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EVALUATION OF AWARENESS AND KNOWLEDGE OF CORTICAL VISUAL IMPAIRMENT IN PEDIATRIC PATIENTS AMONG EYE CARE PROFESSIONALS

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ABSTRACT

Objective: The study was conducted to assess the knowledge about CVI among ophthalmologist's, optometrist's and eye care practitioner's practicing in Pakistan. Methodology: This was a cross sectional study. Data collection was done by administering a preformed, validated questionnaire that was sent via email, WhatsApp and physically filled by visiting ophthalmologist's, optometrist's and eye care practitioner's in different hospitals. Results: 73 eye care practitioners responded to the questionnaire. Two of them had not heard of the term CVI, so they were excluded from the study. Out of 71 participants 18.3% were Ophthalmologist, 59.2% were Optometrist, and 22.5% were general practitioner. The overall mean age was 28.94±7.93 years. Most of the practitioners had good knowledge about the leading causes of visual impairment in children in developed

countries, the cause of CVI, clinical features, investigation of choice in CVI in children, children with CVI need an eye examination, management of CVI, and vision improvement knowledge in children having CVI. However, 60.3 % of participants were aware of the investigation of choice for diagnosing CVI and 38.4 % were aware of the leading causes of visual impairment in the developed countries. The study also established that the knowledge score was higher in ophthalmologists than the optometrist's and other practitioner's. Conclusion: Most of the ophthalmologist's, optometrist's and eye care practitioner's had a good knowledge about the cause, investigation of choice, management and prognosis of CVI regarding the need for eye examination. However only a limited number of participants were aware of the clinical features, common risk factors and the leading causes of visual impairment. Majority of the participants rarely examined patients with CVI, which does not correlate with the high prevalence of perinatal hypoxia, the commonest cause of CVI, in our country.
Keywords: *Cortical visual impairment, Knowledge, Ophthalmologist's, Optometrist's, Eye Care Practitioner's.*

INTRODUCTION

Cortical visual impairment (CVI) in children is a disorder in which there is normal or minimal ocular morbidity with impairment in the VA and/or functionality of vision-guided tasks, including motor planning due to retro chiasmal visual tract disorder. [1] Cerebral visual impairment is a bilateral visual impairment that affects children in all industrialized countries. It has become more common in low-income countries because of the increased survival rates of children who suffer from severe neurological conditions during the perinatal period. The purpose of this study was to determine the characteristics of children with CVI in a tertiary children's eye care center population. In the start, the term "cortical blindness" was used for this disorder. Now, the terms "CVI" and "cerebral visual impairment" are used to describe this. [2] CVI in children can manifest in different ways; for example, being not able to find effects on a cluttered page; bumping into people; being not able to copy from the class whiteboard to their workbooks, or having difficulties controlling their eye position effectively to keep concentrated on a task. [3] Conditions leading to CVI sometimes occur perinatally, with the most common cause reported as hypoxic-ischaemic injury.[4-6]

CVI is also constantly reported among prematurely born children as their pre-maturity results in a raised threat of insult to the developing brain.[7] Refractive errors and accommodation anomalies are common in those affected.[8, 9] This syndrome has structural problems such as cataracts, coloboma, optic atrophy, and retinal dystrophy may coexist.[10, 11] ROP may be seen in association with peri-ventricular white matter injury. Optic nerve hypoplasia and optic atrophy are associated with a wide range of brain disorders, most of which impair visual function.[12] Diseases of eye movement control, including strabismus, nystagmus, unstable fixation, inaccurate fast eye movements (dysmetric saccades), deficient smooth pursuit movements, and paroxysmal deviations, in which the eyes intermittently deviate upward are common in children with CVI. Head movements (in children who have head control) can compensate the problems with visually guided eye movements.[13, 14]

Secondary analysis of data from two community-based studies reported an incidence of 0.06% and 0.07% among children in the United Kingdom. Both studies mentioned that CVI was the most common eye care practitioner diagnosis in children. [15, 16] However, advanced incidence (2.4%) has been reported in the United States of America (USA). [17]Website of the American Association for Pediatric Ophthalmology and Strabismus mentions CVI as one of the leading causes of bilateral visual impairment in children.[18] So far, we have searched PubMed with keywords "CVI" or "cerebral visual impairment" and "prevalence", "India", and "children," 2 and only five articles could be retrieved.[19, 20] The scarcity of Indian literature in this area could be ascribed to inadequate information among eye care practitioners. Similarly, we searched PubMed with the keywords "knowledge" "CVI" and "eye care practitioner." This research retrieved 8 articles, but none of them was

related to the assessment of knowledge among eye care practitioners.[19, 21, 22]

MATERIAL AND METHODS

A cross-Sectional Study was performed from February 2023 to May 2023, at Superior University, Lahore. The sample size was calculated to be 73. All participants were between 20 to 50 years of age.

The study included Eye Care Practitioners who have awareness of the term CVI. Both gender (Male, Female) was included. Eye Care Practitioners who do not have awareness of the term CVI and Eye Care Practitioners who do not want to participate were not eligible for the study. A validated questionnaire was used for data collection. There were 11 items in the questionnaire. Awareness about CVI was examined in the questionnaire in the first item. Only those participants who have awareness of the term CVI responded to the remaining items. There were four responses for each item. The participants were directed to choose the best response for the given item. Prevalence, etiology and pathogenesis, clinical presentation, differential diagnosis, investigation, management, and prognosis of CVI were assured in nine items. "Knowledge score" was obtained by adding the correct responses from each item for each respondent. The correct and incorrect responses were given one and zero marks respectively. The number of patients with CVI seen by eye care practitioners in a given month was also inquired about in one of the items. This was done to find out if there will any link between the knowledge score and the volume of the patient seen by participants. Descriptive analysis, one way ANOVA and Bonferroni test post hoc test was applied. A p-value ($P<0.05$) was considered statistically significant.

RESULTS

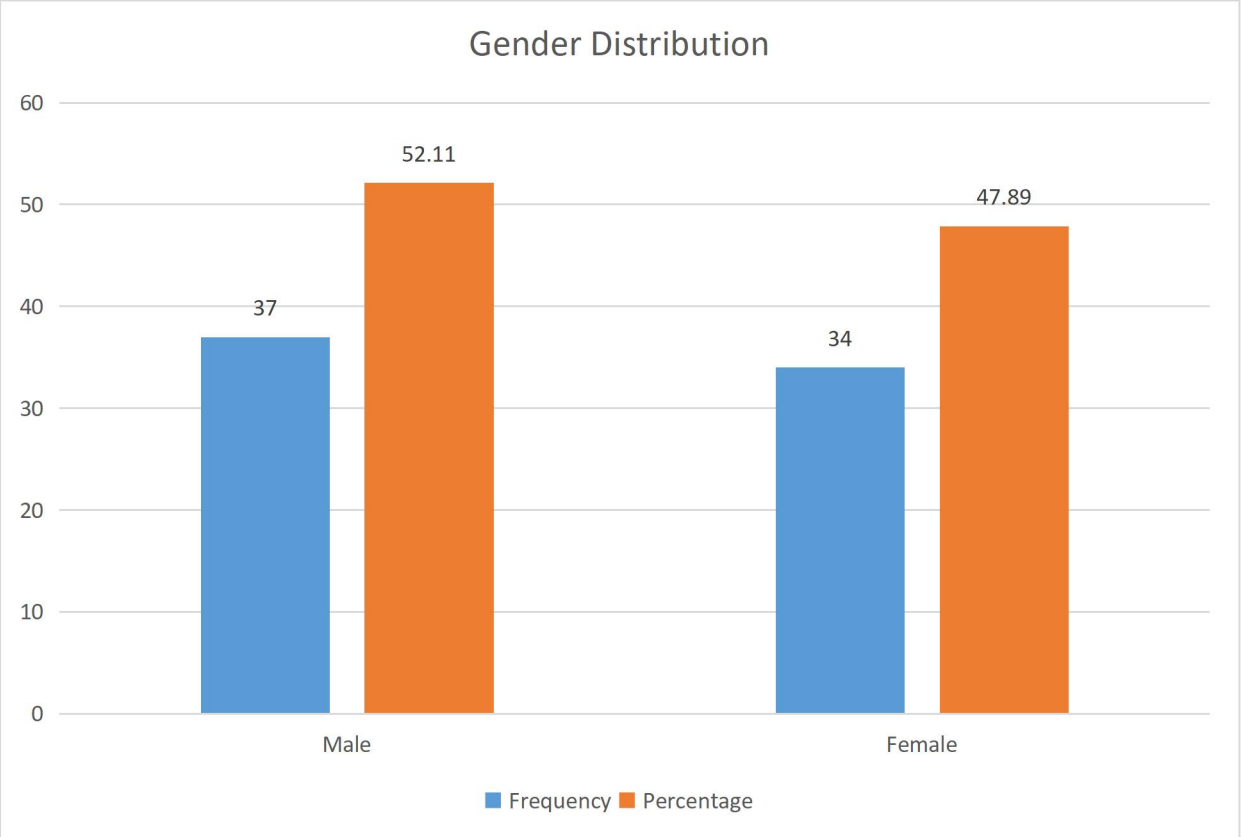

Figure No. 1

73 eye care practitioners participated in the study. Two of them had not heard of the term CVI, so they were excluded from the study. Out of 71 participants 37(52.1%) were males and 34(47.9%) were females,

as shown in (fig. no. 1).

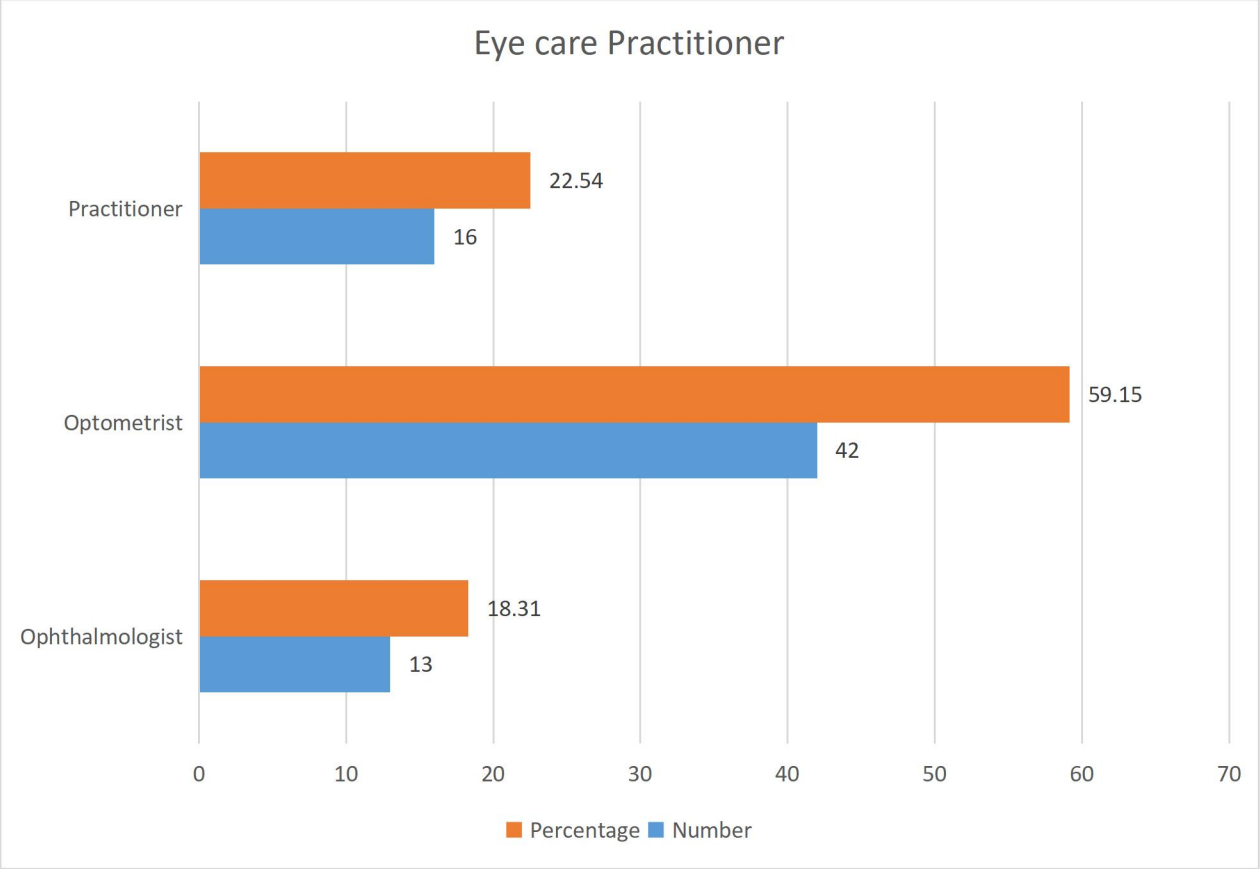

Figure No. 2

In a study 18.3% were Ophthalmologist, 59.2% were Optometrist, and 22.5% were general practitioner (figure no. 2). The overall mean age was 28.94±7.93 years. The average of Ophthalmologists was 32.69±6.67 years, the average age of Optometrists was 26.31±5.51 years, and the mean age of practitioners was 32.81±11.23 years.

Table 1: *Responses with the correct answer*

Questions	Correct Answer	Number (%)	95%CI
What is the cause of CVI in children?	Damage to the visual areas of the brain	59(80.8)	0.72-0.90
What are the three leading causes of visual impairment in children in developed countries?	ROP, CVI, optic nerve hypoplasia	28(38.4)	0.33-0.57

Common risk factors of CVI	Perinatal hypoxia	23(31.5)	0.25-0.48
What are the clinical features of CVI in children?	Variable loss of vision, visual defects, and abnormal visual behavior	22(30.1)	0.29-0.52
What is the investigation of choice in CVI in children?	MRI Brain	44(60.3)	0.47-0.71
Which is NOT a differential diagnosis of CVI in children?	Refractive Error	11(15.1)	0.24-0.47
Do children with CVI need an eye examination?	Always	61(83.6)	0.77-0.94
How often do you diagnose CVI in children in ophthalmology OPD (/month)	<5 cases 5-10 cases >10 cases Rarely	22(30.1) 06(8.2) 03(4.1) 42(57.5)	2.58-3.22
Management of CVI in children	Multidisciplinary rehabilitative approach	46(63)	0.50-0.73
Does vision improve in CVI?	Sometimes	51(69.9)	0.59-0.81

Table 1 shows the frequency and percentages of the correct answers for each question given by the participants.

Table 2: *Knowledge of Eye Care Practitioners about CVI*

Questions	Eye Care Practitioner (True response)		
	Ophthalmologist n=13	Optometrist n=42	General Practitioner n=16
Cause of CVI in children	13(18.31%)	35(49.30%)	09(12.68%)
Knowledge about leading causes of visual impairment in children in developed countries	05(7.04%)	21(29.58%)	06(8.45%)
Common risk factors of CVI	07(9.86%)	14(19.72%)	05(7.04%)
Clinical features	05(7.04%)	21(29.58%)	03(4.23%)
Investigation of Choice in CVI in Children	09(12.68%)	22(30.99%)	11(15.49%)
Which is NOT a differential diagnosis of CVI in children?	06(8.45%)	14(19.72%)	05(7.04%)
Do children with CVI need an eye examination?	11(15.49%)	36(50.70%)	14(19.72%)
Management of CVI in children	07(9.86%)	27(38.03%)	10(14.08%)
Does vision improve in CVI?	09(12.68%)	30(42.25%)	11(15.49%)

Table 2 shows the knowledge among eye care practitioners. Most of the ophthalmologists had good knowledge about the cause of CVI in children, investigation of choice in CVI in children, children with CVI need an eye examination, and vision could be improved in CVI. The optometrist had good knowledge about the leading causes of visual impairment in children in developed countries, the cause of CVI, clinical features, investigation of choice in CVI in children, children with CVI need an eye examination, management of CVI, and vision improvement knowledge in children having CVI.

Table 3: Patient load and average awareness of CVI among eye care practitioners

CVI children	Frequency	Knowledge Score Mean (SD, SEM)	P-value						
			Overall	(<5 vs 5-10)	(<5 vs >10)	(<5 vs Rarely)	(5-10 vs >10)	(5-10 vs Rarely)	(>10 vs Rarely)
<5 cases	21	6.4(2.01, 0.44)							
5-10 cases	6	7.33(1.15,0.67)							
>10 cases	3	9.34(1.42,0.22)	<0.001	0.951	<0.05	0.71	0.061	<0.001	<0.001
Rarely	41	5.33(1.97, 0.80)							
Total	71								

Analysis of the relationship between monthly patient load and awareness yielded a significant p value=<0.001 (Table 3).

Table 4: *Comparison of knowledge score among Eye Care Practitioners*

Eye Care Practitioner	Frequency	Knowledge Score Mean (SD, SEM)	P-value			
			Overall	Ophthalmologist vs Optometrist	Ophthalmologist vs General Practitioner	Optometrist vs General Practitioner
Ophthalmologist	13	8.48(2.15,0.33)				
Optometrist	42	6.69(2.21,0.61)	0.035	0.043	0.039	0.167
General Practitioner	16	5.25(2.38,0.59)				

All the eye care practitioners demonstrated unequal knowledge score about CVI, as there is a significant difference was found between the knowledge score of ophthalmologist and optometrist(P<0.05), as well as between ophthalmologist and general practitioners (P<0.05), whereas no significant difference was found between the knowledge score of optometrist and general practitioners, as shown in Table 4.

DISCUSSION

Most of the participants were correct regarding the cause and common risk factors of CVI. These results are similar to those seen in a study conducted in India.[18] However majority of the participants were unaware of the commonest causes of visual impairment in developed countries, which are CVI, optic nerve hypoplasia and retinopathy of prematurity.[23] In a developing nation there is very little data on the prevalence of CVI. A recent hospital based study done in a developing nation showed that 40 new cases of CVI were diagnosed in a year.[24] A study showed that CVI was seen in 0.2 % of children enrolled in 67 integrated schools for the blind.[25] CVI, however, was the commonest cause of severe visual impairment in children under 3 years of age in India.[26] This contrast in the number of cases of CVI in the two neighboring countries could be due to undetected cases of CVI. Perinatal hypoxia is the most common risk factor of CVI.[27] 31.5 % of the participants were aware of this fact. Countries with limited resources reportedly have a high incidence of perinatal hypoxia. In Nepal a study showed that 15.9% newborns had birth asphyxia with the rate of 21.1/1000 live births.[28] In India the incidence of birth asphyxia varies from 2 to 16.2% in community-based studies.[29] This is in contrast to European countries where 1–4 per 1000 live births

are affected in Europe.[30] Another report showed that the incidence of perinatal hypoxia has decreased to less than 0.1% in developed countries.[31] The higher rates of birth asphyxia in developing countries would lead to more cases of CVI in comparison to the developed nations. The scarcity of data in literature on CVI from developing nations could be due to cases going undiagnosed or misdiagnosed. The clinical features CVI were agreed upon by just 30% of the subjects. The visual cortex is responsible for factors like a visual acuity, color vision, contrast sensitivity and visual field. A poor image clarity, inability to perceive colors and contrast and visual field defects occur when there is an insult in this area.[32] Only 15 % of the participants also agreed on the fact that refractive error was not a differential diagnosis of CVI. This result is contrary to a study done in India in which 58.4 % agreed that refractive error was not a differential diagnosis of CVI. 50.7 % of the participants agreed that children with CVI always need an examination and that vision sometimes improved in these patients. In contrast to adults with cortical blindness, a substantial proportion of children with CVI experience improvement in visual acuity.[33] This can be a result of the presence of extra geniculostriate visual pathways or recruitment of uninjured adjacent neurons to sub serve visual functions.[34] The reported rate of improvement ranges from 46 to 83%.[33] It was interesting to notice that majority 60.3 % were correct about the investigation of choice in CVI, which is MRI Brain. 54.7 % opted for VEP as the investigation of choice. VEP is useful to detect abnormalities of the visual pathways or visual cortex.[35] The dorsal and the ventral stream are also affected in CVI. There is a large variability in VEP tracings produced by normal children in infants and young children which complicates the interpretation of VEP results.[33] VEP response may be nonspecific in children with neurologic disorders. Thus, VEP may have limited utility in diagnosis of childhood CVI. MRI of the brain can accurately identify lesions that cause CVI, the most common being periventricular leukomalacia.[36] Studies have also shown that there is a strong association between the severity of visual impairment and the damage seen in optic radiations.[37] Only 8.2 % of the participants examined 5-10 cases of CVI per month. Almost 57.5 % of the participants rarely examined patients with CVI. This result is similar to the study done in India.[18] This does not correlate with the high prevalence of perinatal hypoxia, the commonest cause of CVI, in developing countries. 63 % of the participants agreed that the management of CVI requires a multidisciplinary approach. An ideal team would include a team of pediatricians, pediatric ophthalmologists, parents, classroom teachers, and teachers for the visually impaired, occupational therapists, speech pathologists, orientation and mobility specialists, physical therapists, and a CVI expert.

CONCLUSION

Most of the ophthalmologist's, optometrist's and eye care practitioner's had a good knowledge about the cause, investigation of choice, management and prognosis of CVI regarding the need for eye examination. However only a limited number of participants were aware of the clinical features, common risk factors and the leading causes of visual impairment. Majority of the participants rarely examined patients with CVI, which does not correlate with the high prevalence of perinatal hypoxia, the commonest cause of CVI, in our country.

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