

## Prevalence and pattern of manifest strabismus in paediatric patients at CCBRT, Dar es Salaam, Tanzania

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### ABSTRACT

**Background:** Awareness on the magnitude of strabismus burden is crucial in preventing development of amblyopia, restore binocularity, aid in development of stereopsis and improve treatments outcomes.

**Objective:** To determine the prevalence, and pattern of strabismus presentation in paediatric patients at Comprehensive Community Based Rehabilitation in Tanzania (CCBRT).

**Design:** Retrospective descriptive hospital based study.

**Subjects:** Children aged 16 years and below presenting with strabismus at CCBRT between January 1, 2014 and June 30, 2014.

**Methods:** All strabismus coded files of patients below 16 years were identified from medical records. The data collected included patients' demographic data; age at onset of strabismus; visual acuity; characteristics of the deviation; refractive status; binocular functions and amblyopia assessment; and relevant ocular and systemic findings.

**Results:** The prevalence of strabismus was 5.9%. Males were 49.1% and females 50.9%. Family history was present in 3.3% of the patients. Most of the patients (61.8%) were below five years; average 4.6 years. A third of the patients (32.5%) presented within one year of onset of strabismus; average duration 25.7 months. Systemic and ocular co morbidities were present in 17.9% and 46.2% of the patients respectively. About half (47.9%), had normal vision. Esotropia was the commonest deviation ( 63.3%); exotropia, 24% and hypertopia 2.8% . In 76.9% the strabismus was unilateral and alternating in 22.6%. Most of the deviations (42.9%) were between 30-50 prism dioptres. Hyperopia was in 51.7%; myopia in 14.4% and astigmatism 11.6% of the eyes. Amblyopia was noted in 25.9% of the patients. Binocular single vision assessment was done in 14.1%; 62.5% had a negative result.

**Conclusion:** The prevalence of strabismus in this study was high at 5.9%. Esotropia was the commonest deviation.

### INTRODUCTION

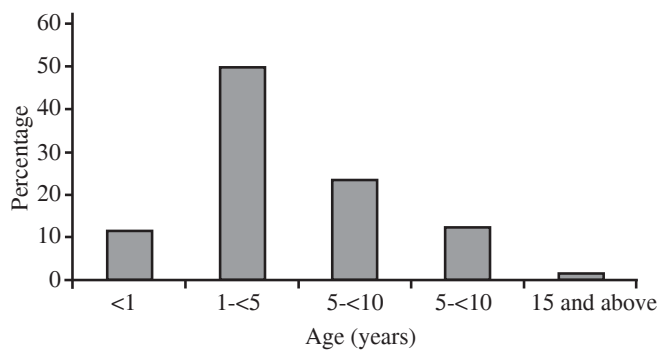
Geographical and racial variation in prevalence and patterns of strabismus in children has been described. Esotropia has previously been described to be more common mainly based on studies of the Caucasian population. In Japan and Indian studies exotropia has been described as more common owing to steady increase of intermittent exotropia over the years. There is a paucity of studies devoted exclusively to strabismus in children in Africa<sup>1,2</sup>. Awareness on the magnitude of strabismus burden in our population is crucial in preventing development of amblyopia, restore binocularity, aid in development of stereopsis and improve treatments outcomes. The objectives of the study were to determine the prevalence, and pattern of strabismus presentation in paediatric patients at CCBRT, Dar es Salaam, Tanzania.

### MATERIALS AND METHODS

This was a retrospective descriptive hospital based study. The study population included children below 16 years of age presenting with strabismus at CCBRT between January 1, 2014 and June 30, 2014. The data collected included patients' demographics; age at onset of the strabismus; visual acuity; characteristics of the deviation; patients refractive status; status of binocular functions and assessment of amblyopia; and relevant ocular and systemic findings.

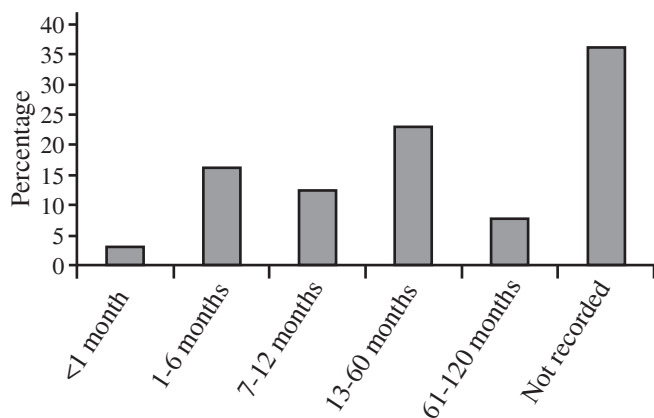
### RESULTS

Two hundred and twelve patients presented with strabismus; out of a total of 3,600 patients during the study period. Thus the prevalence of strabismus was 5.9%. The distribution was almost equal between the two genders; male 49.1% and female 50.9%. Family history was present in 3.3% of the patients (Figure 1).



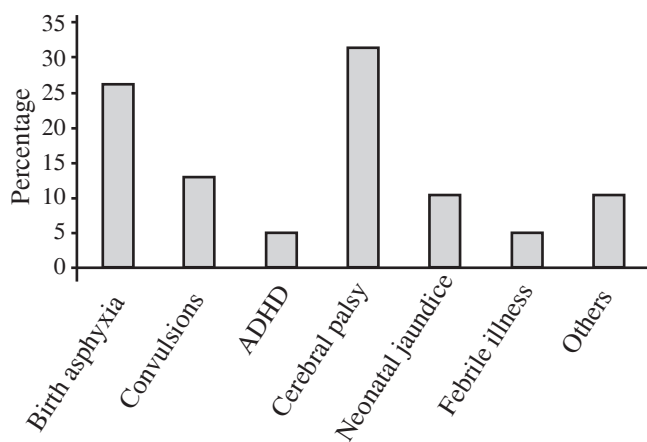
**Figure 1:** Age distribution at presentation (n=212)

Most of the patients (61.8%) were below five years of age. The average age was 4.6 years and the range was one week to 15 years.



**Figure 2:** Duration of strabismus at presentation

A third of the patients (32.5%) presented within one year of onset of strabismus. The average duration of strabismus at presentation was 25.7 months. In 36.3% of the patients the duration of symptoms was not recorded (Figure 2).



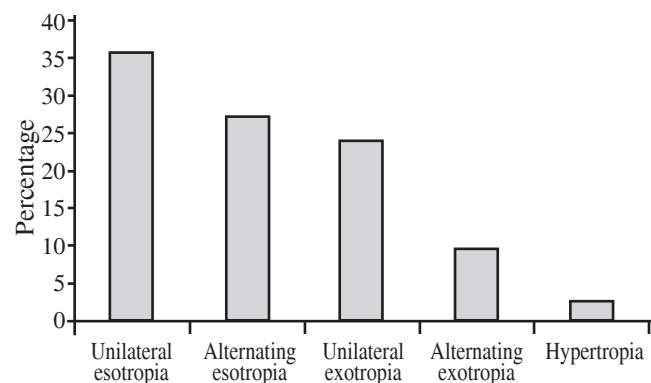
**Figure 3:** Systemic co-morbidities

Systemic co-morbidities were present in 17.9% of the patients, of which cerebral palsy was the commonest. Others included hydrocephalus (1), hemiparesis (1) prematurity (1) and albinism (1) (Figure 3).

**Table 1:** Ocular co-morbidities (n=98)

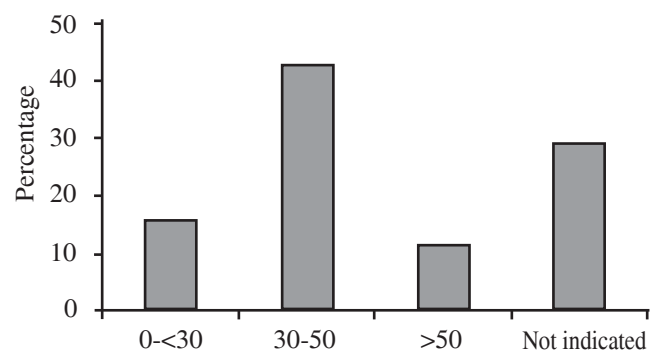
Associated ocular findings	No.	(%)
Aphakia	3	2.9
Pseudophakia	33	31.7
Cataracts	9	8.7
Nystagmus	16	15.4
Cerebral visual impairment	8	7.7
Glaucoma	5	4.8
Duane syndrome	5	4.8
Ocular nerve palsies	5	4.8
Optic atrophy	4	3.8
Macular scars	4	3.8
Retinoblastoma	2	1.9
Others	10	9.6
<b>Total</b>	<b>104</b>	<b>100</b>

Ocular co-morbidities were noted in 46.2% of the patients. The commonest ocular co-morbidity was pseudophakia cerebral visual impairment and nystagmus co-existed with the others in some patients. Others included retinal detachment (2), pathological myopia (2), ptosis (2), microcornea (2), choroidal coloboma (1) and retinitis pigmentosa (1) (Table 1).



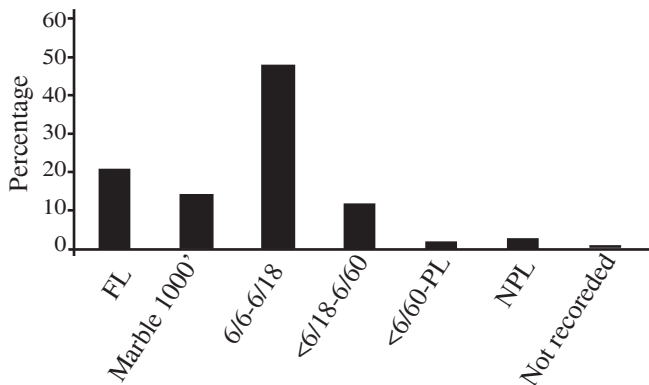
**Figure 4:** Type of deviation (n=212)

Esotropia was the commonest deviation. Hypertropia was combined with horizontal strabismus except in one patient. Two thirds of the cases had unilateral strabismus while in a third it was alternating (Figure 4).



**Figure 5:** Size of the deviation (Prism diptres) (n=212)

Majority of the patients had deviation of 30-50 prism dioptres. In a third of the patients the size of the angle was not indicated (Figure 5).



**Figure 6:** Visual acuity assessment (n=212)

All except two children had vision assessed; with most having normal visual acuity (Figure 6).

**Table 2:** Refractive status (n=424 eyes)

Refractive status	RE	LE	Both	(%)
Plano	9	12	21	5.0
Myopia < -0.50	0	0	0	0.0
Myopia $\geq -0.50$	32	29	61	14.4
Hyperopia < +0.50	8	5	13	3.1
Hyperopia $\geq +0.50$	107	112	219	51.7
Astigmatism $\geq 0.50$	31	30	61	14.4
Not done	25	24	49	11.6
Total	212	212	424	100

Hyperopia was the commonest refractive status. Hyperopia  $\geq +4$  dioptres was present in 13% of the eyes. High myopia  $\geq -6$  dioptres and astigmatism  $\geq 2$  dioptres were noted in 2.1% and 3.8% of the eyes respectively.

*Amblyopia assessment:* Amblyopia was noted in 25.9% of the patients; 44.3% did not have amblyopia while in 29.7% assessment was not done.

*Binocular single vision:* Assessment was done in 30 (14.1%) patients. Majority of these, 24 (11.3%) had stereopsis assessed while 2.8% had prism fusion test. Of those who had stereopsis assessed, the test was negative in 62.5% and positive in 37.5%.

**DISCUSSION**

The prevalence of strabismus in our hospital based study was 5.9%. The worldwide population based studies show a prevalence of 2-5%<sup>3</sup>. School based and rural studies done in Tanzania, Nigeria and Sudan reported a lower prevalence range of 0.5% to 2.6%<sup>4-6</sup>.

The proportion of males (49.1%) and females (50.9%) was similar to what has been noted in a Hong Kong study involving 2704 strabismus patients, where males were 46.8% and females 53.2%<sup>2</sup>.

Esotropias (63.2%) were twice as common as exotropias (34%); similar to what is reported in other studies<sup>1,2,6,7</sup>. In a study in Nigeria, congenital esotropia and accommodative esotropia constituted 50.0% and 18.8% of cases respectively while, exotropia constituted 31.3%<sup>7</sup>. Although, studies in Cameroon, Hong Kong and Asia have reported more exotropias compared to esotropias<sup>2,8,9</sup>.

A third of our patients (32.5%) presented within the first year of life when esotropias are known to set in<sup>10</sup>. In 36.3% the duration of the strabismus was not recorded. It is important to note the duration of strabismus since it can be a pointer to health seeking behaviour with regards to strabismus and also be an indicator to onset of amblyopia.

Majority of the patients (62.8%) had constant unilateral strabismus while a third had the alternating type. It is expected that the unilateral strabismus do not have binocular single vision. Although this was assessed in only 14.2% of the patients, 62.5% had negative results, which is consistent with laterality of the deviations. Challenges associated with binocular vision assessment in children include the age factor, difficulties in understanding the instructions and interpretation of the pictorial elements presented.

Almost half of the patients (42.9%) had deviations of 30-50 prism dioptres. In 29%, the size of the angle was not indicated. This is an important parameter in strabismus because its measure determines progression of the deviation and management of the strabismus during surgery or where accommodative component is involved<sup>11</sup>.

There was significant proportion of patients with systemic (17.9%) and ocular (46.2%) co morbidities. Among the systemic, birth asphyxia with or without cerebral palsy, convulsions and neonatal infections are known triggers of strabismus<sup>12</sup>. Strabismus can also result from sensory deprivation such as in cataracts, ptosis or retinal problems. Of note is retinoblastoma presenting as strabismus, which was noted in two of our patients. This emphasizes the importance of complete systemic and ocular evaluation in children presenting with strabismus.

Majority of the patients (47.9%) presented with normal vision according to WHO standards. Possible causes of poor vision in the study included amblyopia, refractive errors, ocular and systemic co morbidities such cerebral palsy causing difficulties in assessment of vision due to depressed mental state.

Risks of amblyopia in the study which was noted in 25.9% of the patients included long duration before presentation (average 25.7 months), constant unilateral strabismus (62.8%), refractive errors and high proportion of ocular co morbidities; some of which are amblyogenic. In a third of the patients, assessment for amblyopia was not done. Strabismic amblyopia occurs in 40-50% of the patients<sup>13,10</sup>. In our study, it is possible this was under diagnosed considering amblyopia was not assessed in a third of the patients. It is important that all patients with strabismus are assessed so that where possible timely

management is instituted to prevent permanent loss of vision and long term sequel of amblyopia<sup>14</sup>.

### Study limitations

- (i) Information missing on medical records could not be obtained.
- (ii) Intermittent strabismus could have been missed or classified with the constant ones.

### CONCLUSIONS

The prevalence of strabismus was high, (5.9%). Esotropia was the commonest type of strabismus. A significant proportion of patients had systemic and ocular co morbidities. Amblyopia was present in 25.9% of the patients.

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