Biotica Research Today
Vol 3:12 2021
1148 / 1150

Eye Diseases in Children and How to Diagnose Them

Ahmed Taher Hamid Ali[1], Hasnat M. Alamgir[1], Salman Ahmed Taher Hamid[2], Md Mahmudul Hasan[1*] and Imtiaj Hossain Chowdhury[1]

[1]Al Noor Eye Hospital (Al Basar International Foundation-Bangladesh), Satmasjid Road, Dhaka (1207), Bangladesh
[2]Makkah Eye Hospital, Dhaka (Al Basar International Foundation-Bangladesh), Uttara, Dhaka (1230), Bangladesh

Open Access

Corresponding Author
Md Mahmudul Hasan
e-mail: mahmud.albasar@gmail.com

Keywords
Children, Diagnosis, Disease, Eye

How to cite this article?
Ali *et al*., 2021. Eye Diseases in Children and How to Diagnose Them. Biotica Research Today 3(12): 1148-1150.

Abstract

Eyes are among the most vital body organs and we perceive over three-quarters of our senses through sight. Vision helps us to walk, read, write, work and participate in education, social and numerous activities. Through a complex process, eye captures information around it and transmits it constantly to our brain. Eyes like other body organs are prone to many diseases and injuries during adulthood as well as childhood. A number of risk factors can affect a child's vision. Visual impairment in children has serious growth, public health, and economic consequences. Eye diseases in children are particularly important to diagnose on time and treat early because child's vision remains in developing stage and vision has great impact on their mental development, school performance, future work opportunities, and quality of life. Early screening, diagnosis and treatment of eye diseases among children can help deter developing visual impairment and blindness later in life.

Introduction

Eye diseases are very common among children worldwide. The prevalence is widely varied country to country. This difference can easily be distinguished on the basis of socio-demographic profiles of children. Globally cataracts, refractive error and glaucoma frequently occur eye diseases among children. Hereditary factors, infection, allergy, vitamin deficiency, chemical irritants, and lifestyle have been identified by many authors and clinicians as the risk factors of children eye diseases. Early identification on the basis of clinical features and diagnostic test is the first attempt to arrange standard and effective management which can reduce the burden of eye disease among children.

Epidemiology of Eye Diseases

An estimated 314 million people globally have visual impairment and out of them 19 million are children below 15 years according to the World Health Organization (WHO) (WHO, 2021). Cataract, uncorrected refractive errors, and glaucoma are reported by WHO to be the prominent causes of visual impairment worldwide. WHO also states that most of the world's visually impaired people live in the poorest parts of Africa and Asia.

The prevalence and causes of visual impairment vary markedly by country as well as by region within the same country. For example, in the United States, about 6.8% of children have been reported to suffer from eye diseases whereas, in Australia, about 12% of children are affected by eye diseases. These differences may attribute to definitions used or diagnosis method or size and type of sample studied. The data on such prevalence in low and middle-income countries is relatively rare. One study reported that about 30% of blind

Article History
Received in 15th December 2021
Received in revised form 24th December 2021
Accepted in final form 25th December 2021

E-mail: *bioticapublications@gmail.com*

people in India lost their sight before the age of 17. Whereas about 19.9% of Bangladeshi school children aged 5-16 years were reported to be suffering from some kind of eye disease (Hussain *et al*., 2019).

Eye diseases vary by the socio-demographic profile of children. Uncorrected refractive error is a common cause of visual impairment in children and has been reported to be a major cause of avoidable blindness in many regions, including Chile, Africa, and Malaysia. Refractive error was reported to be the most common eye disease among children in Bangladesh as well. A review study (Sheeladevi *et al*., 2018) reported that the overall prevalence of refractive error was 8.0 per 100 children and in schools, it was 10.8 in India. It also stated that the prevalence of combined refractive errors and myopia was found to be higher in urban areas compared to rural areas, and higher among girls than boys at the school level. However, hyperopia was more prevalent among boys than girls in schools.

Another review study on prevalence of childhood cataracts (Sheeladevi *et al*., 2016) reported that 2,00,000 children worldwide are estimated blind due to cataracts and between 20,000 to 40,000 children are born with congenital cataracts each year. According to previous studies, blindness was caused by unoperated cataracts in 13.1%, 9.1%, and 27.6% of children in Malawi, Kenya, and Uganda, respectively (Sheeladevi *et al*., 2016). The overall prevalence of childhood cataracts and congenital cataracts ranged from 0.32-22.9 per 10,000 children and 0.63-9.74 per 10,000 children, respectively and the incidence was calculated to be between 1.8 and 3.6 per 10,000 children per year in Europe and Central Asia, South Asia, East Asia and Pacific, Sub-Saharan Africa, and North America (Sheeladevi *et al*., 2016).

Glaucoma is reported to be the second leading cause of vision loss in people of all ages around the world. Childhood glaucoma is estimated to cause a notable percentage number of blindness in children: 1.2% of children in Great Britain, 3% in Northern India, and 7% in Southern India (Fung *et al*., 2013).

Risk Factors of Eye Diseases

Many risk factors have been identified and reported previously for developing eye diseases in children. Hereditary factors, infection, allergy, vitamin deficiency, chemical irritants, and lifestyle are some of the more common causative agents. Refractive error tends to run in families; therefore, children who have parents with short-sightedness are at risk of having this. Congenital cataracts may be seen if parents or siblings are diagnosed with the condition or if mothers have a history of prolonged use of steroids, smoking, excessive drinking, and medical conditions such as diabetes during pregnancy. In addition, low intake of vitamin A, E, C, B, and proteins and minerals may induce night blindness or long-sightedness, or short-sightedness problems among children. Conjunctivitis among children is usually caused by bacteria or viral infection. They can also be triggered by allergies. The infection spreads by physical contact while playing or using the objects of another infected child.

Clinical Features of Eye Diseases

The clinical features of eye diseases are unique and vary by disease type. Children who suffer from refractive error cannot see the objects clearly either at a long or near distance or both distances. Along with this, headaches, squinting, dual vision, and seeing halos around bright lights are the common symptoms of refractive errors. The light which is received by the children's eyes may be severely obstructed due to cataracts. In addition, faded perceiving of colors, difficulty seeing in low light, glaring or too bright, and blurry or misty vision can be experienced by cataract children. In conjunctivitis, inflammation and redness in the eyes are seen, and the sufferer may experience itching and watering of the affected eye. Children who are suffering from glaucoma may present intense eye pain, nausea and vomiting, red-eye, headache, tenderness around the eyes, seeing rings around lights, and blurred vision.

Diagnosis of Eye Diseases

Early identification is the key to early intervention. In this case, screening of children's eyes plays an important role. A vision screening can also be called an "eye test" which is usually carried out at the school or home by the primary care providers or nurses in order to identify the potential eye problems or disorders. For this purpose, a variety of procedures is applied. Of these, "Distance vision test", "Close-up vision test" and "Color-blindness test" are common and important. However, vision screening does not confirm the presence of a disease or disorder. It provides only a hint about the risk of developing an eye condition. In case of positive results of vision screening, primary care providers refer children to ophthalmologists for confirmed diagnosis.

Figure 1: A child is being examined clinically at Al-Noor Eye Hospital, Dhaka

Eye diseases can be diagnosed through three phases. Firstly, symptoms along with medical history provide an indication for diagnosing eye diseases by an ophthalmologist. Secondly, the appearance of the eye also highlights the presence of eye disease by showing different types of signs. Toward the end, the presence of a specific eye problem is confirmed through an intensive physical examination with the use of equipment. For instance, the "Snellen" test uses a chart six-meter away from which displays rows of letters in diminishing sizes to assess refractive errors. A "Phoropter" is also used.

Figure 2: A child is being examined by slit lamp at Al-Noor Eye Hospital, Dhaka

In this test to determine which corrective lenses would be most effective. The peripheral vision and central area of vision are tested by "Goldmann perimeter" and "Amsler grit", respectively. In order to find out the colour blindness, "Isihara color plates" are used. The ophthalmologists use "Slit lamp" to examine the structures inside and around the eye (eyelids, skin around the eyes, iris, and cornea, the fluid in the front part of the eye, the lens, retina, and the optic nerve). Furthermore, "Tonometry" measures the pressure within the eye which indicates the presence of glaucoma.

Conclusion

Many eye diseases afflict children in different parts of the world; refractive error, cataracts, and glaucoma appear the most commonly diagnosed in this group. Eye illnesses have their own set of signs and symptoms. Although non-health professionals may be able to detect child's risk of developing eye problems based on clinical manifestations, a thorough examination is generally required to confirm the diagnosis and begin therapy to avoid visual impairment. Children eye examinations are critical to ensure that their eyes continue to develop normally and detect any abnormality in their eyes.

Acknowledgement

Research department would like to show gratitude to Al-Basar International Foundation for providing support during the study.

References

Fung, D.S., Roensch, M.A., Kooner, K.S., Cavanagh, H.D., Whitson, J.T., 2013. Epidemiology and characteristics of childhood glaucoma: results from the Dallas Glaucoma Registry. *Clinical Ophthalmology* (Auckland, N.Z.) 7, 1739-1746. DOI: 10.2147/OPTH.S45480.

Hussain, A.H.M.E., Roy, T., Ferdausi, N., Sen, U., 2019. Prevalence of childhood ocular morbidity in a peri-urban setting in Bangladesh: a community-based study. *Public Health* 170, 103-112. DOI: 10.1016/j.puhe.2019.02.026.

Sheeladevi, S., Seelam, B., Nukella, P.B., Modi, A., Ali, R., Keay, L., 2018. Prevalence of refractive errors in children in India: a systematic review. *Clinical & Experimental Optometry: Journal of the Australian Optometrical Association* 101(4), 495-503. DOI: 10.1111/cxo.12689.

Sheeladevi, S., Lawrenson, J.G., Fielder, A.R., Suttle, C.M., 2016. Global prevalence of childhood cataract: a systematic review. *Eye* 30(9), 1160-1169. DOI: 10.1038/eye.2016.156.

WHO, 2021. Blindness and vision impairment. Available at: https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment. Accessed on: 12.11.2021.