 3(2.4%). Esotropia accounted for 80% and exotropia 20% and both were the common types. In our study, the management of strabismus cases included: glasses (30), eye patching (30) and surgery (34). Of the 34 patients operated, post-operative alignment was achieved in 25 cases (73.53%) and under correction occurring in 17.65%.

Conclusion: The prevalence of paediatric strabismus at Ruharo Eye Center was 1.4%. The most common type of paediatric strabismus in this study was esotropia. The surgical success rate was generally good.

INTRODUCTION

Strabismus consists of any deviation of binocular alignment and is present in 2 to 4% of the world's child population¹. It can be both the cause and the effect of poor binocularity. If strabismus arises after binocular vision development, diplopia and image confusion appears, which persists indefinitely or until motor alteration is corrected².

Strabismus is a common cause of amblyopia and its identification at an earlier age may prevent the development of amblyopia and improve the chance of restoring binocularity as well as effectively treating strabismus-associated amblyopia. Moreover, visual loss in childhood may have negative impact on their development and education. With early management of strabismus, improved visual acuity and better cosmetic outcomes can be achieved^{3,4}.

Strabismus causes considerable psychosocial problems in patients and their families and dramatically decreases their quality of life⁵. In fact, the appearance of ocular misalignment may interfere with social and psychological development with potentially serious effects for all patients with strabismus⁶⁻¹⁰.

Patients with strabismus have several treatment options available to improve eye alignment and coordination. These include glasses, eye patching and

surgery, which aim at maximizing binocular single vision, maintaining visual acuity or visual field in both eyes and improving mental and social functions. Outcome of strabismus surgery are categorized as normal alignment, under correction (residual deviation) or overcorrection¹¹.

Few studies have been done in Uganda on strabismus but none was specifically done in children. For the year 2015, 104 children with strabismus were seen at Ruharo Eye Center (Ruharo records, 2015) however its prevalence is not known in our set up. Different therapeutic options are used to manage paediatric strabismus at Ruharo Eye Center but no study has been done so far to assess the outcomes.

Therefore, we conducted this study to determine the prevalence of strabismus and the outcomes of its managements among children at Ruharo Eye Center in order to design better management strategies for strabismus patients in the future.

MATERIALS AND METHODS

The records of 2014 and 2015 were used to identify all the children who attended the clinic during that period and the strabismus cases out of them.

Inclusion criteria: All cases of paediatric strabismus with full medical records and onset age of strabismus below

16 years based on inclusion criteria, we analyzed 125 cases that were reported from January 2014 to December 2015. Data were extracted from questionnaires. For all children with strabismus, data regarding history, socio-demographic and clinical presentation was collected.

Data collection: Gender, age of onset and age at time of presentation, family history of strabismus, refractive errors (Spherical equivalent = Sphere + 1/2 Astigmatism) with or without amblyopia, the type of strabismus, the type of management, and their outcomes. Based on direction, strabismus types are classified as esotropia, exotropia. The strabismus management included: glasses, eye patching, surgery and follow-up.

Successful outcome in our survey was defined as postoperative residual deviation to be less than 8 prism diopters. Misalignments were defined as undercorrection or overcorrection both with more than 8 prisms of deviation. The excel dataset was imported into STATA 12.0 statistical software for analysis. Participants' characteristics were described using appropriate summary statistics that is mean or median for continuous variables and frequency or proportions for categorical variables.

The prevalence of strabismus among children who attended Ruharo Eye Center from January 2014 to December 2015 was calculated as a percentage of all children with strabismus out of all children consultancies at REC within the same period.

Proportions and pie-chart were used to describe the types of paediatric strabismus. Two-way tables and bar-chart were used to present the distribution of various outcomes of strabismus management among children attending Ruharo Eye Centre from January 2014 to December 2015 by treatment method used.

RESULTS

A total of 8,665 children were seen at REC during the period from January 2014 to December 2015. Of these, 125 children had strabismus thus a prevalence of 1.4%. There were 56 males (44%) and 69 females (55%) with mean age of 14 years, from 4 months to 15 years. Twenty nine children (23.2%) had amblyopia and 86 (68.8%) had refractive errors of more than 0.5 diopter. Patients with hypermetropia were 45 (36.0%), myopia 38 (30.4%) and astigmatism 3 (2.4%). Esotropia accounted for 80% and exotropia 20% and both were the common types. In our study, the management of strabismus cases included: glasses, eye patching and surgery.

Table 1: Frequency of different types of managements

Mode of treatment	Number (n)	Proportion (%)
Surgery	34	31.8
Glasses	30	27.7
Patching	30	27.7
Patching and glasses	7	6.4
Patching, glasses and surgery	1	0.9

Out of 29 children with amblyopia 15 (51.7%) had a good outcome with three or more lines of improvement from the base line, 9 (31.03%) had -1 to +1 line of improvement and 5 (17.2%) had +2 lines of improvement from the baseline after three months of treatment (Figure 1).

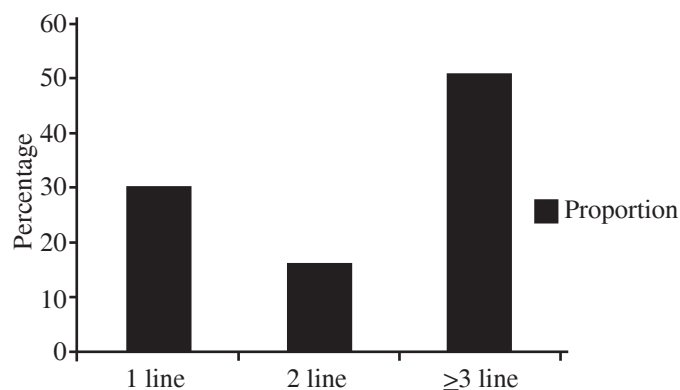


Figure 1: Outcome of patching (n=29)

Among the 30 patients who were treated with eye glasses, 12 (40%) were full accommodative, but 17 (56.7%) were not accommodative. One patient was lost to follow up.

Among the 34 patients who underwent strabismus surgery, 25 (73.5%) achieved alignment, 6 (17.7%) had undercorrection and 3 (8.8%) patients were lost for follow up. In general, the postoperative eye position of patients with strabismus was straight (73.5%) (Figure 2).

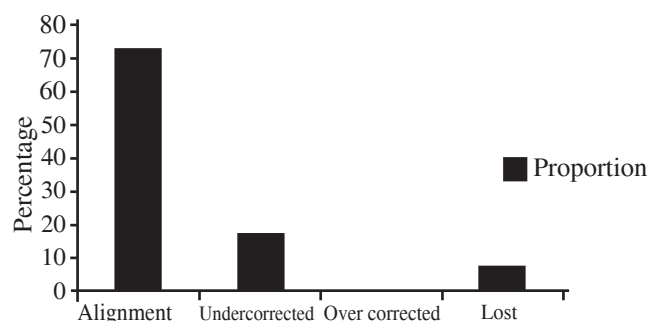


Figure 2 : Outcome of surgery (n=34)

DISCUSSION

This study was done on 125 patients with paediatric strabismus. The prevalence of strabismus at Ruharo Eye Center was 1.4%. A similar prevalence of 1.5% was found in the younger sample of Head Start children¹². A study done in Hispanic/Latino and African-American showed a prevalence of (2.4%), (2.5%) children who participated in the MEPEDS¹³. Also the prevalence of 2% to 5% was reported in studies done in European-based (white) and African American populations¹⁴, but they were population-based studies and cannot be comparable with our study.

In our study, the main types of strabismus were esotropia and exotropia. Matsuo *et al*¹⁵ assessed 86,220 preschool children and found 1,113 cases strabismus of

which exotropia and esotropia was the most common frequent types. Also in the study of Yu *et al.*, 2002 in Hong Kong¹⁶, on 2,704 strabismus patients, they reported that exotropia and esotropia were the most common types.

Esotropia was the commonest type of strabismus in our study with 80% of the cases. Same results were seen in a study done in Minnesota on 627 children, and in Rasht on 291 strabismus children which reported that esotropia (76%) was more common than exotropia (24%)^{17,18}. However, Najafi¹⁹ in Tehran, found a prevalence of 61.5% exotropia and 33.6% esotropia cases.

In this study, 73.5% of surgical cases had successful outcome and (17.5%) were undercorrected. In a similar study done in Romania (73%) had successful outcome, (21.6%) had surgical under correction and (4.5%) were overcorrected¹¹. In Thailand (61.5%) had successful surgical outcome as was the case in Tehran with 90.3%²⁰.

In conclusion, the prevalence of strabismus was 1.4%. Esotropia and exotropia are the most common types of paediatric strabismus. The surgical success rate was generally good.

ACKNOWLEDGEMENTS

Special thanks are extended to Ruharo Eye Centre and Department of Ophthalmology at MUST.

REFERENCES

- Garcia CA da, Sousa, ABD, Mendonca, MBDM, *et al.* Prevalence of strabismus among students in Natal/RN-Brazil. *Arq. bras. oftalmol.* 2004; **67**(5): 791-794.
- Bicas HEA. Visão binocular e estrabismo. *Arq. bras. oftalmol.* 1987; **50**(1): 36-41.
- Simons K. Amblyopia characterization, treatment, and prophylaxis. *Surv Ophthalmol.* 2005; **50**(2): 123-166.
- Woodruff G, Hiscox, F, Thompson, JR, *et al.* The presentation of children with amblyopia. *Eye (Lond)*. 1994; **8** (Pt 6): 623-626.
- Lilakova D, Hejzmanova D, Novakova D. [Effect of strabismus on the quality of life in adults]. *Ceska a slovenska oftalmologie: casopis Ceske oftalmologicke spolecnosti a Slovenske oftalmologicke spolecnosti*. 2003; **59**(3): 184-187.
- Burke JP, Leach CM, Davis H. Psychosocial implications of strabismus surgery in adults. *J Pediatr Ophthalmol Strabismus.* 1997; **34**(3): 159-164.
- Sabri K, Knapp CM, Thompson JR, *et al.* The VF-14 and psychological impact of amblyopia and strabismus. *Invest Ophthalmol Visual Sci.* 2006; **47**(10): 4386-4392.
- Jackson S, Harrad R, Morris M, *et al.* The psychosocial benefits of corrective surgery for adults with strabismus. *Br J Ophthalmol.* 2006; **90**(7): 883-888.
- Coats DK, Paysse EA, Towler AJ, *et al.* Impact of large angle horizontal strabismus on ability to obtain employment. *Ophthalmology.* 2000; **107**(2): 402-405.
- Keltner JL. Strabismus surgery in adults: functional and psychosocial implications. *Archives Ophthalmol.* 1994; **112**(5): 599-600.
- Reza BM, Reza MM, Mojgan K, *et al.* Pediatric strabismus: prevalence and surgical outcomes in Yazd, Iran. *Guoji Yanke Zazhi (Int eye Sci)* 2013; **13**(8):1521-1524.
- Adler-Grinberg D. Need for eye and vision care in an underserved population: refractive errors and other ocular anomalies in the Sioux. *Optomet Vision Sci.* 1986; **63**(7): 553-558.
- Group M.-e.P.E.D.S. Prevalence of amblyopia and strabismus in African American and Hispanic children ages 6 to 72 months: the Multi-ethnic Pediatric Eye Disease Study. *Ophthalmology.* 2008; **115**(7): 1229-1236. e1.
- Friedman DS, Repka, MX, Katz J, *et al.* Prevalence of amblyopia and strabismus in white and African American children aged 6 through 71 months: the Baltimore Pediatric Eye Disease Study. *Ophthalmology.* 2009; **116**(11): 2128-2134. e2.
- Matsuo T, Matsuo C. Comparison of prevalence rates of strabismus and amblyopia in Japanese elementary school children between the years 2003 and 2005. *Acta Med Okayama.* 2007; **61**(6): 329.
- Yu CB, Fan DS, Wong VW, *et al.* Changing patterns of strabismus: a decade of experience in Hong Kong. *Br J Ophthalmol.* 2002; **86**(8): 854-856.
- Medghalchi A. A study on prevalence of horizontal strabismus in patients under 14 years. 2003. *J Guilan Univ Med Sci.* 2003; **12**(47):80-85.
- Mohney BG. Common forms of childhood strabismus in an incidence cohort. *Amer J Ophthalmol.* 2007; **144**(3): 465-467.
- Najafi A. Prevalence of different types of strabismus in Labbafinejad Hospital. *Med Sci J Islamic Azad University-Tehran Med Branch.* 2007; **17**(1): 33-36.
- Kampanartsanyakorn S, Surachatkumtonekul T, Dulayajinda D. *et al.* The outcomes of horizontal strabismus surgery and influencing factors of the surgical success. *J Med Ass Thai.* 2005; **88**(Suppl 9): 94-99.