RETROSPECTIVE ANALYSIS OF OPHTHALMIC AILMENTS IN CHILDREN ATTENDING THE CHILD DEVELOPMENT UNIT IN A TERTIARY CARE HOSPITAL IN SOUTH INDIA

Mary Thomas¹, Vaishnavi R², Gayathri N³, M. Muthayya⁴, Binu Ninan⁵

¹Associate Professor, Department of Ophthalmology, Sri Ramachandra Medical College and Research Institute, Porur, Chennai.

²Senior Resident, Department of Ophthalmology, Sri Ramachandra Medical College and Research Institute, Porur, Chennai.

³Post Graduate Student, Department of Ophthalmology, Sri Ramachandra Medical College and Research Institute, Porur, Chennai.

⁴Professor, Department of Ophthalmology, Sri Ramachandra Medical College and Research Institute, Porur, Chennai.

⁵Professor & Head, Department of Neonatology, Sri Ramachandra Medical College and Research Institute, Porur, Chennai.

ABSTRACT

AIM

To identify the various ocular ailments in children with developmental problems.

MATERIALS AND METHODS

418 children who attended the child development unit in a tertiary care centre during a period of 2 years from January 2014 to December 2015 were retrospectively analysed. A detailed data sheet which included their socio-demographic details, systemic ailments, ocular examination and correlations analysed. Ophthalmic examination included examination of lid and adnexa, anterior and posterior segment examination and assessment of squint and refraction.

RESULTS

75 (17.9%) children had history of consanguinity, 72 (17.2%) were preterm. Speech and language problem was seen in 300 (71.8%), developmental delay was the second in the list 240 (57.4%). Refractive error was the leading ocular problem found in 223 (53.35%) and the most common refractive error was hyperopia. Anisometropia in 18 (4.31%). Squint in 19 (4.55%) and nystagmus in 11 (2.6%). Though vitamin A deficiency was diagnosed as a leading cause of blindness in developing countries, xerophthalmia was noted in only 1 (0.2%) child.

CONCLUSION

Children with multi-system involvement are at high risk of visual disabilities and should not be ignored, as these children depend heavily on their vision. There is an increased risk of refractive errors, anisometropia, fusion mechanisms and accommodation and thus orthoptic and optometric support are mandatory. Ocular problems in these children are usually correctable and early diagnosis and treatment will improve their quality of life.

KEYWORDS

Developmental Assessment, Refractive Errors, Anisometropia, Squint.

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INTRODUCTION

Ocular ailments are common among children with developmental problems. Each of the five senses is a doorway to the developing mind and vision integrates all other senses. Vision is the primary data gathering system or it is the feedback system for all other developing systems during early stages of life. Size, shape, colour, distance and spatial orientation, all can be perceived in one glance and 75% of overall development during infancy and early childhood depends on vision. "There are an estimated 25,000 blind and partially sighted children and young people aged 0-16 years in Britain." (Morris and Smith, 2008).

If born without sight developmental milestones will be delayed, may develop abnormal facial expressions, all the

other senses may appear diminished because of intermittent unverified visual input. Children with intellectual disability often have to depend mainly on their visual systems to communicate and interact with their surroundings. Diagnosis and timely restoration of vision, as in congenital cataract will have a positive impact on child's growth and development.

In children with complex and multiple disabilities, ocular problems are relatively common, but may often go unnoticed as the focus may be on other aspects of health or management or these disabilities may complicate the accurate assessment of visual function.^(1,2) Eye problems sometimes may be mistaken for learning disabilities. Children with very severe attention difficulties may not be able to maintain fixation during vision testing and are at risk of being misdiagnosed as 'blind.'

Children with learning difficulties may experience emotional problems like anxiety, depression and low self-esteem. Those with worsening sight may show aggressive behaviour and may be in need of supportive services. Visual impairments have considerable economic costs both directly due to the cost of treatment and indirectly due to decreased ability to work.⁽³⁾ It also has substantial impact on family's well-being by causing depression or increasing stress to the parents due to overburden, increase in healthcare cost and subsequent financial difficulties.

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Corresponding Author:

Dr. Mary Thomas,

Associate Professor,

Department of Ophthalmology,

Sri Ramachandra Medical College and Research Institute,
Porur, Chennai-600116, Tamilnadu, India.

E-mail: marysanthoshj@yahoo.co.in

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"Visual impairment" refers to all degrees of reduction in vision, which means functional vision and perceptual vision. Functional vision refers to a variety of specific functions of the eye and the neurological control of these functions such as binocularity, pursuit, saccades, accommodation, convergence etc., while perceptual vision refers to understanding, identifying and judging the importance of what you see. Children with developmental problems may be having physical impairment, sensory impairment, cognitive or intellectual impairment, mental illness or various types of psychological problems. All these are hurdles for an accurate identification of the type of visual impairment.

Psychological distress has been noticed in children with visual ailments and is highest when sight loss is not complete. Therefore, early intervention is imperative for enabling successful psychological adjustment.⁽⁴⁾

MATERIALS AND METHODS

This is a retrospective analysis of records of children attending child developmental unit in a tertiary care centre attached to a Medical College in Chennai. This child development unit offers to children, general paediatric, neurological examination, psychological evaluation, developmental assessment, ophthalmic evaluation, speech and language evaluation, physiotherapy, psychological and educational evaluation using standardised scales and nutritional assessment as a package under one roof. In our study we had analysed the case records of 418 children who attended the child development unit during a period of 2 years from January 2014 to December 2015.

Relevant data sheets which included socio-demographic characteristics, birth history, developmental history, orthoptic assessment, dilated fundus examination with indirect ophthalmoscope, retinoscopy, final diagnosis and treatments provided are all collected and recorded in a prepared data collecting format for each child.

Ethical clearance to conduct the analysis was obtained from the Institutional Ethical Committee.

All children attended the child development unit for developmental assessment during the above mentioned period were included in the study except those who found to be normal on assessment.

All ophthalmological care was offered by two ophthalmologists and two optometrists.

As per the records all children were examined for their head posture, eye movements, fixation, ocular alignment and involuntary movements (Nystagmus). Adnexa examination, orthoptic assessment, cycloplegic refraction using 1% cyclopentolate and indirect ophthalmoscopy results were all documented. Visual acuity was assessed according to their intelligence and responsiveness. In nonverbal children it was assessed as central or not, steady or unsteady, maintained fixation or occasional response, i.e. CSM (Central, steady, maintained).

Children less than 2 years with good co-operation and response Lea paddles, 2-4 years Lea symbols or single optotypes such as Landolt C or HOTV (Simson 1983) was used and above 5 years Snellen's chart was used.

Statistical Analysis

All data were entered and analysed by the statistical package for the social sciences (SPSS for windows, version 16). Descriptive statistics included the mean and standard

deviation for numerical variables and the percentage of different categories for categorical variables. The prevalence rate of eye problems was described in simple proportion. Group comparisons were done by the Chi-squared (χ^2) test. P =value of <0.05 was considered significant.

RESULT

Total of 418 children consisting of 279 male children and 139 female children age ranging from 2 months to 204 months (17 years) with a mean of 47.66 months were included in this study of 2 years' duration.

Various systemic problems encountered are shown in Table 1 and ocular ailments in Table 2.

Most common systemic ailment observed was speech and language problem seen in 300 (71.8%) children. Second in the list was developmental anomaly, seen in 240 (57.4%).

For refractive errors following criteria were taken into account. Visual impairment (VI) $<6/18$ in the better eye, Severe Visual Impairment (SVI) $<6/60$ in the better eye and blindness $<3/60$ as corrected visual acuity in the better eye (WHO category 1977). Hypermetropia was defined as $> +2.0$ D spherical equivalent in either eye, myopia as > -1.50 D spherical equivalent in either eye and anisometropia as a difference > 1.0 D spherical equivalent between the eyes.

Refractive error was the most common ocular problem observed. Refraction showed hypermetropia in 99 (23.68%), myopia in 19 (4.55%), astigmatism in 108 (25.84%) children. Highest hypermetropic power seen was +5.50D, myopia - 9.00D and highest astigmatism was -7.00D cylinder.

Second highest in the list was squint; 19 (4.55%) children had squint. Next in the list was nystagmus 11 (2.6 %). Though literature wise vitamin A deficiency is a major problem in many of the developing countries, Bitot's spots was noticed only in 1 child (0.2%).

Out of 18 children with Down's Syndrome (DS), 10 (55.55%) had hyperopia of highest power noted was + 4.50D; 7 (38.88%) had accommodative problem and got corrected with bifocals. Others were either emmetropic or with insignificant power. Other than epicanthal fold and mongoloid slant 3 (16.7%), each had blepharitis and nasolacrimal duct obstruction. Cataract and optic atrophy in 1 (5.6%) each. Others had normal fundus; 12 (66.66%) children with DS had developmental delay. Speech and language affected in 13 (72.2%). None of DS had seizures or Hypoxic Ischaemic Encephalopathy (HIE).

Among 15 children with cerebral palsy (CP), 5 (33.5%) had seizures, 4 (26.7%) had HIE, while 29 (7.2%) children without CP had HIE and is statistically significant [$p = 0.24$]. Though not statistically significant speech and language affected in 13 (86.7%), cognitive function was impaired in 5 (33.3%) and developmental delay in 11 (73.3%), spastic limbs in 7 (46.67%), MR and microcephaly in 2 (13.3%) each.

Ocular ailments in children with CP included 6 (40%) hyperopia, 1 (6.7%) myopia, squint in 2 (13.3%), cataract in 1 (6.7%), Optic atrophy and temporal pallor in 2 (13.3%) each. VI was present in 6 (40%).

Overall incidence of autism in this study was 72 (17.2%), 17 (23.6%) had hyperopia; 2 (2.78%) had myopia. Highest astigmatism noted was +4.50 D cylinder and -7.50 D cylinder. No lid and adnexa problems were noticed. Fundus was normal in all autistic children. Visual impairment was present in 5 (6.9%).

Attention Deficit Hyperactivity Disorder (ADHD) was present in 46 (11%). Commonest ocular problem in them was refractive error - hyperopia in 9 (19.56%) and myopia in 5 (10.87%), 1 (2.17%) had squint and 5 (10.86%) had VI.

Mental Retardation (MR) was seen in 16 (3.8%) in which VI in 7 (43.75%), nystagmus in 2 (12.5%), squint in 3 (18.75%), cataract in 1 (6.25%), hyperopia in 4 (25%), myopia in 2 (12.5%).

Sl. No.	Condition	No.	%
1	Speech and language	300	71.8
2	Developmental delay	240	57.4
3	Hearing impairment	31	7.4
4*	HIE	33	7.9
5	Meningitis	4	1
6	Hydrocephalus	6	1.4
7*	Associated anomalies	40	9.6
8	Cognitive impairment	95	22.7
9	Down's syndrome	18	4.3
10	Cerebral palsy	15	3.6
11	Mental retardation	16	3.8
12	ADHD	46	11
13	Autism	72	17.2
14	Hemiparesis	16	3.8
15	Spastic limbs	12	2.87
16	Microcephaly	22	5.3
17	Seizures	33	7.9

Table 1: Systemic Conditions Observed

*Hypoxic ischaemic encephalopathy.

*Associated anomalies like under development of Corpus callosum, dysmorphic features, Dandy-Walker syndrome, West syndrome, cardiac problems, Cyanotic heart disease, trachea-oesophageal fistula, etc.

Sl. No.	Ocular Condition	No.	%
1	Refractive error	223	53.35
2	Lid and Adnexa problem	7	1.7
3	Nystagmus	11	2.6
4	Squint	19	4.55
5	Bitot's spots	1	0.2
6	Cataract	5	1.2
7	Iris coloboma	1	0.2
8	Hypoplastic disc	1	0.2
9	Optic atrophy	7	1.7
10	Temporal pallor	7	1.7

Table 2: Ocular Problems Observed

DISCUSSION

The most common refractive error in our study was hypermetropia $\geq +2.00$ D seen in 99 (23.68%). In our study Myopia was seen in 4.55% and astigmatism of ≥ 1.0 D was seen in 108 children (25.84%). According to Alison Salt et al, hypermetropia was seen in 44% of disabled children, myopia in 11% and astigmatism was seen in 20.6% of disabled children.⁽⁵⁾

The second common problem in our list was squint, seen in 19 (4.55%) children, while in Alison salt et al study 27% children had strabismus.

In our study, 18 children had Down's Syndrome (DS), out of which 55.55% had hyperopia of ≥ 2.0 D, which was similar to Alison salt et al study.

According to Arsen A, Ozgur O, Ozlem H, et al, moderate-to-high refractive errors are much more common in DS than in the general population. Hypermetropia $> +2.00$ D in 62% in DS and 16% in non-DS and myopia < 0.50 D in 8% DS and 77% in non-DS.⁽⁶⁾ In our study 55.55% had hyperopia of $> +2.0$ D; 7 (38.88%) had accommodative problem and this is much less compared to Creg M, Haugen OH study where they have shown 55-68% children with DS have significant lag of accommodation.^(7,8)

Shapiro M has observed blepharitis in 47% of DS, but in our study we have seen only 5.6%.⁽⁹⁾

Cataract though rare in DS occurs more commonly than in general population.⁽¹⁰⁾ and the present study showed 5.65%. The prevalence of squint is found to be 29- 42% in DS.⁽¹¹⁾ In our study none of them had squint, while in Alison et al had 25% of the Down syndrome suffering from strabismus. But according to Siegfried Pueschel and Stefan Gieswein had 50% DS population suffering from strabismus, which was more than usual.⁽¹²⁾ Caputo, Wagner and Reynolds (1989) examined 187 patients with DS and found that 57% of the study individuals had strabismus. Hiles, Hoyme and McFarlane (1974) noted that 34% of 123 patients with DS had either esotropia or exotropia. This difference in result may be due to small sample size (18 DS cases out of 418 children).

In our study 3 (16.7%) had blepharitis, whereas children without DS 4 (1%) had blepharitis and this difference is statistically significant [$P=0.002$]. Though not statistically significant, developmental delay was found more among children with DS 12 (66.7%) when compared to children without DS 228 (57.0%).

In India vast majority of Cerebral Palsy (CP) patients have spastic CP (91.4%).⁽¹³⁾ Spastic limbs was seen in (46.67%) in our study. Spasticity and blindness are a bad combination since through touch, "the hands of the blind become their eyes."⁽¹⁴⁾

In CP squint was seen in 2 (13.3%). Cataract was seen in 1 (6.75%). In our study 6 (40%) had hyperopia of $\geq +2.0$ D, while in Woo et al hyperopia was seen in 46.6%, while in Sasmal et al the incidence of hyperopia in cerebral palsy was 8.6%.⁽¹⁵⁾ In our study, myopia was found in 6.7%. While in Sasmal et al, myopia was seen in 12.9% children.

Overall incidence of autism in this study was 72 (17.3%), 17 (23.6%) had hyperopia of ≥ 2.0 D, 2 (2.78%) had myopia of > -1.50 D. Highest astigmatism noted was + 4.50D cylinder and -7.50 D cylinder. No lid or adnexal problem noticed. Fundus was normal in all autistic children. Denis et al hypermetropia was seen in 70% of the autistic children.⁽¹⁶⁾

While in Denis et al, strabismus was seen in 60% of the case.⁽¹⁶⁾ In our study, none of the autistic children had squint.

In children with mental retardation, hyperopia was seen in 4 (25%), myopia in 2 (12.5%). But Rajesh and Abhishek et al has observed myopia 60% and hypermetropia in 20%.⁽¹⁷⁾ Refractive errors and strabismus have also been found to be correlated with low IQ.⁽¹⁸⁾ Overall commonest refractive error seen was hyperopia.

In children with disability, attention span is short and they will be quickly bored by the vision checking methods so that subjective assessment may not be accurate. As letters become smaller in the chart, they may become unresponsive or lose interest. As a visually impaired child grows older, although acuity may remain constant visual function seems to improve as they gradually learn how to use the residual vision more.

Children as they are born with an immature visual system, it needs a clear image to be transmitted to the higher visual centres for the normal visual development. So there is an urgency about diagnosing and treating childhood eye problems before the development of amblyopia and there will be a better acceptance to rehabilitation measures. We have seen that most of the children with profound disabilities are having sight problems. Regular eye examinations and corrective measures will make them stay healthy and get the most from life. Otherwise, finally family and society has to face the challenge of providing financial and supportive measures.

CONCLUSION

A clear cut knowledge about the visual problems in children will help in the prevention of vision impairment at three levels, primary prevention by creating a social awareness as to how to prevent the occurrence of the disease, secondary by managing the actual disease process and tertiary prevention of blindness by restoring vision by measures like cataract surgery, correction of refractive errors, amblyopia correction and by providing magnifiers and other low vision aids to restore useful visual function or other rehabilitative measures. Usually children with mental and physical disability are not examined with care due to difficulty in making an assessment or due to a presumption that nothing much can be done.

But a proper examination with patience will help to detect various ocular problems at an early stage and to provide corrective treatment, so that their psychomotor development will be better, quality of life and social interaction will improve and they will learn how to improve within their limitations. It is important to organise a multidisciplinary system with paediatrician at the centre to detect these conditions early in life. They can work in a more coordinated way for a consensus regarding detailed assessment and also to provide practical guidelines for the individual child.

LIMITATION OF THE STUDY

In this study, only ocular ailment analysis is done. Extensive study regarding the management of the problem specific to each child and outcome of management also has to be studied in subsequent analysis and an approach to assessment and management should be outlined.

Children with learning disabilities are found to have serious sight problems than other children and those children are not particularly analysed in this study.

It can be noted that all premature children coming for follow-up in the child development unit are given early visual stimulation cards with black and white patterns. There is a definite improvement in these children, but a controlled study only can prove the significance of early visual stimulation.

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