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A Systematic Assessment of the Prevalence and Factors Contributing to Child Blindness in India

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ABSTRACT
The frequency of childhood blindness and its causes in community-based and blind schools, respectively, from 1990 onwards, were the subject of a thorough search to find research publications from up to the present. To expand the reference data, manual searches of cross references and professional consultation were also conducted. There were discovered to be five community-based research on the prevalence, including two investigations on refractive error in children under the age of 16 that were undertaken throughout India. According to the available blind school research, whole globe anomalies have largely replaced corneal causes as the principal causes of juvenile blindness. This article emphasizes that although the trend is changing due to the availability of adequate healthcare facilities, much work is still needed in the form of timely neonatal eye care facilities, pediatric surgical treatments, and appropriate refractive procedures.

Key words: Childhood blindness, ocular morbidity, prevalence, visual impairment

1. INTRODUCTION

The public health issue of childhood blindness (CHB) affects people all around the world. There are roughly 1.42 million and 17.52 million children worldwide who are blind or have moderate to severe visual impairment, according to estimates on childhood blindness. [1] Nearly 75 percent of them reside in low-middle income countries, where the prevalence is estimated to be as high as 1.5 per 1000 kids as opposed to 0.3 per 1000 in high-income nations. [2]

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Children who go blind have a significant negative impact on the family's economical, psychological, and emotional development. Compared to a seeing child, a blind child is more prone to have developmental milestone delays, frequent hospitalizations, and early death. Such severe visual loss also negatively impacts mobility, orientation, and educational activities from an early age, which results in a lack of work privilege. In underdeveloped nations, these differences between sighted and non-sighted children are more pronounced. Additionally, a blind youngster loses a much greater number of disability adjusted life years (DALYs) than an adult who is blind. [3] For instance, in India, glaucoma causes 5.5 million blind person years, whereas childhood blindness causes 11.2 million blind person years, resulting in a greater DALY loss. As a result, one of the main goals of the Right to Sight project under Vision 2020 is to reduce childhood blindness. The WHO recently set the goal to reduce the burden of preventable vision impairment by 25% from the baseline established by WHO in 2010 by the year 2019. [4,5] Contrary to adult blindness, it has been shown that The Indian perspective on infant blindness

For accurate information on the frequency and causes of juvenile blindness, a larger sample size of children is needed because the prevalence of blindness in children is significantly lower than that in adults. Therefore, there aren't many population-based studies on childhood blindness. Blindness is currently prevalent among children with a rate of 0.8/1000. [3,4] The methods used to quantify blindness, such as community-based surveys and places like rural or urban settings, is likely to have an impact on the prevalence.

CHB continues to be a problem despite numerous intervention initiatives, both for epidemiologists and for healthcare professionals. In India, addressing CHB is complicated by a variety of financial hurdles as well as distinct cultural traditions and beliefs. In addition to this, the biggest difficulties encountered are brought on by the unequal distribution of healthcare services, with the majority of cutting-edge eye care facilities being found in urban regions and isolated rural villages being disregarded.

In order to determine the effectiveness of existing interventions in India and to wisely allocate future resources, customized to the requirements of the community, it is necessary to assess the prevalence and causes of CHB. The necessity for a paradigm shift in the context of India's childhood intervention program will undoubtedly be highlighted by such a review. In fact, it is crucial that data from both sources be is 80% avoidable (either preventable or treatable); in children, less than 50% of the causes are avoidable. This is because population-based studies are few and far between, and blind schools-based surveys are not representative and robust enough. [6]

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2. METHODS

The study's database was compiled using a systematic review, which was also used to ascertain the prevalence and causes of childhood blindness in India.
The Preferred Reporting of Items for Systematic Review and Meta Analysis (PRISMA) standards served as the foundation for the database search. 2018's search period ran from January through June. The search engines used were Google Scholar, Pubmed, Medline, OVID, and the Cochrane Library.
The search was limited to English and was based on the medical subject heading (MeSH) and the keywords [childhood], [child], and [blindness] or blind AND [causes] AND [Prevalence] AND [Blind schools] OR [Community] OR [Field] OR [Epidemiology].
For a variety of articles, the following criteria had to be met: country, community, blind schools, and community-based rehabilitation are the settings (CBR) Participants: Age range and participants Using the WHO/PBL form, determine the anatomical and etiological reasons of childhood blindness. No limitation on the quantity of participants existed. Only primary sources of information were used; secondary sources that examined various causes of blindness were not included. Thus, a total of 35 publications were determined to be appropriate for this study. Data from blind schools were not used to estimate prevalence; instead, only community-based research were examined, and only studies from India were ultimately included in the systematic review.

3. RESULTS

Methods available for determining the frequency and causes of child blindness
By performing community-based surveys, the prevalence of CHB and VI can be found. In addition, the death rate for children under the age of five, information from the CBR, or using key informants[8,9] from the community to perform case studies are alternative proxy methods for measuring CHB. The advantage of community-based studies[10] is that they provide an accurate picture of prevalence, but they are time- and resource-intensive since they need to cover a large sample size of at least 100,000 children.
Blind school-based studies are a crucial method for figuring out the causes of CHB because they have the advantage of using a single examiner (an ophthalmologist) to screen the entire school, which reduces the fallacies of interobserver variation. They are also more cost-effective and time-efficient. In contrast to community-based surveys, these studies have a

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clear disadvantage: they frequently contain children who have various disabilities and are biased due to nonrandom sampling, location, type, clustering, and demographic.

Another effective unique methodology is the use of key informants (KI) to find youngsters who are blind. Key informants (KIs) are neighborhood volunteers who live and/or work in their local neighborhoods, are already engaged in conducting health-related surveys there, and are acquainted with the local populace. [8] Over the past few years, the majority of data on childhood blindness has been compiled on a unique form created by the WHO. [11] In this form, the causes are broken down into anatomical (cornea, lens, retina, cortex, entire globe, uvea, glaucoma, and others) and etiological (Hereditary, intrauterine, perinatal, childhood, and unknown) categories. The key benefit is that, in contrast to the etiological categories, the anatomical causes are typically simple to identify in youngsters. 30–72 percent of childhood blindness in underdeveloped nations can be prevented, with prevention being the most common option. [14]

Community - based prevalence studies

According to data from community-based research, the frequency of visual impairment ranged from 2.05 per thousand to 13.6 per thousand, while the prevalence of childhood blindness ranged from 0.6 to 1.06 per thousand. [15]

Blind school-based studies: causes

Reviewing data from several blind schools for the causes of blindness between 1990 and 2007 revealed that, as noted in the majority of research, corneal causes were mostly responsible for ocular morbidity. [16-17] When compared to studies done after 2000, but between 2007 and 2018, the entire world was the main offender. [7,10,19-20] As a result, the emphasis has switched from reversible causes to causes that cannot be changed. Due to changes in healthcare infrastructure and global socioeconomic conditions throughout time, there have been significant differences in the causes of blindness in school-based research during the past two decades.

Does a trend exists

After reviewing the data collected from various blind schools regarding the causes of visual impairment and blindness, it was discovered that there has been a paradigm shift in the anatomical causes of CHB from corneal causes, as mentioned in studies conducted between 1990 and 2007, to causes related to the entire globe after 2007, as depicted by the study carried out by Rahi et al. in 1995[15], which revealed that corneal abnormalities were the primary cause of blindness. In a 1995 study by Thylefores et al.,[17] it was discovered that CHB and VI in six WHO regions were caused by xerophthalmia and ophthalmia neonatorum.

Possible explanations for the paradigm change in childhood blindness causes

The major reason for this shift is the genetic abnormalities related to PAX 2, PAX 6, use of alcohol and drugs, as well as exposure to pesticides or fertilizers during pregnancy. In anatomical causes of blindness that include various parts of the eye, there is a newer trend in the shift of causes of blindness to the whole globe that includes microphthalmos and anophthalmos.[21] One theory, however, also suggests that, like spina bifida and folate deficit for the genetic defects, the interplay between genes governing retinal acid signaling and maternal Vitamin A deficiency (VAD) during early fetal development. [22,23]

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Hereditary, intrauterine, prenatal, and postnatal causes are among the etiological factors. Iridofundal coloboma has been identified in numerous investigations as a significant genetic source of ocular illness. [24,25]

4. DISCUSSION

This shift in the trend for CHB causes points to the effective implementation of numerous health care, vaccination, and vitamin A supplementation programs that have positively impacted society by reducing the burden of CHB. This trend is corroborated by data showing that vitamin A deficiency in India has significantly decreased over the past 20 years, as seen by a drop in the prevalence of bitot spots among preschoolers from 1.8% in 1975 to 0.2% in 2012. [26,27] This shows a favorable response to the Ministry of Health and Family Welfare's decision to modify Vitamin A supplementation and include it as a crucial element of programs for reproductive and child health beginning in 2006. [28] Three (0.08%) children under the age of 15 were discovered to have corneal opacities as a result of ocular morbidity in a recent study (CORE) on the prevalence of corneal opacities. [29] In India, the cause of CHB has shifted from corneal conditions to globe abnormalities. [4,10,12,15]
Refractive error is the primary cause of VI in Indian children, second only to blindness. [1,16,24] The most significant contributing reason to VI in India is the failure of underlying refractive error to be rectified; [3,16] while most Indian research use the best corrected visual acuity as the criterion, uncorrected refractive error is underrepresented. Using a modified version of the WHO definition for blindness and VI, which measures presenting visual acuity rather than best corrected, will help to alleviate this issue even further. [30]
It is quite heartening to see how the prevalence and underlying causes of blindness have changed between the studies that were examined, since this indicates a response to socioeconomic change as well as the adoption and application of public health initiatives for children's health. A well-designed and efficient integrated healthcare delivery system is necessary for the prevention of childhood blindness, particularly in India and other developing nations. This integrated health system must be adapted for sociocultural acceptance as well as geographic accessibility for both screening and referral services.
This particular paper should make a compelling argument for pediatric eye services as a separate specialty and then pursue action that would reduce childhood blindness. Children's ophthalmologists should be consulted right away for the deficient kids. For the sake of the future of these kids, the government hospitals should hire an honorary pediatric eye care provider if they don't already have one. Adult ophthalmologists' contributions do not appear to be helpful in solving the issue.

5. CONCLUSION

The provision of a continuum of health promotion, disease prevention, diagnosis, treatment, and rehabilitation that addresses the full spectrum of eye diseases should be coordinated across and integrated within the community, at primary, secondary, and tertiary levels within and outside the health sector, and in accordance with people's needs throughout their lives. A careful genetic counseling of parents prior to childbirth, especially in cases of consanguineous marriage, and teleophthalmology to diagnose the preventable and potentially

blinding diseases like ROP timely should be stressed in order to combat the current causes of ocular morbidity due to whole globe and retinal abnormalities. This will help prevent these children from going blind in the future.

6. REFERENCES

1. Dandona R, Dandona L, Srinivas M, Sahare P. Refractive error in children in an rural population in India. Invest Ophthalmol Vis Sci 2002;43:615-22.
2. World Health Organization. Cummulative official updates to ICD–Feb 2009. Available from: http://www.Who.int/clasificationd/ icd/Official updates Combined 1996-2008 VOLUME1.pdf. [Last accessed 2015 Jul].
3. Murthy GVS. Magnitude and temporal trends in avoidable blindness in Children (ABC) in India. Indian J Pediatr 2017;84:924-9.
4. Dandona L, Williams JD, Williams BC, Rao GN. Population based assessment of childhood blindness in Southern India. Arch Ophthalmol 1998;116:545-6.
5. Dandona R, Dandona L. Childhood blindness in India: A population based perspective. Br J Ophthalmol 2003;87:263-5.
6. Universal Eye Health, A global action plan, 2014-2019.
7. Titiyal JS, Pal N, Murthy GV, Gupta SK, Tandon R, Vajpayee RB. Causes and temporal trends of blindness and severe visual impairment in children in schools for the blind in North India. Br J Ophthalmol 2003;87:941-5.
8. Murthy GVS, Mactaggart I, Muhit M, Islam J, Noe C, Khan AI, et al. Assessing the prevalence of sensory and motor impairment in childhood in Bangladesh using key informants. Arch Dis Child 2014;99:1103-8.
9. Gilbert C. Changing challenges in the control of blindness in children. Eye 2007;21:1338-43.
10. Dorairaj SK, Bandrakalli P, Shetty C, Vathsala R, Misquith D, Ritch R. Childhood blindness in a rural population of Southern India: Prevalence and etiology. Ophthalmic Epidemiol 2008;15:176-82.
11. Nirmalan PK, Vijayalakshmi P, Sheeladevi S, Kothari MB, Sundaresan K, Rahmathullah L. The Kariapatti pediatric eye evaluation project: Baseline ophthalmic data of children aged 15 years or younger in southern India. Am J Ophthalmol 2003;136:703-9.
12. Kemmanu V, Hegde K, Giliyar SK, Shetty BK, Kumaramanickavel G, McCarty CA. Prevalence of childhood blindness and ocular morbidity in a rural pediatric population in Southern India. The Pavagadapediatric Eye Disease study 1. Ophthalmic Epidemiol 2016:23:3:185-92.
13. Imdad A, Herzer K, Mayo-Wilson E, Yakoob MY, Bhutta ZA. Vitamin A supplementation for preventing morbidity and mortality in children from 6 months to 5 years of age (Review). Cochrane Library 2011. Internet. Available from: http://onlinelibrary.wiley.com/ doi/10.1002/14651858.CD008524.pub2/pdf. [Last accessed on 2016].

14. Gilbert C, Foster A, Negrel D, Thylefors B. Childhood blindness: A new form for recording causes of visual loss in children. Bull World Health Organ 1993;71:485-9.
15. Rahi JS, Sripathi S, Gilbert CE, Foster A. Childhood blindness in India: Causes in 1318 blind school studies in nine states. Eye 1995;9:545-50.
16. Murthy GV, Gupta SK, Ellwein LB, Muñoz SR, Pokharel GP, Sanga L, et al. Refractive error in children in an urban population in New Delhi. Invest Ophthalmol Vis Sci 2002;43:623-31.
17. Thylefores B, Negrel AD. Parajasegaram R, Dadzie KY. Global data on blindness. Bull World Health Organ 1995;73:115-21.
18. Gogate P, Deshpande M, Sudrik S, Taras S, Kishore H, Gilbert C. Changing patterns of childhood blindness in Maharashtra, India. Br J Ophthalmol 2007;91:8-12.
19. Bhattacharya H, Das K, Borah RR, Guha K, Gogate P, Purukayastha S, et al. Causes of childhood blindness in northeastern states of India. Indian J Ophthalmol 2008;56:495-9.
20. Krishnaiah S, Subba Rao B, Narasamma KL, Amit G. A survey of severe visual impairment in children attending schools for the blind in a coastal district of Andhra Pradesh in South India. Eye 2012;26:1065-70.
21. Israfil AT, Gogate PM, Kulkarni V, Shinde M. Improving functional vision in schools for the blind students with low vision aids in Pune, India. J Clin Ophthalmol Res 2014;2:99-101.
22. Bhalerao SA, Tandon M, Singh S, Dwivedi S, Kumar S, Rana J. Visual impairment and blindness among the students of blind schools in Allahabad and its vicinity: A causal assessment. Indian J Ophthalmol 2015;63:254-8.
23. Danayak PM, Patel RB. Avoidable blindness and its correction in schools for the blind in Gujarat. Int J Adv Med 2015;2:370-2.
24. Fujiki K, Nakajima A, Yasuda N, Tanabe U, Kabasawa K. Genetic analysis of microphthalmos. Ophthalmic Paediatr Genet 1992;1:139-49.
25. Kapil U, Gupta A. Low quality evidence for the continuation of universal vitamin A supplementation among under 5 children in India. India J Public Health 2016;60:176-80.
26. Rahi JS, Tripathi S, Gilbert CE, Foster A. Childhood blindness due to vitamin A deficiency in India: Regional variations. Arch Dis Child 1995;72:330-3.
27. Sil AK, Gilbert CE. Childhood blindness in India. J Indian Med Assoc 2001;99:10-15.
28. International Institute for population Sciences. National Family Health Survey-4 2015-16: India Fact Sheet. Government of India. New Delhi: Ministry of Health and family welfare; 2016. p. 1-6. Available from: http://rchips.org/nfhs/pdf/NHFS4/Indiapdf. [Last accessed on 2017 20 Mar].
29. Gupta N, Vashist P, Tandon R, Gupta SK, Dwivedi S, Mani K. Prevalence of corneal opacities in the rural Indian population. The corneal opacity rural epidemiological (CORE) study. Br J Ophthalmol 2015;99:147-52.
30. Vashist P, Senjam SS, Gupta V, Gupta N, Kumar A. Definition of blindness under national program for control of blindness. Do we need to revise it. Indian J Ophthalmol 2017;65.92-6.

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