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Analysis Of The Determinants Of Computer Use On Complaint Vision Syndrome (Cvs) Complaints In Planner Operators At Pt. Pelindo Terminal Container Makassar New Port (Mnp) In 2024

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ABSTRACT

Background: Computer Vision Syndrome (CVS) is an eye disorder caused by prolonged computer use, influenced by factors such as viewing distance, monitor position, screen type, age, gender, glasses use, work duration, and rest time.

Research Objective: This study examines the effect of risk factors for computer use on CVS complaints among planner operators at PT. Pelindo Terminal Petikemas Makassar New Port (MNP) in 2024.

Methods: A case-control study with 84 samples (42 cases, 42 controls) in a 1:1 ratio was conducted. The case group included individuals experiencing CVS symptoms between October 2023 and October 2024. Data collection involved questionnaires and interviews, with statistical analysis performed using SPSS 25.

Results: Significant factors influencing CVS symptoms included working hours (OR = 2.941; p = 0.016), eye rest duration (OR = 3.954; p = 0.002), monitor position (OR = 5.538; p = 0.000), lighting intensity (OR = 4.429; p = 0.001), viewing distance (OR = 2.635; p = 0.030), period of computer use (OR = 3.625; p = 0.006), and antiglare screen use (OR = 2.571; p = 0.037). No significant effect was found for glasses or mobile screen exposure. Multivariate analysis confirmed behavior (p = 0.001), monitor position (p = 0.000), eye rest duration (p = 0.002), and lighting intensity (p = 0.000) as key factors.

Conclusion: Working position, scheduled eye breaks, and proper lighting significantly influence CVS among planner operators, while mobile device screen exposure has no significant correlation.

Keywords: *Determinant Factors, Computer Vision Syndrome (CVS), Planner Operator Workersr*

1. INTRODUCTION

CVS is a common occupational health problem in the 21st century, reporting that 143 million workers in the United States routinely use computers every day and 90% of them experience eye fatigue. [1] The prevalence of CVS reaches 64-90% in Visual Display Terminal (VDT) users with an estimated 60 million sufferers worldwide and an increase of 1 million new cases each year. [2] Workers who work with computers for more than 3 hours per day are at greater risk of developing eye complaints. [3] The Occupational Safety and Health Administration (OSHA) defines computer vision syndrome (CVS) as complex eye and vision complaints experienced when using a computer. [4] CVS is a compound eye problem related to close-up work experienced by someone when using a computer. [5] Occupational diseases are diseases that arise from things that are done excessively when doing work, related to computer use, one of the occupational diseases that can arise is eye fatigue. [6] Dry eye complaints can occur due to increased tear evaporation and decreased tear secretion, both of which are caused by the need to be able to focus vision on the computer. Excessive activity occurs because the eyes need to adjust to the distance between the eyes and the monitor screen and the characters of letters and images on the computer. [7] The main factors causing CVS are the position of the screen and viewing distance on the computer, improper lighting and other factors from the visual ability of the computer user such as uncorrected refractive errors, oculomotor disorders, history of eye disease, screen contrast or glare, resolution, image refresh duration and flicker, and distance and viewing angle on the screen. In addition, factors related to CVS include gender, eye disorders, lighting levels in the workplace, screen or monitor distance,

and room temperature. [8] The prevalence of CVS varies widely, with data reported globally ranging from 12.1% to 94.8% in the pediatric population and from 35.2% to 97.3% in the adult population. [9] Prevalence varies according to the demographic data evaluated (gender, age group, place of origin, occupation. [10] In Asia, the prevalence of CVS is quite high. Research in Sri Lanka showed the prevalence of CVS in computer users was 67.4%, in Hong Kong it was 67%, and in Malaysia it was 68.1%. In Indonesia, it showed that 97% of computer user respondents experienced CVS. [11] According to the World Internet Users Statistics and 2022 World Population Stats report, 54.9% of the world's population is Asia, where 53.4% of the Asian population are internet users. [12] According to the National Institute for Occupational Safety and Health (NIOSH), poor lighting and reflections from screens can increase eye strain. [13] The application of the 20-20-20 method can help reduce eye strain due to continuous screen use, this rule advises workers to take a break every 20 minutes by looking at an object 20 feet away for 20 seconds. [14] Based on the above, this study focuses on the analysis of determinant factors that contribute to the occurrence of Computer Vision Syndrome (CVS) on stevedores at PT. Pelindo Terminal Petikemas Makassar New Port (MNP). By knowing these factors in depth, it is expected that an effective solution can be found to reduce the number of Computer Vision Syndrome (CVS) incidents and improve. Therefore, research on what determinant factors influence computer use on Computer Vision Syndrome (CVS) complaints on Operator Planners at PT. Pelindo Terminal Petikemas Makassar New Port (MNP) is very relevant to be carried out, with the hope that a solution can be found to overcome the CVS incidents faced by workers in working in front of the monitor for a long duration.

2. FINDINGS

This study involved 84 respondents from PT. Pelindo Terminal Petikemas Makassar New Port (MNP), consisting of 42 respondents who experienced CVS complaints (case group) and 42 who did not (control group). During the period October 2023 - October 2024, CVS symptoms were recorded in 50% of respondents. Of the 42 workers at PT. Pelindo Terminal Petikemas Makassar New Port (MNP) who experienced CVS complaints, most of them experienced the most common complaint, namely tired and strained eyes, experienced by 52 respondents (61.9%). And a small portion experienced dry and irritated eyes, as many as 4 respondents (4.8%) reported dry and irritated eyes.

Table 1. Distribution of Respondents Based on Risk Factors

Factor	Symptoms of CVS			
	Case		Control	
	n	%	n	%
Working Period				
>5 Years	31	36,9	11	13,1
<5 Years	11	13,1	31	36,9
Eye Rest Time				
Non-Standard	31	36,9	8	9,5
Standard	11	13,1	34	40,9
HP Screeb Display				
Exposed	19	22,6	18	21,4
Not Exposed	23	27,4	24	28,6
Use of Glasses				
Not Using	28	33,3	12	14,3
Use	14	16,7	30	35,7
Monitor Position				
Not Ergonomic	34	40,5	6	7,1
Ergonomic	8	9,5	36	42,9
Lighting intensity (light in the eyes)				

< 300 Lux	29	34,5	11	13,1
>300 Lux	13	15,5	31	36,9
Eye-to-Monitor Viewing Distance				
< 50 cm	29	34,5	12	14,3
>50 cm	13	15,5	30	35,7
Duration of Computer Use				
>4 Hours	35	41,7	14	16,7
< 4 Hours	7	8,3	28	33,3
Antiglare Screen				
Not Used	33	39,3	7	8,3
Used	9	10,7	35	41,7

The distribution of respondents showed that in terms of work period, the majority of respondents had a work period of >5 years (31 cases, 11 controls). In terms of eye rest time (11 cases, 34 controls). In addition, exposure to the cellphone screen showed an almost balanced distribution in both groups (19 cases, 18 controls). Meanwhile, in terms of glasses use (14 cases, 34 controls). Based on the monitor position side variable, respondents with monitor positions that were not horizontally straight (8 cases, 36 controls), Lighting intensity <300 Lux was found more in the case group (29 people), while lighting >300 Lux dominated the control group (31 people).

The viewing distance to the monitor <50 cm was more in the case group (29 people), while the distance >50 cm was more in the control group (30 people). The duration of computer use was also a significant factor, with respondents who used computers >4 hours more in the case group (35 people), while those who used computers <4 hours more in the control group (28 people). Meanwhile, the use of antiglare screens was more dominant in the control group (35 people), while not using antiglare screens was more common in the case group (33 people).

Bivariate Analysis

a. Relationship Factors of Working Period with CVS Symptoms in Operator Planner Workers at PT. Pelindo Terminal Petikemas New Port Makassar

Table 2. Working Period with CVS Symptoms

Years of service	**CVS symptoms**				**OR**	**CI (95%)**	***P-Value***
	Cases		**Control**				
	n	**%**	**n**	**%**			
Risk	25	29,41	17	0,016	2,941	1,208 –7,159	0,016
Not risk	14	35,9	28	62,2			

Table 2 shows that workers with a high-risk work period have a prevalence of CVS symptoms of 29.41% (25 people), higher than the control group of 16% (17 people). Conversely, in the non-risk category, the prevalence of CVS was lower in the case group (35.9%; 14 people) than in the control group (62.2%; 28 people). The analysis showed an Odds Ratio of 2.941 (95% CI: 1.208–7.159; p = 0.016), indicating that high-risk workers were almost three times more likely to experience CVS symptoms, with statistically significant results.

b. Relationship Factors of Eye Rest Time with CVS Symptoms in Planner Operator Workers at PT. Pelindo Terminal Petikemas New Port Makassar

Table 3. Eye Rest Time with CVS Symptoms

Eye Rest Time	CVS symptoms				OR	CI (95%)	*P-Value*
	Cases		Control				
	n	%	n	%			
Non-Standard	25	64,1	14	31,1	3,954	1,593-9,814	0,002
Standard	14	35,9	31	68,9			

Table 3 shows that there is a significant relationship between eye rest time and Computer Vision Syndrome (CVS) symptoms. Workers who do not follow the standard break time have almost 4 times greater chance of experiencing CVS symptoms (OR = 3.954; 95% CI: 1.593–9.814). The confidence interval that does not cross the number 1 indicates accurate results, while the p value = 0.002 confirms that this relationship is statistically significant. This indicates that the lack of eye rest significantly contributes to the increased risk of CVS symptoms.

c. Factors of the Relationship between Exposure to Mobile Phone Screens and CVS Symptoms in Operator Planner Workers at PT. Pelindo Terminal Petikemas New Port Makassar

Table 4. Cell Phone Screen Exposure with CVS Symptoms

Cellphone screen display	CVS symptoms				OR	*CI* (95%)	*P-Value*
	Cases		Control				
	n	%	n	%			
Exposed	15	38,5	22	48,9	0,653	0,274-1,560	0,337
Not Exposed	24	61,5	23	51,1			

Table 4 shows that in the case group, 38.5% were exposed to mobile phone screens, while in the control group, exposure was higher at 48.9%. The Odds Ratio (OR) of 0.653 indicates that mobile phone screen exposure is associated with a 34.7% lower chance of experiencing CVS. However, the 95% confidence interval (0.274–1.560) includes the number 1, and the p-value is 0.337 ($p > 0.05$), indicating that this association is not statistically significant. Thus, mobile phone screen exposure is not proven to be a significant risk factor for the occurrence of CVS.

d. Factors of the Relationship between Glasses Use and CVS Symptoms in Planner Operator Workers at PT. Pelindo Terminal Petikemas New Port Makassar

Table 5. Use of Glasses with CVS Symptoms

Use of Glasses	CVS symptoms				OR	*CI* (95%)	*P-Value*
	Cases		Control				
	n	%	n	%			
Not Using	22	56,4	18	40,0	1,941	0,814-4,632	0,133
Using	17	43,6	27	60,0			

Table 5 shows that 56.4% of the case group (with CVS symptoms) did not use glasses, compared to 40.0% of the control group. Conversely, 43.6% of the case group used glasses, while 60.0% of the control group. The Odds Ratio (OR) of 1.941 indicates that individuals who do not use glasses have almost twice the risk of experiencing CVS symptoms. However, the 95% Confidence Interval (0.814–4.632) includes the number 1, and the p-value is 0.133 ($p > 0.05$), indicating that this relationship is not statistically significant. Thus, the use of glasses is not proven to be significantly related to the reduction of CVS symptoms.

e. Relationship Factors of Monitor Position with CVS Symptoms in Operator Planner Workers at PT. Pelindo Terminal Petikemas New Port Makassar

Table 6. Monitor Position with CVS Symptoms

Monitor Position	CVS Symptoms				OR	CI (95%)	*P-Value*
	Cases		Control				
	n	%	n	%			
Not Ergonomic	27	69,2	13	28,9	5,538	2,170-14,136	0,000
Ergonomic	12	30,8	32	71,1			

Table 6 shows that 69.2% of the case group used non-ergonomic monitor positions, compared to only 28.9% in the control group. The Odds Ratio (OR) of 5.538 indicates that workers with non-ergonomic monitor positions have a 5.5 times greater risk of experiencing CVS symptoms. The 95% Confidence Interval (2.170–14.136) and p-value of 0.000 indicate statistically significant results. This means that non-ergonomic monitor positions play a major role in increasing the risk of CVS symptoms in workers.

f. Relationship Factors of Lighting Intensity with CVS Symptoms in Planner Operator Workers at PT. Pelindo Terminal Petikemas New Port Makassar

Table 7. Lighting Intensity with CVS Symptoms

Lighting Intensity	CVS Symptops				OR	CI (95%)	*P-Value*
	Cases		Control				
	n	%	n	%			
Not-Standard	26	66,7	14	31,1	4,429	1,770-11,083	0,001
Standard	13	33,3	31	68,9			

Table 7 shows that 66.7% of the case group worked with non-standard lighting, while only 31.1% in the control group. The Odds Ratio (OR) of 4.429 with a 95% Confidence Interval (1.770–11.083) indicates that workers with non-standard lighting are 4.4 times more likely to experience CVS symptoms. A P-value of 0.001 indicates that this relationship is highly statistically significant, meaning that non-standard lighting contributes to an increased risk of CVS symptoms.

g. Relationship Factors of Visibility Distance with CVS Symptoms in Operator Planner Workers at PT. Pelindo Terminal Petikemas New Port Makassar

Table 8. Visibility Distance with CVS Symptoms

Visibility	CVS Symptoms				OR	*CI* (95%)	*P-Value*
	Cases		Control				
	n	%	n	%			
Not Ergonomic	24	61,5	17	37,8	2,635	1,090-6,371	0,030
Ergonomic	15	38,5	28	62,2			

Table 8 shows that in the group with unergonomic viewing distance, 61.5% experienced CVS symptoms in the case group, compared to 37.8% in the control group. The Odds Ratio (OR) of 2.635 with a 95% Confidence Interval (1.090–6.371) indicates that workers with unergonomic viewing distance have a 2.6 times greater risk of experiencing CVS symptoms. The P-value of 0.030 indicates that this relationship is statistically significant, indicating that unergonomic viewing distance increases the risk of CVS symptoms.

h. Relationship Factors of Duration of Computer Use with CVS Symptoms in Operator Planner Workers at PT. Pelindo Terminal Petikemas New Port Makassar

Table 9. Duration of Computer Use

Duration of Computer Usage	CVS Symptoms				OR	*Confidence Interval* (95%)	*P-Value*
	Cases		Control				
	n	%	n	%			
Risk	29	74,4	20	44,4	3,625	1,432-9,175	0,006
Not Risk	10	25,6	25	55,6			

Table 9 shows that 74.4% of the case group had a high risk computer usage duration, compared to 44.4% in the control group. The Odds Ratio (OR) of 3.625 indicates that individuals with a high risk computer usage duration are 3.625 times more likely to experience CVS symptoms. The 95% Confidence Interval (1.432–9.175) and p-value of 0.006 indicate a statistically significant relationship. Long duration of computer usage is closely related to an increased risk of CVS symptoms.

i. Relationship Factors of Antiglare Screen Use with CVS Symptoms in Planner Operator Workers at PT. Pelindo Terminal Petikemas New Port Makassar

Table 10. Antiglare screen

Use of Antiglare Screen	CVS Symptoms				OR	*CI* (95%)	*P-Value*
	Cases		Control				
	n	%	n	%			
Not used	27	69,2	21	46,7	2,571	1,048-6,308	0,037
Used	12	30,8	24	53,3			

Table 10 shows that 69.2% of the case group did not use antiglare screens, compared to 46.7% in the control group. The Odds Ratio (OR) of 2.571 indicates that individuals who do not use antiglare screens are 2.571 times more likely to experience CVS symptoms. The 95% Confidence Interval (1.048–6.308) and p-value of 0.037 indicate a statistically significant relationship, meaning that not using antiglare screens increases the risk of CVS symptoms.

Multivariate Analysis

Table 11. SPSS Output of Multiple Logistic Regression Test

Variabel		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Working Period	.279	.568	.242	1	.623	1.322	.434	4.028
	Eye Rest Time	.822	.554	2.202	1	.138	2.276	.768	6.744
	Monitor Position	.793	.583	1.846	1	.174	2.210	.704	6.934
	Eye Light Intensity	.876	.553	2.515	1	.113	2.402	.813	7.094
	Viewing Distance	.380	.544	.487	1	.485	1.462	.503	4.247
	Duration of Computer Use	.480	.622	.596	1	.440	1.617	.478	5.472
	Antiglare Screen	.211	.557	.144	1	.704	1.235	.415	3.679
	Constant	-5.576	1.444	14.919	1	.000	.004		
Step 2[a]	Working Period	.316	.560	.319	1	.572	1.372	.458	4.110
	Eye Rest Time	.851	.548	2.414	1	.120	2.342	.801	6.852
	Monitor Position	.840	.570	2.174	1	.140	2.317	.758	7.078

	Eye Light Intensity	.880	.554	2.529	1	.112	2.412	.815	7.137
	Viewing Distance	.382	.545	.491	1	.484	1.465	.503	4.262
	Duration of Computer Use	.474	.624	.576	1	.448	1.606	.472	5.459
	Constant	-5.447	1.395	15.244	1	.000	.004		
Step 3[a]	Eye Rest Time	.913	.536	2.896	1	.089	2.492	.871	7.130
	Monitor Position	.855	.568	2.265	1	.132	2.352	.772	7.166
	Eye Light Intensity	.897	.551	2.649	1	.104	2.453	.833	7.226
	Viewing Distance	.361	.543	.443	1	.506	1.435	.495	4.159
	Duration of Computer Use	.593	.585	1.028	1	.311	1.810	.575	5.702
	Constant	-5.256	1.340	15.395	1	.000	.005		
Step 4[a]	Eye Rest Time	.958	.532	3.244	1	.072	2.606	.919	7.391
	Monitor Position	.941	.554	2.888	1	.089	2.563	.866	7.589
	Eye Light Intensity	.857	.545	2.472	1	.116	2.355	.810	6.851
	Duration of Computer Use	.674	.572	1.388	1	.239	1.962	.639	6.019
	Constant	-4.967	1.253	15.716	1	.000	.007		
Step 5[a]	Eye Rest Time	.891	.522	2.916	1	.088	2.438	.877	6.778
	Monitor Position	1.103	.535	4.258	1	.039	3.014	1.057	8.597
	Eye Light Intensity	1.063	.515	4.264	1	.039	2.894	1.055	7.937
	Constant	-4.485	1.155	15.071	1	.000	.011		

a. Variable(s) entered on step 1: Working Period, Eye Rest Time, Monitor Position, Eye Light Intensity, Viewing Distance, Duration of Computer Use, Antiglare Screen.

In the initial stage, the results of the variable test showed that no variables were statistically significant ($p > 0.05$). However, some variables showed a greater influence, such as Eye Rest Time (Exp(B) = 2.276), Monitor Position (Exp(B) = 2.210), and Eye Light Intensity (Exp(B) = 2.415), although the value was not yet significant ($p > 0.05$). The Antiglare Screen variable had no effect ($p = 0.704$). In the second stage, the model was refined by removing the Antiglare Screen. Eye Light Intensity ($p = 0.112$, Exp(B) = 2.412) and Eye Rest Time ($p = 0.120$, Exp(B) = 2.342) showed a stronger influence. Monitor Position (Exp(B) = 2.317) still showed an influence even though $p > 0.05$. In the third stage, the working period was removed. Eye rest time ($p = 0.089$, Exp(B) = 2.492) and eye light intensity ($p = 0.104$, Exp(B) = 2.453) were getting closer to significance. Monitor position still showed a strong influence (Exp(B) = 2.352), while Viewing distance and Duration of computer use had less influence. In the fourth stage viewing distance was removed. Eye rest time ($p = 0.072$, Exp(B) = 2.606), monitor position ($p = 0.089$, Exp(B) = 2.563), and eye light intensity ($p = 0.116$, Exp(B) = 2.355) were getting closer to significance, with duration of computer use becoming less influential. In the fifth stage the model was simplified into three main variables: Eye Rest Time, Monitor Position, and Eye Light Intensity. Monitor Position ($p = 0.039$, Exp(B) = 3.014) and Eye Light Intensity ($p = 0.039$, Exp(B) = 2.894) were finally significant. Eye Rest Time ($p = 0.088$, Exp(B) = 2.438) still showed an influence although not significant.

3. DISCUSSION

a. The work period factor affects the risk of CVS symptoms in operator planner workers at PT. Pelindo Terminal Petikemas New Port Makassar

Based on the test results in this study, it shows that there is a significant relationship between work period and symptoms of Computer Vision Syndrome (CVS). Workers with at-risk work periods have a prevalence of CVS symptoms of 29.41% (25 people), higher than the control group which is only 16% (17 people). Conversely, in the non-risk category, the prevalence of CVS is lower in the case group (35.9%) compared to the higher control group (62.2%). Further analysis shows an Odds Ratio (OR) value of 2.941, which means that workers with at-risk work periods are almost three times more likely to experience CVS symptoms than workers who are not at risk. In addition, the confidence interval (1.208 - 7.159) which does

not include the number 1 and the p value = 0.016 shows that this relationship is statistically significant.

These findings are in line with research conducted on Factors Related to Computer Vision Syndrome (CVS) Complaints in PT Employees. PLN (Persero) Serang City in 2022. The results of statistical tests using the chi-square test obtained a p value = 0.049 so that the p-value <0.05 which means there is a relationship between work period and CVS complaints.

According to the research assumptions of 29 worker respondents who have a work period of ≥4 years, 4 respondents (13.8%) did not experience CVS, where respondents with a work period of ≥ 4 years but did not experience CVS, this is due to the fact that workers make good use of their rest time, refrain from working during their rest time, and become accustomed to their daily tasks, allowing them to control how much energy is expended during the workday so that they are not too stressed at the beginning so that they do not easily feel CVS complaints. In the results of the study of 12 worker respondents who have a work period of <4 years, 5 respondents (41.7%) experienced CVS, where respondents with a work period of <4 years but experienced CVS, this was due to some workers who misused the predetermined rest time, they used it to complete existing tasks. They believe that by working faster, their work will be completed faster[15]. In other words, although work period is often considered as one of the determinants of CVS complaint risk factors, the results of this study indicate that its influence is statistically significant.

b. Eye rest time factor affects the risk of CVS symptoms in operator planner workers at PT. Pelindo Terminal Petikemas New Port Makassar

Based on the test results in this study, there is a significant relationship between eye rest time and symptoms of Computer Vision Syndrome (CVS). Workers who do not follow the standard eye rest time have almost 4 times greater chance of experiencing CVS symptoms compared to workers who follow the standard rest time, as indicated by the Odds Ratio (OR) value of 3.954. The confidence interval (1.593 - 9.814) which does not include the number 1 indicates that these results have high accuracy and are statistically reliable. In addition, the p value = 0.002 strengthens that the relationship between eye rest time and CVS symptoms is statistically significant. The results of this study are in line with the theory of visual ergonomics which states that adequate eye rest is very important in preventing eye fatigue and CVS symptoms. One of the main factors causing CVS is the duration of prolonged screen exposure without adequate rest, which can cause eye strain, decreased blink frequency, and dry eyes[16]. Regular eye rest can help reduce eye muscle fatigue and maintain the balance of tear production, thereby reducing the risk of CVS. The results of this study indicate that there is a significant relationship between eye rest time and symptoms of Computer Vision Syndrome (CVS). Workers who do not follow standard eye rest time have almost 4 times greater chance of experiencing CVS symptoms compared to workers who follow standard rest time,

c. HP screen exposure factors affecting the risk of CVS symptoms in planner operator workers at PT. Pelindo Terminal Petikemas New Port Makassar

Based on the results of the analysis in Table 3.7, HP screen exposure did not have a significant association with the incidence of Computer Vision Syndrome (CVS). The Odds Ratio (OR) value of 0.653 indicates that individuals who are exposed to mobile phone screens have a 34.7% lower chance of experiencing CVS compared to those who are not exposed. However, the 95% confidence interval (CI) of 1 (0.274-1.560) and p-value of 0.337 (p > 0.05) indicate that this relationship is not statistically significant.

These results are in line with another study by Logaraj et al. (2014) showed that digital device use of more than 8 hours per day significantly increased the risk of CVS symptoms[17]. Lema and Anbesu (2022) in their systematic review reported that the prevalence of CVS reached 66%, with major risk factors including long duration of digital device use and lack of adequate rest18. Improper sitting position and high frequency of computer use are associated with increased CVS symptoms[19].

This research highlights the importance of building a safety culture in the workplace. By encouraging good behavior through training, supervision and rewards for workers who comply with safety procedures, companies can significantly reduce the risk of workplace accidents. Overall, the results of this study indicate a significant association between mobile phone screen exposure and CVS incidence at PT Pelindo Terminal Petikemas Makassar New Port (MNP) Port.

d. The factor of using glasses affects the risk of CVS symptoms in planner operator workers at PT Pelindo Terminal Petikemas New Port Makassar.

Based on the results of the analysis, this study showed that 56.4% of the case group who experienced symptoms of Computer Vision Syndrome (CVS) did not use glasses, while only 40.0% of the control group did not use glasses. In contrast, 43.6% of the case group used glasses, while 60.0% of the control group used glasses. The Odds Ratio (OR) value of 1.941 indicated that those who did not use glasses were almost twice as likely to experience CVS symptoms as those who used glasses. However, this result is not statistically significant as the 95% Confidence Interval (CI) has a range from 0.814 to 4.632, which includes a value of 1, indicating the possibility of no real association. In addition, the p value of 0.133 was greater than 0.05, meaning there was not enough evidence to suggest a significant association between eyeglass use and CVS symptoms in this study. Although there is a tendency that eyeglass use may be associated with a reduction in CVS symptoms, the results obtained were not strong enough to provide a significant conclusion.

These results are in line with research on the analysis of the relationship between the use of glasses and contact lenses with CVS subjective complaints using the Fisher Exact Test, the results obtained p value = 1.000 (p>0.05) so that it can be interpreted that there is no relationship between the use of glasses and contact lenses with CVS subjective complaints. The absence of an association between the use of glasses or contact lenses with CVS subjective complaints indicates that the use of glasses or contact lenses does not affect CVS subjective complaints in Semarang City Diskominfo employees20 . One study emphasized that the use of glasses alone is not enough to prevent CVS symptoms if not accompanied by good work habits, such as periodic breaks and lighting adjustments. This study found that 60% of participants who used glasses still experienced CVS symptoms due to prolonged screen time. This finding supports the idea that while the use of glasses may have a protective effect, environmental factors and work habits are also highly influential.

According to various studies, wearing glasses can affect the risk of Computer Vision Syndrome (CVS) symptoms, but results vary depending on the type of glasses and other contributing factors. Some studies have shown that glasses with specialized lenses, such as anti-reflective or blue light filters, can reduce CVS symptoms, while non-prescription or inappropriate glasses can worsen the condition. However, other findings indicate that the use of glasses is not always significant in reducing the risk of CVS, especially if not accompanied by good work habits, such as regular breaks and ergonomic adjustments. Factors such as duration of electronic device use, sleep quality, and application of ergonomic principles also play an important role in the incidence of CVS. Therefore, while glasses can be a preventive tool, holistic interventions that include regular eye examinations, work environment adjustments and education on healthy habits are needed to effectively manage and prevent CVS.

e. The monitor position factor affects the risk of CVS symptoms in planner operator workers at PT Pelindo Terminal Petikemas New Port Makassar.

The analysis showed that workers who used non-ergonomic monitor positions had a higher proportion of Computer Vision Syndrome (CVS) compared to those who used ergonomic monitor positions. A total of 69.2% of the case group used non-ergonomic monitor positions, while only 28.9% in the control group. The Odds Ratio (OR) value of 5.538 indicates that workers with unergonomic monitor positions are 5.5 times more likely to experience CVS symptoms than those with ergonomic monitor positions. The 95% Confidence Interval (CI) ranged from 2.170 to 14.136, indicating that this result is quite stable and not due to chance. In addition, the p-value of 0.000, which is much smaller than 0.05, indicates a statistically significant relationship. Thus, it can be concluded that the use of non-ergonomic monitor positions significantly increases the risk of developing CVS symptoms in workers.

This is in line with the findings of a study which evaluated ergonomic deficiencies in computer workplaces and investigated their correlation with musculoskeletal disorders and visual symptoms among computer users in Bangladesh Universities showing a correlation between monitor ergonomic deficiencies and visual symptoms. Monitor ergonomic deficiencies had a statistically significant correlation with reported visual symptoms ($p < 0.05$). It was also seen that glare or reflected light from windows and improper monitor settings were significantly correlated with reported symptoms of itchy eyes , watery eyes, and unclear vision ($p < 0.05$). In addition, there was a significant correlation between monitor adjustment and itchy eyes ($p < 0.05$). However, participants who did not position the monitor directly in front of them experienced a higher likelihood of experiencing watery eye symptoms ($p < 0.05$).

Based on the results of these studies, various factors contribute to the occurrence of CVS, including duration of electronic device use, lack of rest, and inadequate application of ergonomic principles. In addition, some studies emphasize the importance of education and awareness-raising regarding healthy device use practices to prevent CVS. Technological innovations such as the “Tiger” eyewear system have also shown potential in helping to reduce CVS symptoms.

f. Lighting intensity factors affect the risk of CVS symptoms in planner operator workers at PT. Pelindo Terminal Petikemas New Port Makassar

Based on the results of the study in the case group with non-standard lighting, there were 26 people (66.7%), while in the control group there were only 14 people (31.1%) as shown in table 3.10. The results of the analysis showed an Odds Ratio (OR) value of 4.429 with a 95% confidence interval between 1.770 and 11.083, indicating that individuals working under non-standard lighting conditions are 4.4 times more likely to experience CVS symptoms compared to those working under standard lighting. The P-value of 0.001 indicates that this relationship is highly statistically significant, meaning that non-standard lighting contributes to the increased risk of CVS symptoms.

This finding is in line with a study on the prevalence and associated factors of Computer Vision Syndrome (CVS) among academic staff at Gondar University, Northwest Ethiopia: An Institution-Based Cross-Sectional Study, this study showed that participants who worked in inappropriate lighting levels (<300 lux or >500 lux) had a 2.47 times higher risk of experiencing CVS compared to those who worked in optimal lighting levels (300-500 lux) [AOR = 2.47, 95% CI (1.47, 4.33)]. This finding indicates that inappropriate lighting, either too dim or too bright, may be a significant risk factor in the development of CVS symptoms. According to a study on the correlation between room light intensity and the onset of Computer Vision Syndrome (CVS) complaints among computer users in an internet cafe in Malang City, 39 people with

inadequate room light intensity reported CVS complaints, compared to 27 (64.3%) and 12 (28.6%) who did not experience complaints. A p value of 0.04, or p < 0.05, was found from Fisher's exact test evaluating the association between room light intensity and the onset of CVS symptoms among computer users in cyber cafes in Malang City. This indicates that the onset of CVS complaints in internet cafes in Malang City is significantly correlated with room light intensity.

g. The visibility factor to the monitor affects the risk of CVS symptoms in planner operator workers at PT Pelindo Terminal Petikemas New Port

Based on the data above, there is a significant relationship between non-ergonomic visibility and the incidence of Computer Vision Syndrome (CVS). In the group with non-ergonomic visibility, 61.5% experienced CVS symptoms, while in the group with ergonomic visibility only 38.5% experienced CVS. Statistical analysis showed that the Odds Ratio (OR) value was 2.635 with a 95% Confidence Interval (CI) between 1.090 and 6.371, meaning that individuals with unergonomic visibility had a 2.6 times greater risk of experiencing CVS compared to those with ergonomic visibility. In addition, the P-value of 0.030 indicates that this relationship is statistically significant, so unergonomic visibility may increase the risk of CVS. Unergonomic viewing distance may cause eye muscle strain and increase the risk of eyestrain, which is a major symptom of CVS.

Unergonomic viewing distances can cause eye muscle strain and increase the risk of eyestrain, which is a major symptom of CVS. According to the American Optometric Association (AOA, 2023), the ideal distance for computer screen use is 50-70 cm, with the screen positioned slightly below the eye's line of sight at about 15-20 degrees downward21. A distance that is too close makes the eyes have to work harder to accommodate, while a distance that is too far can cause a decrease in visual acuity, thus increasing eyestrain22. In addition, a recent study by Sheppard & Wolffsohn (2023) showed that unergonomic screen position and distance increased the risk of CVS by 2-3 times, which is in line with the results in this table23. To reduce the risk of CVS due to unergonomic viewing distance, several preventive measures can be implemented, such as adjusting screen distance to ergonomic standards, using chairs and tables that support good posture, and applying the 20-20-20 rule (resting the eyes every 20 minutes by looking at objects 20 feet away for 20 seconds). Thus, the results in this table further reinforce the importance of ergonomic viewing distance management in preventing CVS.

This study is in line with Insani's research (2018), that there is a relationship between monitor distance and computer operator eye fatigue in Makassar City Company with a p value of 0.003. In addition, other studies have shown the results of the chi square test where the p value = (0.050 = 0.05), so there is a relationship between monitor distance and symptoms of eye fatigue in computer operators in Makassar city companies[24]. The results of this study are also in line with research conducted by Ariyanto (2023) on CVS in Administrative Computer Operators, on the variable eye distance to the monitor shows that the results of the Fisher test, obtained p-value = 0.020 (p <0.05). This shows that there is a relationship between eye distance to the monitor and complaints of computer vision syndrome in employees of Agency X, General Administration Subdivision. The RP value obtained is 9.143 with a 95% confidence interval between 1.533 to 54.542, indicating that respondents with eye distance to the computer less than 50 cm have a 9.143 times greater risk of experiencing computer vision syndrome complaints than respondents with eye distance to the computer more than or equal to 50 cm[25].

h. The factor of duration of computer use affects the risk of CVS symptoms in planner operator workers at PT Pelindo Terminal Petikemas New Port Makassar.

Based on the results of the data analysis, 29 people (74.4%) in the case group had an at-risk duration of computer use, while only 20 people (44.4%) in the control group were exposed to the same duration. The analysis showed an odds ratio (OR) of 3.625, meaning that individuals with risky duration of computer use were 3.625 times more likely to experience CVS symptoms compared to those without risk. The Confidence Interval (95%) range shows that the OR value can be between 1.432 to 9.175, which still includes a number greater than 1, indicating that this relationship is quite strong. The p-value of 0.006 indicates that the association between duration of computer use and CVS symptoms is highly statistically significant, as the p-value is less than the significance limit of 0.05. Therefore, it can be concluded that long duration of computer use is closely associated with an increased risk of CVS symptoms.

This is in line with the results of research conducted by Antarctica et al (2019) on the results of bivariate analysis found that the length of computer use has a significant relationship with the onset of eye fatigue complaints in workers at the KC Hotel. Length of computer use is a risk factor for developing eye fatigue complaints. Workers who work using computers for more than four hours per day are at a risk of 8.4 times compared to workers who work using computers for less than or equal to four hours. According to Law No. 13 Year 2003 on Manpower regulates working hours for employees with a standard of 8 hours a day or 40 hours a week (five working days)[26]. At first glance, high or excessive working hours will definitely produce quality products or services. But the reality is different, if excessive working hours will make a decrease in employee performance and can risk causing other problems such as fatigue, illness and work accidents and lead to decreased productivity[27].

a. The antiglare screen factor affects the risk of CVS symptoms in planner operator workers at PT Pelindo Terminal Petikemas New Port Makassar.

Based on the data above, there is a significant relationship between the use of antiglare screens and the incidence of Computer Vision Syndrome (CVS). Of the group that did not use the antiglare screen, 69.2% experienced CVS symptoms, while in the group that used it, only 30.8% experienced CVS. The analysis showed that the Odds Ratio (OR) value was 2.571 with a 95% Confidence Interval (CI) between 1.048 and 6.308, which means that individuals who do not use antiglare screens have a 2.6 times greater risk of experiencing CVS compared to those who use them. In addition, the P-value of 0.037 indicates that this relationship is statistically significant, such that not using antiglare screens can significantly increase the risk of CVS.

In line with research conducted by Nugroho et al. (2021) on 120 administrative workers in Bandung resulted in findings that the use of antiglare screens with a polarization level of >95% was able to reduce complaints of eye fatigue by 55% compared to the control group. Regression analysis showed OR=0.45 (95% CI: 0.32-0.58), indicating a strong protective effect of using antiglare screens[28]. The results of a study by Widodo and Hartanto (2022) on 150 call center operators in Surabaya proved that ergonomic antiglare screen installation positions can increase the effectiveness of CVS prevention by up to 45%. This study also found a positive correlation between routine maintenance and antiglare screen effectiveness ($r=0.68$, $p<0.001$)[29].

The influence of antiglare screen factors on the risk of Computer Vision Syndrome (CVS) symptoms in computer operator workers is an important topic in occupational health in the digital age. CVS has become a significant occupational health issue as the use of digital devices increases in modern work environments. Antiglare screens or anti-glare filters play a crucial role in reducing light exposure that can interfere with workers' visual comfort..

4. CONCLUSION

Based on the results of the study, it can be concluded that Based on univariate analysis, there are several factors that influence the increase in the frequency of CVS events at PT. Pelindo Terminal Petikemas New Port Makassar. Workers with more than five years of service have a three times greater chance of experiencing CVS symptoms compared to those with less than five years of service. Non-standard eye rest time has also been shown to have a significant effect with OR = 3.954, which shows that workers who do not have standard eye rest time have a four times greater chance of experiencing CVS. Meanwhile, exposure to cellphone screens and the use of glasses did not show a significant effect on the incidence of CVS. In the bivariate analysis, the position of the monitor that is not ergonomic, the intensity of lighting that is not according to the standard, and the non-ergonomic viewing distance have been shown to have a significant relationship with the increase in the incidence of CVS. The duration of long computer use also plays an important role in increasing the risk of CVS symptoms. The use of antiglare screens has a significant effect with OR = 2.571, which shows that the use of antiglare screens can reduce the risk of CVS. In multivariate analysis, factors related to work environment settings, such as monitor position and lighting intensity, were shown to have a more significant effect on CVS incidence. In addition, eye rest time and viewing distance also played a role, although not all variables reached full significance levels. Overall, the results of this study indicate that ergonomic work environment settings, including adequate rest time and the use of aids such as antiglare screens, are very important in reducing the risk of Computer Vision Syndrome (CVS).

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REFERENCES

[1] Rosenfied. (2016). Computer Vision Syndrome (aka digital eye strain). *Optometry Practice J*, 19(1), 1-10.

[2] Amalia H. (2018). Computer Vision Syndrome. *Jurnal Biomedika dan Kesehatan* , 1(2), 117-118.

[3] Rathore I. (2017). Computer Vision Syndroman emerging occupational hazard. *Reasearch J.Science and Tech*, 9(2):293-297.

[4] Reddy S. C., L. C. (2013). Computer Vision Syndrome: a study of knowledge and practices in university students. Nepalese Journal of Ophthalmology: *A Biannual Peer-Reviewed Academic Journal of the Nepal Ophthalmic Society*, 5(2), 161-168.

[5] Affandi, E. S. (2005). Sindrom Penglihatan Komputer (Computer Vision Syndrom). *Majalah Kedokteran Indonesia*, 55(3).

[6] Estu, M. (2021). *Faktor Yang Berhubungan Dengan Kejadian Kelelahan Mata Terhadap Paparan Komputer Pada Karyawan Di PT. Inka Multi Solusi Service* . Madiun.

[7] Permana, A. &. (2015). Faktor Yang Berhubungan Dengan Keluhan Computer Vision Syndrome (CVS) Pada Pekerja Rental Komputer Di Wilayah Unnes. *Jurnal Unnes*, (3).

[8] Gowrisankaran S, S. J. (2015). *Computer Vision Syndrom: A review. Work J*, 52(5), 303-314.

[9] Li L, Zhang J, Chen M, Li X, Chu Q, Jiang R, et al. *Contribution of total screen/online-course time to asthenopia in children during COVID-19 pandemic via influencing psychological stress.* Front Public Health. 2021;9: 736617.

[10] Altalhi A, Khayyat W, Khojah O, Alsalmi M, Almarzouki H. Computer vision syndrome among health sciences students in Saudi Arabia: *prevalence and risk factors. Cureus*. 2020;12(2): e7060.

[11] Alberta, I. B. (2021). *Pendekatan Multidimensional Computer Vision Syndrome di era wfh.* Cermin Dunia Kedokteran, 48(6), 350–354.

[12] World Internet Users Statistics and 2022 World Population Stats. *Asia Internet Usage Stats Facebook and Population Statistics.*; 2022.

[13] National Institute for Occupational Safety and Health (NIOSH), 1999. *NIOSH Publication on Video Display Terminal.* Third Edition U.S. Department of Health and Human Services.

[14] American Optometric Association (AOA), 2021. *Computer Vision Syndrome*. [online] Available at: https://www.aoa.org/healthy-eyes/eye-andvision-conditions/computer-visionsyndrome?sso=y> [Accessed 15 September 2021].

[15] Fajria, P. R. (2022). *Faktor-Faktor Yang Berhubungan Dengan Keluhan Computer Vision Syndrome (CVS) Pada Pegawai PT. PLN (Persero) Kota Serang Tahun 2022 [Universitas Andalas*]. http://scholar.unand.ac.id/201238/

[16] Blehm, C., Vishnu, S., Khattak, A., Mitra, S., & Yee, R. W. (2005). "Computer Vision Syndrome: *A Review". Survey of Ophthalmology*, 50(3), 253-262.

[17] Logaraj, M., Madhupriya, V. and Hegde, S. 2014. Computer vision syndrome and associated factors among medical and engineering students in Chennai. *Annals of Medical and Health Sciences Research*. 4(2): 179.

[18] Lema, A.K. and Anbesu, E.W. (2022). Computer vision syndrome and its determinants: *A systematic review and meta-analysis. SAGE Open Medicine*, 10, pp.1–19.

[19] Assefa, N. L., (2022). Prevalence and associated factors of Computer Vision Syndrome among computer-using bank workers in Ethiopia. *BMC Ophtalmology*, 22(1), 123-132.

[20] Dicky Darmawan, A. S. W. (2021). Indonesian Journal of Public Health and Nutrition Article Info. *Indonesian Journal of Public Health and Nutrition*, 1(1), 101–113. http://journal.unnes.ac.id/sju/index.php/IJP HN

[21] American Optometric Association. (2023). Computer Vision Syndrome: *Symptoms, causs, and treatments*. Retrieved from *https://www.aoa.org/patient_resources/computer-vision-syndrome*

[22] Rosenfield , M. (2021). Computer Vision Syndrome: *Causes, symptoms, and management*. *Survey of Ophthalmology*, 66 (3), 515-530.

[23] Sheppard, A. L. & Wolffsohn, J. S. (2018). Digital eye strain: Prevalence, measurement and amelioration. *BMJ Open Ophthalmology*, 3(1).

[24] Insani, 2018. Hubungan Jarak Monitor Dengan Kelelahan Mata Operator Komputer di Perusahaan CVS Kota Makassar. *Jurnal Manajemen Kesehatan* Vol. 4 Nomor 2 Tahun 2018

[25] Ariyanto, A. I., Koesyanto, H., & Rani, D. M. (2023). Keluhan Computer Vision Syndrome pada Operator Komputer Subbagian Administrasi Umum di Instansi X. *PubHealth Jurnal Kesehatan Masyarakat*, 1(3), 178-192.

[26] Antartika et al (2022)

[27] H. Guyton, Fisiologi Kedokteran. (2014). *(Buku Ajar) diterjemahkan Oleh Adji Dharma*, Jakarta: EGC Buku Kedokteran

[28] Nugroho, R.A., Wardani, L.K., & Rahman, F. (2021). Analisis efektivitas berbagai jenis antiglare screen terhadap gejala Computer Vision Syndrome. *Jurnal Ergonomi Indonesia*, 7(2), 67-78.

[29] Widodo, S., & Hartanto, R. (2022). Aspek ergonomis penggunaan antiglare screen pada pekerja call center. *Jurnal Kesehatan Masyarakat Nasional*, 17(3), 156-168.