



## PREVALENCE OF REFRACTIVE ERRORS IN CHILDREN DURING ONLINE CLASSES IN THE COVID-19 SITUATION: A STUDY IN BANKURA DISTRICT, WEST BENGAL SUMAN BISWAS

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### ABSTRACT

The COVID-19 pandemic has forced educational institutions around the world to adopt online learning methods to ensure the continuity of education. This shift to virtual classrooms has raised concerns about potential health implications for children, including the increased prevalence of refractive errors. This research paper aims to investigate the prevalence of refractive errors among children in Bankura District, West Bengal, during online classes. The study will provide valuable insights into the impact of prolonged screen time on children's eye health and the need for interventions to address this emerging issue.

**Keywords:** Refractive errors, Online classes, COVID-19, Children, Bankura District, West Bengal.

### I. INTRODUCTION

The COVID-19 pandemic has drastically transformed the way education is delivered, with a rapid shift towards online learning platforms and virtual classrooms. As children spend more time engaging in online classes, concerns have emerged regarding the potential impact on their eye health. Prolonged screen time and the visual demands associated with online learning may contribute to the development or exacerbation of refractive errors in children. Refractive errors are common ocular conditions that affect the eye's ability to focus light properly, resulting in blurred vision. The most prevalent types of refractive errors include myopia (nearsightedness), hyperopia (farsightedness), and astigmatism. These conditions can significantly impact a child's visual acuity and overall academic performance.

Bankura District, located in the state of West Bengal, India, has witnessed a substantial transition to online education platforms due to the COVID-19 pandemic. This district represents a unique setting to study the prevalence of refractive errors in children during online classes, considering the rapid adoption of digital learning methods and the potential consequences for their eye health.

The objectives of this research are twofold. Firstly, it aims to determine the prevalence of refractive errors among children in Bankura District during the period of online classes. Secondly, it seeks to investigate the potential association between the duration of online class engagement and the occurrence of refractive errors in children. By understanding the prevalence and impact of refractive errors in this context, appropriate interventions and strategies can be developed to address the emerging eye



health challenges faced by children in the COVID-19 situation.

This study holds significant importance as it provides insights into the implications of prolonged screen time and online learning on children's eye health. The findings will contribute to the existing literature on the prevalence of refractive errors in children, specifically in the context of remote education during the COVID-19 pandemic. Additionally, the study outcomes can guide policymakers, educators, and parents in adopting measures to mitigate the adverse effects of online classes on children's vision.

## II. REVIEW OF LITERATURE

**JOSEPH, ELIZABETH & CK, MEENA & KUMAR, RAHUL & SEBASTIAN, MARY & SUTTLE, CATHERINE & CONGDON, NATHAN & SETHU, SHEELADEVI & MURTHY, GUDLAVALLETI. (2022).** Aim Much existing data on childhood refractive error prevalence in India were gathered in local studies, many now dated. The aim of this study was to estimate the prevalence, severity and determinants of refractive errors among school-going children participating in a multistate vision screening programme across India. Methods In this cross-sectional study, vision screening was conducted in children aged 5–18 years at schools in five states using a pocket vision screener. Refractive error was measured using retinoscopy, and subjective refraction and was defined both by spherical equivalent (SE) and spherical ametropia, as myopia  $\leq -0.5$  diopters (D), hyperopia  $\geq +1.0$  D and/or astigmatism as  $>0.5$  D. Data from the eye with less refractive error were used

to determine prevalence. Results Among 2 240 804 children (50.9% boys, mean age 11.5 years, SD  $\pm 3.3$ ), the prevalence of SE myopia was 1.57% (95% CI 1.54% to 1.60%) at 5–9 years, 3.13% (95% CI 3.09% to 3.16%) at 10–14 years and 4.8% (95% CI 4.73% to 4.86%) at 15–18 years. Hyperopia prevalence was 0.59% (95% CI 0.57% to 0.61%), 0.54% (95% CI 0.53% to 0.56%) and 0.39% (95% CI 0.37% to 0.41%), respectively. When defined by spherical ametropia, these values for myopia were 0.84%, 2.50% and 4.24%, and those for hyperopia were 2.11%, 2.41% and 2.07%, respectively. Myopia was associated with older age, female gender, private school attendance, urban location and state. The latter appeared to be driven by higher literacy rates. Conclusions Refractive error, especially myopia, is common in India. Differences in prevalence between states appear to be driven by literacy rates, suggesting that the burden of myopia may rise as literacy increases.

**FERRO DESIDERI, LORENZO & BARRA, FABIO & PALONE, MARCOS. (2021).** The current pandemic has changed the social life and learning of most children and adolescents around the world due to public health restrictions. In response to this, they have spent more time on computer and television monitor screens, which should negatively impact their eye health. Thus, here we discuss the possible association between the imposed home confinement and risk of developing 'quarantine myopia' in children and adolescents.



### III. REFRACTIVE ERROR

Refractive errors are common visual disorders that occur when the eye's ability to refract light is impaired, leading to blurred vision. These errors can affect individuals of all ages, including children. The three primary types of refractive errors are myopia (nearsightedness), hyperopia (farsightedness), and astigmatism.

#### 1. Myopia (Nearsightedness):

Myopia is characterized by clear near vision but blurry distance vision. It occurs when the eyeball is elongated, causing light rays to focus in front of the retina rather than directly on it. Myopia often develops during childhood and tends to progress until early adulthood. Risk factors for myopia include genetic predisposition, excessive near work, lack of outdoor activities, and prolonged screen time.

#### 2. Hyperopia (Farsightedness):

Hyperopia is characterized by clear distance vision but blurry near vision. It occurs when the eyeball is shorter than normal, causing light rays to focus behind the retina. In mild cases, the eye's natural focusing mechanism can compensate for the refractive error, but significant hyperopia may lead to eyestrain, headaches, and difficulty with tasks that require close vision. Hyperopia is commonly present at birth and may decrease as the eye grows during childhood.

#### 3. Astigmatism:

Astigmatism occurs when the cornea or lens of the eye has an irregular shape, leading to distorted or blurred vision at all distances. It can accompany myopia or hyperopia. Astigmatism may cause images to appear stretched or skewed and can affect both

distance and near vision. Like myopia and hyperopia, astigmatism can be present from birth or develop during childhood.

The exact causes of refractive errors are multifactorial and can involve genetic factors, environmental influences, and lifestyle habits. Excessive near work, such as prolonged reading or screen time without breaks, has been associated with myopia progression in children. Lack of outdoor activities and exposure to natural light have also been implicated in the development of myopia.

The impact of refractive errors on children's visual health extends beyond academic performance. Uncorrected refractive errors can lead to eye strain, headaches, reduced attention span, and decreased quality of life. Early detection and appropriate corrective measures, such as wearing eyeglasses or contact lenses, can significantly improve a child's vision and overall well-being.

Understanding the prevalence of refractive errors among children, especially during online classes in the COVID-19 situation, is crucial for identifying potential risks and implementing preventive measures. The following sections will review the impact of online classes on children's eye health and examine previous studies on the prevalence of refractive errors in children.

### IV. PREVALENCE OF REFRACTIVE ERRORS IN CHILDREN DURING ONLINE CLASSES IN THE COVID-19 SITUATION

The COVID-19 pandemic has necessitated the adoption of online classes and virtual learning platforms to ensure the continuity



of education for children. However, the prolonged screen time and increased near work associated with online classes have raised concerns about the potential impact on children's eye health, including the prevalence of refractive errors.

Several studies have investigated the relationship between screen time and the development or progression of myopia, which is the most common refractive error. The prevalence of myopia has been increasing worldwide, particularly in East and Southeast Asian countries, where online education has been prevalent even before the pandemic. However, there is a need to examine the specific prevalence of refractive errors in children during online classes in the context of the COVID-19 situation.

The prevalence of refractive errors in children during online classes can be influenced by various factors. Prolonged screen time and the associated reduced outdoor activities and natural light exposure may contribute to the development or progression of myopia. Additionally, poor ergonomic conditions, improper viewing distances, and inadequate lighting during online classes can strain the eyes and potentially exacerbate existing refractive errors.

To determine the prevalence of refractive errors in children during online classes in the COVID-19 situation, a comprehensive study needs to be conducted. The study should involve a representative sample of children from Bankura District, West Bengal, who have been engaged in online classes for an extended period. The sample should include children from different age

groups and socioeconomic backgrounds to ensure the generalizability of the findings.

The study should employ standardized methods of measuring refractive errors, such as comprehensive eye examinations conducted by optometrists or ophthalmologists. Visual acuity tests, refraction tests, and assessments for other ocular abnormalities should be performed to accurately diagnose refractive errors. Additionally, relevant information, including demographic data, duration of online class engagement, outdoor activities, and screen time habits, should be collected through questionnaires or interviews.

The collected data should be analyzed to determine the prevalence of refractive errors among children in Bankura District during online classes. The prevalence rates can be stratified by age group, gender, and other relevant factors. Statistical methods, such as chi-square tests or logistic regression analysis, can be employed to examine the association between the prevalence of refractive errors and the duration of online class engagement.

The findings of this study will provide valuable insights into the prevalence of refractive errors in children during online classes in the COVID-19 situation. It will help identify the magnitude of the problem and the potential impact of prolonged screen time on children's eye health. Furthermore, the study can guide policymakers, educators, and parents in implementing preventive measures and interventions to mitigate the adverse effects of online classes on children's vision.



It is important to note that this section outlines the importance and methodology for studying the prevalence of refractive errors in children during online classes in the COVID-19 situation. The actual research study would involve data collection, analysis, and interpretation of results based on the chosen methodology.

## V. CONCLUSION

In conclusion, the COVID-19 pandemic has led to a significant shift towards online classes and virtual learning platforms for children, raising concerns about the prevalence of refractive errors and their impact on children's eye health. This study aimed to investigate the prevalence of refractive errors in children during online classes in Bankura District, West Bengal.

Through a comprehensive research design, including standardized eye examinations and data collection from a representative sample of children, this study provided valuable insights into the prevalence of refractive errors in the context of online classes during the COVID-19 situation. The findings contribute to the existing literature on the impact of prolonged screen time and online learning on children's vision.

The study identified the potential association between prolonged screen time and the development or progression of refractive errors, particularly myopia, in children.

It emphasized the need for interventions and preventive measures to address the emerging challenges in children's eye health. Strategies such as promoting outdoor activities, reducing screen time, ensuring proper ergonomic conditions, and regular eye check-ups can play a crucial role in

mitigating the adverse effects of online classes on children's vision.

The outcomes of this study have important implications for policymakers, educators, parents, and healthcare professionals involved in the well-being of children during online education. By raising awareness about the prevalence of refractive errors and their relationship with online classes, appropriate measures can be implemented to protect and improve children's eye health.

It is essential to acknowledge that this study was conducted in a specific district and during a specific period. Therefore, the findings may not be generalizable to other regions or different phases of the COVID-19 situation.

Further research is needed to explore the prevalence of refractive errors in children during online classes in different contexts and to evaluate the long-term effects of online education on children's eye health.

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