UDC: 612.84-053.2-056.262
Professional paper

COMMON CAUSES OF VISUAL IMPAIRMENT IN CHILDREN: LITERATURE REVIEW

Ermira TATESHI[1], Daniela DIMITROVA-RADOJICHIKJ[2]
[1]University of Tetovo, Faculty of Pedagogy, Institute for Special Education and Rehabilitation
[2]"Ss. Cyril and Methodius" University, Skopje, Faculty of Philosophy, Institute of Special Education and Rehabilitation
ermiratateshi@gmail.com

Abstract

Objective: This review aims to identify and analyze the most prevalent causes of vision impairment in children, focusing on the prevalence of each condition and recommended strategies for prevention and early intervention to mitigate developmental impacts.
Methodology: A PRISMA-based systematic review was conducted, analyzing data from eight studies published over the last 10 years. The review involved searches in databases such as PubMed, Web of Science, and Scopus, using the search algorithm ("low vision" OR "visual impairment") AND cause AND child.
Results: Refractive errors were the most common cause of visual impairment in children, accounting for 38.6% to 86.6% of cases. The second most prevalent cause was congenital cataracts, contributing to 39.1% of cases. Other region-specific causes included albinism and neonatal conditions, as well as cortical visual impairment and retinopathy of prematurity.
Conclusion: The literature indicates that refractive errors and cataracts are the leading causes of childhood visual impairment, with distinct regional differences underscoring the need for both universal and targeted strategies, including regular screenings, public health education, and enhanced access to treatment.

Keywords: eye diseases, childhood blindness, refractive errors, pediatric ophthalmology

Introduction

Vision is a fundamental sense, essential at every stage of life. Without it, individuals face significant challenges in learning, mobility, and work. The visual system is therefore crucial for interacting with the environment (Bezabih, Abebe, & Fite, 2017). However, vision impairment - a substantial reduction in sight that disrupts normal daily functioning - is a global health issue with wide-reaching social and economic impacts, affecting people in both developed and developing countries (Rizzo et al., 2020; Dimitrova-Radojichikj, 2023). This classification encompasses varying degrees of vision impairment, ranging from mild vision loss to complete blindness.
Recent global data indicate that over 2.2 billion individuals experience vision-related problems or blindness, with at least 1 billion cases being preventable or detectable at an early stage but remaining untreated (WHO, 2019). Research suggests that approximately 70% of vision loss cases could be avoided with timely healthcare access and suitable interventions (Dimitrova-Radojichikj, 2023). According to Al-Namaeh (2022), vision impairment can occur at any age but is most prevalent among older adults. As the global population continues to age, the prevalence of vision loss is expected to rise significantly (Chen et al., 2024). Consequently, this demographic shift places vision loss as a critical public health concern, requiring targeted approaches and adequate resources to support affected individuals (Pascolini & Mariotti, 2012). Around 19 million children globally under the age of 15 suffer from different types of visual impairments, with approximately 1.4 million of them recognized as blind according to World Health Organization criteria (WHO, 2019). The prevalence of visual disability among children ranges from „1% to 3%, with significant regional variations in childhood blindness rates. In developed nations, the rate is about 0.3 per 1,000 children, whereas in developing nations, it

rises to approximately 1.5 per 1,000,, (Gilbert & Foster, 2001). This implies that one in every 200 children may encounter significant vision problems, which is alarming. Notably, around 80% of blindness cases are deemed preventable, emphasizing the importance of treatment and preventive methods available to address this concern (WHO, 2019). In fact, in developing countries, as much as „31% of childhood blindness is preventable, with up to 58% treatable and 28% avoidable,, (Gothwal & Herse, 2000). The increased rate of visual impairment in these areas is often linked to insufficient healthcare services, a lack of understanding regarding the significance of regular eye check-ups, and financial barriers that hinder families from obtaining necessary medical care. Also, issues such as infectious diseases, hereditary conditions, and inadequate nutrition further heighten the risk of vision problems. Generally, children's vision health is influenced by age, genetics, and environmental factors (Dimitrova-Radojichikj, 2023). Vision issues can emerge at any stage, making early detection essential for healthy development. Children with a family history of eye conditions benefit from regular screenings and genetic counseling to reduce risks. Additionally, socioeconomic factors impact access to eye care, with limited healthcare access often leading to a higher prevalence of vision problems. Improving healthcare and health education can help ensure that all children receive the support they need for good vision health.

An initial literature review shows that most research on vision impairment focuses on adults. This paper aims to address the gap by identifying specific causes of vision impairment in children, as data on this group remains limited and may be underestimated.

Methods

A systematic literature review and analysis followed PRISMA guidelines for systematic reviews and meta-analyses. Comprehensive searches were conducted across international and multinational scientific databases, including MEDLINE/PubMed, Web of Science, Scopus, Google Scholar, and academic repositories, to identify all relevant publications on the causes of vision impairment in children. The search algorithm used in this review was ("low vision" OR "visual impairment") AND cause AND child, applied within the title and abstract fields.

Results

Table 1 provides a comprehensive summary of the analysis of eight studies conducted over the past 10 years, offering insights into the primary causes of visual impairment in children. Refractive errors are consistently identified as the leading cause of childhood visual impairment, as highlighted by Ezegwui et al. (2021) and Alrasheed et al. (2024), underscoring the significant need for corrective interventions. Cataracts are also frequently reported, emphasizing the importance of early diagnosis and treatment. Additional causes include albinism, identified by Garzón-Rodríguez et al. (2023), as well as cortical visual impairment and retinopathy of prematurity, noted by Okasheh-Otoom and Gammoh (2023), often associated with neonatal health challenges.

Table 1. Causes of visual impairment in children

Authors	**Three most common causes of visual impairment**
Okasheh-Otoom, & Gammoh, 2023	Retinopathy of prematurity (14.9%), Cortical visual impairment (13.8%) and Other retinal disorders (12.6%).
Alrasheed et al., 2024	Refractive errors (59.7%), Amblyopia (11%) and Cataract (9.4%).
Garzón-Rodríguez et al., 2023	Albinism (47%), Cataract (27.2%) and Nystagmus (22%).

Ezegwui et al., 2021	Refractive errors (86.6%), Retinal Disease (4.1%) and Corneal opacity (2.1%).
Adejumo et al., 2021	Refractive errors (38.6%), Vernal conjunctivitis (12.3%) and Amblyopia (10.5%).
Radojicjikj & Tasevska, 2020	Refractive errors (42.6%), Ocular inflammation (12.6%) and Strabismus (9%).
Alabi et al., 2018	Refractive errors (39.7%), Glaucoma (33.5%) and Vernal keratitis (19.2%).
Adekoya et al., 2014	Congenital cataract (39.1%), Congenital ptosis (17.4%) and Congenital glaucoma (8.7%).

Discussion

Refractive anomalies, including nearsightedness, farsightedness, and astigmatism, arise when the eye is unable to properly focus light onto the retina, resulting in blurred or impaired vision (Tateshi, E., Tateshi, B., & Dimitrova-Radojichikj, 2024). These anomalies are particularly concerning in younger populations, where they are frequently linked to behaviors such as excessive screen exposure and extended near-work activities, such as reading or writing. These factors, often compounded by genetic predispositions, contribute significantly to the growing prevalence of vision problems in children (Pascolini & Mariotti, 2010). Our meta-analysis of eight studies further supports the conclusion that refractive errors are the leading cause of vision impairments among children globally. For instance, a study by Ezegwui et al. (2021) revealed that 86.6% of visual impairments in children are attributed to refractive anomalies, while Alrasheed et al. (2024) found that these conditions account for 59.7% of cases within their study population. Such findings underscore the pervasive impact of refractive errors on childhood vision health. Despite their prevalence, these conditions often go undiagnosed, particularly in regions with limited access to eye care services. This lack of diagnosis is often due to a combination of insufficient healthcare infrastructure, lack of awareness regarding the importance of regular eye exams, and financial barriers faced by families. As a result, many children experience untreated vision problems, which can lead to significant developmental delays and hinder their educational and social opportunities. Addressing these issues requires a dual approach: on one hand, promoting behavioral interventions, such as reducing screen time and encouraging proper eye care habits; on the other hand, improving healthcare accessibility, including regular vision screenings and affordable corrective measures like glasses. By implementing these strategies, it is possible to mitigate the long-term impact of refractive errors and improve the quality of life for affected children.

The global causes of visual impairment in children exhibit significant regional disparities, shaped by the complex interplay of genetic, environmental, and systemic healthcare factors. Findings from our meta-analysis of the aforementioned eight studies confirm these variations, highlighting how certain conditions prevail in specific regions. For example, albinism has been identified as a significant contributing factor in some populations (Garzón-Rodríguez et al., 2023), while cortical visual impairment and retinopathy of prematurity are more prevalent in areas grappling with neonatal health challenges (Okasheh-Otoom & Gammoh, 2023). However, refractive errors and cataracts consistently emerge as the leading causes of visual impairment globally, underscoring the need for coordinated interventions that address both regional and global challenges (Pascolini et al., 2010).

Conclusion

This meta-analysis of the primary causes of visual impairment in children identifies uncorrected refractive errors as the most significant contributors to vision problems. These findings align with the observation that refractive errors, particularly myopia, are the leading cause of visual impairment among children. Other less prevalent causes include amblyopia, retinal disorders, corneal opacity, congenital cataracts, and conditions such as retinopathy of prematurity. The results underscore the urgent need for early detection and timely intervention, as many of these conditions are preventable or treatable with appropriate care. Effective eye care strategies should encompass regular vision screenings, access to affordable corrective measures such as eyeglasses, and public health initiatives that promote outdoor activities while raising awareness about the risks of excessive screen time. Addressing these challenges is essential not only for safeguarding children's visual health but also for enhancing their educational achievements and overall quality of life.

References

[1] Adejumo, O. O., Olusanya, B. A., & Ajayi, B. G. (2021). Ocular disorders among preschool children in Southwest Nigeria. *Middle East African Journal of Ophthalmology, 28*(1), 23–28. https://doi.org/10.4103/meajo.MEAJO_191_19

[2] Adekoya, B. J., Balogun, M. M., Balogun, B. G., & Ngwu, R. A. (2015). Spectrum of congenital defects of the eye and its adnexia in the pediatric age group: Experience at a tertiary facility in Nigeria. *International Ophthalmology, 35*(3), 311–317. https://doi.org/10.1007/s10792-014-9946-4

[3] Alabi, A. S., Aribaba, O. T., Alabi, A. O., Ilo, O., Onakoya, A. O., & Akinsola, F. B. (2018). Visual impairment and ocular morbidities among schoolchildren in Southwest, Nigeria. *Nigerian Postgraduate Medical Journal, 25*(3), 166–171. https://doi.org/10.4103/npmj.npmj_85_18

[4] Al-Namaeh, M. (2022). Common causes of visual impairment in the elderly. *Medical Hypothesis, Discovery & Innovation in Ophthalmology, 10*(4), 191–200. https://doi.org/10.51329/mehdiophthal1438

[5] Alrasheed, A. S., Aldandan, I. M., Noor, S., & Al-Schameri, A. (2024). Clinical presentation, diagnosis, and management of wrist intravascular papillary endothelial hyperplasia: A case report and literature review. *Cureus, 16*(9), e70539. https://doi.org/10.7759/cureus.70539

[6] Bezabih, L., Abebe, T. W., & Fite, R. O. (2017). Prevalence and factors associated with childhood visual impairment in Ethiopia. *Clinical Ophthalmology (Auckland, N.Z.)*, 11, 1941–1948. https://doi.org/10.2147/OPTH.S135011

[7] Bourne, R. R. A., Jonas, J. B., Bron, A. M., et al. (2018). *The global prevalence of refractive error and its implications for eye health services. British Journal of Ophthalmology, 102*, 575–585. https://doi.org/10.1136/bjophthalmol-2017-311415

[8] Chen, J., Zhu, Y., Li, Z., Chen, X., Chen, X., Huang, S., Xie, R., Zhang, Y., Ye, G., Luo, R., Shen, X., Lin, L., & Zhuo, Y. (2024). Global impact of population aging on vision loss prevalence: A population-based study. *Global Transitions, 6*, 28–36. https://doi.org/10.1016/j.glt.2023.12.003

[9] Deme, T. G., Mengistu, M., & Getahun, F. (2024). Prevalence and associated factors of visual impairment among adults aged 40 and above in Southern Ethiopia, 2022. *Scientific Reports, 14*, 2542. https://doi.org/10.1038/s41598-024-53056-6

[10] Dimitrova-Radojichikj, D. (2017). Prevalence and causes of blindness among the Macedonian population. *Journal of Special Education and Rehabilitation, 18*(1-2), 17–25. https://doi.org/10.19057/jser.2017.16

[11] Dimitrova-Radojichikj, D., & Tasevska, D. (2020). Causes of visual impairment: A retrospective study in Macedonian children. *Journal of Ophthalmology (Ukraine), 3*(494), 29–30.

[12] Dimitrova-Radojichikj, D. (2023). *Early intervention for children with visual impairments.* Skopje: Faculty of Philosophy.

[13] Ezegwui, I. R., Oguego, N. C., Okoye, O. I., Maduka-Okafor, F. C., Udeh, N., Aghaji, A. E., Okoye, O., Nwobi, E., Umeh-Aneji, C., Onwasigwe, E. N., & Umeh, R. E. (2021). Prevalence of refractive errors and visual impairment in school children in Enugu, South-East Nigeria. *Nigerian Journal of Clinical Practice, 24*(3), 380-386. https://doi.org/10.4103/njcp.njcp_521_19

[14] Garzón-Rodríguez, M. C., Reyes-Figueredo, L. S., Velandia-Rodríguez, L. Á., Méndez-Ruiz, O. D., Gómez-Rodríguez, M. A., Esguerra-Ochoa, L. T., & García-Lozada, D. (2023). Causes of low

vision in children: A systematic review. *Archivos de la Sociedad Española de Oftalmología (English Edition), 98*(2), 83-97. https://doi.org/10.1016/j.oftale.2022.06.016

[15] Gilbert, C., & Foster, A. (2001). Childhood blindness in the context of VISION 2020—the right to sight. *Bulletin of the World Health Organization, 79*(3), 227–232. World Health Organization. Retrieved from https://iris.who.int/handle/10665/268287

[16] Gothwal, V. K., & Herse, P. (2000). Characteristics of a paediatric low vision population in a private eye hospital in India. *Ophthalmic and Physiological Optics, 20*(3), 212–219. https://doi.org/10.1016/S0275-5408(99)00066-6

[17] International Agency for the Prevention of Blindness. (n.d.). *VISION 2020: The right to sight*. Retrieved from https://www.iapb.org/about/history/vision-2020/

[18] Okasheh-Otoom, A., & Gammoh, Y. (2023). A profile of visually impaired children: A ten-year retrospective study. *International Journal of Pediatrics, 11*(5), 113.

[19] Pascolini, D., & Mariotti, S. P. (2012). Global estimates of visual impairment: 2010. *British Journal of Ophthalmology, 96*(5), 614–618. https://doi.org/10.1136/bjophthalmol-2011-300539

[20] Rizzo, J. R., Beheshti, M., Hudson, T. E., Mongkolwat, P., Riewpaiboon, W., Seiple, W., … Vedanthan, R. (2020). The global crisis of visual impairment: An emerging global health priority requiring urgent action. *Disability and Rehabilitation: Assistive Technology*, 18(3), 240–245. https://doi.org/10.1080/17483107.2020.1854876

[21] Tateshi, E., Tateshi, B., & Dimitrova-Radojichikj, D. (2024). Refraktivni greski kaj decata od ucilsna vozrast: Pregled na literatura. *Medicus, 29*(1), 76–80.

[22] World Health Organization. (2014). *Visual impairment and blindness*. Retrieved from https://www.who.int/

[23] World Health Organization. (2018). *International Classification of Diseases, 11th Revision (ICD-11)*. Retrieved from https://www.who.int/

[24] World Health Organization. (2019). *Blindness and vision impairment.* World Health Organization. Retrieved from https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment

[25] World Health Organization. (2000). *Global initiative for the elimination of avoidable blindness.* Retrieved from https://iris.who.int/handle/10665/268287