BioChemMed

Technium BioChemMed Vol. 9, pp.1-7 (2024)
ISSN: 2734-7990
www.techniumscience.com

The Correlation Between the Use of Eyeglasses and Gender with Computer Vision Syndrome Symptoms

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Abstract

Background: Computer Vision Syndrome (CVS) is a group of symptoms related to eye and vision problems caused by long-term use of computers, tablets, smartphones, and other electronic devices. Several risk factors of CVS have been identified, including individual factors, such as gender and the use of eyeglasses.

Objectives: Therefore, this study aimed to determine the correlation between the use of eyeglasses and gender with CVS symptoms among students at the Faculty of Medicine, Mulawarman University, Samarinda.

Methods: The study procedures were carried out using an observational analytic method with a cross-sectional design. The sample population comprised 177 students from the Medicine, Dental, and D-3 Nursery Study Programs. Data were then obtained using the Computer Vision Syndrome Questionnaire (CVS-Q) with the assistance of Google Forms and analyzed with the Chi-Square test.

Result and Conclusion: The results showed that a total of 146 students (82.5%) experienced CVS symptoms. In addition, the results of statistical tests revealed that risk factors, such as the use of eyeglasses (p= 0.019 OR= 2.990) and gender (p = 0.005 OR = 3.183) had a significant association with CVS symptoms.

Keywords: The Use of eyeglasses, Gender, Computer Vision Syndrome

1. Introduction

Computer Vision Syndrome (CVS) is a group of symptoms associated with eye and vision problems caused by the prolonged use of computers, tablets, smartphones, and other electronic devices [1-2]. CVS symptoms are typically divided into 2 categories, namely ocular (eye strain, redness, asthenopia, blurred vision, dry eye, irritation, diplopia) and extraocular (headaches, musculoskeletal pain of the upper extremity, namely in the neck, shoulders, and back) [2-6]. In addition, several studies showed that the prevalence ranged from 18% to 80% among computer users with various eye and visual problems [2],[7]. In 2007, approximately 60 million people suffered from CVS, with projections indicating an expected annual increase of 1 million new cases [8]. World Health Organization (WHO) in 2010 also showed that 285 million individuals or 4.24% of the world's population experienced various eye-related issues. These included blindness (39 million), low vision (246 million), and visual impairment (82%) [9].

In line with previous studies, factors influencing CVS can be divided into 3 categories, namely individual, Visual Display Terminal (VDT), and working condition. Individual factors comprise gender, age, medical diseases, poor sitting position, insufficient working procedures, inappropriate eye-to-

Technium BioChemMed Vol. 9, pp.1-7 (2024)
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screen distance, improper viewing angles and distances, and long duration of computer usage [1]. VDT factors include aspects related to the display equipment, while working condition is associated with environment and computer setup, such as improper workstations, contrast and resolution rooms, poor lighting, slow refresh rate, glare of the display, excessive screen brightness, and imbalance of light between computer screen and surrounding working room [1],[10-11]. Among individual factors, gender and the use of eyeglasses have shown significant differences across various reports. Logaraj's study revealed that the incidence of CVS was higher in men compared to women [12]. However, this result was inconsistent with Darmaliputra and Dharmadi who showed that 83.3% of women experienced CVS symptoms, with only 70.1% of men being affected [13]. The differences can be attributed to the tear film layer in women, which becomes thinner faster due to aging, leading to an increased risk of dry eye [14].

According to previous studies, the use of eyeglasses is often associated with a higher frequency of complaints compared to individuals who do not use the vision aid [15]. The results were consistent with [16] that eyeglasses users were 3.5 times more at risk of experiencing CVS subjective complaints compared to normal eyes. Contrasting results were obtained by [17-18] which reported the absence of a relationship between both variables. Therefore, this study aims to determine the correlation between the use of eyeglasses and gender with CVS symptoms among students at the Faculty of Medicine, Mulawarman University, Samarinda.

2. Study Method

This study used an analytical observational method with a cross-sectional method to determine the correlation or relationship between the use of eyeglasses and gender with symptoms of CVS among students at the Faculty of Medicine, Mulawarman University Samarinda. The sample population comprised students of class 2018 - 2020 Medicine, Dental and Diploma (D3) Nursery Study Programs. In addition, participants were selected using cluster random sampling and continued with a simple random sampling method to obtain a total of 177 students. Primary data were obtained through Computer Vision Syndrome Questionnaire (CVSQ) questionnaire, which was adapted from [19] and assisted with Google Forms and Zoom Cloud Meeting software. The collected data were then analyzed using the Chi-Square and Odd Ratio hypothesis tests, which were displayed in narrative and table form.

3. Result and Discussion

The study procedures were conducted online at the Faculty of Medicine, Mulawarman University, Samarinda, from January 2022 to February 2022. The data obtained were the characteristics of participants, the use of eyeglasses, and CVS symptoms. A total of 177 students who met the predetermined inclusion and exclusion criteria were selected for the analysis. Characteristics of Participants Characteristics of participants were categorized based on age, gender, class, and study program, as shown in Table 1. The results showed that the age of the participants ranged from 17-22 years with the highest frequency of 19 years old (61 students or 34.5%). The characteristics reviewed by the class revealed that the majority were from the class of 2019 (64 students or 36.2%) and the Medicine Study Program (90 students or 50.8%).

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Table 1. Characteristics of Participants

No	Characteristics	Frequency (n)	Percentage (%)
1	Age		
	17	4	2.3
	18	50	28.2
	19	61	34.5
	20	49	27.7
	21	11	6.2
	22	2	1.1
2	Class		
	2018	52	29.4
	2019	64	36.2
	2020	61	36.2
3	Study Program		
	Medicine	90	50.8
	Dental	31	17.5
	Diploma (D3)-Nursery	56	31.6

3.1 Univariate Analysis

3.1.1 The Use of Eyeglasses

The distribution of participants based on the use of eyeglasses is presented in Table 2.

Table 2. The Distribution of Respondent based on Eyeglasses Uses

Glasses Uses	**Frequency (n)**	**Percentage (%)**
Yes	67	37.9
No	110	62.1
Total (N)	177	100

The results showed that the majority of participants did not wear eyeglasses, totaling 110 students with a percentage of 62.1%.

3.1.3 Gender

The distribution of participants based on age is presented in Table 3.

Table 3. The Participants' Distribution Based on Age

Gender	Frequency (n)	Percentage (%)
Man	40	22.6
Woman	137	77.4
Total (N)	177	100

The majority of participants were women, totaling 137 students or 77.4%.

3.2 Bivariate Analysis

3.2.1 Relationship between the Use of Eyeglasses with CVS Symptoms

Analysis of the relationship between the use of eyeglasses and the presence of CVS symptoms is presented in Table 4.

Table 4. Relationship between the Use of Eyeglasses with CVS Symptoms

Eyeglasses Use	CVS Symptoms n	CVS Symptoms %	Symptoms n	Symptoms %	Frequency (N)	p value	OR	CI (%)
Yes	61	34.5	6	3.4	67	0.019	2.990	1.157
No	85	48.0	25	14.1	110			7.730
Total (N)	146	82.5	31	17.5	177			

Based on the results, the use of eyeglasses had a significant relationship with the onset of symptoms of CVS (p= 0.019) with OR value of 2.990. This indicated that individuals who wore glasses were 2.990 times more at risk of experiencing these symptoms compared to others. The results were in line with [20], that there was a relationship between the use of eyeglasses and CVS symptoms with a value of p= 0.000. These results were also consistent with the theory presented by [1][21], where other factors that played a role in the occurrence of CVS included eye distance to the computer screen, screen height, and inclination, setting the screen light intensity and surrounding environment, type of computer, and the use of eyeglasses, contact lenses or anti-glare covers. The use of eyeglasses by individuals showed a decrease in eye function, necessitating the use of vision aids. When individuals interacted with VDT for a long period and were exposed to blue light, it could worsen the eye condition when the eyeglasses in use were not properly equipped with the blue light filter, making it easier to experience symptoms [20]. Eyeglasses users with refractive errors were likely not to experience eye symptoms when there was no performance of visual tasks that were not too heavy. Prolonged use of a smartphone could increase visual task demands due to the letters on the screen being formed by small dots called pixels. Consequently, the eye, which had certain refractive problems, worked a little harder to keep the image in focus [22].

The results obtained in this study showed that 67 or 37.9% of participants wore eyeglasses, with 61 or 91% experiencing CVS. Although the number of eyeglasses users was less, the results obtained significantly showed that the use of eyeglasses during smartphone/VDT increased the risk 2.990 times for experiencing CVS subjective complaints compared to students with normal eyes. Eyeglasses were used to correct individuals' refractive errors when their correction was poor. Subsequently, there was a risk of eye fatigue when using VDT. Cole, Maddocks, and Sharpe [23] stated that 62.5% of VDT users with eyeglasses most likely complained of frequent headaches in the frontal area due to eye fatigue.

3.2.2 Relationship between Gender and CVS Symptoms

The results of the cross-test between gender and the appearance of CVS symptoms are presented in Table 5. The results revealed that gender had a significant relationship with the onset of CVS symptoms (p= 0.005) with OR value of 3.183. This indicated that women were 3.183 times more at risk of experiencing these symptoms compared to men. The results were in line with [17], which reported a five times higher risk for women. Theories that explained the outcome of this study included physiological differences between women and men, which caused women to be more susceptible to disease with higher stress levels [24].

Table 5. Relationship between Gender and CVS Symptoms

Gender	CVS				Frequency	p	OR	CI
	Symptoms		No Symptoms					
	n	%	n	%	(N)	value		(%)
Man	119	67.2	18	10.2	137	0.005	2.990	1.393 – 7.276
Women	27	15.3	13	7.3	140			
Total (N)	146	82.5	31	17,5	177			

The highest risk factors that influenced the incidence of CVS were age, gender, length of time working at computer, and length of rest after using computer [21] and the prevalence of CVS was found to be higher in women than in men [5],[14],[25]. In addition, as women get older, the tear film layer thins more quickly, the reason for this condition was that the regulation of tear secretion was also influenced by hormonal mechanisms such as Leutinizing Hormone (LH), Follicle Stimulating Hormone (FSH), Prolactin, Progesterone, and Estrogen [26]. This endocrine system influenced the activation of acinar cells to produce aqueous and lipids in the tear layer which function to keep the eyes moist. The mRNA receptors for androgen, estrogen, progesterone, and prolactin hormones were found in human eye tissue necessitating the influence on the physiology and pathophysiology of the lacrimal glands which function to regulate the secretion and function of the lacrimal glands and meibomian glands [27]. As an individual gets older, the estrogen hormone decreases and causes lacrimal gland regression, and tear film lipid production decreases, so tear production also decreases [28].

4. Conclusion

In conclusion, this study concluded that there was a relationship between the use of eyeglasses and gender on CVS of students in the Faculty of Medicine, Mulawarman University, Samarinda.

References

[1] Anbesu, E. W, Lema, A. K. Prevalence of computer vision syndrome: a systematic review and metaanalysis. Scientific Reports, 2023, 13, 1-11. https://doi.org/10.1038/s41598-023-28750-6

[2] Shin, S,Yang, E. H, Lee, H. C, Moon, S. H, Ryoo, H. The relationship between visual display terminal usage at work and symptoms related to computer vision syndrome. Annals of Occupational and Environmental Medicine, 2023, 9 (35),1-12. https://doi.org/10.35371/aoem.2023.35.e1 eISSN 2052-4374

[3] American Optometric Association. Computer vision syndrome, 2020. Downloaded from https://www.aoa.org/healthy-eyes/eye-and-vision-conditions/computer-vision-syndrome?sso=y&ct=bf on 20 March 2021

[4] Alamri, A, Amer, K. A, Aldosari, A. A, Althubait, B. M. S, Alqahtani, M. S, Abdulrahman, A. M, M, Bandar, A. M, M, Alqahtani, F. A. M, Alhamoud, N. S. Y. Computer vision syndrome: symptoms, risk factors, and practices. Journal of Family Medicine and Primary Care, 2022, 11 (9), 5110-5119. https://doi.org/10.4103/jfmpc.jfmpc_1627_21

[5] Alhasan, A, S, Aalam, W. A. Magnitude and determinants of computer vision syndrome among radiologists in Saudi Arabia: a national survey. Academic Radiology, 2022, 29 (9), e197-e204. https://doi.org/10.1016/j.acra.2021.10.023

[6] Tsai, L. H, Chen, B. Y, Su, K. C, Cheng, C. Y. The status of binocular visual function among Taiwan high-tech industry engineers and its correlation with computer vision symptoms. Scientific Reports, 2024, 14 (826), 1-13. https://doi.org/13.1038/s41598-024-51314-1

[7] Sheppard, A. L, Wolffsohn, J. S. Digital eye strain: prevalence, measurement, and amelioration. BMJ Open Ophthalmology, 2018, 3(1). 1-10.

[8] Yandi, N. Health in the Age of Digital Screens. Cermin Dunia Kedokteran, 2017, 44 (11), 788-791.

[9] Ministry of Health of the Republic of Indonesia. Data and Information Center of the Ministry of Health of the Republic of Indonesia, Situations of Visual Impairment and Blindness, 2014:1-12.

[10] Priliandita, T. N. Analysis of Factors Associated with Computer Vision Syndrome Complaints in Internet Cafe Computer Operators in Sumbersari Village, Jember. 2015. Downloaded from http://repository.unej.ac.id/handle/123456789/72833 on 01 May 2021.

[11] Dimitrijević, V, Todorović, I, Viduka, B, Lavrnić, I, Viduka, D. Prevalence of computer vision syndrome in computer users: a systematic review and meta-analysis. Vojnoosanitetski Pregled, 2023, 1-28. https://doi.org/10.2298/VSP220301024D

[12] Logaraj, M, Madhupriya, V, Hegde, S. K. Computer vision syndrome and associated factors among medical and engineering students in Chennai. Annals of medical and health sciences research, 2014, 4 (2), 179-185.

[13] Darmaliputra, K, Dharmadi, M. Description of Individual Risk Factors for Computer Vision Syndrome in Information Technology Students at Udayana University Year 2015. E-Jurnal Medika, 2019, 8 (1), 95-102.

[14] Pavel, I, A, Bogdanici, C, M, Donica, V. C, Anton, N, Savu, B, Chiriac, C. P, Salavastru, S. C. Computer vision syndrome: an ophthalmic pathology of the modern era. Medicina, 2023, 59 (412), 1-12. https://doi.org/10.3390/medicina59020412.

[15] Reddy, S. C, Low, C. K, Lim, Y. P, Low, L. L, Mardina, F, Nursaleha, M. P. Computer vision syndrome: a study of knowledge and practices in university students. Nepalese Journal of Ophthalmology, 2013, 5(2), 161-168.

[16] Afifah, A. N. Risk factors analysis for subjective complaints of computer vision syndrome in employees of Bank Negara Indonesia, University of Indonesia Branch, Directorate of Student Affairs and Development of Information Systems Services, University of Indonesia). Departemen Keselamatan dan Kesehatan Kerja, Fakultas Kesehatan Masyarakat Universitas Indonesia (Department of Occupational Safety and Health, Faculty of Public Health, University of Indonesia, 2014, 1-17.

[17] Azkadina, A, Julianti, H. P, Pramono, D. The relationship between individual risk factors and computers on the incidence of computer vision syndrome. Media Medika Muda, 2012.

[18] Pratiwi, A. D, Safitri, A, Junaid, J, Lisnawaty, L. Factors associated with computer vision syndrome (CVS) of employees in PT Media Kita Sejahtera Kendari. An-Nadaa: Jurnal Kesehatan Masyarakat, 2020, 7(1), 41-47.

[19] Seguí, M. D, M, Cabrero-García, J, Crespo, A., Verdú, J, Ronda, E. A reliable and valid questionnaire was developed to measure computer vision syndrome at the workplace. Journal of Clinical Epidemiology, 2015, 68 (6), 662-673.

[20] Maeda, M. B. I, Fitri, A. M, Amalia. Factors associated with computer vision syndrome (CVS) of employees in PT. Depoteknik Duta Perkasa Year 2020. In Prosiding Seminar Nasional Kesehatan Masyarakat 2020 (Vol. 1, No. 1, pp. 223-239).

[21] Valentina, D. C. D. D. C. D, Yusran, M., Wahyudo, R, Rani Himayani, R. Risk factors for computer vision syndrome in students majoring in computer science, Faculty of Mathematics and Natural Sciences, University of Lampung. JIMKI, 2019, 7 (2), 29-37.

[22] Ranasinghe, P, Wathurapatha, W. S, Perera, Y. S, Lamabadusuriya, D. A, Kulatunga, S, Jayawardana, N, Katulanda, P. Computer vision syndrome among computer office workers in a

developing country: an evaluation of prevalence and risk factors. BMC Research Notes, 2016, 9 (1), 150.

[23] Cole, B. L, Maddocks, J. D, Sharpe, K. Effect of VDUs on the eyes: report of a 6-year epidemiological study. Optometry and vision science: official publication of the American Academy of Optometry, 1996, 73(8), 512-528.

[24] Rosenfield, M. Computer vision syndrome: a review of ocular causes and potential treatments. Ophthalmic and Physiological Optics, 2011, 31(5), 502-515.

[25] Toama, Z, Mohamed, A. A, Hussein, N. K. A. Impact of a guideline application on the prevention of occupational overuse syndrome for computer users. Journal of American Science, 2012, 8 (2), 265-282.

[26] Lemp, M.A, Baudouin, C, Baum, J, Dogru, M, Foulks, G.N, Kinoshita, S, et al.. The Definition and Classification of Dry Eye Disease: Report of the Definition and Classification Subcommittee of the International Dry Eye Work Shop (2007), 2007; 5 (2): 75-92.

[27] Idu, F. K, Emina, M. O, Ubaru, C. O. Tear secretion and tear stability of women on hormonal contraceptives. Journal of Optometry, 2013, 6 (1), 45-50.

[28] Wulandari, R, Meida, N. S. The Difference of Dry Eye Syndrome in Third Trimester Pregnant Women and Non Pregnant Women. Bantul Yogyakarta-Indonesia. Universitas Muhammadiyah Yogyakarta. 55183, 2012, p. 1-14.