



OCULAR MORBIDITY IN CHILDREN WITH INTELLECTUAL DISABILITY

Ophthalmology

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ABSTRACT

Background:- Intellectual Disabilities as defined by the Diagnostic and Statistical Manual of Mental Disorders-V (DSM-V) is a group of neurodevelopmental disorders that begin in childhood and are characterized by intellectual difficulties as well as difficulties in conceptual, social, and practical areas of living. Children with neurological deficits are at a higher risk of suffering from visual impairment than those without such disabilities (10.5% vs 0.16%) [1]. This study would highlight treatable ocular morbidity in such children so that suitable intervention can be possible. **Methodology:-** This observational cross-sectional study was carried out at the tertiary care Centre. The intellectually disabled of the enrolled participants was graded by psychiatric doctors and informed written consent was taken from their parents /guardians. The participants were then ophthalmologically evaluated and the ocular morbidity was noted. **Sample Size:-** 60 patients aged between 5 to 18 years. **Results:-** The mean age was 10.15±4.86 at 95% CI. 46 (77%) patients had ocular morbidity. Refractive error (68%) is the most common ocular morbidity occurring in children with ID. 16.67% participants had strabismus, of which esotropia was most common. Other ocular morbidities included partial optic disc pallor (15.8%), Nystagmus (15%), Total optic atrophy (5%), Congenital cataract (4%), Retinal detachment (3%), Aphakia (3%), Phthisis bulbi (3%), Astigmatic disc (3%), Axial proptosis (2%), Microcornea (2%), Corneal opacity (2%), Glaucomatous optic disc (2%), Retinitis pigmentosa (2%), Myopic fundus changes (2%), Fundus coloboma (1%), Amblyopia (1%). **Conclusions:-** Ocular morbidity is found in 77% of Intellectually disabled children with refractive error being the most common. Nearly two-thirds of the ocular morbidities found in these children are treatable to provide an enhanced and functional vision in such patients.

KEYWORDS

Ocular Morbidity, Intellectual Disability, Refractive Error, Cerebral Palsy

INTRODUCTION

Intellectual Disabilities as defined by the Diagnostic and Statistical Manual of Mental Disorders-V (DSM-V) is a group of neurodevelopmental disorders that begin in childhood and are characterized by intellectual difficulties as well as difficulties in conceptual, social, and practical areas of living.^[2]

Children with neurological deficits are at a higher risk of suffering from visual impairment than those without such disabilities (10.5% vs 0.16%).^[1] One of the reasons for this heightened vulnerability is that brain injury underlies a range of disabilities. The prevalence of visual impairment increases with age and the severity of the intellectual disability.^[3]

The incomplete development of the visual pathway may be attributed to the lack of prolonged good vision. Uncorrected refractive errors can lead to amblyopia and poor binocular function, which may compound other visual deficits and leads to a substantial educational disadvantage for a child.^[4] Early identification of refractive error will provide knowledge of a child's visual limitations, while amelioration may improve visual abilities.^[4]

This study was an attempt to provide a systemic and mindful approach to perform and interpret the ophthalmic examination in a special child. This information can in turn aid in the early screening of visual problems and pave the way for appropriate ophthalmic intervention of the treatable ocular morbidities in these children.

Literature Survey

Ocular impairment has an impact on all aspects of life. It is associated with reduced functional ability, social isolation, reduced quality of life and has a negative impact on mental health status. It is a well-known fact that what a child learns in school is information that is presented visually. Ocular abnormalities are common in children and adolescents with intellectual disabilities. However, assessment and management of visual disorders in children with mental impairment presents a complex challenge to a clinician and hence is often missed or misdiagnosed.

The higher prevalence of refractive anomalies in the older children of the present population suggests that continuous monitoring of refractive status throughout childhood is also necessary to facilitate the detection of abnormal refractive development.^[4]

METHODOLOGY

This was an observational cross-sectional study of 60 Intellectually

Disabled children aged between 5 to 18 years carried out at the ophthalmic OPD in a tertiary health center. The intellectual disability was graded by the psychiatric doctors. All the patients enrolled in the study were examined after giving proper information about the study and taking informed written consent from their parents/guardians. The aim was to ophthalmologically evaluate the intellectually disabled children and correlate ocular morbidity with their intellectual disability. Detailed history including the birth, developmental and family history was documented prior to examination.

The ocular assessment included diffuse torch light examination for head posture and facial abnormalities, strabismic evaluation, age-appropriate vision testing, refraction, dilated retinoscopy and fundus evaluation.

RESULTS AND DISCUSSION

In this study, the mean age of participants was 10.15 years with standard deviation of ± 4.86 with 95% CI. Maximum number of participants (51.67%) belonged to the age group of 5-9 years, which coincides with the school starting age of the children when their behavior is first observed by the parents and teachers. Similar findings were noted by **Arican et al**^[5]. However, no correlation was found between age and ocular morbidity in ID patients.

When classified as per DSM-V, nearly 42% participants had mild ID followed by around 38% participants with moderate ID and 11.67% with severe ID. Profound ID was found in 8%. **Soneji et al n.d.**^[6] had similar distribution in their study but with overall less prevalence. We observed that the percentage of ID children has shown a rising trend over years exhibiting the alarming increase in the overall prevalence of ID.

Epilepsy/seizures was the most common (53%) birth related risk factor in the participants followed by Asphyxia at birth (23%).

We found that out of the 60 Intellectually disabled participants, 46 (77%) had ocular morbidity. This observation is in tie with various studies as shown in Table 1.

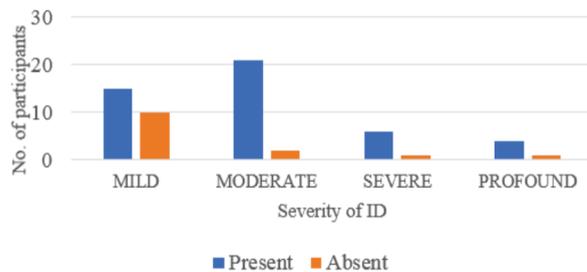
Table 1: Comparison of distribution of refractive error in ID patients

Ocular morbidity	Present study	Wu et al [6]	Akinci A et al [7]	Katoch S et al [8]	Veleva et al 2020 [9]	Kaur et al [10]
Present	77%	56.10%	77%	68%	59.5%	43%
Absent	23%	43.9%	23%	32%	40.5%	57%

If we categorize the presence of ocular morbidity based on the severity of ID, it was found that out of 25 children with mild ID, 15 (60%) showed ocular pathologies. This percentage was 91.3% in moderate ID ,85.7% in severe ID and 80 % in children with profound ID (Graph 1). The chi square statistic for this is 6.9882 with p=0.07227 which proves no statistically significant association between type of ID and presence of ocular disorder. However due to the limitation of a small and confined sample size, this observation was in a contradiction to the work of **Joshi et al**^[11].

Joshi et al^[11] in 2013 studied ocular problems in total of 241 mentally retarded school children in the age group of 6-16 years. An association was found between the severity of mental retardation and ocular problems (P<0.005).

DISTRIBUTION OF OCULAR MORBIDITY BASED ON SEVERITY OF ID



Graph 1: Distribution of Ocular morbidity in various severity types of ID in participants.

In our study refractive error was the most common ocular morbidity in ID found in 82 out of 120 eyes. Shockingly only one-third of them were using prescription glasses. Astigmatism was most common (46%), followed by myopia (31%) and hypermetropia (23%). These findings were consistent with **Joshi et al**^[11] with 49.18% refractive error.

However, no correlation was seen with between ID and refractive error^[11]. The emmetropisation process involves both active and passive factors that guide the eye towards emmetropia and then maintain it at an approximately emmetropic level^{[12][14]}. The active part of this process is thought to involve a visual feedback mechanism. It is known from animal studies and clinical experience that visual deprivation in infancy leads to an altered emmetropisation process and retention of, or even increases in, infantile refractive errors.^[4] The work of **Woodruff et al.**^[13] (1980) suggests that refractive error in neurologically impaired children occurs due to distorted development of ocular structures in conjunction with retarded mental development.^[4]

Strabismus was found in 16.67% participants, of which 50 % had esotropia , 35% had exotropia and 10% had hypertropia. However no significant association was found between strabismus and ID, which was consistent with the work of **Koslowe et al.n.d.**^[14]

The various other ocular morbidities noted in our study are summarized in Table 2.

Table 2: Overall Distribution of various Ocular morbidity in participants

Ocular Morbidity	No. of eyes	Percentage of Total (120 eyes)
Refractive error	82	68%
Amblyopia	1	1%
Congenital Cataract	5	4%
Axial Proptosis	2	2%
Microcornea	2	2%
Phthisis	3	3%
Horizontal Nystagmus	18	15%
Strabismus	20	16.67%
Aphakia	3	3%
Corneal Opacity	2	2%
Partial Optic Disc Pallor	19	15.8%
Optic Atrophy	6	5%
Fundus Coloboma	1	1%

Retinal Detachment	4	3%
Retinitis Pigmentosa	2	2%
Tilted Astigmatic Disc	3	3%
Glaucomatous Disc	2	2%
Myopic Fundus	2	2%

A noteworthy 15.8% of patients with optic disc pallor underwent a thorough retinoscopic evaluation and surprisingly refractive error was not significant in these patients. However, due to unavailability of investigations like VEP and ERG at our Centre ,we were unable to further evaluate such patients.

Cerebral Palsy (CP) was found to be an associated disability in 50% of our participants. Amongst the other half, Gross Developmental Delay (GDD) had a major share (17%) followed by Microcephaly (10%),Quadripareisis (8%), Autism (7%), Corpus Callosum abnormality (5%) and Macrocephaly (3%). **Kaur et al**^[10] in 2016 conducted a similar study in which 63% children had Cerebral Palsy.

Amongst the CP children in our study, 65% children were found to have refractive errors, 45% had strabismus, 25 % had disc pallor and 20% had nystagmus.

Verma et al^[15] 2010 in their study examined 20 children with cerebral palsy ,out of which 67.20% had refractive errors.

CONCLUSION:

Various ocular morbidities are substantially prevalent in the intellectually disabled children, refractive error being the most common. While an ID child can have a combination of ocular morbidities, nearly two-thirds of these are treatable (e.g.- refractive error , strabismus, cataract, aphakia etc.) to ensure useful vision and increased functionality of such patients.

Future Scope

Present study observed that visual impairment due to ocular morbidity is common in the intellectually disabled children. Dissemination of results of this study will help an ophthalmologist and psychiatrist to understand the correlation between intellectual disability and ocular morbidity. Investigations like VEP and ERG can serve to further evaluate the ID children with partial disc pallor and those uncooperative for visual assessment.

Procurement of an early intervention in the form of prescription glasses, special aids, or surgical intervention along with appropriate parent counselling would make a huge difference in the lives of these special children. The study further emphasizes on the need for routine eye screening of such children.

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