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Assessment of Self - Rated Computer Vision Discomfort, Knowledge and Stated Preventive Measures among Computer Users: A Descriptive Study

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Abstract: ***Introduction****: Nowadays, most of the jobs requires one to stare at the computer screens for hours at a time. That can put a real strain on one's eyes. In keeping with the health care system, it is necessary to detect self - rated computer vision discomfort, knowledge and stated preventive measures among computer users.* ***Objectives****: The study was conducted to assess the self - rated computer vision discomfort, knowledge and identify the stated prevention measures regarding computer vision discomfort among computer users of Engineering Works Pvt. Ltd in West Bengal.* ***Methods****: A descriptive research survey design was adopted. Data were collected in 2023 through utilising of CVS Questionnaires (CVS - Q) and Structured questionnaire to assess knowledge and identify stated prevention measures with 75 computer users of Shubhapuspa Engineering Works Pvt. Ltd. in West Bengal. Descriptive and inferential statistics were used to analyze the data according to the objectives of the study. Results: The findings revealed that the prevalence of computer vision discomfort was (76%). The most common detected symptoms were headache (76%), Itching of eyes (74.6%), burning of eyes (70.6%) and tearing of eyes (66.6%). The mean percentage of digital eye strain was 48%. The majority i. e.64% of the computer users had fair knowledge, 12% had good knowledge and 24% had poor knowledge. The majority (63%) of the computer users obtained satisfactory preventive measures score. There is a significant positive relation between knowledge & preventive measures (p<0.05) regarding computer vision discomfort. As the value of the correlation coefficient is 0.352 which is positive. Recommendation to prevent CVS by not only knowledge and preventive measure also might reduce discomfort by regular eye care, eye exercises and 20 - 20 - 20 rules.* ***Conclusion****: The present study revealed a high prevalence of computer vision discomfort Keeping in view of the findings, planning for awareness program recommendations were devised for further studies. This study can be implemented in nursing services, nursing education, nursing administration and the nursing research.*

Keywords: Computer vision discomfort, Knowledge, and Prevention measures

1. Introduction

"Eyes are the windows to the soul", is an expression that perfectly defines the deep connection one feels, and is also vital in how we view the world around us. By utilizing our eyes and vision, we can connect and engage with our surroundings, which helps us maintain our safety and mental stability. Computer Vision Syndrome (CVS) is a term used to describe eye problems that result from computer use. Digital eye strain, also referred to as Computer Vision Syndrome (CVS), is a contemporary health concern; resulting from the growing use of digital devices such as computers, smart phones, tablet and e - readers

Mendagudli (2023) describe CVS as a specific problem consisting an entire spectrum if eye strain and discomfort. It has been found that between 50% (Amy L Sheppard and James S Wolffsohn 2018) and 90% of individuals who work at a computer screen, exhibit some level of symptoms which includes eye strain, headaches, ocular discomfort, dry eyes, diplopia and blurred vision after prolonged computer use (Rosenfield M.2011). Not just working adults, using tablets or computers for an extended period during the day at school can cause problems for young students as well, particularly with poor lighting and a stooping posture.

Globally 60 million people suffer from this phenomena CVS (P Ranasinghe, W S Wathurapatha, Y S Perera, D A Lamabadusuriya et al, (2016) CVS was significantly related to the use of mobile or tablet (Simanta Roy, Azaz Bin Sharif, Sreshtha Chowdhury, Mohammad Azmain Iktidar 2022). In Bangalore, India's Silicon Valley, more than 75% of young software professionals and IT students have reported experiencing vision discomfort. (Smitha J, Jilta 2017)

Majority of people use computers at home or at work, leading to numerous complaints about health issues triggered by working at VDT (video display terminals). Eye troubles are the pivotal cause of ailments. VDT users frequently report eye strain, irritation, tiredness, burning sensation, redness or flickering, as well as blurred vision and double vision. Prolonged use of visual display terminals (VDTs) has been suggested as an important risk factor for Dry Eye disease. Office workers ranged from 26% to 70% with as few as 1 - 2 hr of VDT exposure per day being associated with DED (Fjaervoll H, Fjaervoll K, Magno 2021)

The leading occupational health hazard of Twenty - First century is Computer Vision Syndrome. The most common symptoms of CVS were notably: blurred vision 73.76% (Fentahun Adane, Yoseph Merkeb Alamneh & MelakuDesta (March 2022.) and headache (56.77%); followed by eye strain (50.52%), blurring of vision (40.62%), and redness of eyes (23.95%) (Harpal Singh, Marry J. Tigga, Sagarika Laad, Nida Khan (2016)

Computer has become an integral and irreplaceable part of our daily routine. While using a computer screen for extended periods, the eyes experience irritation or discomfort. Thousands of years ago ancient yogis created simple yoga eye exercises to ease the mind and stretch out muscles around our eyes. They conjectured that eye exercise could enhance vision by strengthening the optic nerve. CVS awareness and implementing intervention could be effective (Alatawi Saleha K, Allinjawi Kareem, Alzahrani Khaled, Eman N Ramadan et. al. (2022).

CVS, a repetitive strain disorder that causes eye and vision problems due to extensive computer use, has been identified by OSHA as affecting over 90% of US workers who use computers for more than three hours daily. In a recent NIOSH study, a significant reduction in discomfort and eye strain was noted when four additional five - minute "mini - breaks " were taken by the computer workers throughout their work day. The NIOSH study demonstrates that VDT discomforts can be minimized through strategic breaks without impairing productivity. Increased awareness of CVS and adherence to recommended ergonomic practices are necessary to reduce the prevalence of CVS ultimately enhance work satisfaction and productivity (Samuel Bert Boadi - Kusi, Abu Sampson Listowell et al 2020)

Eye exercise has been associated with better self rated relaxation as well as with physiological relaxation. Diligent Yoga practice appeared to appeas visual discomfort (Shirley Telles, K V Naveen, Manoj Dash, et al 2006) 10% of students were willing to take any measures to prevent the disease. Majority of Nursing students almost 66% obtained satisfactory preventive measures score with respect to digital eye strain (S. K2022)

Vision Exercise Therapy is crucial in promoting healthy energy and relaxation for the eyes. The use of vision exercises by computer operators, helps them to find solutions and feel more unrestrained while performing their jobs; without affecting their eyesight.

Minimal study has been performed, to assess the effects of computer use on physical health of Indian users, specially among Computer Design companies, Business & IT sector as well as college and secondary school students. The study was designed to determine the prevalence, knowledge and preventive measures on computer vision discomfort by using CVS - Q questionnaire.

2. Methods

Permission from the respective Scientific and Ethical committee clearance and administrator of computer users of two private Ltd companies namely Arcreation Design Pvt. Ltd and Shubhapuspa Engineering Works Pvt. Ltd. In West Bengal was obtained and every participant was informed about the purpose of the study. A written consent form was signed prior to conducting the study. Total enumerative sampling technique was employed in this study. A semi - structured questionnaire was used to obtain socio - demographic data, a standardized rating scale questionnaire was used for measuring the extent of Computer Vision Syndrome, a structured knowledge questionnaire was used to determine the knowledge level of computer users regarding Computer Vision Syndrome. A structured 5 - point rating scale questionnaire was used for measuring the prevention practices. Tools were developed & validated by using Cronbach's Alpha (.79) and the Split half (.72) method. Each participant was surveyed using a questionnaire which include the demographic profile, hours of computer /day and common CVS related symptoms like headache, dry eyes etc.

They were also asked to indicate the grade of visual problem during or after computer usage. Categories for different computer visual problems were listed as follows: none, mild, moderate and severe. Participants were asked to answer 16 validated questions, computer discomfort score in between none (0 - 5) between (6 - 12) was considered as mild, moderate (13 - 18) and (19 - 32) was considered as severe.

Statistical Analysis

All the data were analysed using descriptive and inferential statistics. Descriptive data were presented as frequency, percentages or as mean and standard deviation. Chi - Square was performed to assess the association between demographic variables and CVS. To detect r value correlation coefficient was used as 0.05 level of significance.

3. Results

In the present study, among 75 participants majority (77.3%) of computers users belonged to the age group of 31 - 52 years, the majority of the general educational qualification of computer users was (49.3%) graduate. Again (69.3%) of computer users were residing in their own house and (30.6%) were in rented house and most of computer users family income was with in >20000.

The Majority (37.3%) of computer users spent favourite leisure time by internet browsing, the majority (44%) computer users used Smartphone, Laptop, Desktop, Tablet and only (4%) computer users used Smartphone, Laptop, Desktop &e books.

Among (53.4%) of computer users used digital devices were used for 4 - 8 hours per day. Among them (50.6%) reported using digital devices in continuously use for more than 2 hours at a stretch and 49.4% used digital devices in an intermittently.

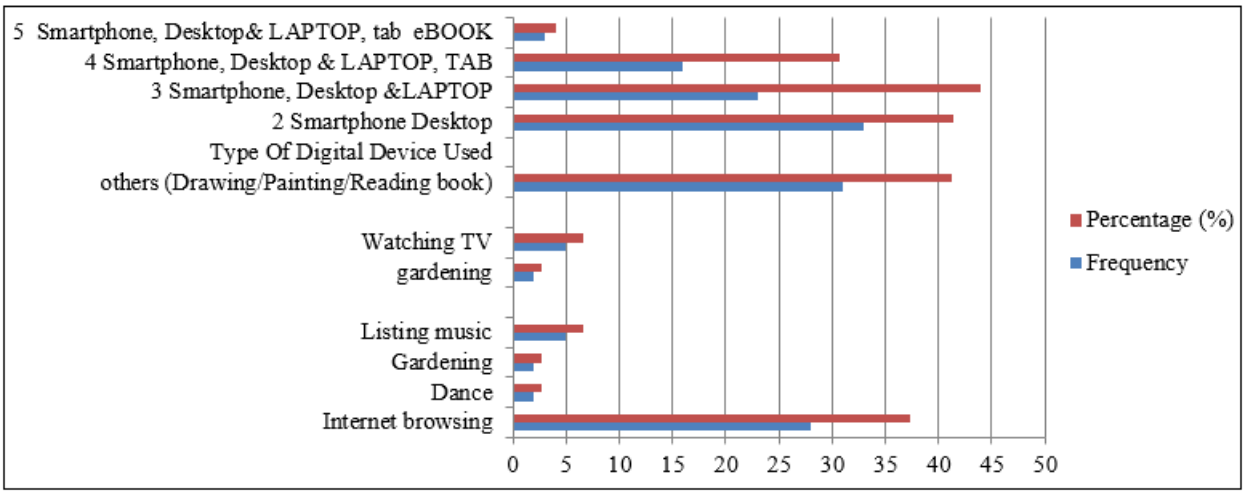

Figure 1 (n=75)

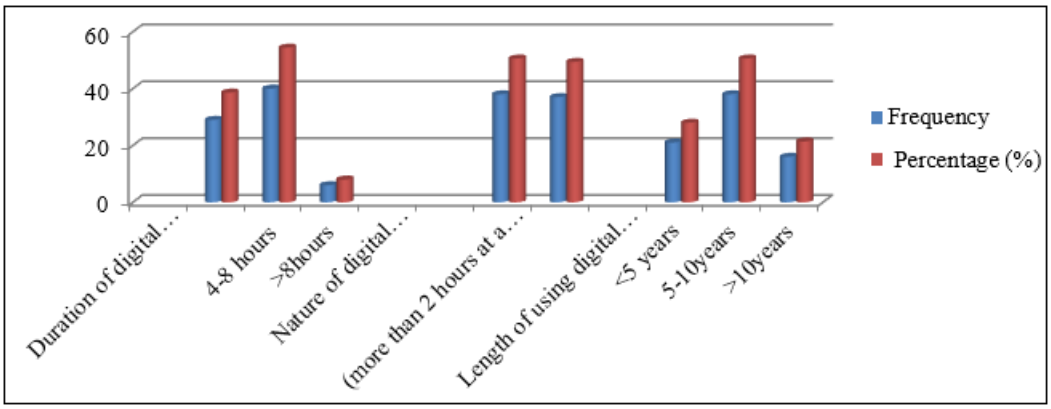

Figure 2: n=75

There was no significant association between demographic variables and computer vision discomfort. The prevalence of computer vision discomfort was 76%, majority (66.6%) of the participants were suffering from mild discomfort and 9.4% were suffering from moderate grade of computer vision discomfort.

Table 2 Findings related to the assessment of the computer vision discomfort among computer users as measured through self - rated frequency and intensity of experience, n=75

Variable percentage	Range of Possible score	Range of Obtained score	Mean	Median	SD	Mean percentage
Computer vision discomfort		0- 32	0- 16	7.68	3.58	48%

The data presented in table 2 shows that the computer vision discomfort score of computer users ranged from 0 - 32, the maximum possible score was 32, the mean digital eye strain score was 7.68 and the Median was 7 with SD 3.58. The mean percentage of digital eye strain was 48%.

Table 3 Frequency and percentage distribution of computer users as grade of computer vision discomfort, n=75

Grades of digital Eye strain	Range of score	Frequency	Percentage (%)
None	0 - 5	18	24
Mild DES	6 - 12	50	66.4
Moderate DES	13 - 18	7	9.4
Severe DES	19 - 32	0	0

Maximum possible score: 32
Minimum possible score: 0

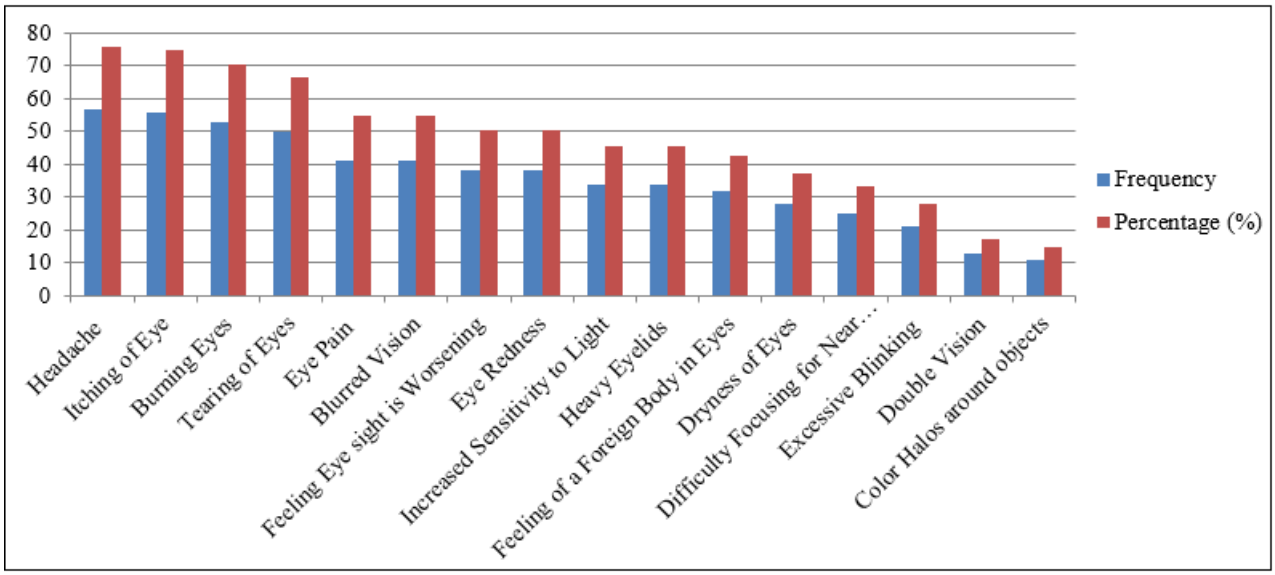

Figure 3: Frequency and percentage distribution of computer users as presence of digital eye strain, n=75
*Multiple responses included

Figure 3 shows that among all the symptoms, headache was the most common one experienced by 76% of participants. Out of 57 participants majority (73.8%) of them occasionally experienced headache at a moderate intensity. Similarly out of 56 participants the majority (83.9%) of them experienced Itching of Eye occasionally with moderate intensity. The findings regarding Burning Eyes showed that (75.5%) of the participants had occasional burning of eyes with moderate Intensity. Regarding Eye Pain the majority 85.3% of them had occasionally experienced it at moderate Intensity.

Table 4: Findings related to the knowledge of the computer vision discomfort among computer users, n=75

Variables	Range of obtained score	Mean	Median	SD	Mean Percentage
Knowledge Score	5 - 14	8.75	9	2.776	62.48

Minimum possible score - 0
Maximum possible score - 14

The data presented in table 9 shows that the knowledge score of computers users regarding computer vision discomfort ranged from 5 - 14, where the maximum possible score was 14. The mean knowledge was 8.75, the median was 9 with SD with 2.7. The mean percentage of knowledge score was 62.48%.

Table 5: Frequency and percentage distribution of computer users according to the level of knowledge score regarding computer vision discomfort, n - 75

Level of Knowledge	Range of score	Frequency	Percentage (%)
Poor Knowledge	0 - 7	18	24
Fair Knowledge	8 – 11	48	64
Good Knowledge	12- 14	9	12

Minimum possible score - 0
Maximum possible score - 14
The data shows in the table 6 that the majority 64% of the computer users had fair knowledge, 12% of computers users had good knowledge and 24% of the computer users had poor knowledge regarding computer vision discomfort.

Table 6: According to the grading of preventive measures score regarding computer vision discomfort, n=75

Grading of preventive measure	Range of score	Frequency	Percentage (%)
Unsatisfactory	0 - 17	20	27
Satisfactory	18 - 36	47	63
Highly satisfactory	37 - 56	8	10

Minimum possible score - 0
Maximum possible score - 56

The data shows in the table 6 that the majority 63%) of the computer users obtained satisfactory, and only 10% computer users obtained highly satisfactory preventive measures score regarding computer vision discomfort.

4. Discussion

Computer vision discomfort or Computer Vision Syndrome is a growing problem, it is very important to know about the population at the highest risk to ensure prevention and management as early as possible. In the current study, the prevalence of computer vision discomfort was found 76% among computer users of Computer design company. In different studies prevalence rate depends on factors like workstation environment, awareness levels and practice on workers regarding ergonomics (Mowatt Lizette, et al (2018). Computer related problems has become an important occupational health problem and is a great concern on health. The high prevalence makes to take collaborative and suitable preventive measures. Relevant and necessary knowledge is needed. This study has also brought into focus a lot of problems that are experienced by researchers. The present study shows that majority of the (53.4%) computer users used digital device for 4 - 8hrs per day and majority of the (50.6%) computer users used computer more than 2 hours at a stretch, and computer users 50.6% had been using digital devices for the last 5 - 10 years. According to Mohammed Iqbal, Ahmed El Massry et al at Sohag University, Egypt study (2021) 86% of the medical student's were using their digital screens 3

hours or more daily which made them very prone to get one or more computer vision syndromes.

Headache

In present study among all the symptoms, headache was the most commonly experienced as 76% of participants did. In another study of Wangsan Kampanat, et al (2022 March) to assess the prevalence, characteristics, and associated factors of Computer Vision Syndrome among students of Chiang Mai University, Thailand, who were currently studying in a virtual classroom. The study result showed that out of 527 students, 516 (97.9%) experienced at least one symptom that was headache (90.9%).

Also in current study, it revealed that out of 57 participants majority (73.8%) of them occasionally experienced headache at a moderate Intensity. However a small percentage (3.5%) of the participants experienced occurring headache with Intense Intensity. (14%) of participants reported headache having often/always Moderate Intensity and (8.7%) of participants having headache with Intense Intensity. except the symptoms of Headache (14%) and Burning Eyes (1.9%), no other symptoms were experienced at an intense intensity.

Burning of eye, **Blurred vision, Dry eyes, eye pain and double vision, eye strain, color vision**:

The present study findings regarding burning of eyes was experienced by (70.6%) of computer users, which is supported by other studies of Wangsan Kampanat, et al (2022 March) burning sensation was (92.5%). Another study by Lizette Mowatt, et al (2018) explained that burning sensation of the eye was (61.9%).

The present study findings showed Eye Pain & Blurred Vision (54.6%), Feeling Eye sight is Worsening & Eye Redness (50.6%). Blurred vision may result from nearsightedness or farsightedness that would require corrective lenses.

The present study findings were supported by a study of Wangsan Kampanat, et al (2022 March) to assess the prevalence, characteristics, and associated factors of Computer Vision Syndrome among students of Chiang Mai University, who were currently studying in a virtual classroom The study result showed that out of 527 students Eye pain (96.5%), was the most frequent symptom, followed by the degree of severity, the most intense symptoms were the feeling of worsening eyesight (15.9%), followed by eye pain (12.2%). Another finding were reported by Marwa M. et al. (2019) at Cairo University that eye pain was (63.8%).

The other symptoms observed in the present study was digital eye strain like dryness of eyes (37.3%)

Other study findings were reported by kumar B Senthil (2020) which was the effect of prolonged computer use on the eyes and factors affecting it among 100 medical students of VMKV Medical College and Hospitals, Salem, Tamilnadu. The result showed that eye strain (41.7%). Further study supported by Mowatt Lizette, et al (2018) eyestrain was (67%), As a result, the blinking mechanism is severely affected, less tears are produced.

The current study reveals that computer users who faced teary of eyes were (66.6%) and double vision was (17.3%).

Similar study revealed by Gammoh Yazan (Feb2021) which was conducted as a cross - sectional study on digital eye strain and its risk factors among a university student in Jordan. The study results showed that the prevalence of Computer Vision Syndrome was 94.5%. Tearing of the eyes (59%) was the most prevalent symptom while the least experienced symptom was a double vision (18.3%). The study also revealed that prevalence of computer vision syndrome was highly prevalent (94.5%) among university students in Jordan.

The present study result showed that other problems like double vision (28.9%). This was followed by Itching of eyes (74.6%), Increased Sensitivity to Light & Heavy Eyelids in eyes (45.3%). The other symptoms of digital eye strain like dryness of eyes (37.3%), difficulties focusing (33.3%), and excessive blinking (28%) were experienced by less number of participants. However some symptoms like colored halos around eye were experienced by only (14.6%) of the participants respectively.

Similar findings were reported by Mowatt Lizette et al (2018) in their cross - sectional study on Computer vision syndrome and ergonomic practices among 409 undergraduate university students. The study results showed that neck pain (75.1%), and shoulder pain (65.5%) were the most common Computer Vision Symptoms. Dry eyes (26.2%), double vision (28.9%), and blurred vision (51.6%) were the least commonly experienced symptoms. The symptoms of burning eye, eye strain and neck pain were significantly related to the level of viewing. Moderate eye burning (55.1%) and double vision (56%) occurred in those students who used handheld devices at an angle. Most (63%) of the students who looked down at a device while using it experienced severe eye pain Mowatt Lizette et al 2018)

The study findings were reported by Kumar B Senthil (2020) which were the effects of prolonged computer use on the eyes and factors affecting it among 100 medical students of VMKV Medical College and Hospitals, Salem, Tamilnadu. The result showed that eye strain (41.7%) and headache (26.6%) were two main ocular complaints of CVS (Computer Vision Syndrome) which includes eye fatigue, headache, and burning sensation of the eyes (Kumar BS 2020)

Knowledge: The present study result showed that the majority 64% of the computer users had fair knowledge regarding computer vision discomfort.

A descriptive study was done by George Amala, et al. (2021) to assess the level of knowledge regarding Computer Vision Syndrome among engineering students in a selected college at Kottayam, Kerala and the findings were that the majority (70%) of students were having an average knowledge regarding Computer Vision Syndrome.

The present study revealed that the Mean and Standard Deviation of knowledge score regarding Computer Vision discomfort was 8.7±2.7 and the Mean and Standard deviation of preventive measures score regarding computer vision

discomfort was 24.3±9.9. There is a significant positive relation between knowledge & prevention measures regarding computer vision discomfort as the value of the correlation coefficient is 0.352 which is positive.

Preventive measure

In a current study majority (56%) of them never used to practice 20 - 20 - 20 rule during the use of computer. Make a conscious effort to blink was also never followed by (49.3%). (46.6%) participants did not wear blue light blocking glasses while using computer screen and (40%) participants expressed that they never practiced any eye exercise and (34.6%) of the participants expressed that they never maintained appropriate viewing distance between the screen and eyes. Maintenance of appropriate sitting position (sit upright with back neck and head aligned) during the use of computer was also never practiced by more than 28% of computer users. The majority 63%) of the computer users obtained satisfactory grading of preventive score

Among the preventive measures that were reported to be practiced better than other measures were using one computer device at a time (46.6%). Similarly during the use of computer most of the participants (36%) maintain appropriate sitting position, (33.3%) participants take a 10 - 15 minute break every 1or 2 hours and (30.6%) participants wear blue light blocking glasses and (30.6%) participants also clean the screen of computer while using computer screen.

Another study conducted by AlDarrab Abdulrahman et al (2022 Jan) on awareness and practice regarding use of digital devices and ocular health among Saudi adolescents at a university students knowledge about CVS was excellent in 41 (7.9%) students, good knowledge was found in 161 (39%) students. The present study result showed that computer users had fair knowledge and had taken satisfactory preventive measure techniques.

There is a significant positive relation between knowledge & preventive measures regarding computer vision discomfort as the value of the correlation coefficient is 0.352 which is positive.

5. Conclusion

The present study revealed a high prevalence of Computer Vision discomfort among computer users. The study showed that there was no association between socio demographic variables and computer vision discomfort. Extended computer use causes vision problems which reduces the efficiency and productivity of work and thereby the quality of life. Therapeutic regiments and awareness programmes regarding eye exercise need to be developed to eradicate this widespread condition. It is also recommended and implicated in nursing education, nursing administration and nursing research. The limitations and recommendations for the further studies were put forth for deeper consideration.

Ethical Clearance

This study received ethical approval from concerning authority. Concerning the written inform consent, computer users were notified in the invitation letter that completing the survey indicated their consent to participate and Computer users also informed that participation was voluntary and they could revoke consent at any time. All information was shared with Director and administrators while still protecting the privacy of the data collected from the participants

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study

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