“EFFECT OF LIFESTYLE CHANGES DURING COVID 19 ON ACCOMODATIVE FACILITY OF YOUNG ADULTS”

Submitted in fulfilment of requirement for the award of degree

Of

BACHELOR OF OPTOMETRY

Submitted by

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Enrollment No- AJU/180950

Batch 2018 -2022

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ARKA JAIN UNIVERSITY JHARKHAND

DECLARATION

I hereby declare that the thesis entitled "**STUDY ON EFFECT OF LIFESTYLE CHANGES DURING COVID 19 ON ACCOMODATIVE FACILITY OF YOUNG ADULTS**" submitted by me, for the award of the degree of B.OPTOMETRY to **ARKA JAIN UNIVERSITY, JHARKHAND** is a record of bonafide work carried out by me, at **JAMSHEDPUR EYE HOSPITAL**. The project work was carried out, under the supervision of DR NITIN G DHIRA -Consultant Ophthalmologist Jamshedpur Eye Hospital.

I further declare that the work reported in this thesis has not been submitted and will not be submitted either in part or in full, for the award of any other degree or diploma in this institute or any other Institute or University.

Place : JAMSHEDPUR
Date: 18/05/22

Signature of the Candidate

CERTIFICATE

This is to certify that the thesis entitled "STUDY ON EFFECT OF LIFESTYLE CHANGES DURING COVID 19 ON ACCOMODATIVE FACILITY OF YOUNG ADULTS" submitted by SABAHAT ZIA, for the award of the degree of Bachelor of Optometry, is a record of bonafide work carried out by the student under my supervision, at JAMSHEDPUR EYE HOSPITAL as per the academic code of the University.

The contents of this report have not been submitted and will not be submitted either in part or in full, for the award of any other degree or diploma in this institute or any other Institute or University. The thesis fulfils the requirements and regulations of the University and in my opinion meets the necessary standards for submission.

DR. NITIN G. DHIR

Place: JAMSHEDPUR.

Date: 18/05/22

Signature

(Research Guide)

CERTIFICATE

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Place: JAMSHEDPUR
Date: 18/05/22

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It gives me great pleasure in presenting this project as a success of twelve months (pursuing) Internship at JAMSHEDPUR EYE HOSPITAL, JHARKHAND.

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ABSTRACT

BACKGROUND: The use of smartphones and electronic devices has increased rapidly almost in every household in India and worldwide during the COVID-19 pandemic. Prolonged near task could lead to visual anomalies and result into associated symptoms.

AIM: The purpose of this study is to evaluate accommodative facility in young adults aged 18-35 at JAMSHEDPUR EYE HOSPITAL, JHARKHAND.

OBJECTIVE: All young adults visiting JAMSHEDPUR EYE HOSPITAL will go through comprehensive eye assessment along with accommodative facility testing.

STUDY DESIGN: Retrospective Study

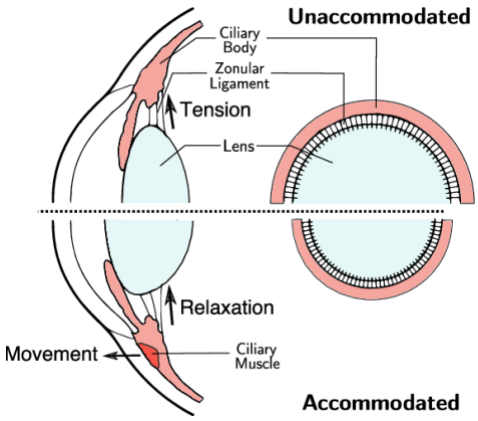
METHOD: Subjects consisted of 200 adults between 18 and 35 years of age with visual acuity 20/30 (6/9) or better in each eye who visited Jamshedpur Eye Hospital for eye examination between August 2021 to April 2022. It is a questionnaire based study- the questionnaire used was taken from previous study which has already been validated. Complete medical history was recorded, visual acuity was assessed using LogMAR chart at 3m, refractive error was assessed and cycloplegic refraction was performed. The amount of near work, dynamic accommodative facility and asthenopic symptoms were measured for each subject by the use of accommodative flippers and questionnaire respectively.

CONCLUSION: We had included 200 patients with male to female ratio of 118:72 with age group (18-35) years, mean SD of female and male were 21.48±2.264 and 22.65±1.783e respectively. It was found that with increased cumulative near work time during the pandemic the accommodative facility in young adults was severely reduced with majority of the sample size failing the plus lens test.

KEYWORD: Accommodative facility, asthenopia, screen time, covid 19.

INTRODUCTION

Accommodation is the mechanism by which the eye changes refractive power by altering the shape of lens in order to focus objects at various distances.



On accommodation the pupil constricts with contraction of the ciliary muscle, the lens becomes more spherical, and the vitreous pushes forward, moving the lens forward, increasing its effective power. The most widely held theory of accommodation was proposed by von Helmholtz in 1856: "When viewing a far object, the circularly arranged Müller's ciliary muscle is relaxed, allowing the lens zonules and suspensory ligaments to pull on the lens, flattening it in the periphery. The source of the tension is the pressure that the vitreous and aqueous humours exert outwards onto the sclera." According to von Helmholtz, when viewing a near object, the ciliary muscles contract (resisting the outward pull of the sclera) causing the lens zonules to relax which allows the lens to spring into a thicker form.

Accommodative Facility is the dynamics of accommodation, it measures the speed of accommodative responsiveness- ability to alter accommodation rapidly and actively- to blur, using negative –positive lens to induce and relax accommodation. Negative lens stimulates accommodation where as positive lens relaxes accommodation.

The use of smartphones and other digital devices like computer, tablets for both professional and non-professional activities is practically universal in the developed as well as developing world, prolonged amount of near work increases the risk of ocular discomfort. Studies have shown eye related symptoms are considered one of the most common health related complaints in electronic display device users. Young adults spend increasingly more time viewing electronic devices which could lead to asthenopic symptoms and computer vision syndrome.

In clinical practice , it has been observed that prolonged near work as well as short period of intense near work can affect dynamics of accommodation [1,2] .The symptoms experienced with digital device use has increased drastically during the pandemic with increased hours of near work people being restricted to home and limited outdoor activity as well as work from home.

The present study was developed to investigate the accommodative facility and symptoms experienced during this period. For this purpose we measured accommodative facility (AF) , nearwork time, asthenopic symptoms in sample of young adults.

Facility measurement was done by using accommodative flippers of +/- 2D. Association between AF and asthenopic symptoms in school children have been demonstrated in earlier studies[3]. A questionnaire was used in the present study to assess the asthenopic symptoms and hours of nearwork[4].

REVIEW OF LITERATURE

Year/Place of publication	Author/s	Title	Methodology	Result/Summary
International Ophthalmology -February 2001	Rafael Iribarren, GeorgeK Hung, Andrea Fornaciari	Effect of cumulative nearwork on accommodative facility and asthenopia.	Subjects consisted of 87 young students and office workers with uncorrected visual acuity of 20/30 or better in each eye. The amount of nearwork, accommodative facilityand level of asthenopia were measured for each subject.	Total cumulative nearwork was negatively coorelated with accommodative facility and positively related asthenopic symptoms.

Year/Place of publication	Author/s	Title	Methodology	Result/Summary
1998 Oxford Boston	Rosenfield M, Gilmartin B	Myopia and nearwork	A cross sectional study of 1005 school children aged 7 to9 years was conducted in two schools. Cycloplegic refraction, keratometry and biometry measurements were performed.	This study reported relatively myopic shifts with mean approx. 0.40 D and range from 0.12 to 1.30 D. Children with greater current reading were more likely to be myopic.

Year/Place of publication	Author/s	Title	Methodology	Result/Summary
September 2021 Indian Journal of Ophthalmology	Neelam Pawar, Meenakshi Ravindran, Sabyasachi Chakrabarty	Accommodative anomalies during COVID-19 in pediatric ophthalmology: our experience	A retrospective analysis of various accommodative parameters was done to determine the frequencies of accommodative anomalies among symptomatic children during COVID-19 from electronic medical record of children with asthenopic symptoms. Subject consisted of 87 children with uncorrected visual acuity of 20/30 or better in each eye.	The mean standard age was 12.94 ± 3.4 years. The mean (SD) facility was 9.11±3.4 cycles per minute. Mean hour of attending online class was 2.60±1.5 hour.

METHODOLOGY

Subjects consisted of 200 individuals between 18 and 35 years of age. They were selected from the patients who came at Jamshedpur Eye Hospital for eye examination during the time of pandemic. We followed the tenets of the Declaration of Helsinki. One examiner evaluated all subjects.

CLINICAL EXAMINATION

The inclusion criteria was uncorrected visual acuity (VA) at distance to be 6/9 or better in each eye ,no past use of glasess and the exclusion criteria was individual who had myopia or hyperopia more than 1 dioptre , strabismic patient and visual acuity less than 6/9.

The uncorrected visual acuity for distance ,was estimated by LogMAR chart at 3m. Hirschberg test was performed to check for orthophoria, cover/uncover test was performed to find phoria measurements. Near point of convergence was measured by push-up method.

FLIPPER TEST

First monocular then binocular accommodative facility was measured by +/- 2D lens accommodative flipper (in cycles per minute cmp) at 40 cm distance with the means of Snellen near chart focusing at N8 letter.

QUESIONNAIRE

Following the test subjects completed the questionnaire , total near work time was inquired -for how long they have been doing that amount of near work- and also the frequency of asthenopic symptoms were noted. Questionnaire was used in previous study on Effect of cumulative near work on accommodative facility and asthenopia [4]same questionnaire was used in this study.

RESULT

Table 1:- Male and Female percentage:-

Among 200 subjects the number of male and female was 118 and 82 respectively. The percentage of male and female was 59% and 41% respectively.

MALE	FEMALE
118	**82**

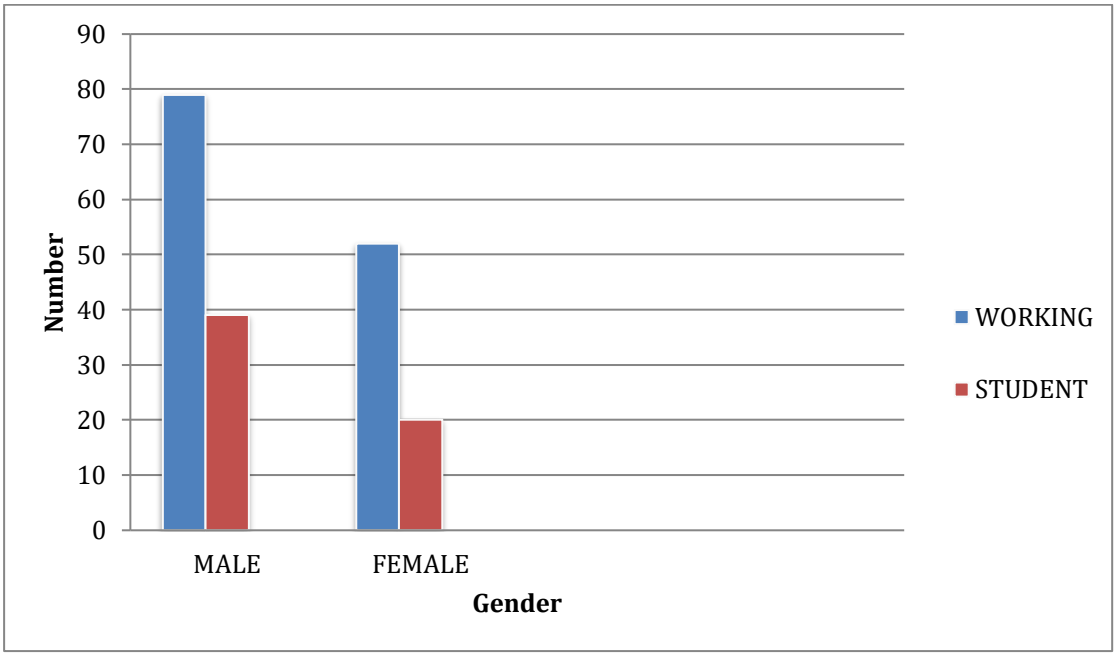


Table 2:-Accommodative facility Normal vs Reduced:-

Out of 200 subjects 163 had reduced accommodative facility where as 37 subjects had accommodative facility in the normal range of which 94 female and 69 male had reduced accommodative facility.

	MALE	FEMALE
NORMAL	**24**	**13**
REDUCED	**94**	**69**

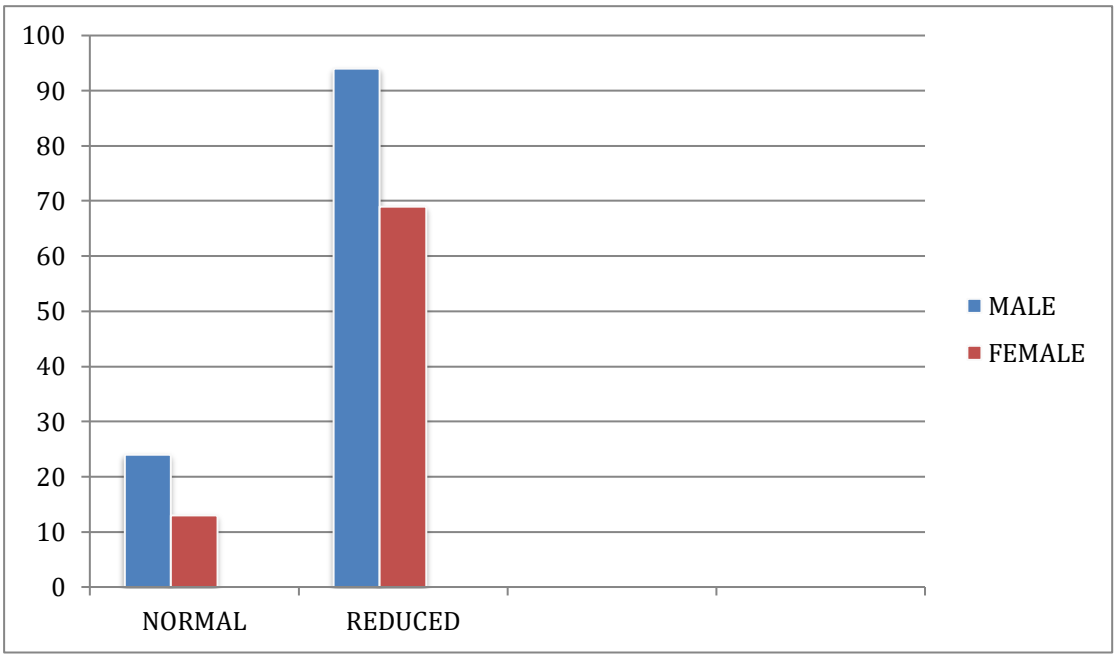


Table 3:-Reduced facility on the basis of lens:-

128 patients failed the plus lens test (were unable to clear the plus lens)

27 patients failed the minus lens (were unable to clear the with minus lens)

8 patient were unable to clear both plus and minus lens

(+) PLUS LENS	(-) MINUS LENS	(+) AND (-) LENS
128	**27**	**8**

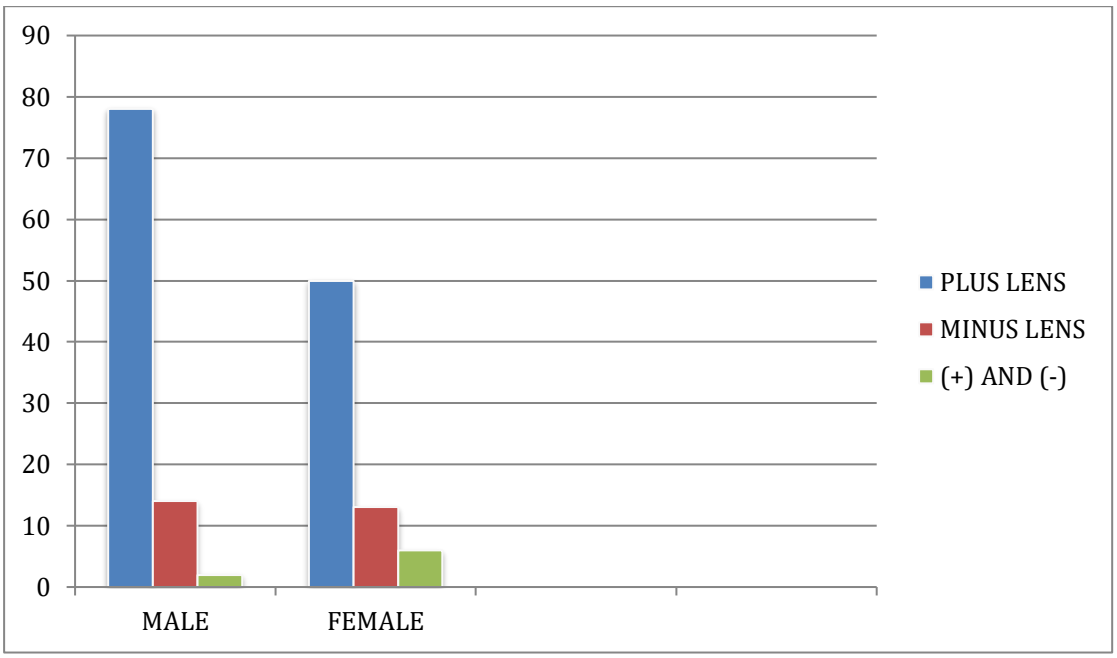


Table 4:-Duration of near work:-

Out of 200 subjects 162 had screen time more than 6 hours per day out of which 95 were male and 67 were female.

GENDER	MORE THAN 6 HR	LESS THAN 6 HR
MALE	**95**	**23**
FEMALE	**67**	**5**

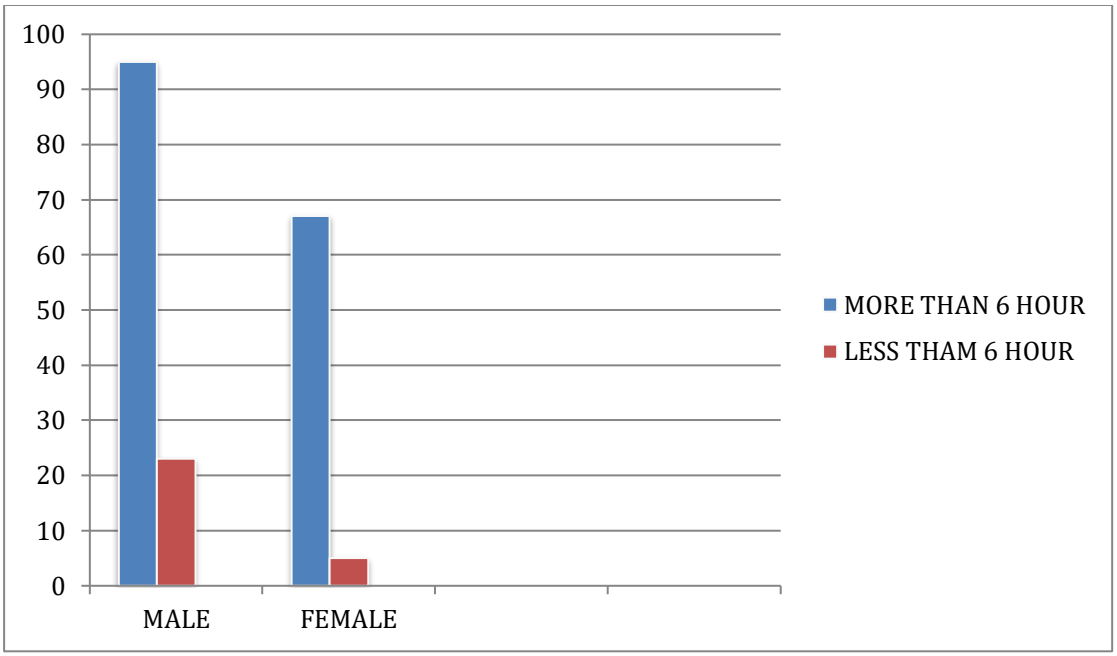
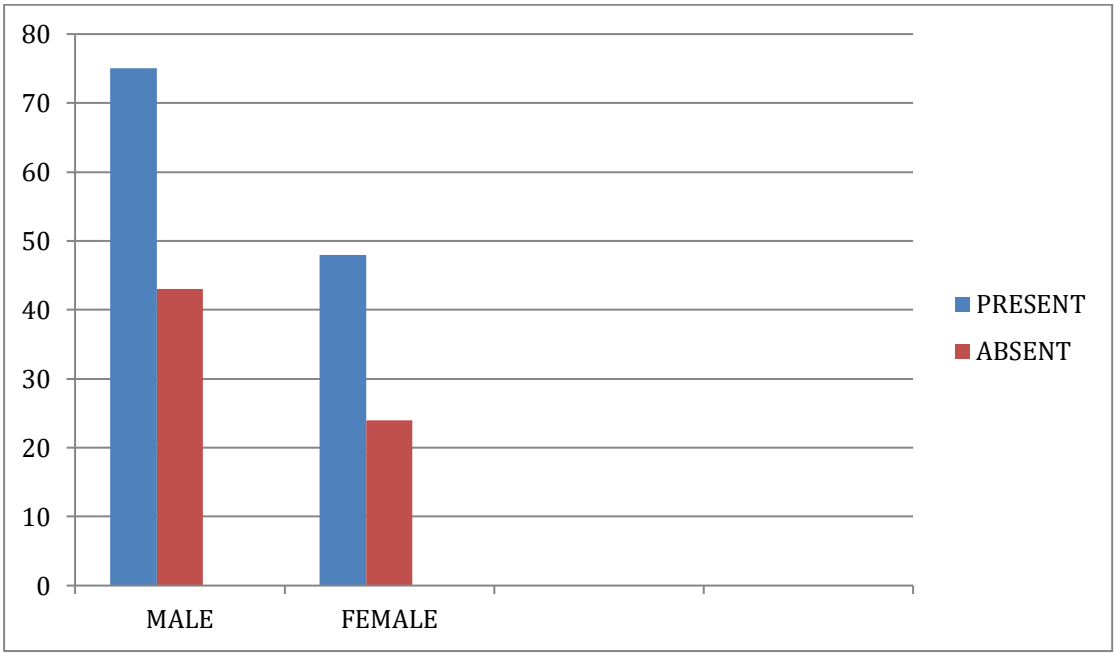


Table 5:- Prevalence of asthenopic symptoms:-

Out of 200 subjects 123 had asthenopic symptoms, out of which 75 were male and 48 were female, only 67 patients did not have asthenopic symptoms.

GENDER	PRESENT	ABSENT
MALE	75	43
FEMALE	48	24



DISCUSSION

In the present study, it was found that during the pandemic due to increased use of digital devices and high screen time young adults showed severly decreased AF and increased asthenopic symptoms (especially blurred vision). These results suggest a relationship between performing nearwork and reduced AF values. This is supported by recent findings on accommodative adaptation [3] and nearwork-induced transient myopia [2], which demonstrated that "blurred vision" may be related to short periods of sustained and intense nearwork. Accommodative adaptation to a 20-minute task elicited similar changes in both accommodative decay following nearwork and the non-ocular AF responses [4]. Intense nearwork has been associated with adult-onset myopia progression in a prospective study in adult microscopists [6]. We have now shown a retrospective correlation between high screen time and reduced accommodative facility.

Another important issue is the comparison between computer use and reading habits. Cole et al. [9] studied two groups of office workers, one with and one without the use of computers (PC). They did not find a significant difference in asthenopic symptoms between the two groups. In their study, symptoms related to glare, red eyes, and blurred vision, were slightly more frequent among the PC users. In the present study, the number of symptoms was more associated with office workers than students. Also, the symptoms of "blurred vision" and "burning eyes" were associated more with office workers than the students, whereas the symptom of "red eyes" school students. We agree with Cole et al.[5] in the sense that PC use under current ergonomic conditions is no different from hardcopy with respect to the development of asthenopic symptoms. However, our data show the importance of reading in the development of asthenopic symptoms. Reading/using mobile phones typically presents a greater stimulus for accommodation, because it is usually done at 40 cm (2.50 D) distance, while computers are viewed at 70 cm (1.4 D) and hence represents only about 50% of the near demand. As shown in, the correlation of AF with mobile phone had a greater significance level than that of AF with the use of computers.

The AF test is a dynamic measure, which is import- ant for assessing the overall

time course or “speed” of the accommodative response; in contrast, the accommodative amplitude, relative accommodation and lag of accommodation can be considered static or steady-state measures.Thus, the AF test appears to be a valuable test for measuring the overall dynamics of accommodation in the clinic, as it is correlated with symptoms and nearwork duration.

The present results also confirm previous findings [7] of an association between accommodative facility and asthenopia (especially with the symptoms of blurred vision). We also found a correlation between the amount of nearwork and some of the asthenopic symptoms (e.g., blurred vision, burning, and red eyes). More importantly however, a correlation was found between the cumulative amount of time spent on nearwork over a period of years and reduced accommodative facility. This suggests that the cumulative amount of nearwork adversely affects dynamics of the accommodative system in young individuals. Perhaps this can be conceptualized as producing a very mild conditioned spasm of accommodation due to sustained focusing at near stimulus levels over extended periods of time (months and years). This is consistent with recent findings [2,4] demonstrating very slow and irregular decay of NITM in symptomatic individuals, even under binocular viewing conditions with the presence of blur and disparity feedback.

Therefore, we propose that accommodative facility should be routinely assessed in asthenopic patients, as well as in asymptomatic individuals performing in- tense nearwork. It would be diagnostic in the former and preventative in nature in the latter group. To provide remediation in symptomatic patients with low AF measures, orthoptic treatment is a possible recommendation if future research confirms its effectiveness [8].

CONCLUSION

The severe symptoms which were observed in young adults had severely reduced accommodative facility and difficulty mostly with plus lens they had headache, but with headache few other symptoms like burning sensation, transient blurring of vision, watering. Double vision was least observed in this study. From this study we observed digital device user were more in comparison to hardcopy readers since the era of digitalisation has lead to shift towards digital devices. From this study we conclude that males are more affected in comparison to males and office workers had more severely reduced accommodative facility than students. Headache is most common symptom in asthenopia and the average screen time usage was found to be eight hours per day which is quite high number which could lead to accommodative spasm in young adults which is suggested by severely reduced accommodative facility in the observed age group.

LIMITATION

- Less sample size.
- Lack of awareness
- It does not address the long term consequences.
- Age group.

CONFLICT OF INTEREST

- There are no conflicts of interest in my study.

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QUESTIONNAIRE

Appendix – Patient Symptom Questionnaire

Feel free to respond to this questionnaire because it is anonymous. The data you provide will be analyzed with the data of many other people, and then published. (Make an X where necessary)

1. In **A WEEK DAY**, summing up work, study and pleasure,

How many hours do you spend reading? None, 1, 2, 3, 4, 5, 6, 7, 8, 9, More.

How many hours using a computer? None, 1, 2, 3, 4, 5, 6, 7, 8, 9, More.

2. On **SATURDAYS OR SUNDAYS**, summing up work, study and pleasure,

How many hours do you spend reading? None, 1, 2, 3, 4, 5, 6, 7, 8, 9, More.

How many hours using a computer? None, 1, 2, 3, 4, 5, 6, 7, 8, 9, More.

3. How long have you been doing this amount of nearwork?

3 months 6 months 1 year 2 years 3 years

4. During a week, you may experience:

	Never	1 or 2 days	3 or 4 days	5 or 6 days	Every day
Headache					
Pain in the eyes					
Blurred vision					
Double vision					
Burning eyes					
Watery eyes					
Red eyes					