

An Evaluation of The Effects of Online Education During The COVID-19 Pandemic on The Refraction Values of Children With Myopia

COVID-19 Pandemi Sürecinde Online Eğitimin Miyopik Çocuklarda Refraksiyon Değerleri Üzerine Etkilerinin Değerlendirilmesi

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Özet

Amaç: Bu çalışmanın amacı COVID-19 pandemisi nedeniyle uzaktan eğitim alan çocuklarda refraksiyon değişimlerini değerlendirmektir.

Gereç ve Yöntemler: Çalışmaya pandemi döneminde uzaktan eğitim alan ve en az 6 saat ekran maruziyeti olan ve gözlük reçete edilen 18 yaş altı 56 hasta dâhil edildi. Snellen Eşeli ile görme keskinliklerine bakıldı. Hastanın tam gördüğü refraksiyon değerleri kaydedilip retrospektif olarak kayıtları tarandı. 2020 yılındaki refraksiyon değerleri 2018 ve 2019 yıllarındaki refraksiyon değerleri ile karşılaştırıldı. $p<0.05$ istatistiksel olarak anlamlı kabul edildi.

Bulgular: Hastaların yaş ortalaması 14.23 ± 3.17 yıl idi. Hastaların 2020 yılındaki ortalama refraksiyon değerleri sağ gözde -2.69 ± 1.37 D, sol gözde -2.63 ± 1.01 D idi. 2019 yılındaki ortalama refraksiyon değerleri sağ gözde -2.17 ± 1.10 D, sol gözde -2.00 ± 1.23 D idi. Hastaların 2018 yılındaki ortalama refraksiyon değerleri ise sağ gözde -1.54 ± 1.22 D, sol gözde -1.42 ± 1.18 D idi. Hastaların 2020'deki her iki göz ortalama refraksiyon değerleri 2019'a göre, 2019'daki ortalama refraksiyon değerleri ise 2018'e göre anlamlı olarak yüksekti ($p<0.001$, $p<0.001$). Pandemi dönemindeki refraksiyon artışı bir önceki yıl ile benzer orandaydı (sağ: $p=0.48$, sol: $p=0.94$).

Sonuç: Çalışmamızda pandemi nedeniyle uzaktan eğitim alan ve yoğun ekran maruziyeti olan miyop çocukların ortalama refraksiyon değerlerinde anlamlı bir artış saptadık ve bu artış bir önceki yıl ile benzer şekildeydi. Bu durumun çocuklarda pandemi dönemindeki uzaktan eğitime ek olarak akıllı telefon, bilgisayar, tablet gibi elektronik cihazların bilinçsiz uzun süreli kullanımından, dışarıda geçirilen zamanın azalmasından ve uzun süreli yakın çalışmadan kaynaklandığını düşünmekteyiz.

Anahtar kelimeler: Miyopi, Pandemi, Uzaktan eğitim

Abstract

Objective: The aim of this study was to evaluate the changes in refraction values in children receiving online education because of the COVID-19 pandemic.

Material and Methods: Fifty-six patients under the age of 18 who received distance education during the pandemic period, had at least 6 hours of screen exposure and were prescribed spectacles were included in the study. Visual acuity was measured with Snellen Chart. The refraction values seen by the patient were recorded and his records were scanned retrospectively. Refraction values in 2020 were compared with refraction values in 2018 and 2019. A value of $p<0.05$ was considered statistically significant.

Results: The mean age of the patients was 14.23 ± 3.17 years. The mean refraction values of the patients in 2020 were -2.69 ± 1.37 D in the right eye and -2.63 ± 1.01 D in the left eye. The mean refraction values in 2019 were -2.17 ± 1.10 D in the right eye and -2.00 ± 1.23 D in the left eye. Mean refraction values of the patients in 2018 were -1.54 ± 1.22 D in the right eye and -1.42 ± 1.18 D in the left eye. The average refraction values of the patients in both eyes in 2020 were significantly higher compared to 2019, and the average refraction values in 2019 were significantly higher than in 2018 ($p<0.001$, $p<0.001$). Refraction increase during the pandemic period was similar to the previous year (right: $p=0.48$, left: $p=0.94$).

Conclusion: In our study, we found a significant increase in the mean refraction values of myopic children who receiving online education due to the pandemic and had intense screen exposure, and this increase was similar to the previous year. We think that this situation is caused by the unconscious long-term use of electronic devices such as smartphones, computers and tablets in addition to the online education during the pandemic period, the decrease in time spent outside and the long-term close work.

Keywords: Myopia, Online education, Pandemic

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INTRODUCTION

Myopia is one of the most common treatable causes of reduced vision in childhood. Genetic and some environmental factors are held responsible in the etiology of myopia, which generally starts at school age (1-4). The current intense use of technological devices such as computers and mobile telephones, the intense study program in school periods, and spending less time outside are thought to be significant environmental risk factors (5-7). The number of children with myopia is currently increasing, not only in Turkey, but worldwide (8,9).

The emergence of the novel severe acute respiratory syndrome coronavirus (SARS-CoV-2) in December 2019 causing coronavirus disease 2019 (COVID-19) rapidly became a global pandemic (10). In Turkey, as throughout the world, many changes were made in healthcare, education, economic, and sociocultural areas. One of the most important of these changes was the conversion of face-to-face learning to online education. The aim of this study was to evaluate the changes in refraction values in children receiving online education because of the COVID-19 pandemic.

MATERIALS AND METHODS

The study was performed in adherence with the tenets of the Declaration of Helsinki and was approved as a prospective study by the Ethics Committee of Firat University Faculty of Medicine (Approval no: 2021/06-16).

The study included 56 children, aged <18 years, who presented at the Ophthalmology Polyclinic in November and December 2020 with complaints of reduced vision and were prescribed spectacles. The subjects included were those who were receiving online education because of the pandemic and were exposed to at least 6 hours of screen time per day for online education. All the patients underwent a full ophthalmological examination. Visual acuity was examined with the Snellen Chart. Measurements were made with a Canon RF-2 autorefractometer when necessary, by enlarging the pupil with cyclopentolate. The refraction values were recorded and the records of all the patients seen were reviewed retrospectively. Comparisons were made of the refraction values in 2020 with the refraction values in 2018 and 2019. Evaluations were made of whether or not there was an increase in the refraction values of the patients and whether or not the increase was significant according to the year.

Statistical Analysis

Data obtained in the study were analysed statistically using SPSS v22.0 software (Statistical Package for the Social Sciences version 22.0 -SPSS Inc., Chicago, IL, USA). Conformity of the data to normal distribution was assessed with the Kolmogorov-Smirnov test and the distribution was determined not to be normal. Changes in the refraction values between the years were examined with the Friedman test. Paired comparisons were made with the Wilcoxon test. A value of $p < 0.05$ was considered statistically significant.

RESULTS

Evaluation was made of 56 patients, comprising 31 (55.36%) females and 25 (44.64%) males with a mean age of 14.23 ± 3.17 years. The mean refraction values in 2020 were -2.69 ± 1.37 diopter (D) in the right eye, and -2.63 ± 1.01 D in the left eye. In 2019, the mean refraction values were -2.17 ± 1.10 D in the right eye, and -2.00 ± 1.23 D in the left eye. The mean refraction values in both eyes in 2020 were determined to be statistically significantly higher than the values in 2019 ($p < 0.001$). The mean refraction values of the patients in 2018 were -1.54 ± 1.22 D in the right eye, and -1.42 ± 1.18 D in the left eye. The mean refraction values in both eyes in 2019 were determined to be statistically significantly higher than the values in 2018 ($p < 0.001$).

The increase in mean refraction value from 2018 to 2019 was determined to be 0.62 ± 0.89 D in the right eye, and 0.57 ± 1.23 D in the left eye. From 2019 to 2020, the increase in mean refraction value was found to be 0.52 ± 0.97 D in the right eye, and 0.63 ± 0.85 D in the left eye. The increase in refraction values during the COVID-19 pandemic was determined to be similar to the increase in the previous year (right eye: $p = 0.48$, left eye: $p = 0.94$).

CONCLUSION

With the onset of the COVID-19 pandemic, many countries introduced quarantine measures. This resulted in people spending less time outside and less exposure to natural light. To pass the time while confined at home, many people, and especially children, started to read more books and spend more time using computers, tablets and mobile phones, and playing video games. Home computers started to be used for compulsory needs such as education. Overuse of electronic devices sig-

nificantly increases screen time and overstimulates the adaptation effort caused by close work. This excessive close work constitutes a greater risk for myopia in those with accommodation disorder (11-14).

In a study by Olavi et al that evaluated the genetic and environmental factors effective in the progression of myopia, the onset of myopia in approximately half the cases was found to be at school age, when intense reading and close work, and spending less time outdoors had an effect (15). Hepşen et al evaluated the effect of intense reading on students with emmetropia, and determined a change in refraction towards myopia (16).

In a study by Wong et al, it was reported that the increased screen time because of the COVID-19 pandemic restrictions could contribute to the development and progression of myopia. Precautions were suggested in the study that could be taken against intense screen time and close work that could create long-term side-effects of addiction in children (17).

However, there are also studies in literature showing that the restrictions applied during the pandemic had no negative effects on myopia. In a study in India, from a total of 3540 paediatric patients who presented at the polyclinic in March and April 2019 because of refractive defects, myopic refractive defects were determined in 80% (n=2265). In March and April 2020, when the COVID-19 pandemic restrictions were in force, from a total of 917 patients who presented at the same clinic, myopic refractive defects were determined in 79% (n=578). Although the refractive increases of the patients were not evaluated in that study, the rate of patients diagnosed with myopia did not change (18). That there was no change in the rate of diagnosis can be interpreted as the pandemic not having caused an increase in myopic progression.

In a study in China that followed up 122.535 children aged 6-8 years between 2015 and 2019, in the follow-up examinations in 2020, there was determined to be a -0.3 diopter myopic shift compared to the previous years. The same changes were not determined in children aged ≥ 8 years. It was attempted to explain this situation with the hypothesis that the younger children more sensitive to the environmental change than the older children (19). This idea is supported by the study of VanderVeen et al. which reported that orthokeratology may be effective in slowing myopic progression in children and adolescents, with a potentially greater effect when initiated at an early age (6-8 years) (20).

In the current study, no additional increase was determined in the rate of myopia during the pandemic compared to previous years. The mean age of the patients in the current study was 14.23 ± 3.17 years, and therefore, that there was no increase in the rate of myopia in this study could be explained by the relatively older age group of patients.

The results of the study showed that there was a significant increase in the mean refraction values of myopic children receiving online education because of the COVID-19 pandemic and therefore exposed to more screen time. However, when this increase was compared with previous years, the rates were similar. It was thought that in addition to online education during the pandemic, this was also due to unconscious long-term use of electronic devices such as smartphones, computers and tablets, spending less time outdoors, and long periods of close work. This should be viewed as an important public health problem and the necessary preventative measures should be taken.

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