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Comparision of Accommodative Facility and Assessment of Tearfilm Before & After 6 - 7 Hrs of Usage of Digital Screen

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Abstract

➢ ***Background & Objectives***

Aim of this study was toCompare the accommodative facility and to assess tear film before and after 6-7 hours of digital screen usage". The main objectives of this present study is to check& compare the binocular accommodative facility &tearfilm stability and tear volume in digital screen users of prolonged duration of time in the age group of 18-30 yrs of irrespective genders.

➢ ***Methods***

Initially, Pre-measurements of following values are needed to compare it with the post measurements of accommodative facility,amplitude of accommodation will be measured for each patient by push up method over full correction. TBUT (Tear break up time) test is done to asses the tearfilmprofile of the eye and Tear film volume check by Schiermer 2 procedure by the help of this two procedure tear film assessments are done.

➢ ***Result***

Total 57 subjects and 25.05 years (SD+ 3.44) mean age of the subjects was selected. In this study Accommodative facility was found9.70cpm is decreased to 8.17cpm on average binocularly. In Monocular estimation RE 11.17cpm is decreased with a mean value of 10.26cpm and LE 11.54cpm is decreased to 9.88cpm significantly with the p value of 0.000521 which is > 0.005.

Schiermer'sstrips is declined from mean SD of 23.58mm to 18.41mm gradually after 6-7 hrs of usage of computer system also significant.

Tearbreakup test reveals the decrement in time from mean 12.36secto 10.03 sec in RE and 13.52sec to11.34sec in LE gradually and p value of 0.00536 which is > 0.005.

➢ ***Conclusion***

To conclude Accommodative facility and tearfilm stability, volume are found to reduce after the prolonged usage of digital screen So it is important to take an account about these parameters while testing IT company employees & long term digital gadgets users in clinical practise.

Keywords:-*Tear Breakup Time(TBUT), Schiermer 2, Accommodative Facility(AF), Computer Vision Syndrome(CVS).*

I. INTRODUCTION

Eye is the forward protrusion of the brain, a complex organ of the human body, the most important function for a clear vision is achieved by the inner parts of the eyes as well as the outer covering layers of the eyeball. Tear film is the fluid thin outer and anterior coverage of the eye ball. This smooth and even pre-corneal tear film forms the first refractive surface of the human optical system and it is required for the good visual acuity. For batter gas exchange between air and epithelium layer of cornea tear film make the cornea moist. This will remove the debris from cornea to make surface clear optical path and provide transparency so we can clearly.[1]Tear film is the integral part of the ocular surface which is highly specialized and carefully ordered fluid structure. Smooth pre-corneal tear film formed after blinking is important not only to protect ocular anterior surface but also to maintain visual function. Pre-corneal tear film must be intact otherwise its breakup may cause irregular and rough surface of cornea and can make adverse effects on ocular system. Tear film lubricates the ocular surface to maintains optical qualities but dryness can ultimately affects the transparency of the cornea. Secretion and production of tear fluid components by lacrimal gland is plays major role to maintain eye and its functions..[1]If this secretion is disturb or altered in either volume or composition, result to the disease called dry eye syndrome. In severe dry eye cases, vision threatening condition like corneal scar, corneal ulcer and loss of transparency can occur So the quality of pre- corneal tear film evaluation is most important factor in optometry and ophthalmology clinics, The technique commonly used to evaluate tear secretion is Schirmer test.[2]

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The tear film is a three layered sandwitch. lipid, aqueous and mucin layer of tearfilm.[3]

Lipid layer is a superficial outermost oily layer, which is derived from the the secretions of meibomian, zeiss and moll glands and is cover the hole free surface of tear film. This layer form by chemicals with low polarity lipids such as wax and cholesterol esters. These chemicals are stayed in fluid form at body temperature inspite of their formation like cholesterol contents and high average molecular weight, other then these few more high polarity lipid chemicals are present in negligible amount such as triglycerides, free fatty acid and phospholipids. The thickness of this layer is about 0.1µm and it depends the palpebral fissure width, i.e., it increases when the lids are partially closed. The oily layer of tear film prevents the outerflow of tears and retards their evaporation.

Aqueous layer is the middle layer of tear film and is the only layer involved in true tear flow, this layer is secreted by lacrimal and accessory lacrimal gland of krause and wollfring. Main bulk of thickness of tear film is constituted by this layer. Thickness pre-corneal tear film aqueous layer is varies between 6.5µm and 7.5µm which is uniform in nature over cornea.

This layers is low viscosity containing ions of inorganic salts, proteins, glucose, glycoproteins, lyzozomes, lactoferin aqueous solution. tear specific prealbumin and secretory immunoglobin-A are the main constituents of protein fraction, in tear fluid some bicarbonate ions and proteins were present and because of these tear fluid has buffering capacity and because in tear fluid some bicarbonate ions and proteins were present which has buffering capacity. Because some bicarbonate ions as well as proteins are present, the tear fluid has some buffering capacity.

It serves to provide atmospheric oxygen to the epithelium, washes away debris and noxious irritants and contains antibacterial substances like lysozome and betalysin [4]. The aqueous layer is the vehicle for most of tear film components and is the transfer medium for oxygen (to the cornea) and carbon dioxide (from the cornea) [4].

Mucous layer It is the innermost and thinnest layer of the tear film. It plays a vital role in the stability of the tear film. This layer is mainly secreted by conjunctival goblet cells, crypts of Henle and the glands of Manz. But mucous has also been identified both histochemically and biochemically in the secretions of main lacrimal gland. Mucin lubricates the ocular and palpebral surfaces, so that minimal energy is lost as friction during blinking and eye movements. It also provides a slippery coating over the foreign bodies, Thereby protecting the cornea and conjunctiva against abrasive effects of such particles as they move with blinking.[3]

- *Functions of Tear Film:*

It provides oxygen to the corneal epithelium.
Washes away debris and noxious irritants.
Keeps the cornea and conjunctiva moist.
Prevents infection due to presence of antibacterial substances
It provides a pathway for white blood cells in case of injury.
Facilitates movements of the lids over the globe.
The most important function is to form perfectly smooth optical surfaces on the cornea.[3]

Physical properties of tear film: Tear fluid is a clear, salty, slightly alkaline and watery. The average thickness of tear film varies from 4µm to 8µm.Volume of tear film has been reported to be 7µL with a range of 4-13µL during basal conditions. The volume is highest in young age and then begins to decline in a linear manner. This constant slow decrease in tear film volume is accompanied by signs and symptoms of dryness. In the non-stimulated subjects the average rate of tear secretion is 12µL per min, Refractive index of tear film is about 1.357 .The PH of tears is nearly 7.4 the usual range is from 7.3 to 7.7. the osmotic pressure of tear film in normal eyes is equivalent to 0.90% to 0.95% sodium chloride solution. Osmotic pressure is significantly changed with reflex stimulation of tears[3].Under basal conditions with normal blink rate, temperature of the tear film and anterior cornea with eyelids open ranges from 350 C at limbus and 300C at the center of the cornea.

Basically two types of tear secretion exists
1. Basic tear secretion 2. Reflex tear secretion

Basic tear secretion occurs normally without any stimulation and its sources are accessory lacrimal glands such as glands of Krause and wolfring. It is responsible for maintenance of moistness of cornea and conjunctiva.

Reflex secretion occurs in response to sensations from the cornea and conjunctiva, produced by evaporation and break up. It also depends on psychological (emotional) factors.[4]

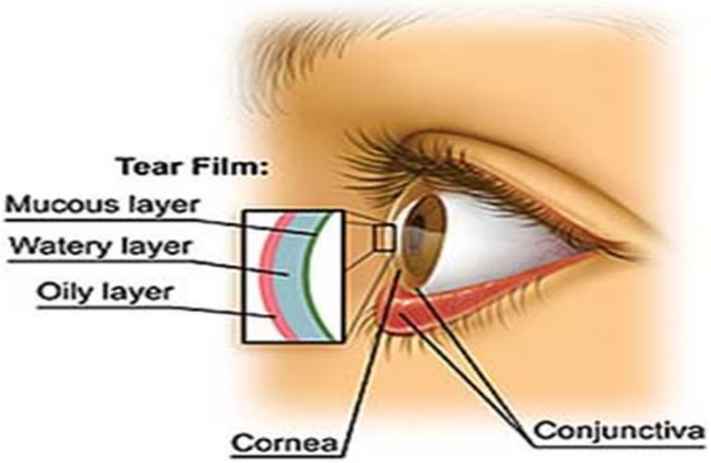

Fig 1:- Anatomy of tear film.

Fig 2:- Lacrimal apparatus

Accommodation: Accommodation is a unique mechanism by which our eyes can even focus the diverging rays coming from a near object on the retina in a bid to see clearly. Whenever, will look at near objects accommodation and convergence take place and when working on computer for long time it has been found that relative accommodation and vergenceboth will change.[5,15]

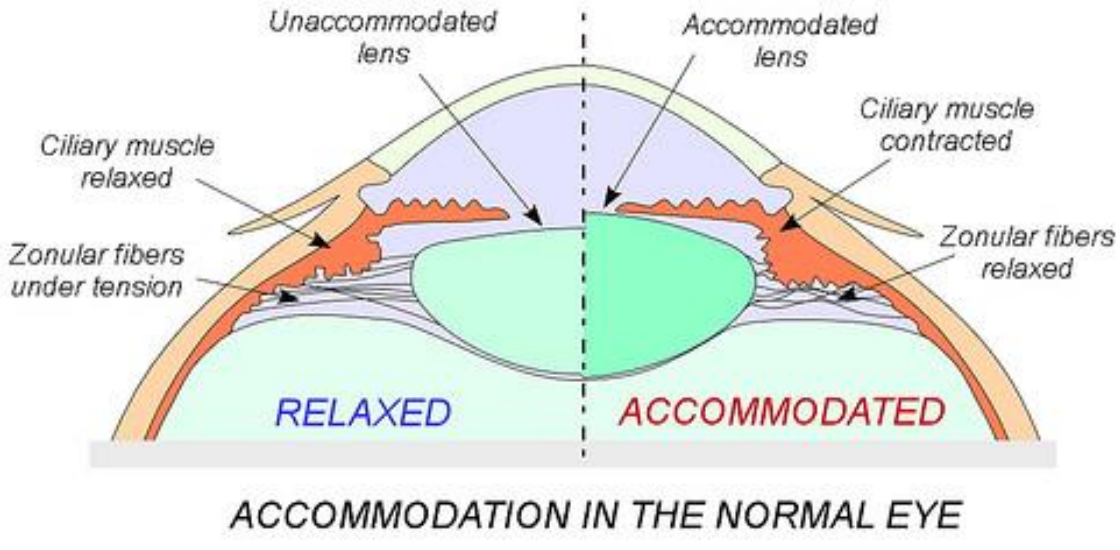

Fig 3:- Accommodation in the normal eye.

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There are actually three aspects of accommodation: the near point of accommodation(NPA), the accommodative amplitude, and the range of accommodation. The near point of accommodation is the point closest to the eye at which a target is sharply focused on the retina. The accommodative amplitude is the power of the lens that allows such clear vision. This power is measured in units called diopters (D) and is calculated by dividing the NPA in centimeters into 100. The accommodative amplitude is thus simply the reciprocal of the NPA (e.g., a patient with an NPA of 20 cm has an accommodative amplitude of 100/20 =5 D). The range of accommodation is the distance between the furthest point at which object of a certain size is clearly visible and the nearest point at which the eye can maintain that clear vision.[6]

Convergence: Convergence is a vergence adduction movement that increases the visual angle to allow single binocular vision during near vision [21]. Convergence can be voluntary and It is also reflexive and a co-movement in the near response. accommodation and convergence are related so if one will change the other will also change. Convergence may be separated into four subtypes: (a) tonic convergence; (b) accommodative convergence; (c) fusional convergence; and (d) voluntary convergence. The eyes normally tend to diverge. Keeping the eyes straight thus requires increased tone in the medial rectus muscles. This tone is tonic convergence. Accommodative convergence is the amount of convergence elicited for a given amount of accommodation. The relationship between accommodation and convergence is usually expressed as the ratio of accommodative convergence in prism diopters (PD) to accommodation in diopters that is AC/A ratio and as we know the value of accommodation decreases with age but the AC/A ratio increases with age. Convergence and accommodation both are related so both can stimulate each other thats why just like AC/A because of convergence can be stimulated by accommodation similarly accommodation can be stimulated by convergence. The ratio of convergence accommodation in diopters to convergence in PD is called the CA/C ratio.Fusional convergence is convergence that is stimulated not by changes in accommodation but by disparate retinal images. Pupillary constriction can occur with fusionalvergence, but the amplitude of this form of convergence is not as great as that of accommodative convergence.Voluntary convergence is measured by determining the near point of convergence(NPC) which is the nearest point to which the eye can converge. It is closer to the eyes than the near point of accommodation and, in general, does not deteriorate with age as does the NPA.[4,6,7]

CVS (Computer vision syndrome): CVS is also known as digital eye strain which patient are getting due to computer and its a combination of eye and vision problem, most of the indian population is using the computer or some kind of digital device (including desktop, laptop, tablets, smartphones and electronic reading devices) in there daily life more or near to 10 hours per day and they are using it from very closed distance without taking rest.

As the other study suggest that blink rate will decrease when ever persons are using digital device compare to any other reading material and less blink rate can induce the dry eye due to high rate of evaporation. Present study suggest that around 40% of adults and up to 80% of teenagers may experience significant visual symptoms(principally eye strain, tired and dry eyes) and this have significant impacts on both visual comfort and occupational productivity. Now a day all the modernisation of the society continues to turns towards even more uses of electronic devices for both work and daily activities and due to these its very difficult for the patient to get satisfy visual requirements so it can cause significant lifestyle difficulties.[22] so now it is eye care practitioners responsibility to find the related problem and its association for give proper treatments.

The ocular factors leading to CVS has been grouped into two major areas[14]:

- Inappropriateoculomotor responses
- Dry eye

- Environmental factors can cause corneal dryness because of low ambient humidity
- Increased corneal exposure because most of the time eye is in primary position while using computer and it leads to more eye area open most of the time.[10]
- Age and gender, woman are more prone to get dry eye compare to man. (Gayton 2009; Salibello and Nilsen 1995; Schaumberg et al. 2003).
- 4. Systemic diseases and medications, it has been reported that people with arthritis, allergy or thyroid disease are more prone to get dry eye and similarly some medication like antihistamines,antidepressants, oral steroids or vitamins can leads to dry eye

Video display terminal(VDT)[11] is commonly known as computer screen. The computer has become a common item used in day today life in today s society.On the other hand computers have increased the work efficiency .

- *The blue light and theory behind the blue light effect:*

As per the current study we know that blue light emit from digital displays and this study suggested that it can cause dry eye syndrome but still there is not proper evidence or published paper to support this dry eye syndrome cause. Wavelengths between 380 to 500nm is generally considered as blue light.

Fortunately, eyes have inbuilt wavelengths absorbing capacity, cornea absorb 295nm and crystalline lensabsorbs below 400nm, which will protect retinal damaging from short-wavelength radiation. As we know shorter the wavelengths higher the energy so if the eye expose to short wavelength of light for less time still it can cause harm photo chemically to the eye.

As per the present study blue light can implicated in the development of age-related macular degeneration, visible blue light can easily enter to the eye and reach to the

retina and can cause oxidative changes in photoreceptor and retinal pigment epithelium layers (Taylor et al. 1990)

Few group of case may get more damage compare to others from blue light such as aphakia, pseudophakia, children (because of the transparency of their crystalline lens) and individuals who either cannot filter out short wavelengths of blue light, or fail to do so adequately.[12,13,14]

Asthenopia: Athenopia means group of symptom in which commonlyassociated with this diagnostic term included eye strain, eye fatigue, discomfort, burning, irritation, pain, ache, sore eyes, diplopia, photophobia, blur, itching, tearing, dryness and foreign-body sensation. During asthenopia effects investigation several symptom appears and many study find out that mainly two categories of symptom existed,

First group termed external symptom included burning, irritation, ocular dryness and tearing, and was related to dry eye.

The second group, termed internal symptoms, included eye strain, headache, eye ache, diplopia and blur vision.

These symptom is generally caused byvergence or accommodative anomalies and refractive errors. Identifying of this problems very important for the treatment so many study proposed that these underlying causes could beidentified by the symptom description and location and with the help of we will be able to give proper treatments.[6,16,17]

II. REVIEW OF LITERATURE

There are many literature regarding the computer vision syndrome, accommodation and dry eye and the relation between them but very few are available for accommodative facility and tear film which is directly related to dry eye.

Gratton, as per his study near work can change in accommodative resting sreps restingstate of accommodation for distance viewing after 6 hours of work.found adultsusing visual display terminal 6.9+/-2.6 hours/day, accommodative infacility as most common ocularchanges.[18]

Cardona G conducted study on blink rate & amplitude on 25 individual of computer users and concluded that performing visual display terminal task suggesting a negative influence & frequent breaks and blinking awareness training are recommended.Blink rate, blink amplitude, and tear film stability were compromised during the most dynamic visual display terminal task,Statistically significant differences were revealed in blink rate ($F = 595.85$, $p < 0.001$) and blink amplitude ($\chi 2 = 34.00$, $p < 0.001$), with blink rate during fast- and slow-paced game play decreasing to almost 1/3 and 1/2 of baseline levels, respectively, and with a larger percentage of incomplete blinks during dynamic tasks.[19]

Rafael Iribarren, in this study shown that visual symptoms are related with accommodative infacility and most common symptoms are eye fatigue, eye strain, blur vision especially when looking across the room, and headache.[20]

Rosenfield done the study on Computer vision syndrome (CVS) and it is a mixture of eye and vision problemsexperienced during computer use in upto 90% cases and as per the present study it has been found that the main cause of getting this syndrome is related to accommodation or vergence but there is very few evidence are present to support this claim, the aims of this study were to find out whether patient with computer vision syndrome have really abnormal accommodative facility and to identify whether computer user produces a significant change in either of these ocular problem and the finding were shows that mean values of monocular and binocular accommodative facility and vergence facility are same before and after computer uses, when considering the most prevalent ocular symptoms in CVS are reported such as tired eyes, dry eye and eyestrain, there was a significant positive correlation between pre-task vergence facilityreported the most severe ocular CVS symptoms.[8]

Mark Rosenfield, CVS is the combination of eye and vision problems associated with the use of computersbecouse of the reduced blink rate and increased corneal exposure. Rosenfield has taken (N=520; mean age = 39.3 years) office workers. The most prevalent symptom associated with CVS was tired eyes, which was reported by 40% of subjects as occurring "at least half the time". 32% and 31% of subjects reported symptoms of dry eye and eye discomfort, respectively, with this same frequency. A significant positive correlation (r=0.93) was observed between CVS symptoms and the OSDI. Based on the OSDI data, 21%, 12% and 18% of subjects had mild, moderate and severe ocular surface disease, respectively [9]

AlperYazici, Here the Alper had find out thatchanges in ocular symptoms and tear film characteristics in 51 young computer users before and after the use of video display terminal (VDT). Computer use duration, Ocular Surface Disease Index (OSDI) questionnaire, tear osmolarity, Schirmer test, tear break-up time (TBUT), and ocular surface vital dye staining were performed pre and post uses of computer to check the abnormality because of prolonged computer uses. The mean age was 31.2 (SD ± 6.3) years in computer users and 33.7 (SD ± 5.8) in controls. The mean reported computer use was 6.9 (SD ± 2.7) hours/day in computer users and 0.4 (SD ± 0.5) hours/day in controls. The mean value ofpre and post uses of computer values in computer users for OSDI were 23.2 (SD ± 16.6) and 27.0 (SD ± 17.6), osmolarity306.6 (SD ± 14.9) and 311.0 (SD ± 12.5)mOsm/L, TBUT13.9 (SD ± 4.0) and 13.2 (SD ± 3.8) seconds, and Schirmer test 22.7 (SD ± 11.8) and 20.6 (SD ± 12.5) mm, The vocational change was

significant for all parameters in the computer user groupand as per this criteria Alper concluded that both symptoms and signs of dry eye increased significantly with computer use. Approximately out of every three to four computer users one was found to have dry eye with higher tear osmolarity values.[10]

III. METHODOLOGY

➢ *Aim:*

To assess the accommodative facility & evaluation of tearfilm in digital screen users of prolonged duration of time in the age group of 18-30 years of irrespective genders.

➢ *Objectives:*

- To find out the near point of accommodation before and after prolonged digital screen users and relation between them
- To find out the monocular and binocular accommodative facility and relation with VDU users
- Find out the relation between NPA and Accommodative facility with dry eye

Design of this study: Prospective Cross sectional
Time period of this study: 6 months.
Sample size :- 57 Subjects

➢ *Inclusion criteria:-*

- Emmetropes of refractive error <+/- 0.50D spherical equivalent
- Willing to give consent or participate for study
- Computer desktop,laptop users for prolonged duration.(6-7 hrs)
- Age group between 18 – 30 years.

➢ *Exclusion criteria:-*

- Ocular pathology
- Any binocular anomalies
- Contact lens users
- Computer users less than 6 hrs

IV. PROCEDURE

After filling the questionnaire each steps will be followed by each patient would undergo through detail history taking, visual acuity measurement &refraction ,binocular balancing, amplitude of accommodation will be measure in push up method over full correction, average of three reading will be taken to indicate the binocular amplitude of accommodation.Accommodative facility will be measured with flippers of +/- 1.50D .Tear film stability check by TBUT method and tear volume by schirmers 2 procedure .A negative value (more than 10mm of secretion of tear of moisture on the schiermer paper in 5 min) test result is normal.Both eyes normally secrete the same amount of tears.And also normal TBUT value of 15-45 sec is considered as normal .TBUT less than of 10 sec is abnormal. If variation persist conclusion and also indigital screen users that evaluation changed symptoms & tear film character in young age people of computer users will give the data of this study and the significant for intervals in duty timings will be made mandatory.

NEAR POINT OF ACCOMMODATIVE MEASUREMENTS done by RAF ruler Push-up method, Bring a target closer to the patient's eyes till it first sustained blur is noticed.

AMPLITUDE OF ACCOMMODATION MEASUREMENTS done by the help of RAF ruler Push-up method, Expected amplitude and age, Hofstetter formulas(using the obtained information of Donders,Duane and Kaufman)Used Probable amplitude = 18.5-0.3×(age)

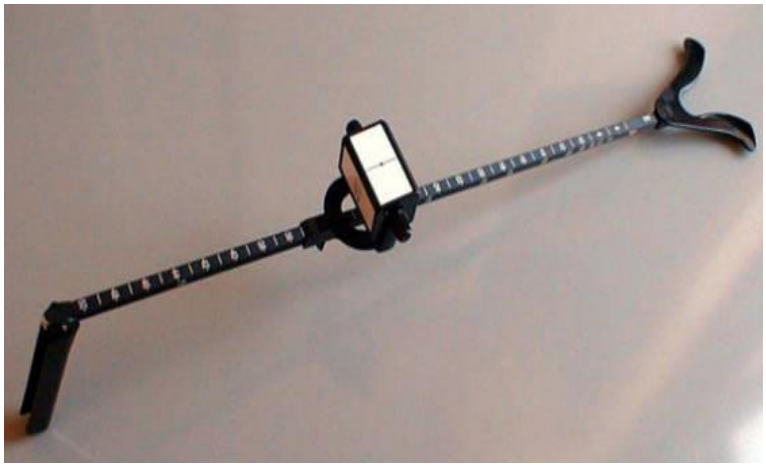


Fig 4:- RAF rulerFig5:- Accommodative Flipper

ACCOMMODATIVE FACILITY FLIPPER :This measures the value and range of accommodation changes that the patient sees and still maintain to view a single clear image.Dynamics of accommodation can be assessed by testing accommodative facility, accommodative flipper of + 1.5DS with -1.5DS is used to test accommodative facility by rapidly flipping the lenses monocular and binocularly and no of cycle recorded

SCHIRMERS TEAR PRODUCTION TEST : Schirmer 2 with anesthetic measures aqueous tear production of baseline secretion with schirmers strips, The schirmer strip is bent by pressing from below and 5mm from one end and kept in the lower fornix at the junction of lateral one third and medial two third , Tears collected in the conjunctival sac will wet the paper strip.After duration of 5 minutes, the filter paper is taken out and the distance of wet paper

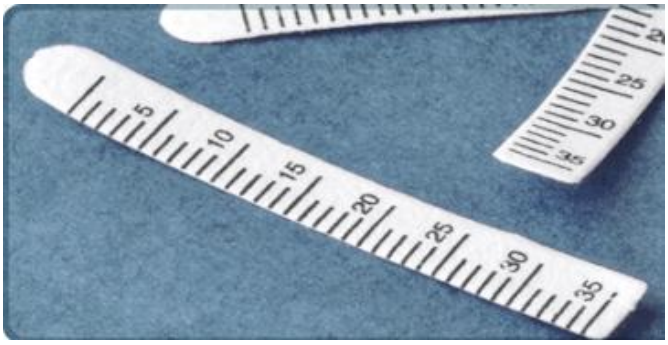


Fig 6:- Schirmers strips for evaluation of dry eye

Fig7:- Fluorescein strips

TBUT TEST : TBUT is done to check the quality of tear film in the eye. 2% of fluorescein is instilled in lower fornix and ask patient to blink ,andtearfilm is checked using the slit lamp instrument with a cobalt beam using the diffuse light pattern .After an certain period,black spot or thin lines appears in the fluorescein colour stained pattern film-dry areas.

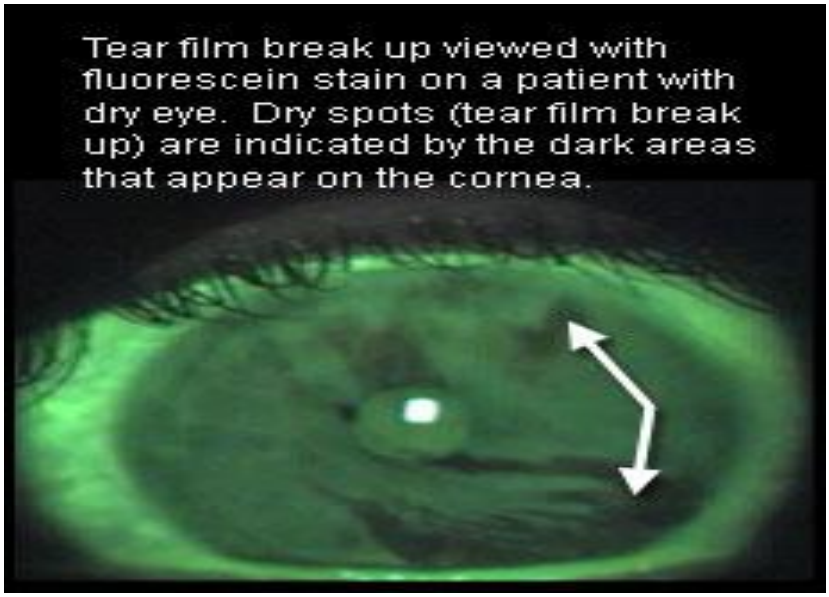


Fig 8:- TBUT dry spot.

V. STATISTICAL ANALYSIS

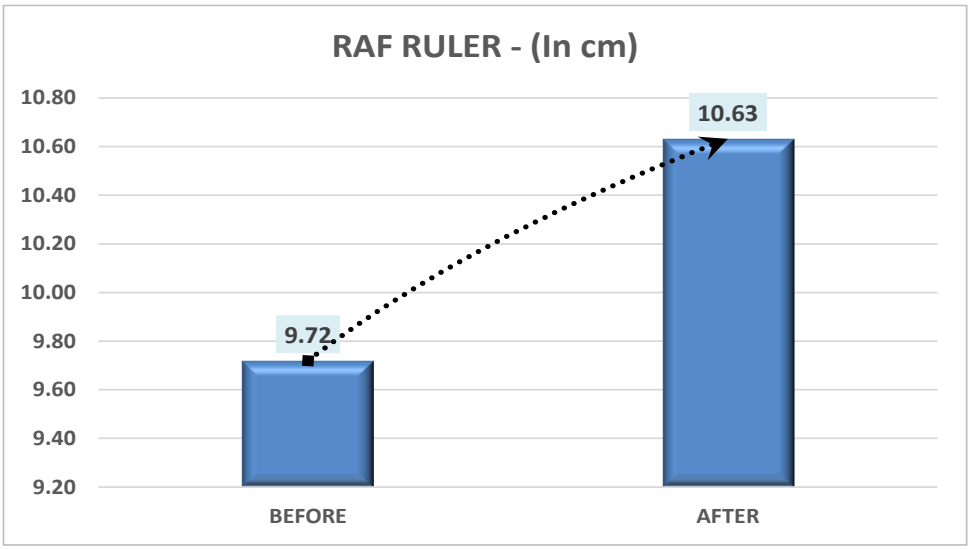
All statistical analysis were performed using the Commercial software from IBM SPSS STASTICTS V20 Data was checked and analyzed with the p (probability) value < 0.05 is calculated significantly.

VI. RESULT

Total 57 digital screen user subjects were included in the study . Among them were 43 male and 14 female .Mean average age of the subjects were 25.05 years(SD+-3.44).Irrespective of gender.

➢ *Graph : 1*

Single bar graph indicates the mean of Near point of accommodation (by RAF ruler) is 9.72 cm before the use of digital screen is increased to 10.63 cm after the usage of 6-7 hours of computer is with a difference of 0.91 cm.Which indicates the increment in the values thereby decreasing the accommodative point binocularly.

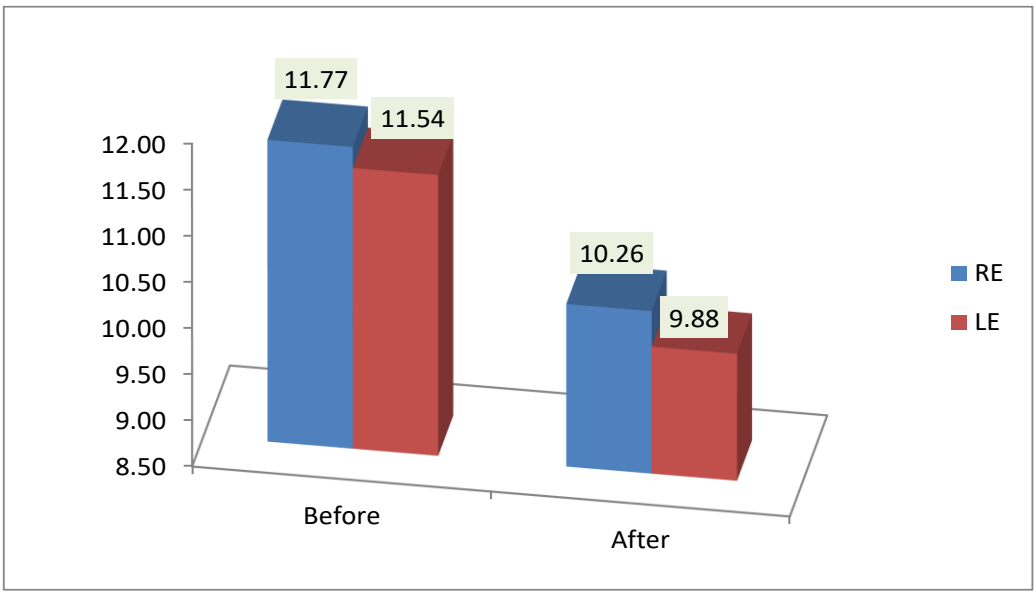


P value of 0.003183> 0.005.

Graph 1

➢ *Graph : 2*

Both mococular and binocularly Accommodative facility was tested in computer users before and after 6-7hrs of computer usager (by using Flippers of +/-1.5Ds) in the study was found to be 9.70cpm in morning is decreased to 8.17cpm on average binocularly.(In the graph blue coloured bar represents RE values and red colour indicates LE values) In Monocular estimation RE 11.17cpm is decreased with a mean value of 10.26cpm and LE 11.54cpm is decreased to 9.88cpm which is statistically significant with the p value : 0.000521 .

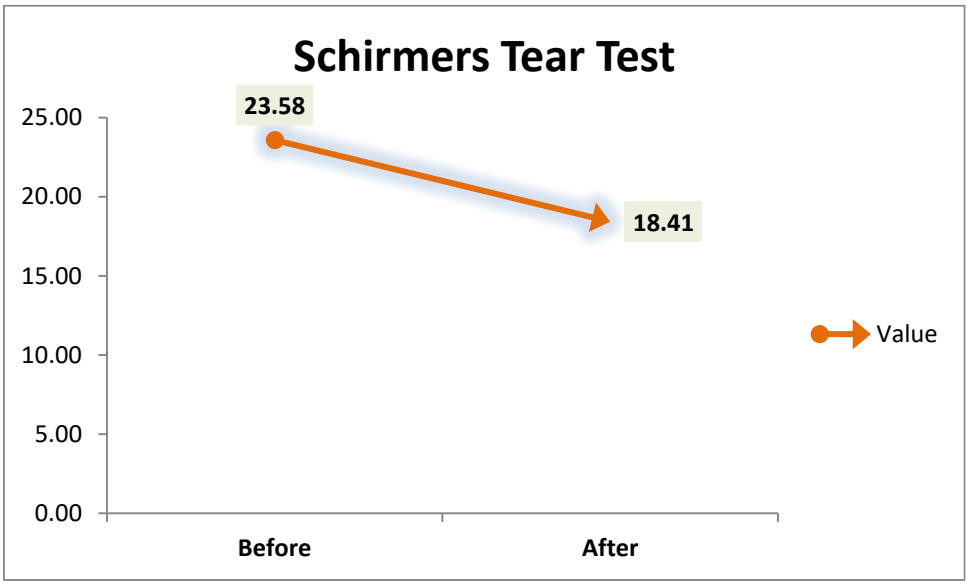


p value of 0.000521 > 0.005 .

Graph 2

➢ *Graph :3*

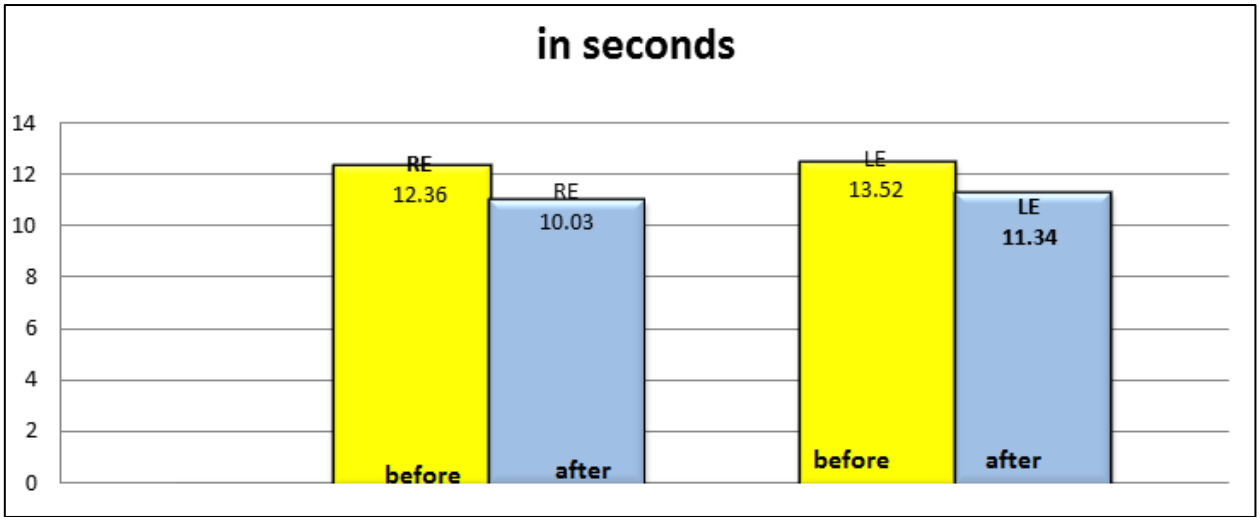
Vector graph indicates the Value of Secretion of tears done by using Schiermer'sstrips is declined from mean SD of 23.58mm to 18.41mm gradually after 6-7 hrs of usage of computer system in computer users,here the volume of tears is measured morning before they start performing their work and again evening it is tested before they are leaving to their home.



Graph 3

➢ *Graph :4*

In this bar graph yellow colour indicates before computer using measurements and blue indicates after the computer usage values and Tearbreakup test reveals the decrement in time from mean 12.36sec to 10.03 sec in RE and 13.52sec to 11.34sec in LE gradually By noticing the spot on the cornea with the help of fluorescein stain that is first appearance of dry spot on cornea(tearbreakup)which indicated the reduction in time of dryness of cornea and also p value of 0.00536 which is > 0.005 which is statistically significant.



P value of 0.00536 > 0.005.

Graph 4

VII. DISCUSSION

Computer vision syndrome, is a condition resulting as digital eye strain, is the set of eye and visual problems joined with the use of computers and other electronic display systems . Today, many people spend so many numbers of hours viewing these digital screens. However, the visual requirements changes drastically from those presented by traditional old method of printed book materials,as the result that more than 80% of users says significant set of symptoms both during and immediately after viewing electronic digital screen gadgets. This project paper explains the principal ocular systems for this condition, and describe how the standard eye examination should be changed to meet today's scenario.

Amplitude of accommodation is not a fixed quantity, it varies primarily with age, but it is also decreasing with the amount of stress given to the eyes by the digital gadgets. Also a number of researchers have indicated that ocular symptoms occur in 70-90% of VDU users.

The most common ocular symptoms in was tiredness and headache but in this study it was found that symptoms of burning sensation and irritation is more common .So a mandatory break in their work duration should be given and the importance of taking care of ocular health is very important so that has to be explained and trained in detail to the employees by giving a pamphlet written in detail of sitting posture along with tips to combat CVS is mentioned in detail and said to put in front of noticing cabin place so they remember of washing eyes and sitting posture alignment can be done in pause period of the staffs in their free time

VIII. CONCLUSION

The results of the study indicated the normal values of AA accommodation is lowering by the continuos usage of Digital gadgets as well as decreament in tear volume is also noted ,It is important to take account of this point when testing for IT Company employees & long time gadget users & explaining the significance is very important for diagnostic decision.The treatment needs to be designed particularly to the individual separate patient ,however a large body of work is still required to uncover gaps in our understanding of the problem. A special ocular designed examinations for computer users and along with it the counselling about the current good practices in computer use would go a long way in preventing the loss of productivity and rate of being disease from this conditions.

The current idea needs to be shared along with the quality or state of being closely connected or appropriate and importance that it deserves.It may be that the technological revolutionary changed through which we are now living may be seen in the future as equal to the industrial revolutionarized change of th 19th century.

Clearly,technology will stay forever but we should be aware of how to use it wisely. However, the demands of visual need of today are very different from those encountered in the past decade.Electronic devices differ significantly from printed materials in books in terms of their viewing distance, required viewing gaze angle, degree of symptoms and blink patterns. Accordingly, the eye examination must be modified to meet these new visual demands .

The optometrist should approach this syndrome complex more scientifically to explain patients to make best possible usage of digital systems,which are there to stay in a big way ahead for the future.

LIMITATION

There is no consideration of data collected in middle of their work period because of company guidelines allowance to perform the eye test several times in working hours.

On different environment of AC users and non AC users are not performed.

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