

Original Research Article

Ocular manifestations in children with developmental delay in an eye hospital of northern Bangladesh

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ABSTRACT

Background: The aim of this study was to identify common ocular manifestations in children with developmental delay in an eye hospital of northern part of Bangladesh.

Methods: It was a retrospective medical record review of children with developmental delay who attended the pediatric ophthalmology department in an eye hospital from January 2019 to December 2019. Data were collected for their age, gender, past medical history, ophthalmic examination findings and systemic problems. Ophthalmic examination included examination of lid and adnexa, anterior and posterior segment examination and assessment of squint and refraction.

Results: Medical records of 102 with developmental delay were identified and studied (59 boys and 43 girls, mean age 1.57 years, 53.9% aged <1 year). Of these children, 44 (43.1%) were referred by the pediatricians. The most common past medical histories were perinatal asphyxia (42.2%), history of convulsion (30.4%), neonatal seizures (9.8%) and history of speech delay (1%). On ophthalmic examination, 30 (29.5%) had poor vision, 20 (19.6%) had refractive error, 23 (22.5%) had Strabismus and 11 (10.8%) had nystagmus. Optic atrophy was also observed among 11 children (10.8%).

Conclusions: Ocular manifestations are commonly seen in children with developmental delay which can be cause of severe visual impairment and overall disability in later life. Hence an early ophthalmologic screening and intervention in these children by developing good referral network between ophthalmologist and pediatricians can help to substantially improve the developmental and academic achievement.

Keywords: Developmental delay, Optic atrophy, Refractive error, Strabismus

INTRODUCTION

Developmental delay is a condition when a child does not out stretch their turning point at the expected time. Overall it is delay in the process of development of a child in every aspects such as gross motor, vision and fine motor, speech, hearing and language, personal and social.¹ Genetic cause (autosomal recessive), complication during pregnancy, birth asphyxia, prematurity, neonatal septicemia, are the different causes of developmental delay.² However, these children with ocular and visual problem are relatively not uncommon

but sometimes may be overlooked due to others health related issues and management. It is appeared that certain deficiency frequently go untreated either through lack of identification or unknowingness of importance in developmental delay population and they receive less than average care.

Children with visual handicap plays an important role in the overall morbidity, social and economic burden.³ Though it is difficult, it should be managed properly. Consequently the pediatricians need to engaged for seeking ophthalmic assistance of developmental delay

children and help to improve the overall achievements of their lives.⁴

The main aim of this study was to show the common ophthalmic problems of developmental delay children attending the pediatric ophthalmology OPD of Deep Eye Care Foundation in one year.

METHODS

The study was a retrospective review of case records of children (children <16 years, as defined by WHO) with a diagnosis of developmental delay, seen between January 2019 and December 2019 at pediatric ophthalmology department of Deep Eye Care Foundation, Darshona, Rangpur. The diagnosis of the developmental delay was made either by the pediatricians who referred the case or by the ophthalmologist who assessed the general physical condition of the children and took history from the parent or guardian who accompanied the child. Relevant details regarding any disability, family history, birth history were also recorded. Ocular complaints regarding visual inattention, deviation of eyes, nystagmus, and abnormal head posture were enquired. The following details were noted for each case which includes age at presentation, presenting complaint, visual acuity, cycloplegic refraction, ocular alignment and motility, and anterior and posterior segment findings.

The evaluation of vision and visual correction was always a tough task in these children who had developmental delay. Snellen's vision chart was used for assessing visual acuity in children who could read and co-operate. Can fix and follow light/object was used for children below 3 years. For children between 3 to 5 years of age, visual acuity was tested using KPT (kay picture test). Cardiff's preferential looking test was also done where indicated. Anterior segment was examined using torch light and slit-lamp examination. Direct and consensual pupillary light reflexes were also checked. Hirschberg's light reflex test and cover uncover test was used to evaluate visual axis and strabismus. Ocular movements were tested and presence of nystagmus was checked. Subjective correction of refractive errors was attempted in children who were cooperative. Cycloplegic retinoscopy was done in most of the children. A detailed fundus examination after dilatation was done by direct ophthalmoscope. The data was entered using an excel sheet and analyzed using SPSS software version 22. The study was approved by the ethical institutional review board of Deep Eye Care Foundation.

RESULTS

The study included a total of 102 children with developmental delay who were seen by the pediatric ophthalmology department during the study period. Out of the 102 children, 59 were boys and 43 were girls. The majority of the children (55) were in the age group of less than 1 year (Table 1). Forty four children (43.1%) were

referred by the pediatricians. There was a history of perinatal asphyxia in 43 children (42.2%) and history of convulsion in 31 children (30.4%). Others history includes history of seizures 10 (9.8%), history of auditory disease 3 (2.9%), microcephaly 2 (1.9%), history of speech delay 1 (1%) (Table 2).

Table 1: Distribution of age group of the children.

Age group (years)	Frequency	Percentage	
Less than 1	55	53.9	Mean =1.57
1-4	36	35.3	Median =0.91
5-8	10	9.8	Mode =1.00
9 and above	1	1.0	Minimum =0.2
Total	102	100.0	Maximum =10

Table 2: Past medical history of the children (n=102).

History of the children	Frequency	Percentage
History of perinatal asphyxia	43	42.2
History of convulsion	31	30.4
History of seizures	10	9.8
History of auditory disease	3	2.9
Microcephaly	2	1.9
History of speech delay	1	1

Table 3: Refractive status of the children.

Refractive status of the respondents	Frequency	Percentage
No refractive error	82	80.4
Refractive error	20	19.6
Simple myopia	2	2.0
Simple myopic astigmatism	9	8.8
Simple hyperopia	7	6.9
Compound hyperopic astigmatism	2	2.0
Total	102	100.0

Table 4: Presence of strabismus and types of strabismus (n=102).

Strabismus	Frequency	Percentage
Esotropia	13	12.7
Exotropia	10	9.8
Total	23	22.5

Among all the cases, any kind of ocular manifestation was presented in 67 (65.7%) children, rest of the cases showed normal ocular findings. Visual acuity test revealed that, 30 children (29.5%) had poor visual acuity where refractive error was found in 20 (19.6%) children among all the cases.

Table 5: Strabismus in relation to refractive error.

Strabismus status	Refractive error status			Total N (%)	Statistics
	Myopia group N (%)	Hyperopia group N (%)	No refractive error N (%)		
Exotropia	2 (20.0)	0 (0)	8 (80.0)	10 (100)	$\chi^2= 11.18$ P= 0.02
Esotropia	2 (15.4)	4 (30.8)	7 (53.8)	13 (100)	
No strabismus	7 (8.9)	5 (6.3)	67 (84.8)	79 (100)	
Total	11 (10.8)	9 (8.8)	82 (80.4)	102 (100)	

Table 3 shows the refractive status of all the cases. Of 102 children, we found manifest strabismus in 23 (22.5%). Strabismus was registered in the forms of esotropia and exotropia. Esotropia was found in 12.7%, exotropia in 9.8%. Strabismus was significantly correlated with refractive errors ($p=0.02$) (Table 5). Esotropia was found most often in those with significant hyperopia and exotropia was found most often in the myopic group. Nystagmus was found in 11 children (10.8%). The most common posterior segment anomaly found was optic atrophy, seen in 11 cases (10.8%). Others ocular problems which found in the study cases were watering and discharge from eye in 2 (1.9%), retinal dystrophy in 1 (1%) and blepharitis in 1 (1%) (Table 6).

Table 6: Findings of ocular examination (n=102).

Ocular examination findings	Frequency	Percentage
No abnormal findings	43	42.2
Poor vision	30	29.5
Strabismus	23	22.5
Refractive error	20	19.6
Nystagmus	11	10.8
Optic atrophy	11	10.8
Pupil not reacting to light	5	5.0
Watering and discharge from eye	2	1.9
Retinal dystrophy	2	1.9
Blepharitis	1	1.0

DISCUSSION

Vision is an important part of child's overall development. Impairment of vision delays both visual and general development of child. Children with developmental delay have frequent ocular and visual anomalies which are often overlooked as other factors associated with handicaps take precedence. In this study of one year, 102 developmental delay children were screened. Of these 102 children, 59 were boys and 43 were girls forming 57.8% and 42.1% respectively. In a study by Wu et al sex distribution was found 68% male and 32% female which is often close to our study.⁵ 53.9% children were below 1 year suggest that parents were conscious about their baby's vision and they try maximally for medical assistance during this period.

Ocular manifestations in children with developmental delay were seen in 65.7% cases in this study which is similar to Reena et al who found 64.6% children with delayed milestones had ocular manifestations.⁶ This study is also comparable with studies conducted by Katoch et al where they found 68% children with cerebral palsy had visual morbidity Akinci et al where they found in 77% cases.^{7,8} Another study by Smitha et al who reported 83.6% children with intellectual disability had ocular features.⁹

The most common visual abnormality in the study was poor vision 29.5%. In a study of Reena et al, severe visual impairment was seen in 51 cases (34.6 %).⁶ The common cause of poor vision was cortical visual impairment, thought to be the finale of hypoxic ischemic insult to the developing brain during delivery process and worsens the visual outcome in these patients. Because we had histories of perinatal asphyxia in 42.2% cases. Histories of convulsion and neonatal seizures are respectively 30.4% and 9.8% cases. In a study by Solomon et al, birth asphyxia was found in 34 cases (27.2%) and seizures in 10 (8%) which is similar to our study.¹⁰ In a study by Neilson et al, it was found that visual impairment was due by perinatal factors in 7% and postnatal factors in 2%.¹¹

The second most common ocular problem was strabismus. The overall prevalence in our study of strabismus was 22.5% with esotropia (12.7%) being more common than exotropia (9.8%) which is similar with the study of Nielsen et al who found strabismus in 26.8% (esotropia in 14.9%, exotropia in 10.3%).¹² In other studies of children with developmental delay, the prevalence of strabismus varied from 10% to 43%.¹³⁻¹⁶ The high prevalence of strabismus is caused by several factors commonly found in children with developmental delay. In children with cerebral palsy, a high prevalence of strabismus mainly esotropia is found due to spastic activity of the muscles.¹⁷⁻¹⁹ Prematurity, which is common in children with developmental delay, is another condition with a high prevalence of strabismus due to cerebral damage.²⁰

Among the refractive errors of the children with developmental delay, refractive error was found in 20 (19.6%) in our study. Our findings are in accordance with previous studies which have reported the prevalence of refractive errors in such children to be in the range of 10-

60%.²¹⁻²⁴ Refractive error (53.35%) was the most common ocular problem observed in a retrospective study of children attending child developmental unit of a tertiary hospital in Chennai where 57.4% was child of developmental delay.²⁵

Other visual abnormalities were nystagmus 11 (10.8%) and optic atrophy 11 (10.8%), that is comparable with the study of Banks et al who studied 200 children with developmental delay and found nystagmus 7.5% and other features like cataract, optic atrophy and retinopathy.¹⁶ The study of Smitha et al also found 9.7% cases had optic atrophy.⁹

CONCLUSION

With the development of pre and post-natal care of incidence of child birth with developmental delayed has been reduced but still a significant number of children with developmental delay are presented in populated country like Bangladesh. In order to give them a comfortable lives the stakeholders need to play an important role. Bridging the gynecologist, neonatologist, pediatricians and the ophthalmologist can play a vital role. From the perspective of pediatric ophthalmologist may play role identifying their hidden eye problems and giving them solution to ease their lives. Besides this awareness development and health education for the parents of sufferers are very important. Specially, government health system need to incorporate a comprehensive health care system for the developmental delayed children to get rid of economic loss from this group of population. A sustainable vertical and horizontal health approach through developing network among all stake holders can deal a lot of the problems.

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