

To Observe the Appearance of Amblyopia in 6 to 10 Years of School Going Children during and Post COVID Era.

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Abstract

Introduction: As a part of prophecy by WHO nearly half of the population of Globe will be facing problem of refractive errors by 2050. In India by the mid of this century these diseases will flourish in Indian continent with frightening velocity. Amblyopia is one of the basic reason for refractive errors in childhood with maximum global prevalence of 4.7% averaging 2% school going children. "Amblyopia" is a disorder in retinal image foundation because of decline in the value of central, adjusted vision which most commonly happens during first decade of life. Hence we have undertaken the present study to know the status of amblyopic status in school going children during and in Post Covid sessions.

Methodology: In this hospital-based observational cross-sectional study we examined (optometry, retinoscopy along with Auto-refractometer) 639 school going students from our tertiary care institutes who were facing problem in their vision.

Results and discussion: Amongst the participants during COVID period 331 (52.73%) were girls and 308 (48.2%) were boys learning in different classes having refractive errors. Out of these total participants 27 students were found to have amblyopia. Affecting a greater number of females that is 16 (4.8%) and 11 boys (3.5%) of the total participating population. While in post covid period out of 437 boys students 3.4% were having amblyopia with statistical significant difference between the two groups depicting more number of boys having amblyopia during COVID period. Refractive errors are mostly caused by prolonged focusing on the screen, that children should take a break from the screen every half an hour to avoid possible eye problems.

Conclusion: We conclude that if detection of amblyopia is possible in earlier phases of life then nationwide campaign or programme should be initiated and implemented for prevention of mortality of vision.

Keywords: Amblyopia, Refractive Errors, COVID and Post-COVID Period.

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Introduction

Refractive errors are the leading world health issues especially in school going children. As a part of prophecy by WHO nearly half of the population of Globe will be facing problem of refractive errors by 2050. [1]

In India earlier refractive errors were believed to be less effectual as compared to more earning countries but by the mid of this century these diseases will flourish in Indian continent with frightening velocity. [2]

Amblyopia is supposed to be one of the morbid conditions of eye in adults which seeds in form of under treated myopia in early childhood. [3]

It is also one of the basic reason for refractive errors in childhood with maximum global prevalence of 4.7% averaging 2% school going children.[4, 5]

“Amblyopia” is a disorder in retinal image foundation because of decline in the value of central, adjusted vision which most commonly happens during first decade of life. [6, 7]

Amblyopia is defined by one or more lines variance in visual acuity amongst the eyes. This disease is one of the most common causes of serious visual impairments and being commonly seen in early childhood. [8]

Amblyopia is the resultant cause of strabismus, high refractive error, anisometropia and defect of the ocular media, or a combination of two or more etiologist in the same patient. Which in further stages of life results in faulty image formation by higher centres of brain whatever may be the correction done in optics of vision. [9]

Hence if not diagnosed and treated in earlier phases of life this diseases will result in permanent visual disability. [10, 11]

Hence we have undertaken the present study to know the status of amblyopic status in school going children during and in Post Covid sessions.

Methodology

In this hospital-based observational cross-sectional study we examined school going children from our tertiary care institutes who were facing problem in their vision.

Depending upon the OPD visits of the students with in a period of three months from Oct 2020 to Dec 2020; 746 school going children visited the OPD during COVID period. Out of which 639 student's guardians accepted to participate in study after being diagnosed to have refractive errors of vision. For post COVID period we have considered period of three months from October 2022 to December 2022. Out of which a total 931 students were examined summing up 829 students who gave acceptance to participate in study. All those students full filling 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.[12]

Amongst the study participant's on their visit to hospital history collection and screening of the students were performed. In history information about personal habits and any past or familial history of significance was sorted. Screening was done using computerized automated machine by Optical coherence tomography 3D myestro2 by Topcon, Japan for 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 up to maximum limit to which it was possible.

No students were provided with any compensation for participating the study.

Refraction Screening:- Students who were coming to OPD had been given appointment at least a day prior and all COVID-19 safety precautions were maintained before the start of examination. All participants and experts doing test were using sanitizers and wearing mask throughout the procedure.

Students using contact lenses, eye glasses or goggles were asked not to use them while performing the screening procedure. No students were getting any ophthalmic drug or low-dose atropine.

Examination was shepherded by department's routine and qualified staff to get the results from each child in a minimum of 2 trials.

For amblyopic vision:

Then checking for refraction errors visual acuity was examined unaided and aided for the children already having spectacles was recorded for far and near vision. Children already having spectacles were examined for further improvement. Then objective refraction was done by retinoscopy along with Auto-refractometer followed by subjective refraction correction to the maximum which could be best possibly achieved. Then ocular movements were examined in all gazes to diagnose any muscular deformities of eye. Alternating cover examination was also done for far and near vision to assess alignment of the eyes. Detail eye examination was performed for any other anatomical defects in eye.

Finally cycloplegic Refraction was done wherever required. Practically amblyopia was defined as finest adjusted visual acuity was 6/12 or less in the absence of any anatomical complications. [13, 14, 15]

There are different Five major causes of amblyopia include:

1. Isometropic amblyopia – refractive error in the two eyes overdone or equalled to 5.0 D.
2. Anisometropic amblyopia – When there is a variance of refractive error in both the eyes of ≥ 1 D of astigmatism, ≥ 2 D of hypermetropia, and ≥ 4 D of myopia.
3. Strabismic amblyopia – amblyopia existing in an eye that had persistent obvious strabismus.
4. Meridional amblyopia – amblyopia as a consequence of astigmatism of ≥ 2.00 D in one or both the eyes.
5. Mixed amblyopia- when more than one reason of amblyopia is present in a single eye. [16]

Inclusion Criteria:

- Students having any problem related to vision.
- Students in age group of 6 to 10 years
- Students and guardians willing to take part in the study.

Exclusion criteria:

- Having ptosis, mental retardation or ocular opacities.
- By means of any medicated eye drops for ocular diseases.
- Having a history of any ocular surgery.
- Students or their guardians not willing to take part in the study.

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 during COVID period 331 (52.73%) were girls and 308 (48.2%) were boys learning in different classes having refractive errors. Out of these total participants 27 students were found to have amblyopia. Affecting a greater number of females that is 16 (4.8%) and 11 boys (3.5%) of the total participating population. While in post covid period out of 437 boys students 3.4% were having amblyopia with statistical significant difference between the two groups

depicting more number of boys having amblyopia during COVID period.

Table 1: Showing gender wise distribution of amblyopia.

Gender	With refractive errors	With amblyopia	% amblyopia
During COVID period			
Boys / males	331	16*	4.8%
Girls/females	308	11 [#]	3.5%
Post COVID period			
Boys/ males	437	15*	3.4%
Girls/females	392	14 [#]	3.6%

* - $p < 0.05$ statistically significant # - $p > 0.05$ Insignificant

Amongst the diagnosed cases 10 students (35.71%) having unilateral amblyopia and rest 17 students (62.96%) having bilateral amblyopia. While in post COVID period 55.17% were having monocular amblyopia while 44.82% were having binocular amblyopia with statistical significant differences amongst the groups.

Table 2: Showing monocular or binocular involvement of amblyopia.

	Amblyopia	% amongst total amblyopic
During COVID period		
Monocular	10*	35.71%
Binocular	17*	62.96%
Post COVID period		
Monocular	16*	55.17%
Binocular	13*	44.82%

* - $p < 0.05$ statistically significant # - $p > 0.05$ Insignificant

Considering the refractive error patterns majority of students were having myopic astigmatism where none of the student was found to have hypermetropic astigmatism. Whose details are depicted in table 3.

Table 3: Distribution of refractory errors in amblyopic students.

	Amblyopic students	% students
During COVID period		
Myopia	11*	40.74%
Myopic astigmatism	14*	51.85%
Hypermetropia	2 [#]	7.4%
Hypermetropic astigmatism	0	0
Post COVID period		
Myopia	15*	51.72%
Myopic astigmatism	10*	34.48%
Hypermetropia	3 [#]	10.34%
Hypermetropic astigmatism	1	3.34%

* - $p < 0.05$ statistically significant # - $p > 0.05$ Insignificant

Considering age wise pattern majority of amblyopic were found to be the children having 6 years age details of which are depicted in table. 4

While considering the results statistically significant results were seen in 8 years and 10 years age group students in during and post COVID period.

Table 4: Showing age wise distribution of amblyopia cases.

Age	Number of amblyopic	% of amblyopic
During COVID period		
6 years	8 [#]	29.62%
7years	6 [#]	22.22%
8 years	3*	11.11%
9 years	4 [#]	14.81%
10 years	6*	22.2%
Post COVID period		
6 years	6 [#]	20.68%
7years	4 [#]	13.79%
8 years	10*	34.48%
9 years	6 [#]	20.68%
10 years	3*	10.34%

* - $p < 0.05$ statistically significant # - $p > 0.05$ Insignificant

Considering the pattern wise distribution of amblyopia majority of the diagnosed were having anisometric type of amblyopia with detailed description as depicted in table. 5 While comparing students with strabismus were found to have significant results amongst the COVID and post COVID group.

Table 5: Showing distribution of different types of amblyopia amongst diagnosed cases.

	Amblyopia	% diagnosed cases
During COVID period		
Anisometric amblyopia	14 [#]	51.85 %
Strabismus	2*	7.4 %
Isometric	7 [#]	25.92%
Stimulus deprivation	4 [#]	14.81%
Post COVID period		
Anisometric amblyopia	16 [#]	55.17 %
Strabismus	4*	13.79 %
Isometric	6 [#]	20.68%
Stimulus deprivation	3 [#]	10.34%

<0.05 statistically significant # - $p > 0.05$ Insignificant

Discussion

With the start of the new decade WHO has already announced 'vision 2020' along with International agency for prevention of blindness (IAPB). The basic moto of this global drive is to prevent blindness all over the world. The refractive errors are numbered in top five disorders of the eye increasing visual mortality and morbidity; which is also considered as abrupt priority by WHO. [17]

Where globally 70 million blind person years are observed in which pathology is

initiated in childhood and majority of them goes unnoticed fulminating in to a blind eye. [18]Irrespective of so many researches and advancement of technology no significant evolution has occurred in treatment of amblyopia. [19] Hence the best way left is to diagnose this condition in earlier phases of life when it sets in and prevent it. Thus present study was undertaken to diagnose this condition in the age group of 6 to 10 years age.

In present study 331 girls and 308 boys were observed during COVID and 437 boys and 392 girls during post COVID period for

myopic or astigmatic deviations in their eyes. These deviations were concurring with the findings of Hittakamani SB et. al and Rao CM et al. Further Hittakamani SB added that early childhood detection of myopia may end in lessening of indisposition due to the disease which may land in to complicated condition like amblyopia. [3, 20]

Amongst the total 27 detected amblyopia cases during and 29 detected amblyopia in post COVID period showing significantly more number of boys affected during COVID period. This change could be attributed to increased hours of digital screening for students and were affected by impaired vision. Similar results were observed by Singh V who examined more than 4500 school going children of west Uttar Pradesh region. They also concluded that most common cause of ocular morbidity was refractive errors like amblyopia. [21]

Out of all the amblyopic cases 10 (35.71%) were facing the unilateral involvement while rest 17 (62.96%) were facing the disease for both the eyes during COVID phase and 16 unilateral and 13 bilateral involvement of eyes in post COVID period. Similar results were found by M. Gupta et.al studying in schools going students of Uttarakhand territory. [22]

School going children facing amblyopia were diagnosed to have myopic astigmatism (51.85%) during COVID and only myopia 51.72% in post COVID period and least students were having hypermetropia. But results found by coinciding with the results of present study. These changes could be attributed to the defect in axial length while development of childrens eye along with their day to day activity hampering acuity of vision. [23]

In present study students having age of 8 and 10 years amongst both groups were having significant differences seeking attention towards more affected children in this specific age groups who were mostly

affected by the disease similar findings were observed by D. Gupta while studying on children in Uttar Pradesh. The present finding is a ray of hope towards organising national or state level diagnostic camps for amblyopia and for its prevention which will reduce the mortality of vision in elderly. [24]

In present study we observed that maximum of 51.85% students were facing the problem of Anisometropic amblyopia amongst both the groups with similar results found by Sapkota K et al. in their study they found that nearly 54% of the cases were facing the Anisometropic amblyopia. The cause for progress of amblyopia in anisometropia is a chronically distorted image in one or both eye which precludes the regular development of visual acuity. Even if anisometropia is optically adjusted, anisokenia may lead to amblyopia. [25,26]

Conclusion

Hence from the present study we conclude that if detection of amblyopia is possible in earlier phases of life then nationwide campaign or programme should be initiated and implemented for prevention of mortality of vision. But for doing this tedious work a large population need to be examined. Refractive errors mostly caused by prolonged focusing on the screen, that children should take a break from the screen every half an hour to avoid possible eye problem. Hence this study could be a stepping stone for initiation programmes in our country to make a bright and 'Visionary' India of tomorrow.

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