Contact Lens Update
CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

Progression of myopia in school-aged children after COVID-19 home confinement: a review

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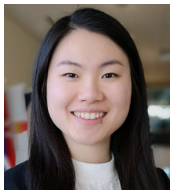

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Progression of Myopia in School-Aged Children After COVID-19 Home Confinement. Wang J, Li Y, et al. JAMA Ophthalmology 2021, 139 (3): 293-300.

Background

Does the COVID-19 lockdown have an impact on the development of myopia in children? Based on the current understanding of myopic development, one might speculate so. There are certain risk factors that promote the onset and the progression of myopia. They include spending less time outdoors and performing near work for a prolonged duration. Both risk factors are likely exacerbated when people are confined to their homes during the lockdown.

One recent study tracked and compared the refractive status of school-aged children before and after the COVID-19 lockdown. The findings from this study may shed light on the potential impact of the pandemic-induced home confinement on the development of myopia in children. Its value and relevance can be appreciated by examining the study in greater detail.

Method

This was a prospective cross-sectional study conducted from 2015 to 2020. A sample of 123 535 children entered the study; some children participated in the study over multiple years. 194 904 test results (389 808 eyes) were used for the analysis. The children were from ten elementary schools in Feicheng, China, and were between 6 and 13 years old.

At the beginning of each school year in September, the children underwent photoscreening. Their non-cycloplegic refractive errors were measured by the handheld Spot Vision Screener. From 2015 to 2019, their data were collected in September. As a result of the pandemic, the schools were closed between January to May of 2020. They re-opened in June, and the photoscreening took place in the same month. The data were subsequently analyzed in July 2020.

The exclusion criteria of this study included wearing contact lenses on the day of the screening, wearing ortho-K lenses one night before the screening, using medicated eye drops, and having had a history of ocular surgery.

Results

The refractive status of the sample group was evaluated by examining the mean spherical equivalent refraction (SER) value (Table 1) and its distribution (Figure 1). The results were organized by group and calendar year. The mean SER values across all age groups remained stable between 2015 to 2019. In 2020, a significant myopic shift (approximately -0.3D) was observed in the younger school-aged children. A myopic shift of -0.32D, -0.28D, and -0.29D was found in age 6-, 7-, and 8-year-olds respectively. Some myopic shift was also observed in the older children between 9 and 13 years old; however, this shift was not considered to be clinically significant.

The prevalence of myopia for each age group per year was also examined (Table 2). In 2020, the prevalence of myopia was higher than the highest prevalence of myopia observed between 2015 to 2019. They were 21.5 vs. 5.7% in 6-year-olds, 26.2% vs. 16.2% in 7-year-olds, and 37.2% vs. 27.7% in 8-year-olds. In contrast, for children between 9 and 13 years old, the increase in the prevalence was not substantial.

In addition, the development of myopia differed between sexes and the eyes. The onset of myopia was earlier in girls than boys. The right eye was found to be more myopic than the left eye.

Discussion

The visual environment can impact the development of myopia. Two known risk factors are decreased outdoor time and prolonged near work. While home confinement has yet to be identified as a risk factor, it may be associated with an increased risk of myopic development. This is because lessened outdoor time and increased near work are likely to occur during home confinement.

The COVID-19 pandemic created a special scenario for such association to be explored. Between January to May 2020, the schools in China were closed. During this time, courses were delivered virtually, and children were confined to their homes. By comparing the refractive status of a sample of school-aged children before and after home confinement, one may evaluate the impact of home confinement on myopia development.

A substantial myopic shift and increase in the prevalence of myopia were observed in the 6 to 8 years old group in 2020 compared to previous years. These changes were less significant in the older age group: the 9 to 13 years old children. Given that the data in 2020 were collected shortly after the end of the COVID-19 home confinement, the observed myopic progression, particularly in the younger age group, was likely related to home confinement.

It was interesting to note that the younger children (6 to 8 years old) underwent a more significant myopic shift than the older children (9 to 13 years old) after a period of home confinement. The younger children may have been more sensitive to the environmental changes than the older children. The authors speculated that perhaps there is an age window where the plasticity of myopia is high. Children who are within the age window may be more sensitive to environmental triggers, which may promote or control their myopic progression. If an age window of myopia plasticity truly exists, one may consider introducing myopia control during this period to strive for more effective treatment. Given that this is only speculation, more research is required before clinical implementation.

The study found myopia to develop earlier in girls than boys. The reason behind this observation was not fully understood. Such difference in the age of onset of myopia between the sexes may be related to girls undergoing puberty earlier than boys. The study also found the right eye often was more myopic than the left eye. This was thought to correlate with eye dominance. In individuals with anisometropia, the dominant eye, usually the right eye, tended to be more myopic than the non-dominant eye.

Limitations

When evaluating the results of this study, it is important to be mindful of its limitations. Foremost, the refraction was non-cycloplegic and was measured by a photoscreener. While the photoscreener may be a reliable screening tool, it cannot replace a cycloplegic refraction that offers better measurement accuracy. Secondly, ortho-K wearers were included in the study if they did not wear their lenses the night before the screening day. However, a full washout of ortho-K lenses requires more than one night of lens discontinuation. For patients who only discontinued ortho-K wear for one night, residual ortho-k treatment remains, and their refractive measurement would not reflect their full refractive error. Including these patients in the study introduced measurement bias. Thirdly, the exact amount of screen time, near work, and outdoor activities were not measured. One may presume that during home confinement, the hours spent outdoors were lessened and vice versa for indoor activities, including near work and screen time. The lack of quantification of these myopic risk factors limits interpretation of the data. Additionally, only school-aged children between the ages of 6 and 13 years old were included. If the study included preschool-aged children, one may wonder how these children's refractive status might be affected by home confinement and whether they would be more sensitive to environmental changes. Finally, axial length and corneal curvature were not measured in this study. When myopic progression occurs, often the axial elongation increases significantly while the corneal curvature remains relatively stable. In the absence of these data, it was ambiguous whether the underlying mechanism was related to true myopic progression.

Conclusion

The findings suggested that a significant myopic shift may be associated with home confinement during the COVID-19 lockdown, particularly for younger school-aged children between 6 and 8 years old. Current evidence in evaluating the relationship between home confinement and myopic progression is nominal, and further research would be beneficial.