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FUTURE EYE RELATED DISEASE DUE TO MYOPIA

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In 2010, Myopia has been one of the leading causes of refractive error, with a prevalence of 27% worldwide.[1-2] This figure is predicted to increase every year especially after COVID-19 Pandemic. WHO predicted that in 2050, there will be an explosion of myopia cases worldwide due to pandemic.

This figure is predicted to reach 9.8% of the world's population or around 938 million people. Since the pandemic, the insufficient time spent outdoors, and the increasing amount of time on cellphones and computers have been the major cause of myopia cases.[1,3,4]

The cause of myopia can occur multifactorial, a mixture of genetics and the environment.[5,6] Environmental causes that have been mentioned are the amount of time using gadgets, lack of time spent outdoors, low levels of vitamin D, and poor diet. [7-14] A rapid increase in myopia cases has been found in many countries. In China, there are around 80% of students aged 12 years who are now myopia and 10-20% of them have high myopia exceeding -6 D. This incident can also be found in Indonesia. Based on research by Gajah Mada University, studies done in 312 children, 41% of them had myopia and 21% of them had severe refractive errors. This number has grown rapidly, especially since the pandemic.[3] This phenomenon needs to be watched out for by parents because eye health plays an important role in children's health and scholar achievement. [1,3]

Recent research now can predict the occurrence of myopia as early as possible. Studies about the axial length growth is being developed to determine whether a child's axial length is normal for his or her age to predict the likelihood of future myopia. An article discusses how we can predict myopia based on current axial length, changes in axial length, prediction using axial length growth charts, and using the AL/CR ratio.[15] Prediction using the current axial length is done by a study in Singapore. They found that myopia can occur at an axial length of 23.69±0.69mm in girls and 24.08±0.67mm in boys, regardless of age. This figure is the cut-off for predicting myopia onset.[16-17] Another way of predicting myopia is using the changes in the axial length. The Collaborative Longitudinal Evaluation of Ethnicity and Refractive Error (CLEERE) Study, collects data on children over 11 years of age, found that children who are still emmetropic have an annual axial length growth of about 0.1 mm per year. They also found that axial length grows the fastest 1 year before the onset of myopia where it grew by 0.33 mm on average. This rate will decrease by 0.2-0.27mm/year after the initial myopia onset.[18] The use of axial length growth charts can also be used to predict future

myopia. By comparing the current child's axial length to match their age-normal result. If the child is above the 50% percentile, there is a high risk of developing myopia in the future.[19-20] Another way is to use the AL/CL ratio. A longer axial length in comparison to the corneal radius generally indicates a greater risk of becoming myopic. A study in China and Europe showed that children who have an AL/CR ratio of more than 3 have a higher chance of myopic error. Measurement of the AL/CR ratio requires measurements using keratometry or corneal topography. Therefore, it is very important to have routine eye examinations once every 6-12 months to prevent eye diseases that can endanger our vision.[21-22]

One of the ways to prevent myopia is to reduce screen time, spending more time on outdoor activities, and consume a good diet.[1] However, when myopia has occurred, it must be treated properly. Myopia that is not corrected properly can cause dangerous complications that can lead to blindness. One of the conditions that can arise in children with refractive disorders is lazy eye. This happens because there is severe myopia in one eye so that the child's brain will rely on a healthy eye. This lazy eye cannot be cured with ordinary glasses or contact lenses and if left untreated can be a big risk factor visual impairment related disease.[3] Even if appropriate correction is given, myopia is still a risk for sight-threatening diseases such as glaucoma, cataracts, retinal tears which will lead to retinal detachment, and myopic maculopathy or myopic macular degeneration. This condition can especially be found in conditions that have high myopia.[23-24] In a systematic review about glaucoma, the risk of developing glaucoma was 50% higher in people with moderate to severe myopia (odds ratios 2.5 and 1.7) compared to low myopia.[25] In cataracts it was also found to be higher (17% more likely) in patients with high myopia to perform cataract surgery (OR 3.4 and 2.9) compared to low myopia.[26] In cases of retinal detachment, the increase in cases reaches 5-6x higher in people with high myopia. This is because someone with high myopia has longer eyes so that the retina is more stretched and causes vulnerability to cause retinal tears. High myopia is also a cause of central retinal degenerative changes such as chorioretinal atrophy, posterior staphyloma, and lacquer cracks. Another risk in cases of high myopia is myopic muscular degeneration where the incidence rate increases with age and increasing myopia. This condition may develop in the form of atrophic changes or be complicated by choroidal neovascular membrane formation. In more advanced conditions, myopic maculopathy can cause loss of central vision for which there is currently no treatment.[27-28]

With the rising numbers of myopia, the visual impairment caused by myopia will rise in the future. As ophthalmologists especially in the vitreoretinal field, we must be aware of the potential social dangers in Indonesia due to an increase cases in myopia. The steps we can take to reduce the number of myopia cases are by working with related parties (government, society, media, etc.) to increase their awareness of this case. Increasing education related to myopia will make it easier for all of us to overcome this problem. INAVRS encourages eye specialists in Indonesia to conduct research related to myopia.

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