Increased short-sightedness in younger children associated with home schooling and confinement

Review of article: Wang J, Li Y, Musch DC *et al*. Progression of Myopia in School-Aged Children After COVID-19 Home Confinement. *JAMA Ophthalmol* [Internet]. 2021 Jan 14 [cited 18 Feb 2021]; Available from: https://doi.org/10.1001/jamaophthalmol.2020.6239

STUDY QUESTION

Objectives: To assess the refractive error of school age children following home confinement owing to the COVID-19 pandemic and to compare findings with preceding years.

Setting: Ten elementary schools in Shandong, Feicheng, China, from 2015 to 2020.

Patients: 123 535 children aged 6–13 years were assessed annually with an automated-refraction device.

INTERVENTION

During 4 months of home isolation preceding the 2020 assessment, children in grades 1 and 2 (age 6–8 years) were taught online for 1 hour/day, whereas those in grades 3–6 (age 8–13 years) were taught for 2.5 hours/day. Outdoor activity was severely restricted, often to none.

A Spot Vision Screener, an automated assessment of refractive error, was held at 1 m from the patient in the pre-COVID-19 era. In the COVID-19 era (2020), there were three method changes. First, screeners stood at 1.8 m and extended their arms forward to the required 1 m testing distance. Second, masks were worn by the screeners and children. Third, students had their autorefraction in May 2020 rather than September, following easing of COVID-19 restrictions.

The assessment of refractive error in May 2020 was compared with data from September in each of the years 2015–2019, inclusive.

OUTCOMES

Results for the 6 years, 2015–2020, inclusive, were compared across the age ranges. Results are reported as a mean spherical equivalent refraction (SER) measured in dioptres (D). A negative value indicates myopia/short-sightedness, and a positive value indicates hyperopia/long-sightedness. SER is a simple means of mathematically representing the appropriate spectacle lens power in a single number, incorporating the astigmatism component.

Exclusions

Topical eye medications or having a history of ocular surgery. Children using contact lenses at night to reshape the cornea for myopia control were included only if they ceased wearing these the night prior to their assessment.

Table 1 Summary of results comparing 2020 to the previous 5 years showing changes in mean refractive error and prevalence of myopia

Age	Mean refractive error in 2020 compared with the most myopic outcome in the previous 5 years	Prevalence of myopia in 2020 compared with previous 5-year high, P value
6	−0.32 D	+15.8%, ≤0.01
7	−0.28 D	+21%, ≤0.01
8	−0.29 D	+9.5%, ≤0.01
9	−0.12 D	+1.8%, 0.09
10	−0.11 D	−2.3%, 0.03
11	−0.06 D	−3%, 0.004
12	−0.05 D	−8.4%, ≤0.01
13	−0.05 D	−3.4%, ≤0.01

Results grouped by age.

MAIN RESULTS

The mean SER was largely stable between 2015 and 2019 across all age groups. However, in 2020, there was a clinically and statistically significant shift towards myopia for the ages 6 (−0.32 D), 7 (−0.28 D) and 8 (−0.29 D) years when compared with the previous 5 years. There was a smaller shift for older children (table 1).

The prevalence of myopia (defined as SER≤0.5 D) also increased in 2020. The change in prevalence was greatest for younger children aged 6–8 years. There was an almost 400% increase in myopia prevalence for 6-year-old children, from 5.7% to 21.5% (table 1).

CONCLUSION

Following lockdown and home-schooling, children showed both greater amounts of myopia and a higher prevalence of myopia than in the preceding 5 years. Both these findings reached statistical significance. There was a graded response with younger children aged 6–8 years showing the greatest changes compared with older age groups.

COMMENTARY

The WHO projects that myopia will affect 52% of the world's population by 2050, an almost fivefold increase[1 2] compared with present levels. Being myopic confers an increased risk of glaucoma (pooled OR 1.88 (1.60–2.20) with higher risks of higher myopia.[3] Further associations are the increased need for cataract surgery,[4] increasing rates of retinal detachment[5] and choroidal neovascularisation. Untreatable central visual loss related to myopia can occur due to retinal atrophy.[5 6]

Visual loss from uncorrected refractive error has been estimated to cost $202 billion in global loss of productivity,[7] a value that will increase. It has been estimated that a 50% reduction in the rate of myopia progression may reduce high myopia prevalence by 90%.[1] A number of interventions have shown promising results in trials, including low-dose atropine, soft and rigid contact lenses, progressive addition spectacle lenses and others.[8]

Modifiable risk factors such as increasing time spent outdoors can reduce levels of myopia[9 10] and conversely excessive near work (less than 30 cm) can be a problem.[11] A useful evidence-based approach is to recommend a minimum of 40 min of outdoor activity each day[12] or while doing close work, a useful and pragmatic rule which paediatricians might model and share is to look 20 feet away, for 20 s every 20 min.[13]

This study suggests that environmental factors on myopia have a greater impact when experienced at younger ages, though the reasons for this are not elucidated here or well understood.

Although the screening technique changed with the advent of the pandemic to prevent viral spread, this does not offer an explanation for the age-dependent findings.

Many have said that COVID-19 has little impact on children. However, during the pandemic there has been a significant deterioration in childhood mental health[14] and increased childhood obesity risk.[15] School closures leading to increasing myopia prevalence may prove to be an additional burden on children living through this pandemic. This study adds to the growing literature of negative impacts on children, and our hope is that understanding this may result in further research and interventions which may mitigate this specific effect.

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