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Ocular health status of subjects with Down's syndrome in Benin City, Nigeria

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Summary

Down's syndrome is the commonest cause of mental retardation worldwide. In Nigeria, persons with Down's syndrome remain largely stigmatised and neglected. There is a dearth of literature on the ocular health status of Nigerian subjects with Down's syndrome. To determine the ocular health status of Nigerian subjects with Down's syndrome in 4 special schools in Benin City, Nigeria, one hundred and forty four subjects with Down's syndrome had external ocular examination, visual acuity testing and Ophthalmoscopy in a school setting. Majority of the subjects had poor visual acuity of 6/18 or worse (59.0%), in at least one eye. There was a high incidence of refractive errors. Hyperopia was present in 29.2% of subjects; Astigmatism 22.2%; Myopia 6.3%; Strabismus 18.1%; Nystagmus 4.2% and cataracts in 2.8%. Liberal early use of corrective lenses is advocated in persons with Down's syndrome. Community based enlightenment programmes to encourage parents of children with Down's syndrome to bring their children for ocular examination early, preferably in infancy, and to enrol the children in a continuous ocular screening programme need be put in place. This will go a long way in improving their intellectual abilities, quality of life and life expectancy.

Keywords: *Down's syndrome, ocular, refractive errors*

Résumé 2782

Le syndrome de Down est une cause commune des retards mentaux dans le monde entier. Cette maladie reste stigmatisé et négligé au Nigeria. Cette étude avait pour but de déterminer le statut de la santé oculaire aux nigériens ayant le syndrome de Down dans quatre écoles sélectionnées au hasard dans la province de Bénin, au Nigeria. 144 patients étaient examinés inclus un test d'acuité visuelle et l'ophtalmoscopie dans l'enceinte de l'école. La majorité des patients avaient une acuité visuelle faible (6/18 :59.0%) au moins dans un œil. Il y avait une incidence élevée d'erreurs réfractaire. L'hyperopie était présent chez 29.2% des patients, 22.2% d'astigmatisme, 6.3% de myopie, 18.1% de strabisme, 4.2% de nystagmus et 2.8% de cataracte. L'emploi des lunettes correctives est stressé aux personnes ayant le syndrome de Don. Des

programmes d'éducation dans la communauté afin d'encourager les parents et les enfants ayants ce syndrome sont recommandés dans l'enfance et une suivie est nécessaire est nécessaire pour améliorer les capacités intellectuelles, la qualité et la durée de vie.

Introduction

Down's syndrome is the most common cause of mental retardation worldwide with an incidence of about 1.5/1000 live births [1]. Studies have shown that in children and adults with Down's syndrome, refractive errors tend to be more frequent than among the normal population [2-4]. Similarly, poor accommodation and strabismus amongst other ocular pathologies are more common [5]. Merrick and Koslowe reported a significant correlation between progressive strabismus, ocular pathology and amount of learning difficulty in Down's syndrome [6]. It is known that the range as well as mean refractive error does not differ significantly between normal children and children with Down's syndrome during infancy but increases with age [2]. Hence, early detection and modification of ocular anomalies enhances the ability of these children to learn and improves their quality of life.

Life expectancy and quality of life have improved substantially for the mentally retarded in Caucasian populations. In Nigeria, unfortunately, the situation is different. The mentally retarded remain largely ignored and outside the sphere of public and professional concern. And there is a dearth of accessible literature on the ocular peculiarities of persons with Down's syndrome in Nigeria. The purpose of this study was to ascertain the ocular health status of subjects with Down's syndrome in 4 special schools for the mentally retarded in Benin City, Nigeria. This was with the goal of providing data on the pattern of ocular disorders as well as making appropriate recommendations for interventions to improve the ocular health of persons with Down's syndrome in Nigeria.

Materials and methods

This was a survey of the ocular health status of subjects with Down's syndrome in 4 special schools for the mentally retarded in Benin City, Nigeria: Paragon School for slow learners, Payne Primary School, Iyoba Primary School and Salvation Army Primary School. Informed consent was obtained from the parents and guardians before the subjects were included in the study and ethical approval received from the institutions before the study commenced.

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All the children lived with their parents and guardians and came to school from home. The medical data of each subject was part of the school records and supplied information on the cause of mental retardation. One hundred and forty four mentally retarded children in the schools had definitive diagnoses of Down's syndrome and were the subject of this study. Seventy-four were male and 70 female. Their ages ranged from 6 to 19 years. Most tests used in visual assessment of the children were objective.

rection as the examiner's. The last correct response was recorded. The test was done monocularly then binocularly. Retinoscopy was done with a drop of 1% cyclogyl instilled into each eye and another drop 5 minutes later. Only objective refraction by retinoscopy was done.

The results of this test were classified as follows: Hyperopia was defined as the need for a plus lens in excess of one diopter to neutralise the reflex, myopia as a need for a minus lens in excess of one diopter to neutralise

Table 1: Ocular findings with various tests in subjects with Down's Syndrome

Test	Findings % (Number)			
Version	Normal 88.2 (127)	Nystagmus 4.2 (6)	Jerky 7.6 (11)	
Cover test	Normal 66.0 (95)	Esotropia 13.2 (19)	Exotropia 4.9 (6)	not cooperative 15.9 (23)
Ophthalmoscopy	Normal 61.8 (89)	Cataract 2.8 (4)	suspected pathology 4.2 (6)	Not cooperative 31.3 (45)
Pupillary reflex	Normal 57.6 (83)	Direct weak or absent 16.7 (24)	Consensual weak or absent 25.7 (37)	
Visual acuity	better eye ≥6/12 36.1 (52)	better eye ≤6/18 59.0 (85)	Not cooperative 4.9 (7)	
NPC*	10cm-20cm 36.1 (52)	OD out 18.1 (26)	OS out 22.2 (32)	Not cooperative 23.6 (34)
Retinoscopy	Hyperopia 29.2 (42)	Myopia 6.3 (9)	Astigmatism 22.2 (32)	Not cooperative 25.0 (36)

*NPC=Near point of convergence

The following tests were done: version, near point of convergence, cover test, ophthalmoscopy, pupillary reflex, visual acuity, and retinoscopy. For version test, each of the subjects was confronted with a penlight at a distance of 40 centimetres. The light was moved to each of the 8 cardinal points. The monocular and binocular pursuits were noted.

For near point of convergence test, a small bell suspended from a black string was dangled before the subject's eyes at 40cm. After the subject had fixated the bell, it was slowly brought closer to the eyes in the median plane until one eye deviated. Alternate and cover-uncover method was used for cover test. Ophthalmoscopy was done monocularly in dim illumination. Only the grossest of observations were possible. A penlight was used as a source of light for the direct and consensual pupillary reflexes

Visual Acuity was done using the Snellen's illiterate E chart where possible as well as a modified form of the illiterate E. The subject was given a wooden letter E of about 18cm square to manipulate. At a distance of 6 metres or 3 metres, the subject was told to hold his/her letter in the same di-

rection and astigmatism as a need for cylindrical lens of at least one diopter to neutralise the reflex in all meridians. Ametropia was defined as the need for a lens of at least plus one to minus one diopter to neutralize the reflex. There was an adjustment of 0.50 D to compensate for cycloplegia.

All the tests could not be carried out on all subjects because some of them were very fearful while others were unfriendly and could not be approached sometimes. In all, every one of the subjects had some tests carried out on them in this study.

Results

Of the 144 subjects with Down's syndrome, 51.4% (74) were male and 48.6% (70) female. Their ages ranged from 6 to 19 years. All the tests could not be done in all the subjects. Retinoscopy was done in 75.0% (108) of subjects, visual acuity in 95.1% (137), near point of convergence in 76.4% (110), pupillary reflex in 100% of cases, ophthalmoscopy in 68.7% (99), cover test in 79.2% (114), and version in 100% of cases. Figure 1 and Table 1 show the ocular findings with various tests. Hyperopia (29.2%) and Astigmatism (22.2%) were the commonest refractive errors. Major-

ity of the study population had poor visual acuity of 6/18 or worse (59.0%) in at least one eye while 40.3% had convergence insufficiency.

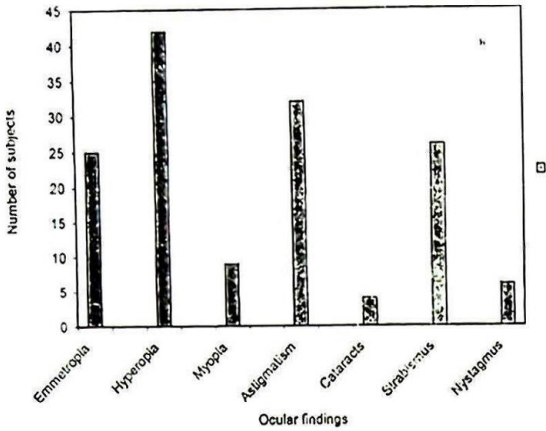


Fig. 1: Ocular findings in subjects examined

Table 2: Distribution of refractive errors in subject's according to degree.

Refractive error	Degree (Diopters)	Frequency % (number)
Myopia (n=9)	-5.25 to -6.00	0
	-4.25 to -5.00	11.1 (1)
	-3.25 to -4.00	33.3 (3)
	-2.25 to -3.00	33.3 (3)
	-1.25 to -2.00	22.2 (2)
Emmetropia (n=25)	± 0.25 to ± 1.00	
Hyperopia (n=42)	1.25 to 2.00	30.9(13)
	2.25 to 3.00	16.7(7)
	3.25 to 4.00	21.4(9)
	4.25 to 5.00	19.0(8)
	5.25 to 6.00	11.9(5)
Astigmatism (n=32)	1.25 to 2.00	34.2(14)
	2.25 to 3.00	29.3(12)
	3.25 to 4.00	7.3(3)
	4.25 to 5.00	7.3(3)

Table 2 shows the percentage distribution of refractive errors according to degrees in the subjects that were refracted. Astigmatism was in the degree of 1.25 to 5.00DC, with 81.3% in the range of 1.25 to 3.00DC. Myopia occurred in the degree of -1.25DS to 5.00DS, with about 66.6% of the occurrence in the range of -2.25DS to 4.00DS.

Hyperopia was also in the degree of +1.25DS to +6.00DS with majority of them, 30.9%, in the range of +1.25DS to +2.00DS.

Discussion

The results of this study show that about three-fifth (59.0%) of the children with Down's syndrome had poor visual acuity. Other ocular abnormalities found included a high incidence of refractive errors, nystagmus, cataract and strabismus. This is similar to findings in other parts of the world [1-5]. Similarly, the finding that hyperopia was the commonest refractive errors is consistent with findings in most previous studies [2-3]. However, Kim *et al* reported [5] that astigmatism was the commonest refractive error in a survey of Asian children with Down's syndrome, although the reported incidence of hyperopia (28%) in their study does not vary much with the 29.2% found in this study. Again, previous workers, as was found in this study, have reported high incidences of Astigmatism in children with Down's syndrome [2,3,5]. Comparatively, the reported incidence of refractive errors in Nigerian children of school age is in the range of 3.9-7.3% with hyperopia being the commonest cause [7,8].

In this study, almost a fifth of the study population had strabismus and majority of them were esotropic. Incidences of 25% and 48% have been reported in Asian and Caucasian children with Down's syndrome respectively [5,9]. The finding of strabismus in Down's syndrome has negative implications especially when it is progressive. Merrick and Koslowe reported a significant correlation between progressive strabismus and increased amount of learning difficulty and recommended early ocular examination within the first six months of life and then annually for early detection and treatment of strabismus [6]. Four point two percent of the subjects had nystagmus. This is much lower than incidences as high as 22-33% and 28% found in Asian and Spanish children respectively [9,10]. Unfortunately, we were unable to clearly define the specific type of nystagmus in our study population as described by Wagner *et al* [11]. Also, in our study, cases of amblyopia could not clearly be ascertained since only objective refraction was done and ophthalmoscopy was barely just possible. As much as 26% of Brazilian children with Down's syndrome have been reported to have amblyopia [12].

It is noteworthy that other ocular abnormalities like blepharitis, brushfield spots and keratoconus which have been reported to occur more frequently in children with Down's syndrome and other children with mental retardation compared to normal children were not found in this study [2,9]. Brushfield spots have been reported to occur commonly in most studies in Caucasian children. However, as found in this study, they were absent in studies in Asian children [5,10,13]. It has been reported that brushfield spots are more common in light-coloured irides compared to dark-coloured irides [14]. The occurrence of dark irides in blacks may explain our findings. Similarly, the

absence of keratoconus in our study population is in agreement with findings in Asian populations [5,10,13]. Incidences of Keratoconus as high as 15% has been reported from a Turkish study [14]. Unlike in the studies above, only 2.8% of the children had cataracts in this study. Our findings must be interpreted in the light of the fact that only the grossest of observations was possible by ophthalmoscopy, because of difficulty in obtaining optimum cooperation from the subjects and in a significant number of subjects (31.3%) examination was clearly not possible. Hence, the presence or absence of posterior segment diseases could not be assessed. This was a major limitation of this study and was due to the peculiarities of the study population.

A major weakness of this study is the fact that due to the absence of reliable data on all persons with Down's syndrome in Nigeria, it is difficult to say with certainty whether the findings only reflect a select group or the prevalence of ocular problems in all young persons with Down's syndrome in Benin city, Nigeria. Again due to widespread ignorance about the disease and the stigma associated with it, it is probable that many of the children with Down's syndrome do not attend school. Another limitation of this study is the fact that all the tests could not be done in all the subjects due to the peculiarity of the study population. Nevertheless, in the absence of community based, all-inclusive data as available in most developed countries, our findings provide a basis for action.

The findings of this study have important implications for learning in children with Down's syndrome in Nigeria. Firstly, although this study suggests that they have a higher incidence of ocular abnormalities, most of them including hyperopia, myopia, astigmatism and strabismus are modifiable. Since, it has been reported that the use of corrective lenses leads to significant improvement in social behaviour, gross and fine motor skills as well as reading and writing skills with the changes most evident in younger age groups [15], liberal early use of corrective lenses must be encouraged. There is therefore an urgent need for community based enlightenment programmes to encourage parents of children with Down's syndrome to bring their children for ocular examination early, preferably in infancy, and to enrol the children in a continuous ocular screening programme. With the high prevalence of poverty in Nigeria, government and non-governmental agencies may need to assist indigent parents. In this light, it is advocated that health care, including comprehensive ocular care, be made free and readily accessible to people with Down's syndrome. This will go a long way in improving their intellectual abilities, quality of life and life expectancy.

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