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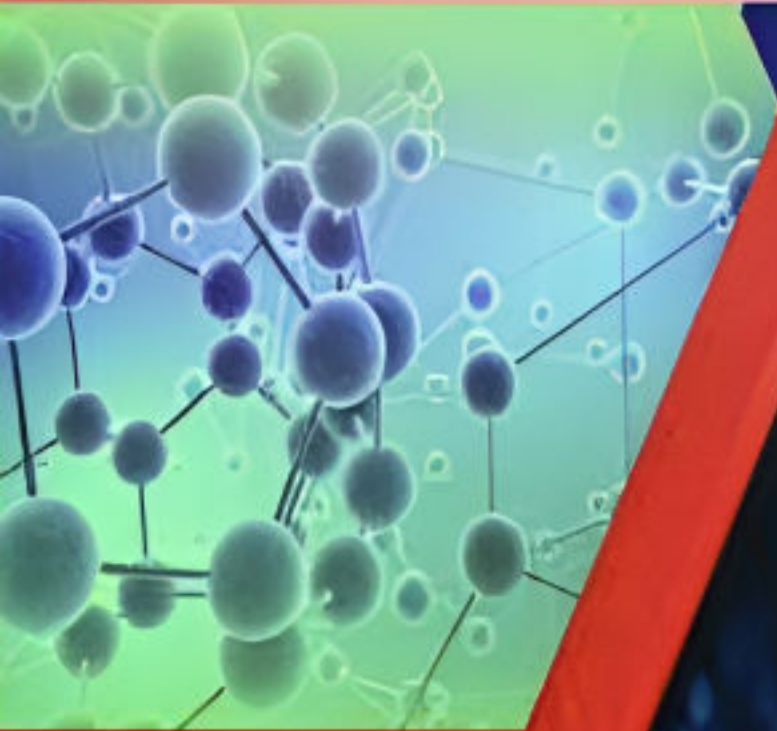
**TITLE:** EFFECT OF EMPAGLIFLOZIN VS PIOGLITAZONE VS METFORMIN WITH URSODEOXYCHOLIC ACID AND VITAMIN E IN NON-ALCOHOLIC FATTY LIVER DISEASE AND NON-ALCOHOLIC STEATOHEPATITIS IN EGYPTIAN PATIENTS WITHOUT DM

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# Study of Prevalance of Computer vision syndrome in BE Computer science students during COVID Pandemic.

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**INTRODUCTION:**

•        Computer vision syndrome (CVS) is defined as a complex of eye and vision problems resulting from the activities which stress the near vision during the use of the computers and digital screens.

•        Vision gets affected because of interaction with digital screens, computer display or their environment.

•        The daily use of personal computers and digital screens for 3 hours or more makes the person is at high risk of developing CVS, Occupational Overuse Syndrome (OOS), headache & psychosocial stress .

•        In modern days, millions of people including children &students are accustomed to use the digital screens &computers for very long hours.

•        A video display terminal is now considered as a computer screen.

•        The new bad habits of the school and university students to study their subjects using the computers instead of the classic book studies have made the things worse.

•        In addition they are playing games &watching movies on the digital screens .

•       CVS is also known as Digital Eye Strain (DES).

•       CVS/DES is usually related to watching the computers or digital screens that make the near work of the eye more difficult.

•       The high visual requirements and visual attention makes any computer user susceptible developing DES.

•       The main symptoms of CVS are eyestrain, headache, blurred vision, tearing, burning of eyes, watering of eyes, photo phobia, red eyes, burning, itching, neck and shoulder pain, and contact lens troubles .

•       The possible pathophysiological mechanism  of CVS is three mechanisms:

1.Extraocular mechanism, 2.Accommodative mechanism & 3.Ocular surface mechanism.

•       1/more factors could be responsible for the development of CVS.

•       These factors are infrequent blinking, uncomfortable sitting position, prolonged continuous looking at the digital screens, improper illumination, ammetropia, glare &incorrect distances between the eye &the computer.

**AIMS AND METHODS**:

AIM:To evaluate the prevalence of computer vision syndrome in Computer science engineering students during COVID .

CVS Survey Questionnaire Form

•       The authors in this article created a new survey questionnaire which was an own-made one designed especially for this study concerning the CVS survey. The questionnaire form included 20 questions designed by the authors and related to the personal data and habits of the students. To facilitate the recording and the interpretation of results the authors used the term 'screen-hours' to describe the number of hours the student spend every day on his computer or smart phone screens. Meanwhile, the authors use the term 'screenyears' to describe the number of years the student previously spent watching his computer or smart phone screens with his/her routine screenhours.

•       These 20 questions included age, gender, the frequent computer digital screen use, the hours the student spend every day on his screen, the hours the student spend on his screen in dark room, whether the student screenhours are continuous or interrupted, the illumination level of the screen in room light, the screen-hours the student spend more during the day or at night, the

presence of any symptoms of complaints related to CVS, whether the student using eye drops or not, whether the student is suffering from dry eye disease or not, the presence or absence of the refractive errors, whether the student is using glasses or contact lenses, whether the student is seeing the details of objects clear or hazy after prolonged screen-hours, any complains in the fingers, wrists or shoulders of the student using smart phones, the number of screen-years the student spent on his screen, whether the student is using touch screen, touch pad, note pen or the mouse and keyboard, whether the student believes that CVS affects his life style and eye health or not and finally whether the student is willing to decrease his screen-hours in the future.

Methods

• A cross sectional study to evaluate the Prevalance of Computer vision syndrome in Computer science engineering students during COVID Pandemic.

• Participants were enrolled by non probability convenience sampling.

• An electronic survey adapted from previous literature research on CVS was used for data collection.

• Microsoft Excel (Microsoft Office 2010) was used to get the CVS Excel sheet that was used by authors for data input to enter the answers of the CVS questionnaire form fulfilled by the students.

• Thereafter, the data in the CVS Excel sheet was used for statistical analysis of the results of the CVS questionnaire form.

• CVS symptoms are categorized into ocular and extraocular.

• Ocular symptoms include dry eyes, red eye, burning sensation, foreign body sensation, blurred vision and increased sensitivity to light, excessive tearing, itching, ocular pain,change in visualizing colors,and double vision.

• Extraocular symptoms include head ache,neck,shoulder, or back pain; and numbness of the hands or fingers.

• The survey included demography, refractive errors, using spectacles or contact lens for vision correction, duration of studying using

computers,frequency and duration of breaks, seating posture and source of illumination, using anti glare screen, frequency of CVS symptoms experienced on continuous computer work, and preventive measures taken to reduce the symptoms.

• The inclusion criteria were all consented volunteer students who are studying computer science in engineering college who use their laptops or tablets during studying for at least six months prior to the study.

• Data were analyzed using Statistical Package for Social Sciences (SPSS v21).

• The chi-square test (Fisher's exact test when required) was used to study the significance of associations.

• P value<0.05 was considered statistically significant.

**Results**

• A total of 169 participants were invited to participate in the study.

• So, this study included 20 questions. The structure of many questions of this questionnaire allowed the computer science engineering students to choose more than one answer for the same question which explains the presence of different percentages for the same question.

• The first question was about the age of the students and the age ranged between 18 and 24 years, with a mean of 21 years.

• Prevalence of 76% CVS was observed, in which students reported at least one symptom of CVS during studying using computers.

• Prevalence was highest (34.9 %) among those aged 20 years or more and lowest (2.4%) among those aged 24 years.

Age (between 18-24 years)

• 6.5%(11) people were aged 18 years

• 13.6%(23) people were aged 19 years

• 34.9%(59) people were aged 20 years

• 31.4%(53) people were aged 21 years

• 7.7%(13) people were aged 22 years

• 3.6%(6) people were aged 23 years

• 2.4%(4) people were aged 24 years

**Sex**

• The second question was about the gender and the results were

53.3% (90) were females, and 46.7% (79) were males;

• In regard to demographical data in this study, female gender (56.3%)

(72) was observed to have higher risk of CVS (P =0.092).

**The frequent computer digital screen used**

• The third question was about the frequent computer digital screen used by the engineering students and the results were-Laptop was used by 113 students.Android was used by 98 students.Ordinary computer screen was used by 29 students.

• Tablet/I Pad/Note were used by 12 students

• I Phone was used by 5 students

Hours spent on the digital screen during day time

• The fourth question was about how many hours the students usually was spending on their digital screens. The results were- 48 students spent 2-3 hours.

• 16 students spent 1-2 hours

• 51 students spent 3-4 hours

• 38 students spent 4-6 hours

• 27 students spent >6 hours

• 9 students spent <1 hours

Hours spent on the digital screen in dark room

• The fifth question was about how many hours the students used to spend watching their digital screens in the dark room. The results were 66 students spent <1 hours

• 54 students spent 1-2 hours

• 40 students spent 2-3 hours

• 16 students spent 3-4 hours

• 4 students spent 4-6 hours

• 1 student spent >6 hours

**Hours spent on the digital screen**

• The sixth question was about whether the hours the engineering students used to spend on their digital screen continuous or interrupted. The results were Continuous in 69.6%(117)

• Interrupted in 30.4%(51)

**To what level you illuminate your digital screen**

• The seventh question was about the level of the illumination of the digital screens that the students used to in the room light. The results were -

• <10% was used by 11.2%(19)

• 11-25% was used by 35.9%(61)

• 26-50% was used by 35.3%(60)

• 51-75% was used by 15.3%(26)

• 76-100% was used by 2.4%(4)

Screen usage time during night/ morning

• The eighth question was about the most preferred time for the students to use their screens during the day or the night. The results were-44.6% (75) during both day & night time.

• 41.7%(70) during both day time.

• 13.7%(23) during night time.

**Symptoms**

• The ninth question was about the symptoms related to CVS that the students complained of.

• The most commonly reported complaint was headache (47.7 %), followed by neck and shoulder pain (39.1 %), whereas the least common complaint was double vision(1.6 %).

Symptoms

**Do you have a previously diagnosed dry eye?**

• The tenth question was about the presence of a previously diagnosed dry eye disease. The results of this question were 8.9% of the students had dry eye. 91.1% of the students did not had dry eye.

  Yes

No

Usage of topical eye drops for dry eye

• The eleventh question was about using any topical eye drops as a treatment for this previously diagnosis dry eye. The results of this question were the 91.1% of the students did not use any eye medication. 8.9% of the students used topical eye drops.

  Yes

No

Do you have any refractive errors

• The twelfth question was about the presence of any refractive errors. The results of this question were 14.3% of the students had refractive errors, 85.7% of the students had no refractive errors while 9% of the students did not know their refractive status.

  Yes

No

Usage of glasses or contact lenses

• The thirteenth question was about wearing glasses or contact lenses. The results of this question were 14.3% of the students were wearing glasses or contact lenses while 85.7% of the students were not wearing any glasses or contact lenses.

  Yes

No

**Prolonged usage of digital screen the object to eyes get**

•       The fourteenth question was about the descriptions of the details of the objects after prolonged hours of using the digital screens. The results of this question were- Clear among 50.3%(76) students.

•       Blurred among 17.9%(27) students

- Hazy among 31.8%(48) students

After prolonged use of smart phone

- The fifteenth question was about the presence of any complains after using the smart phones for prolonged hours. The results of this question were -28 students had shoulder pain

- 24 students had joint pains in fingers and wrist

- 10 students had inability to hold objects

- 6 students had difficult to write using pen

- 112 students did not have any problem

Years spent using screen

- The sixteenth question was about the years each student spent this way and these hours on the digital screens. The results of this question were- Nearly 1 year by 23.8%(39)

- Nearly 2 years by 33.5%(55) • Nearly 3 years by 25%(41)

- Nearly 4 years by 12.8%(21)

- Nearly >5 years by 4.9%(8)

Gadzet used by students were

- The seventeenth question was about the type of the digital screen the students frequently used during these years. The results of this question were- Touch screen by 143 students.

- Touch pad by 15 students

- Note pen by 5 students

- Mouse and key board by 62 students

Students studied the subject using

- The eighteenth question was about the usual tool used by the students to study the subject. The results of this question wereScreen by18.9%(32) students

- Books by 8.3%(14) Students

- Both screen and books by 72.8%(123) Students

Students feeling digital screen affects the eye health and life style

- The nineteenth question was about the feeling whether the digital screens affected the life style and the eye health of the students or not. The results of this question were Present in 78.7%(133)

- Absent in 21.3%(36)

Students willing to decrease screen hours to guard against CVS

•	The twentieth question was about the willing of the students to decrease their screen hours to guard against CVS. The results of this question were Students willing to decrease screen hours to guard against CVS were 80.5%(136)

•	Students not willing to decrease screen hours to guard against CVS were 19.5%(33)

Discussion

•	Among the 169 students enrolled in the study a low prevalence of CVS 76% is reported. A study by Hassan et al. who reported a prevalence of 90.5% among medical students in Pakistan. Reddy et al.

also provided a prevalence of 89.9% among university students in Malaysia. A lower prevalence was observed in studies among engineering and medical students(67.2% and 77.4%, respectively) .

•	In regard to gender,females were observed to have more risk of CVS. This association agrees with the findings by Guillon and Maɪssa who studied the effect of gender on tear film evaporation, which showed a significant high evaporation rate in females, thus higher risk of CVS . In addition, Straker et al. studied the association between gender and posture during computer use, which concluded that females had greater prevalence of neck/shoulder pain.

•	Other studies in Sri Lanka, India, and United Arab Emirates also support the significantly high CVS prevalence among female computer workers, with significantly higher headache and blurred vision incidence .

•	In contrast, males were found to have higher risk of redness, burning sensation, blurred vision, and dry eyes among medical and engineering students in India.

•	Students in this study were relatively young,with a mean age of 21 years. No significant associations were found between the year of engineering school and the age with CVS. However, Ranasinghe et al. found a significantly higher prevalence of CVS among those aged more than 40 years compared with those aged less than 20 years.

•	Guillon and Ma¨ɪssa also noted a significantly higher tear film evaporating rate in patients older than 45 years compared with younger individuals, which exaggerate symptoms of dryness associated with CVS.

•	The most frequently reported extra ocular symptoms is headache. Head ache is the most commonly reported extraocular symptom in some studies . Headache is explained in CVS patients by the constant need to adjust the eyes by contracting the extra ocular muscles and ciliary muscles to maintain the lens in the accommodating phase.

• Difficulty in refocusing the eyes is seen in 18.9%.Through out the time,focusing and refocusing are required repeatedly to see in different distances from the screen to the keyboard and to work documents, leading to eye muscle fatigue causing headache .

• Other musculo skeletal symptoms are well related to improper seating posture and placement of the screen .

• It is note worthy that extraocular symptoms were reported more frequently than ocular symptoms in our study.

• This is in line with a study performed by Logaraj et al., in which neck and shoulder pain and headache were more frequently reported than ocular symptoms

• In contrast,a study by Noreen et al. indicated that ocular complaints (55%) were higher than headache, and neck, shoulder, or back pain (12%) in medical and dental students .

• Among the extraocular symptoms, Followed by headache in 47.7%, neck, shoulder, or back pain was the common symptom in 39.1%, and joint pains of the hands or fingers in 14%. The first two were associated significantly with short distance from the screen.

• Eye strain was experienced by 36.1% of students and blurred vision in

29.5%, both associated significantly with improper Illumination.

• Blurred vision could be explained also by inaccurate accommodative response and failure to relax after prolonged near-vision activities.

• Increased sensitivity to light was observed in only 6.2%, specifically and significantly among students using higher screen brightness and higher level of the screen from the eyes.

• Double vision were reported by 1.6% which was correlated significantly with improper room illumination and not using screen filters.

• The most statistically significant risk factors were duration of studying,followed by distance from the screen and brightness of the screen.

• Duration of studying using computers was the most significant risk factor, in which the longer the time spent, the more prevalent and extent are symptoms.

• This finding is consistent with the findings of Hassan et al. and a report by the American Optometric Association .

• Furthermore, Noreen et al. and Logaraj etal. reported that among CVS-positive group,students who spent more than four hours were at significantly at higher risk of CVS than who spent less than four hours.

• Strengthening the fact, Reddy et al. found a significantly higher CVS among students who used computers for more than two hours.

• It was also observed that the longer the duration,the longer the complaint last even after work.

• The frequency of taking breaks were not associated significantly with CVS, which is supported by the same finding in previous studies.

• In contrast,Hassan et al. found that taking short breaks every 30 minutes every hour decreases visual discomfort . Students who were not taking breaks at all during studying (69.6%) associated significantly with tearing, and neck, shoulder, or back pain.

• Strengthening the fact, visual symptoms reported significantly among users who were not taking frequent breaks in previous studies .

• No significant association was noted regarding the source of lightning and development of CVS in this study. Nevertheless, the screen brightness and the room illumination should be balanced,working facing an un shaded window or using desk lamps or an overhead lightning contribute significantly to CVS problems.

• Screen brightness was associated significantly with the developing of CVS in our study. Specifically, higher brightness was correlated significantly with increased sensitivity to light. Similarly, higher brightness increased the incidence of headache among university students in Ajman. In addition, using computers in dark screen increased the incidence of dry eyes as found by Shantakumarietal. study.

• Dry eyes was seen in 13.1% of the students & Eye redness or irritation is seen in 18.9% of the students.Shantakumari et al.added that the risk of developing tired and dry eyes was increased among students not using screen filters .

• Upon assessing the preventive measures taken by students to prevent CVS-related symptoms, a significant association was noted among students who applied the 20-20-20 rule and the reduced risk of CVS. Furthermore,using screen filters might help reduce glare and reflections from the screen, especially in situations when sitting with the back to an unshaded window .

• Similarly, a study showed that taking frequent breaks every hour for five minutes decreases the discomfort associated with CVS . Reddy et al. added that looking at far objects frequently during work associated significantly with less frequent CVS symptoms .

• Applying this rule showed improvement in work efficiency in previous studies. Proper location of the screen is another measure that showed significant correlation with reduced risk of CVS.

• Other measure showed no significant association.

•        Noticeably, most of the students neglected the frequent blinking and using screen filters. Hassan et al. found that most of engineering students were not aware of the correct sitting position.

•        Rana singhe et al. also provided that knowledge of ergonomics practice was higher among the mild-moderate CVS group than those reported sever CVS symptoms . Limitations of this study include a cross-sectional study design conducted in a single center and CVS diagnosed based on self-reported symptoms without ophthalmic examination.

**Conclusion:**

•        Nearly 60 million people suffer from CVS globally, it is noted from the study that good knowledge is associated with good attitude and higher ergonomic practices.

•        This study proved that CVS is a common syndrome that is simply misdiagnosed.

•        Based on the survey performed in this study, 76% of the engineering students were complaining of one or more of the CVS manifestations. Therefore there is urgent need to educate computer engineering students regarding computer vision syndrome.

•        This study recorded that dry eye, blurring of vision, eye strain and headache were the most common CVS symptoms. This study recommended performing larger studies including many universities in India, provided that the future studies should include both objective and subjective examination tools.

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