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Assessment of post pandemic visual effects among primary students of urban Tripura

Goutam Datta[1]; Dr. Amar Kanti Chakma[2]
[1]*Scholar, Department of Optometry, OPJS University, Churu, Rajasthan- India*
[2]*Professor & HOD, Department of Ophthalmology, Tripura Medical College, Hapania, Agartala, Tripura, India. Pin : 799014*

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ABSTRACT
Background: One of the small and beautiful North – East Indian state is Tripura. Agartala is the capital city of Tripura. Tripura has mixed population. Tripura carrying highest literacy rate among North – East Indian state. Around 40 lacks people are residing in Tripura. Bengali is the main language of Tripura. Though agriculture is the main scorch, still every people busy to take formal education. In this connection, every people were very much serious in their school education, even in pandemic period.
Methodology: The aim of the study is to assesses and demonstrates the ocular side effects after attending long-time online classes in pandemic period among primary level students of urban Tripura.Visual acuity assessment by Snellen's chart for distance and near both. Accommodative anomalies assessment by RAF rule and theanterior segment examinations by binocular loupe with torch light, fundus examination by direct ophthalmoscope. Objective refraction procedure by streak retinoscope in undilated pupil followed by subjective refraction.
Results: Total 231 primary school students were randomly examined starting from March 2022 to May 2022in different primary schools of urban Tripura.A questionnaires sheet was supplied to all the primary school students, those who had attending online classes; which was included the digital device information, Visual performance, clinical examination. Out of 231 students, 93(40.26%) students were suffering with different anomalies of accommodation, where 56(24.24%) were boys and 37(16.02%) were girls. Rest 138(59.74%) students were suffering vision related abnormalities, where 67(29.00%) were myopic, in which 29(12.55%) were boys and 38(16.45%) were girls; 22(9.52%) students were hypermetropic, in which 13(5.63%) were boys and 9(3.89%) were girls; and 49(21.21%) students were astigmatic, in which 28(12.12%) were boys and 21(9.09%) girls.
Conclusions: In pandemic period students were attend their classes through digital devices around 3 to 4 hours regularly around 7 to 8 months, due to long time uses of digital devices for online classes, asthenopia developed. Primary school students were developed low corrected myopia, hypermetropia, and astigmatism after long time studying through digital devices in pandemic period, which could be due to improper uses of digital devices, low illumination in study area, unconsciousness, long time near work activities. Proper and adequate eye examination can eliminate post pandemic visual abnormalities.
Keywords-primary school students; online digital study; refractive errors; pandemic period; accommodative anomalies; asthenopia;

I. INTRODUCTION

Online classes werevery much popular in India in pandemic period, because all the face-to-face academic activities were closed to prevent the spreading of Covid–19. Covid–19 is very dangerous viral diseases, which spread rapidly through personal contact. To prevent the spreading the corona virus as per direction of WHO, central government restrict the personal contact. In that connection all the schools and colleges were closed from 16th March 2020. To prevent the loosing of academic session there was starting of online study. All types students were attending online classes through electronic devices, as they were restricted face to face regularclasses. In previous studies showed that long time uses of digital devices, create vision related asthenopia, develop ametropia, ocular dryness.

As per human physiology, light rays come from infinity and focused upon the macula, subsequently it transmits the images through optic nerve to CNS, then we can see the object clearly. If the light rays are not focus upon the macula properly, then create ametropia, means refractive errors. There are three types of refractive errors; namely, myopia, hypermetropia, astigmatism. If light rays focused in front of macula, it is myopia; light rays focused behind the macula it is hypermetropia; sometimes light rays focused from different meridian either in front of macula or

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behind the macula is called astigmatism. The root causes of ametropia occurs due to changes of ocular structure.The common symptoms of refractive errors, either blurring vision or asthenopia, or both.Uncorrected refractive errors are the most common cause of visual impairment and second major cause of avoidable blindness in India.[1]

Asthenopia or eye fatigue increased due to worsening of eye health impairment by online education.[2]Patient suffering with refractive errors are commonly faces with headache, eye ache, watering, blurring vision, burning sensation, fatigueness, redness, itching, dryness. All the symptoms in one word are called asthenopia. The literature suggested that watching TV, especially from a short distance, using electronic devices for a long time, using dim light while reading, family history, gender (female), and near work activity are major risk factors for refractive errors.[3]In different survey showed that online study through digital devices has led to increasing prevalence of refractive errors among all category student. Awareness, appropriate identification and refractive error correction can reduce the prevalence of future blindness.

Aims & Objectives of the Study

1)The aim of the study is to assesses and demonstrates the ocular side effects after attending long-time online classes in pandemic period among primary level students of urban Tripura. 2) To know the prevalence of the development of refractive errors after performing online classes among the primary level students of Tripura.

Back Ground & Profile of the Study Area

One of the small and beautiful North – East Indian state is Tripura. Three sides are surrounded by Bangladesh. Agartala is the capital city of Tripura. Tripura has mixed population with tribe and non-tribe. They have followed their won cultures. Tripura carrying highest literacy rate among North – East state. Around 40 lacks people are residing in Tripura. Bengali is the main language of Tripura. Though agriculture is the main scorch, still every people busy to take formal education. In this connection, every people were very much serious in their school education, even in pandemic period also.

II. MATERIALS AND METHODS

The whole study was conducted, based on questionaries among primary level students, those who were attending online classes during pandemic period by electronic devices. Students,those who were suffering post pandemic visual abnormalities or asthenopiawere examined in different mobile eyecamp in different primary schools. The survey was conducted in different primary schools of urban Tripura, starting from March 2022 to May 2022. **Sampling criteria:** 1) All the primary students those who were attending online classes and suffering either vision related asthenopia or blurring vision were added in this study. 2**)** Students, those who, had no vision related abnormalities and had no asthenopia were excluded in this study. **Examination procedure:**Visual acuity assessment by Snellen's chart for distance and near both. Accommodative anomalies assessment by RAF rule and theanterior segment examinations by binocular loupe with torch light, fundus examination by direct ophthalmoscope. Objective refraction procedure by streak retinoscope in undilated pupil followed by subjective refraction.

III. RESULTS

In this study total 231primary school students were randomly examined in that period in different primary schools of urban Tripura. A questionnaires sheet was supplied to all the primary school students, those who had attending online classes;which was included the digital device information, Visual performance, clinical examination, where 105(45.45%) were girls and 126(54.55%) were boys [Table No. 1].

Table No. 1

Gender	Students	%
Boys	126	54.55
Girls	105	45.45
Total	231	100.00

Gender wise student distribution

Out of 231 students, 93(40.26%) students were suffering with different anomalies of accommodation, where 56(24.24%) students were boys and 37(16.02%) students were girls. Rest 138(59.74%) students were suffering vision related abnormalities, where 67(29.00%) were myopic, in which 29(12.55%) were boys and 38(16.45%) were

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girls; 22(9.52%) students were hypermetropic, in which 13(5.63%) were boys and 9(3.89%) were girls; and 49(21.21%) students were astigmatic, in which 28(12.12%) were boys and 21(9.09%) girls[Table No. 2].

Table No. 2

	Anomalies of accommodation	Myopia	Hypermetropia	Astigmatism	**Total**
Boys	**56**	**29**	**13**	**28**	**126**
%	**24.24**	**12.55**	**5.63**	**12.12**	
Girls	**37**	**38**	**9**	**21**	**105**
%	**16.02**	**16.45**	**3.89**	**9.09**	

Gender wise post pandemic visual abnormalities distribution

In this study, 93 students were suffering different types of anomalies of accommodation, which were measured by RAF rule. Only two types of anomalies were detected by RAF rule, namely accommodative excess and accommodative insufficiency. They were suffering anomalies related asthenopia. Their vision was normal, that's why no need for correction. Out of 93 students 61(26.41%) students were suffering accommodative excess, in which 37(16.02%) were boys and 24(10.39%) were girls; 32(13.85%) students were suffering accommodative insufficiency, in which 19(8.22%) were boys and 13(5.63%) were girls [Table No – 3]. Since, there were no need for refractive error correction, the students were advised for vision therapy as per requirement.

Table No. 3

	Accommodative excess	**Accommodative insufficiency**	**Total**
Boys	**37**	**19**	**56**
%	**16.02**	**8.22**	**24.24**
Girls	**24**	**13**	**37**
%	**10.39**	**5.63**	**16.02**

Gender wise anomalies of Accommodation distribution among primary school Students

Out of 67 myopic primary students, 44(19.05%) students were corrected less than equal to – 0.75Dsph, in which 18(7.79%) were boys and 26(11.26%) were girls; 23(9.95%) students were corrected above – 0.75Dsph, in which 11(4.76%) were boys and 12(5.19%) were girls; [Table No – 4].

Table No. – 4

	≤ – 0.75Dsph	**More than –0.75Dsph**	**Total**
Boys	**18**	**11**	**29**
%	**7.79**	**4.76**	**12.55**
Girls	**26**	**12**	**38**
%	**11.26**	**5.19**	**16.45**

Gender wise myopia distributions among primary school Students

Out of 22 hypermetropic primary students, 15(6.49%) students were corrected Less than equal to + 0.50Dsph, in which 9(3.90%) were boys and 6(2.59%) were girls; and 7(3.03%) students were corrected above + 0.50Dsph, in which 4(1.73%) were boys and 3(1.30%) were girls[Table No – 5].

Table No – 5

	≤ + 0.50Dsph	**More than +0.50Dsph**	**Total**
Boys	**9**	**4**	**13**
%	**3.90**	**1.73**	**5.63**
Girls	**6**	**3**	**9**
%	**2.59**	**1.30**	**3.89**

Gender wise hypermetropia distributions among primary school Students

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Out of 49 astigmatic primary students, 30(12.99%) students had simple astigmatic, in which 17(7.37%) were boys and 13(5.63%) were girls; 12(5.19%) students had compound astigmatic, in which 7(3.03%) were boys and 5(2.16%) were girls; again 7(3.03%) students had mixedastigmatic, in which 4(1.73%) were boys and 3(1.30%) were girls [Table No – 6].

Table No – 6

	Simple	Compound	Mixed	Total
Boys	**17**	**7**	**4**	**28**
%	**7.36**	**3.03**	**1.73**	**12.12**
Girls	**13**	**5**	**3**	**21**
%	**5.63**	**2.16**	**1.30**	**9.09**

Gender wise astigmatism distributions among primary school Students

IV. DISCUSSION

In the above survey a clear picture was found of visual effects after pandemic period among the primary school students of urban Tripura. Around 45% girls' students were also affected by online study. 40% students were developed anomalies of accommodation after pandemic period, due to attending long time digital classes.

Around 38% primary school student were needed low graded ametropic correction. Myopia was the most prevalent type of refractive error than other types of refractive errors, where girls were more effected than boys.

In this study low corrected was more than higher myopic correction. It was also found that girl students were more sufferer than boys in myopic correction. From the study it was also found that in hypermetropia less than equal to +0.75Dsph correction was more than higher hypermetropic correction. In this study it was found that simple astigmatism is much more than compound and mixed astigmatism. In case of astigmatism girl students were also more affected than boys.

The possible association between near work activity and the prevalence of refractive error can be explained on the basis that increasing the amount of near-work done can consequently increase accommodation, which in turn could potentially cause defective vision, particularly myopia[4]

In pandemic period primary school students were attend their classes through digital devices around 3 to 4 hours daily for around 7 to 8 months, which developed the asthenopia.In most cases primary school students were developed low corrected myopia, hypermetropia, and astigmatism after long time studying through digital devices in pandemic period. Which could be due to improper uses of digital devices, low illumination in study area, unconsciousness, longer time near work activities. Proper visual acuity examination and appropriate spectacle correction can be developed their study area and eliminate the impactsthis easily treated cause of visual impairment.

V. CONCLUSIONS

The study can be concluded, post pandemic visual effects hampering educational life of the primary school students in urban Tripura. Visual effects are related to asthenopia and refractive errors, which can be easily diagnosed, measured and corrected with spectacles or vision therapy. Improper correction of refractive errors gradually become the cause of low vision or even amblyopia.

Several factors like, long time uses of digital devices, supine position reading preference, long time TV watching from near, less outdoor activities during pandemic period increases myopia among primary school students. To prevent vision related asthenopia and accommodative anomalies, school students should restrict the above factors. A regular eye check-up is necessary to prevent deterioration of the visual functions.

Long time online study through digital devices affects primary school student's visual system. Students are mostly suffering itching, burning sensation, blurring vision, headache, eye ache, eye strain, etc. All the students, those who were attending in online digital classes regularly around 3 to 4 hours for 7 to 8 months, they were suffering vision related asthenopia. Long time focusing on near object may develop accommodative anomalies, namely accommodative excess or accommodative insufficiency.

Long time uses of digital devices developed myopia. In the pandemic period primary school students were uses their devices 3 to 4 hours daily. That's why, primary students are develop

low corrected myopia. Post pandemic visual abnormalities from uncorrected refractive errors can have immediate and long-term consequences in primary students, which can hamper their educational activities. To prevent post pandemic visual disturbance, it is mandatory to regular eye checkup camp should be in regular basis.

Students should restrict the uses of digital devices. Sufficient and proper illumination can also reduce the asthenopic symptoms. Students those who are suffering accommodative anomalies, should proceed proper vision therapy regularly, which eliminates the post pandemic accommodative anomalies. This type of study has been done first time in North-East India. It was a good exercise to justify collecting more epidemiological data to make plans to overcome the problems of visual abnormalities in this region about post pandemic period.

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