



## EFFECT OF DIGITAL SCREENING ON VISUAL ACUITY OF SCHOOL GOING CHILDREN IN JABALPUR CITY AFTER COVID-19 LOCK DOWN: A CROSS SECTIONAL OBSERVATIONAL STUDY.

### Ophthalmology

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### ABSTRACT

**Background:** This study was done to check for refractive errors in these children from Jabalpur city in the age group of 6 to 10 years age.  
**Methods:** For the present observational cross sectional study school going children of 6 to 10 years age group were considered having minimum of 1 hour 30 minutes of digital screen mode of online teaching. Students having myopic unocular or binocular vision refractive errors were made out and corrected subjectively using appropriate lenses.  
**Results:** In present study 331 girls and 308 boys were examined for refractive errors in which 498 children were having mild myopia. In present study a significant SER value difference was observed in 6 to 7 years students.  
**Conclusions:** Thus we conclude that digitalization of schooling or online teaching learning methods of children is going to have ill effects on children's visual health.

### KEYWORDS

Myopia, digital screening, COVID-19 lockdown.

#### INTRODUCTION:

Children's are basically meant for making their growth by proper supplementation of nutrients along with making proper indoor and outdoor games as a part of their routine activity.1

COVID -19 pandemic which has become a catastrophe for humans had already affected nearly billions of children and adolescent constituting nearly 30 % of world's population in same or the other manner as per UNICEF 2019 reports.2

Due to current scenario of COVID-19 pandemic; the only mode of prevention of disease was either physical distancing or social isolation of a subject prior to development of a new drug or a vaccine.3

Hence to avoid spread of the disease Govt. had imposed lock down all over the country. This drastically affected the outdoor roaming and games for budding children resulting in increased home stays of the children.4

As per Govt. of India guidelines for Schooling; online or home based internet platform teaching learning methods are made essential which leads to increase in the digital screen facing time of school going children.5

In present day scenario considering prevalence of myopia; total crude prevalence of for last forty years is 7.5 % (95 % CI, 6.5–8.5 %) in 5-15-year age group. This prevalence is more in urban childrens tending to 8.5 % as compared to rural children which is just above 6% and is constantly increasing.6

This may lead to increase in the incidence and prevalence of myopia in Indian school going children.7 Hence we have undertaken the present study to check for refractive errors in school going children from Jabalpur city in the age group of 6 to 10 years age by means of simple testing in these children to look after the myopic trends amongst these schooling children.

#### METHODOLOGY

In this hospital-based observational cross-sectional study children from age group of 6 to 10 years attending online classes for more than 6 months and not less than one hour thirty minutes a day were considered. 746 school going children visited the OPD. Out of which 639 student's guardian accepted to participate in study. Sample size was drawn considering prevalence for myopia 8.5%, confidence limits for study 2.1% with 95% confidence interval calculated to 660 subjects to be involved.

All those students fulfilling the inclusion and exclusion criteria were allowed for further steps of the study. Written informed consent was obtained before the start of the study from parents of all participants

according to the Declaration of Helsinki.8

Screening was done calculating the refractive errors in terms of spherical equivalent refraction (SER). Then subjects were asked to perform distant vision test by using Snellen's Chart and near vision test by using Jaeger's chart. Correction of refractive errors was done by using appropriate use of subjective lenses for either myopia or astigmatism or both as per standard operating guidelines. COVID-19 safety precautions were maintained before the start of examination. Myopia was demarcated as spherical equivalent refraction (SER) of  $-0.50$  Diopters or less.

#### Inclusion Criteria

- Students having any problem related to vision.
- Students in age group of 6 to 10 years.
- Attending at least 1 hr 30 min of daily online learning method apart from their other screen timings like TV or cell phone for entertainment purpose.

#### Exclusion Criteria

- Wearing contact lenses on the day of examination.
- Wearing ortho-K lenses for other ocular deformities.
- By means of any medicated eye drops for ocular diseases.
- History of any ocular surgery or congenital defects in eye.
- Not using any screen mode like TV or cell phone at their houses or using it for less time than 2 hours.
- Students or their guardians not willing to take part in the study.

Data was analyzed using Microsoft office excel 2013 and prism pad 5 by graph pad Inc. Age wise distribution of the students was made and analyzed by application of analysis of variance to get significance in changes of SER values.

#### RESULTS:

A total of 639 students between the age group of 6 to 10 years were selected for the study fulfilling all the required criteria. Amongst the participants 331 (52.73%) were girls and 308 (48.2%) were boys learning in different classes.58% students were having binocular vision impairment with short sightedness.

Depending upon grades of myopia ; the defect ranging from  $-0.5$  D to  $-3.00$  D is supposed to be mild,  $-3.00$  D to  $-6.00$  is supposed to be moderate and  $> -6.00$ D is supposed to be of high grade myopia.9

Amongst the study group 498 (77.93%) students were in mild myopic category while 141 (20.34%) students were in moderate myopic grades and non-found to have high myopic grades.

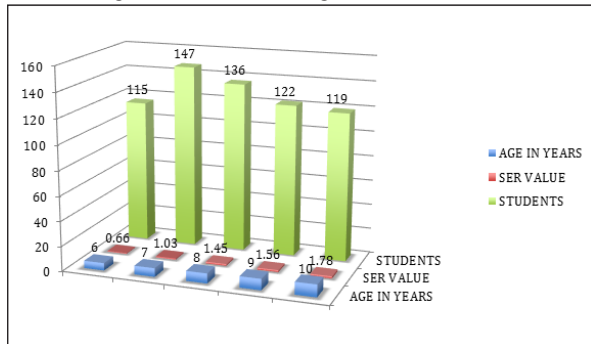
Depending upon average spherical equivalent refraction (SER) different age group students were categorised and their values are

depicted in table. 1 as follows:

**Table 1: Age Wise Distribution Of SER Values And Number Of Students**

| Age in Years | No. of students | % amongst total students | Mean ± 2 SD SER value |
|--------------|-----------------|--------------------------|-----------------------|
| 6            | 115             | 17.8                     | -0.66 ± 0.12          |
| 7            | 147             | 22.6                     | -1.03 ± 0.26          |
| 8            | 136             | 20.9                     | -1.45 ± 0.21          |
| 9            | 122             | 19.1                     | -1.56 ± 0.24          |
| 10           | 119             | 18.5                     | -1.78 ± 0.34          |

From the above data table after application of one way analysis of variance test with post hoc Turkey's test it can be clearly seen that SER values showed significant hike form 6 years to 7 years age group (p < 0.01) making it more vulnerable for changes occurred in refraction. Similar changes can be observed in Fig. 1.



**Figure 1. Age Wise Distribution of SER Values**

Considering census of Jabalpur urban area nearly 45,000 (10) students use to learn in the age group of 6 to 10 years age of both the genders. Considering the fact proportion per 1000 population can be calculated as:

Proportion = No. of new myopic students in given time / No. of students in same period of time

Therefore proportion for myopia for students in Jabalpur city come around 14.2 per 1000 school going children. This value is nearly twice big as four decades prevalence of myopia in our country which is just 8.5 per 1000 children belonging to urban population.<sup>6</sup>

**DISCUSSION:**

Myopia or short sightedness is the growing burden on world health as WHO had already announced it to be visual health catastrophe by 2050 hampering nearly half the population of our globe. <sup>11, 12</sup>

Increasing worldwide burden of the disease will also lead to change in shifting patterns of myopia in India. In our country previously disease was supposed to be less effective as compared to more earning countries but by 2050 myopia will flourish in Indian continent with alarming swiftness.<sup>13</sup>

In present study 331 girls and 308 boys were observed for myopic changes in their eyes. These changes were coinciding with the findings of Hittakamani SB et. al and Rao CM et al. Further Hittakamani SB added that early childhood detection of myopia may result in reduction of morbidity due to the disease which may land in to complicated condition like amblyopia. <sup>14, 15</sup>

In present study binocular visual defects were more as compared to unocular visual defects similar results were observed by Kobashi H et al. They also suggested that required spherical refraction correction in the monocular condition was more than that in the binocular condition. <sup>16</sup>

J. Wang et. al. who were studying on school going children since 2015 clearly observed that there was increasing in incidence and prevalence of myopia in the year 2019 as compared to previous years since 2015. These myopic changes in last year and increased prevalence was attributed to the increased digital screen time by children and lack of outdoor activities. <sup>17</sup>

Most disastrous fact about this progression of myopic changes in

children is that in Jabalpur school going children proportion was equal to 14.2 which is far higher than four decades prevalence for myopia in urban children.

**CONCLUSION:**

The outcomes of the present study are a call of time for searching more preventive and curative methods towards digitalized teaching learning methods and reducing eye strain on budding India. Furthermore researches should be intended amongst several provinces of India to reveal the inclination of myopia and various other epidemiological threats involved to make a Visionary India.

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