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The screening of computer vision syndrome in medical students of Udayana University

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ABSTRACT

Introduction: Computer Vision Syndrome (CVS) is a group of symptoms caused by a continuous computer usages. This disease could affect everybody who are active on using computers such as the college students. This syndrome has multifactorial risk factors. Objective: The purpose of this research is to know the result of CVS symptoms screening on the medical student of Medical Faculty of Udayana University.
Method: This research is a descriptive study with a cross-sectional data collection method. This research was conducted in April 2016 at the Faculty of Medicine Udayana University. The samples were consisted of 600 people who had met the inclusion and exclusion criterias. The data were collected using questionnaires. The data were presented in the form of frequency tables and cross tabulation to determine the prevalence ratios and the factors related to the results of this study. **Result:** The prevalence of CVS was 58.8% (353/600). The most common complaints was tense or tired eyes which was 72.8% (437/600). The factors which was statistically valued with CVS was the use of eyeglasses while using computer (P=0.003), the use of contact lens while using computer (P=0.022), the duration of computer usage in one day less than 4 hours (P=0.041), the distance between eye and the center of monitor between 30-70 cm (P=0.05), and the usage of anti-glare screen (P=0.033). The prevalence of CVS in medical students was 58.8%. The most complaints was tense or tired eyes. The factors which was statistically significant with CVS was history of eyeglasses usage while using computer, history of contact lens usage while using computer, the duration of computer usage in one day less than 4 hours, the distance between eye and the center of monitor between 30-70 cm did not reduce the CVS prevalence. **Conclusion:** The usage of anti glare screen was important statistically and without it, CVS prevalence was found to be higher.

Keyword: *Computer Vision Syndrome,* medical student, anti-glare screen
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INTRODUCTION

Computer Vision Syndrome (CVS) is a GROUP of some symptoms caused by continuous computer usages. This disease could affect everybody who are active on using computers such as the office workers, lecturers, IT staff, bank workers, secretaries and also the college students. Computer Vision Syndrome could suddenly attack everyone who is in use of computers for a long term. Visual Display Terminal (VDT) or this kind of computer screen is what that gives a bad impact on the eyes. In the early stages, the symptoms can disappear by itself so that, not outrageously disturbing the daily activities. In general, patients usually come to seek the treatment if the damage felt already severe enough affecting the eyes. This disease can actually be prevented and controlled, but if not get a fast and proper treatment, then it will cause damage to the eyes.

In a study in Malaysia conducted by Reddy et al it was noted that 90% of students had CVS-related symptoms in college students who used more than 2 computers on a continuous per-day basis[1] and in a study by Logaraj M et al in India had stated that 78.6% of medical students experienced CVS while using the computers.[2] Although the students start to rarely use computers and switch it to laptops but the impact was similar to the use of computers, in which the usage of laptops more than 2 hours per day would caused health complaints.[3] Computer Vision Syndrome have a bad influence on the quality of life. In a study in Indonesia had showed 92.9% of computer users had complained any symptoms in the eyes. These symptoms consisted of tired, tension eyes, pain accompanied by headaches, irritation of the eyes, watery, blurred eye complaints, multiple visions suddenly upon seeing the computer and others. In addition to the complaints on the eyes there were also some complaints such as neck pain, shoulder and back that were relatively caused by the body posture when using the computer that was

not ergonomic.[4] Direct impact on CVS recorded in 97% of FKM UI students that had health complaints due to the use of laptop where the most body part complained were the neck, eyes, shoulders, upper back and ankle.[5] In research at Muhamadiyah University in Surakarta, it had been stated that the eye complaints that had been occured also had made a decreased in learning achievement.[6]

The data from the Indonesian Association of Internet Service Providers (*Asosiasi Penyelenggara Jasa Internet Indonesia* / APJII) had noted an average of 1000 students per university were using the internet every day.[7] This active use of computers had caused the students at a high risk for the exposure of CVS. In addition, the high prevalence on the above studies suggested that medical students have a high risk of CVS. Research on the prevalence among Asian students such as like in India and Malaysia has not been widely studied in Indonesia, especially in Bali. Screening of CVS symptoms on the productive ages in Bali has never been published. On the basis of this facts, the authors are interested to examine the results of CVS Symptoms Screening on Medical Students of the Faculty of Medicine in Udayana University.

MATERIAL AND METHOD

The design of this study was a descriptive with an observational study design that was cross-sectional in which the measurements conducted were measured simultaneously, just once at a time, without any follow-up. The design of this study aimed to be able to describe and interpret the results of computer vision syndrome screening on the college students as well as accompanying symptoms in accordance with the reality. The subject of this research were student of the Medicine Sciences Program of Medical Faculty in Udayana University, with the period of 2013-2015, in the year of 2016. This research was conducted at Faculty of Medicine in Udayana University on March 2016-December 2016. Exclusion criteria for this research was : the student in Medicine Sciences Program of Faculty of Medicine Udayana University period 2013-2015 in the year of 2016 who does not return the questionnaire. In this observational study the measurements were conducted using direct interviews using questionnaires. The type of questionnaire referred to the theories and concepts used by the researchers. The questionnaire was a result of the adaptation of a foreign questionnaire that was collaborated with the individual data required. The prevalence of CVS was assessed based on the total symptoms experienced, that was it would be said to be resulted positive if more or equal to 3, and negative if less than 3 The data collected was processed by some stages of data editing that were each questionnaires were re-examined to ensure that each questionnaires already been answered completely, coding data was a code giving step on each answers to facilitate the data processings, the data processing was the data transfer from the questionnaires into the computer in order to process it then by using the IBM Statistic 21 SPSS with the tabulation techniques, data cleaning was the examination on the data to determined whether any errors had been happpened. The data presentation of this study in the form of frequency tables which there was also a descriptive analysis and cross-tabulation had been conducted to determine the prevalence ratio and the factors that influence the results of this study.

RESULT

This research was conducted in April 2016 at Faculty of Medicine Udayana University, Denpasar. The data obtained were 600 respondents who had met the inclusion and exclusion criterias.

Table 1. The Distribution of Respondents by Age, Gender, Semester and Eye Health History

Variables	Frequency n (%)
Age	
≤20 year	474 (79.0)
>20 year	126 (21.0)
Gender	
Male	225 (37.5)
Female	375 (62.5)
Semester	
2	175 (29.2)
4	199 (33.2)
6	226 (37.7)
Eye Health History	
Basic Illness History	131 (21.8)
Drug Use/treatment History	13 (2.2)
Eye glass usage history while in exposure	282 (47.0)
Contact lenses usage history while in exposure	29 (4.8)

Based on Table 1, it had been known that the respondents mostly aged under or equal to 20 years, that were about 79% (474/600) with the youngest age of 16 years and the oldest was 24 years old.

Based on sex or gender in this study, the number of female respondents was more frequent that were 62.5% (375/600) than men and 37.7% (226/600) of respondents were in the 6th semester who were the most frequent semester group of the respondents compared to other semesters.

Based on the eye health history, students who used glasses during computer usage were found to be 282 people (47%) and use contact lenses while using computer were 29 people (4.8%)

Table 2. The Distribution of Respondents based on Computer Usage History

Variables	Frequency (Percentage)
The focus duration for each exposure (per one exposure)	
< 4 hours	474 (79.0)
≥ 4 hours	126 (21.0)
Exposure duration in one day	
< 4 hours	422 (70.3)
≥ 4 hours	178 (29.7)
Break/rest	
Yes	559 (93.2)
No	41 (6.8)
Break duration	
< 10 minutes	185 (30.8)
≥ 10 minutes	415 (69.2)
Eyes distances to the center of the monitor	
< 30 cm	105 (17.5)
30 – 70 cm	481 (80.2)
≥ 70 cm	14 (2.3)
The monitor height against eyes position	
Lower	214 (35.7)
Equal	359 (59.8)
Higher	27 (4.5)
The monitor screen	
Convex	9 (1.5)
Flat	591 (98.5)
Anti-glare screen	
Yes	123 (20.5)
No	477 (79.5)

Based on Table 2, 79% (474/600) of respondents had a focus duration in each or per one computer exposure for less than 4 hours while 70.3% (422/600) respondents had a duration of exposure in one day less than 4 hours, so that among the medical students it was found that most of them had the computer usage in less than 4 hours per one day.

In this study it had been founded that about 93.2% (559/600) of the respondents confirmed on took a rest during computer usage and as much as 69.2% (415/600) did the break time for more or equal to 10 minutes. Most of the respondents had used computers with an eye distances of 30-70 cm with the monitor center, which were found 80.2% (481/600), while for the monitor height against the eye position was found to be the most frequent on using the equal height, which were about 59.8% (359/600). The most used monitor screen by the respondent was the flat screen that were 98.5% (591/600) while for the use of anti-glare screen variable was found to be that most respondents did not use anti-glare filter that were amounted of 79.5% (477/600).

This showed that the knowledge of medical students about the work position using the computer was already good enough, but there was one thing that became a problem, that was the use of anti-glare screen.

Table 3. The Distribution Based on the Eye Complaints Experienced

Variables	Frequency (Percentage)
Tired or strain eyes	437 (72.8)
Headache	204 (34.0)
Distinct vision on the both eyes	32 (5.3)
The difficultness on the eyes coordination	34 (5.7)
Blurr vision	106 (17.7)
Double vision	20 (3.3)
The difficultness on focusing the vision	82 (13.7)
Watery eyes	265 (44.2)
Irritated eyes	61 (10.2)
Back pain	264 (44.0)
Neck pain	349 (58.2)

Tabel 4. Demography Characteristics toward CVS

Variables	CVS (n=353)	Non CVS (n=247)	P
Age			
≤ 20 years old	279 (79.0)	195 (78.9)	0.979
> 20 years old	74 (21.0)	52 (21.1)	
Total	353 (100)	247 (100)	
Gender			
Male	134 (37.9)	91 (36.8)	0.781
Female	219 (62.1)	156 (63.2)	
Total	353 (100)	247 (100)	
Semester			
2	107 (30.3)	68 (27.5)	
4	113 (37.7)	86 (34.8)	
6	133 (37.7)	93 (37.7)	
Total	353 (100)	247 (100)	
Eye Health History			
Basic Illness	88 (67.2)	43 (32.8)	0.028
History Drug Use treatment	7 (53.8)	6 (46.2)	0.712
Eye glass usage history while in exposure	184 (65.2)	98 (65.2)	0.003
Contact lenses usage history while in exposure	23 (79.3)	6 (20.7)	0.022

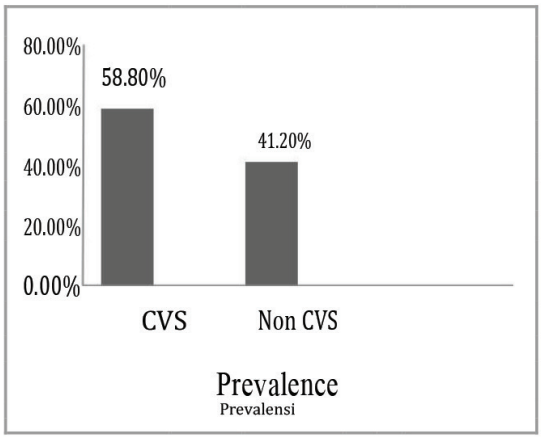

Diagram 1. **The Prevalence of Respondents who were Experiencing CVS and Non CVS**

Based on Diagram 1, the number of respondents who were experiencing CVS were 353 people (58.8%) of the total 600 samples.

Based on Table 3, the most common eye complaints experienced by the respondents were tense or tired eyes with the total of 437 people (72.8%) had complained these symptoms. The least complained symptom was double vision with total of 20 people (3.3%).

Based on Table 4, in this study, there were no statistically significant results on age, sex and semester. In this study there will be no discusion about the history of the basic illnesses although it was found to be statistically significant and also the history of drug or treatment owned by respondents. Based on the eye health history, it was founded that respondents who had a history of using glasses while in exposure, most of them had experienced CVS, that was 65.2% (184/282) with P = 0.003 so the results were statistically significant. In addition, it was founded that the use of contact lenses was also statistically significant with P = 0.022 with a percentage of 79.3% (23/29) who experienced CVS.

Based on Table 5, respondents with the duration of exposure in one day less than 4 hours were more likely to had CVS compared with more or equal to 4 hours that is as much as 67.1% (237/353) (P = 0,041) so that it was statistically significant. In this study, 77% (272/353) of respondents with an eye distance of 30-70 cm with the center of the monitors experienced the most CVS compared with other distances with P = 0.05, so that the results were statistically significant. Respondents who did not use anti-glare filters were more likely to had CVS, that were in 291/353 with P = 0.033 so that the results were also statistically significant.

Tabel 5. History of Computer Usage toward CVS

Variables	CVS (n=353)	Non CVS (n=247)	P
The focus duration for each exposure (per one exposure)			
< 4 hours	274 (77.6)	200 (80.9)	0.321
≥ 4 hours	79 (22.4)	47 (19.1)	
Exposure duration in one day			
< 4 hours	237 (67.1)	185 (74.8)	0.041
≥ 4 hours	116 (32.9)	62 (25.2)	
Break/rest			
Yes	330 (93.0)	229 (92.7)	0.712
No	23 (7.0)	18 (7.3)	
Eye distances to the center of the monitor			
< 30 cm	73 (20.6)	32 (9.0)	0.050
30 - 70 CM	272 (77.0)	209 (84.6)	
≥ 70 CM	8 (2.4)	6 (1.4)	
The monitor height againts eyes position			
Lower	139 (39.3)	75 (30.3)	0.054
Equal	197 (55.8)	162 (65.5)	
Higher	174 (4.9)	10 (4.2)	
The monitor screen			
Convex	3 (0.8)	6 (2.4)	0.208
Flat	650 (92.2)	241 (97.6)	
Anti-glare screen			
Yes	62 (17.5)	61 (24.6)	0.033
No	291 (82.5)	186 (75.4)	

DISCUSSION

By age, medical faculty students were most aged under or equal to 20 years old. Research conducted by Kurmasela et al also had been including the medical students ranging from 18-19 years old.[3] The use of glasses with poor correction increased the risk of tired or tense eyes.[8] The use of contact lenses greatly contributed to dry eye events associated with the eye lubrication. The most common reason for the use of contact lenses was as the aesthetics and not for the substitution of the glasses.[9] In the Tutt study, there was a decrease in the quality of the shadows falling on the retina that was resulting from the use of contact lenses.[10]

The results obtained in accordance with table 2 had founded an accordance with the research by Kurmasela et al in which it stated that medical faculty students in Sam Ratulangi University used an average time for laptops about 2-3 hours per day.[3] For the eye complaints, it was founded in accordance to the research by Azkadina which also founded that complaints at most were tense eyes (85%) and the least complaint was double vision (23.3%), in which to prevent the eye fatigue the things that could be done are: keep the distance between the eyes with the monitor and it is recommended to do the blink oftenly(16-20 times/minute).[8]

The prevalence results was the same with the study that had been publiched by Reddy et al toward students in Malaysia, in which it was founded that 89,9% prevalence of CVS from 795 students and research by Logaraj et al toward the medical students in Chennai also found a high prevalence that was 78,6% (158/201).[1,2] In this study, it could be seen that the student was a group that was active on using the computers so that CVS prevalence was found to be very high.

Based on table 4, it was founded the results which also had been supported by Ningsih et al study in which respondents who did not have eye disorders tend to had fewer total complaints. Other studies had also suggested that symptoms of CVS were more complained by the glasses users than non-glasses users.[11,12] In contact lens usage, this was supported by research of Logaraj et al., which stated that contact lens users had a higher risk of experiencing all the symptoms of CVS.[2] Many other studies also suggested a strong association between CVS and the use of contact lenses.[13]

Based on Table 5, it was founded that in other studies also stated that increased of usage duration also then increased CVS risk significantly.[2] In the study by Reddy et al., it also supported this result that CVS risk increased in computer users with the duration more than 2 hours a day.[1] This may suggested that computer usage less than 4 hours and more than 2 hours had a high risk of CVS. The study by Bandheri et al., had stated that the eye distances should be as far as possible to minimize the complaints experienced.[14] This was also supported by Akinbinu et al research, that the type of computer without anti-glare screen was significantly related to CVS incidence in which the user of that type of computer had a risk of 4,5 times higher to had CVS.[15] The use of anti-glare screen had a smaller risk than non-glare screen on CVS.[8] However, this was contrary to Reddy et al study, in

which it stated that the use of anti-glare screen had no relation with the CVS symptoms reduction.[1]

CONCLUSION

1. Based on the results of data analysis and discussion in the previous chapter, it can be concluded in this study as follows: The demographic characteristics distribution of the respondents, that was Medical Faculty students in Udayana University were 600 people. Female students more frequent than men. 6th semester students were the most respondents in this study.
2. Usage of computer history distribution, in Medical Faculty students in Udayana University showed that the most frequent duration in per exposure and per 1 day of exposure duration were less than 4 hours. The students took a break with a duration of more than 10 minutes. Students had the most eye distance between 30-70 cm with the center of the monitor and had the monitor height that was parallel to the position of the eyes. The use of flat monitors and non-use of anti-glare screen was found to be the most likely reported in this study.
3. The most common CVS complaint were tense or tired eyes and the least was double vision. In this study it was founded that the CVS prevalence was 58.5% and non CVS was 41.2%.
4. CVS distribution based on demographic characteristics and history of computer usage, in which the age group less than 20 years and female gender who were the most likely to had CVS. Students with a history of eye glasses and contact lenses usage were founded more likely to had CVS. Students who had the exposure in 1 day less than 4 hours, and eye distances of 30-70 cm to the center of the monitor were founded to be the most frequent, however the results obtained were statistically significant so that the use of such computer did not decrease the number of CVS prevalence. The use of anti-glare screen was founded to be statistically significant and without their use was founded to be high in CVS prevalence.

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