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Frequency of convergence insufficiency among students at a tertiary care centre in rural Karnataka, India

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Abstract:

As per our literature search studies on convergence insufficiency are being conducted in children or among the geriatric age group and before the pandemic affected the world. Since the commencement of COVID 19 pandemic, increased screen time has increased with online teaching and work affecting their near work and increased convergence, refractive errors especially myopia. Hence the rate of change of convergence insufficiency might be possible. As per our knowledge this is one of first study being conducted among students on convergence insufficiency post Pandemic with increased near work as well as display time. The purpose of this study is to determine the frequency of convergence insufficiency and also determine the correlation between gender, refractive error (Corrected and uncorrected refractive error) and the amount of screen time among the students of same age group.

Keywords: Corrected and uncorrected refractive error, binocular vision anomalies, convergence insufficiency, screening time

Background:

In World among the children the prevalence of Convergence Insufficiency is estimated at 4.2% - 6%. In adults, the annual incidence is 8.4 per 100,000 populations. By the ninth decade of life approximately 70% of individuals may be affected. The incidence increases with additional near work demand [1]. Convergence insufficiency is the inability to obtain or maintain adequate binocular convergence for any length of the time without undue effort [2]. Ocular asthenopia are the major complaints people are suffering now a days with intensive near and digital works have brought many non-strabismus binocular vision disorder (NSBVD). Convergence insufficiency (CI) is one of the most prevalent NSBVD [1]. The common symptoms that occur with convergence insufficiency are doubling of vision (Diplopia), eye strain during or after near work, blurring of the vision, deviating of the eyes especially outwards when patient tried to concentrate, dizziness, closing of an eye to avoid diplopia, mild to severe headaches and the words appears to be moving while reading. The symptoms of convergence insufficiency become worse and worse by illness, In wakefulness, nervousness, despair and long duration of close work [3]. Convergence insufficiency typically present with venerable and persistent complaints of double vision at near, with the negative past medical history. Convergence insufficiency is the legitimate and troublesome binocular vision dysfunction. The etiology of convergence insufficiency may be associated with the wide nasal bridge (the eyes appear in divergent condition), endocrine disorders, debility or disease, toxemia, head injuries, encephalitis, hepatitis, malnutrition, mononucleosis, debility, and inadequate development of the neuromuscular function, tiredness and the prolonged near work or reading [2].

Materials & Methods:

Study design:

Cross section observational study

Study period:

30 March 2022 to 16 November 2022

Inclusion and Exclusion criteria:

Inclusion criteria

Subjects of 17 years age group
BCVA better than or equal to 6/18, N6. Both gender (male and female) are included equally.
Informed consent and willingness to participate in the study.

Exclusion criteria

History of any previous intraocular/squint surgeries.
Ocular abnormalities.
Strabismus.
History of ocular trauma and head trauma.
Anisometropia greater or equal to 2D.

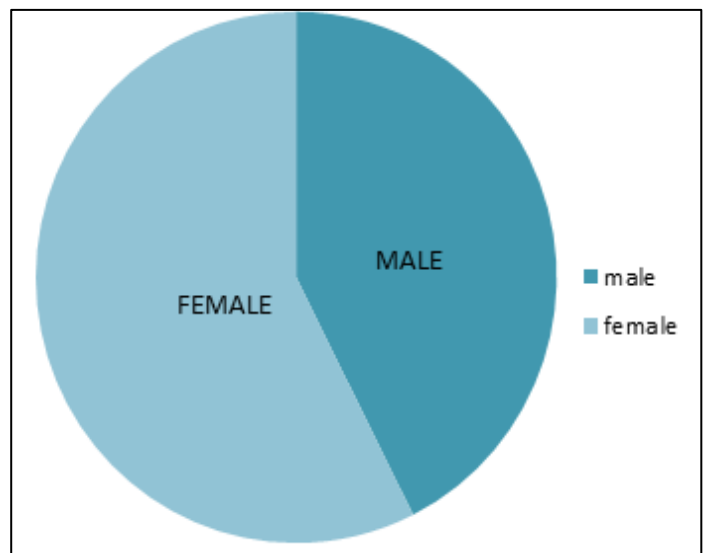


Figure 1: In the above figure it shows that Females are more affected with the convergence insufficiency than Male subjects as per our research study.

Sample size:

Sample size for the present study estimated based on the prevalence of the convergence insufficiency (18.25%) as reported in the study, considering an absolute error of 5% with 95% confidential interval of sample size required for study is 230 students of age group 17 years.

Study population:

Students aged 17 years studying in SDUAHER, irrespective of their refractive error.

Test name	Procedure	Value
Visual acuity test	1. Snellen's chart used for distance vision at a distance of 6 meters. 2. Jagger's chart used for near vision at a distance of 40 cm. 3. Pinhole visual acuity are recorded.	• Best corrected visual acuity was 6/18
Fusional vergence test	Horizontal prism for near.	• PFV and NFV for near break point • Normal value for PFV <15PD(near)
Extra ocular motility test	Broad H test is using for all the nine gazes by testing both monocular and binocular.	• Normal in all gazes.
Pupillary assessment	It is done by a torch light in dim illuminated environment.	• To evaluate pupil shape,size and reaction.
Cover and uncover test	It is done by shifting occluder from one eye to another.	• To check the amount of ocular deviation.
Near point of convergence test	RAF rule will be used.	• To measure objective and subjective convergence.

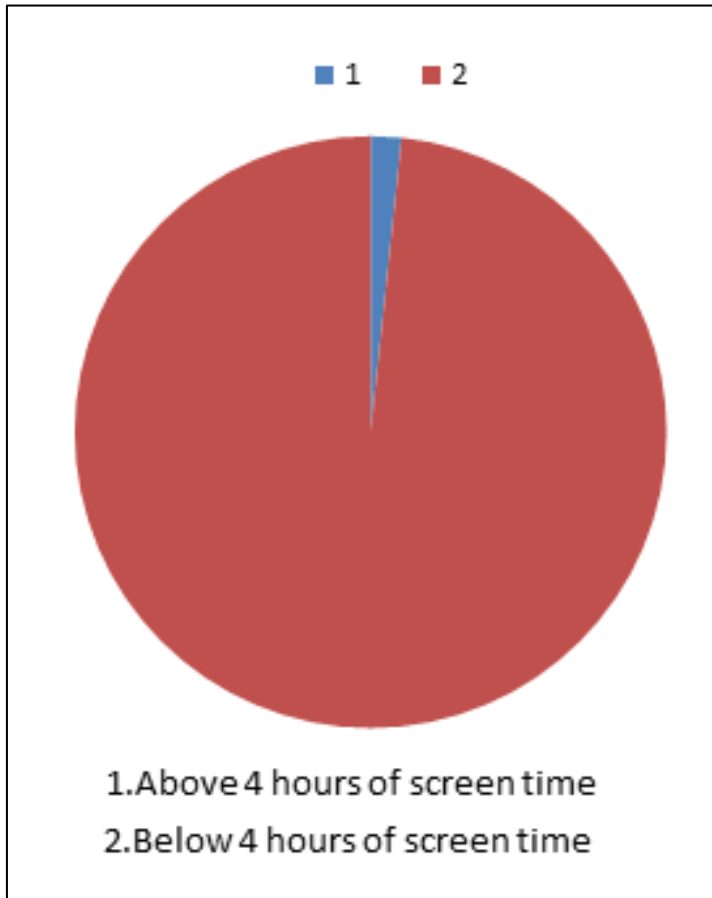


Figure 2: In the above figure it indicates that the subjects whose screen time is above 4 hours are having higher risk of visual problems than the subjects whose screen time is below 4 hours.

Methodology:

After obtaining informed consent from the participants, demographic details are noted. Subjects were selected by simple random sampling. Males and females are considered equal in number. Every subject undergoes the above mentioned tests.

Results and Discussion:

This Study will provide insights into the differences in orthoptic evaluations and comparison between the age factor and also the sex the subject belongs to. It is also known that the students were more prone to the binocular vision anomalies. In this study we included

230 students of age group 17 years of equal proportion from Sri Devraj Urs Academy of Higher Education and Research, a tertiary health care centre and it is observed that the female students were more affected with the visual problems like convergence insufficiency, asthenopic symptoms, headache and many other binocular anomalies due to their less outdoor work and increased screen time through orthoptic evaluation. It is also observed that in males since the outdoor work is increased and screen time is decreased, they are less affected with the visual problems and binocular anomalies. By observing Figures 1 & 2 we noticed that the female subjects who are at risk of convergence insufficiency are above 4 hours of screen time. We also noticed that their academic performance of female subjects is good than male subjects. This is due to their less of outdoor activity in female subjects.

Conclusion:

It is estimated that after the evaluation among the students aged 17 years, they were not having the routine eye check-up and complete eye evaluation. Hence in this study we conclude that female subjects are more affected with the binocular anomalies and near visual problems with asthenopic symptoms due to their increased screen time and decreased outdoor work. And they were recommended with the vision therapy exercises, hart chart exercises, cat card exercises, fusional exercises.

Acknowledgement:

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