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Understanding And Preventing Eye Health Disorders In Office Workers

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Abstract

Eye health problems are one of the work disorders that affect workers. One type of work that can have eye health disorders is office workers. Most office workers work using computers or laptops. Long-term use of computers or laptops often results in an increased risk of health disorders, especially eye health. Based on this, this study aims to provide an overview of the causes of eye health disorders along with prevention in dealing with eye health problems in office workers. This research method is quantitative research with the type of research used is analytical observational research, using a cross-sectional study design. The population in this study were 146 employees who worked in the office. In sampling using the Slovin formula with a 10% confidence level, it is known that the number of samples is 60 people. The sampling technique used is accidental sampling. The results obtained are based on the significance value (P-value) obtained < alpha value (α) (0.05), namely age (0.003), length of service (0.019), use of visual aids or glasses (0.023) and lighting in the work environment (0.030) which means that these 4 factors have an influence on eye health disorders. While gender has no influence with a significance value of 0.539. The conclusion in this study is that almost all factors have a significant influence on eye health problems experienced by respondents. The suggestion in this study is that workers are expected to always rest their eyes while working and adjust their viewing distance until they stare at the computer or work documents for a long time.

Keywords: *Occupational Health, Health eye, office workers, work environment lighting*

1.Introduction

Eye health is an important aspect of occupational health that often does not receive adequate attention, even though eye health disorders can have a significant impact on workers' productivity and quality of life. In this modern era, workers are exposed to various risk factors that can disrupt their eye health, such as intensive use of computer screens, inadequate lighting, and exposure to hazardous chemicals. With the advancement of technology, the use of digital devices such as computers, smartphones, and tablets has increased rapidly. Prolonged use of these devices is often associated with eye fatigue, especially due to intensive and continuous visual interaction. Evaluation of these risk factors is important to prevent and manage eye health disorders in the workplace (Sembel, G., et al. 2019).

The rapid development of technology is certainly closely related to human resources in an industrial process. Current work activities are often accompanied by the use of electronic devices, such as computers or laptops. Generally, the use of computers or laptops supports office work such as administrative activities and discussions or meetings that are now carried out online or hybrid. The very important role of computers and the increasingly popular use of the internet have caused workers to spend at least three hours a day in front of

computers (Afifah, A. N., et al, 2022). Computers are one of the developments in technology. The use of computers worldwide has increased over time. Based on a survey in the United States, the average working time spent working with computers is 5.8 hours or 69% of the total 8 working hours. When using a computer, it is best not to use it for more than 4 hours a day. If it exceeds that time, the eyes tend to experience refraction. In this case, the National Institute for Occupational Safety and Health (NIOSH) VDT Studies and Information recommends taking a 15-minute break from using a computer for two hours. Regular break frequencies are useful for breaking the chain of fatigue so that it will increase comfort for computer users (Munshi, S., et al, 2017).

The rapid development of technology is certainly closely related to human resources in an industrial process. Current work activities are often accompanied by the use of electronic devices, such as computers or laptops. The very important role of computers and the increasingly popular use of the internet cause workers to spend at least three hours a day in front of the computer (Boadi-Kusi, S. B., et al, 2022). This is evidenced by data from the 2018 Puslitbang Aptika IKP Kominfo in a survey conducted with 2,121 respondents, showing the use of laptops for work as much as 54.55% when not connected to the internet (offline), the rest for learning purposes reaching 53.55% and 34.94% for entertainment purposes. Meanwhile, the use of laptops when not connected to the internet (online), in a survey conducted with 4,238 respondents for the purpose of using laptops during work activities has a high proportion, namely 67.08%. However, the activity of using computers or laptops for too long can have negative impacts on the body, namely causing eye and neck muscle health problems. Working by staring at a monitor screen for a long period of time will cause the eyes to always focus on close-up views continuously so that over a certain period of time there will be discomfort in the eyes and vision (Farida A. S, et al, 2022).

Excessive use of computers will increase the risk of work disorders. One of them is eye health disorders. Eye health disorders due to computer use occur because the eyes continuously look at the computer monitor or visual display terminal (VDT). Eye fatigue is related to the length of use of the computer monitor (VDT). In order to overcome the negative impacts caused by computer use, it is necessary to pay attention to factors that can be related to eye fatigue, such as room lighting (Ibrahim. H. et al, 2018). According to the American Optometric Association (AOA), symptoms of discomfort that arise from staring at the monitor for too long are often referred to as Computer Vision Syndrome (CVS). Computer Vision Syndrome (CVS) is an ocular (eye and vision) problem caused by exposure to computer or laptop screens due to high frequency or duration of use. Symptoms of CVS sufferers are usually characterized by a feeling of eye fatigue (visual fatigue), burning sensation, irritation, redness, blurred vision, and dry or watery eyes (Sánchez-Brau, M. et al, 2020).

The consequences that will occur if CVS is not handled properly can result in decreased work productivity, lack of concentration at work, and decreased job satisfaction. According to the Occupational Safety Health Administrator (OSHA) survey in 2015, CVS is the main complaint related to occupational health in offices. Globally, there are around 60 million people who experience CVS and one million new cases increase each year. Around 70% of computer workers worldwide are reported to have vision problems and there is an increase in the incidence rate (Akinbinu & Mashalla, 2013). The Asian continent has a relatively high prevalence of CVS. The prevalence of CVS for office workers who use computers in Sri Lanka in 1 year is 67.4% (Heiden, M, 2019). Based on the many problems related to eye health that occur, researchers want to know the causes of eye health disorders and prevention in dealing with eye health problems in office workers.

2. Materials and methods [This section provides detailed methodology carried out to achieve the objective]

2.1 Materials

This study uses quantitative research methods with the type of observational research and cross-sectional approach. This research was conducted at one of the PT PLN (Persero) offices in the city of Surabaya.

2.2 Data collection procedures

The population in this study were 146 employees working in the office. In sampling using the Slovin formula with a 10% confidence level, it was found that the number of samples was 60 people. The sampling technique used was accidental sampling, anticipating the number of respondents who were unwilling and also the number of respondents who were not in the office at the time of data collection.

2.3 Data analysis

Data Collection Sources and Techniques in this study are divided into two, namely: Primary data, namely data obtained from survey results, interviews with workers to measurements of the work environment, and then Secondary data obtained from company data or documents. The analysis in this study will use regression analysis in testing the influence of factors that can affect eye health disorders.

3. Results and discussion [A good scientific paper has minimum 5 sections]

Based on the results of identification and evaluation of problems in the field, the data obtained is as follows:

3.1 Distribution of respondent overview

Table 1. Distribution of respondents based on age

Age	**Information**	**n**	**%**
	21-30 Years	11	18
	31-40 Years	29	48
	41-50 Years	16	27
	≥ 50 Years	4	7
	N	60	100

The results of the age distribution show that 48% of respondents have an age within 31-40 years.

Table 2. Distribution of respondents based on Education

Education	**Information**	**n**	**%**
	High School	3	5
	Diploma III	9	15
	oma IV / Bachelor	37	62
	N	11	18

The results of the education distribution show that 62% of respondents have a level of education is Diploma IV/ Bachelor.

IV/ Bachelor.

Table 3. Distribution of Gender

Gender	**Information**	**n**	**%**
	Man	35	58,3
	Woman	25	41,7
	N	40	100

Based on the results of the distribution of the respondent gender factor, it is known that the majority of respondents are male, as many as 58.3%.

Table 4. Distribution of respondents based on work Period

Vork Period	**Information**	**n**	**%**
	≤ 5 Years	12	20
	>5 Years	48	80
	N	60	100

Based on the results of the distribution of respondents' work period factors, it is known that almost all respondents have a work period of more than 5 years, as much as 80%.

Table 5. Distribution of the Variable of Use of Visual Aids

of Visual Aids/ Glasses	**Information**	**n**	**%**
	Use	42	70
	Not Use	18	30
	N	60	100

Based on the results of the distribution of factors for the use of visual aids or glasses, it is known that the majority of respondents (70% of respondents) use glasses as a visual aid in everyday life or to help with work processes.

Table 6. Distribution of lighting overview in the work environment

ıtification work environment lighting	**Information**	**n**	**%**
	Standard	3	5
	Non-standard	57	95
	N	60	100

The table above is the result of the distribution of work environment factors, namely lighting in the workplace. It is known that the standard measurement value is said to be in accordance with Lighting

Standards, namely (300 - 1000 lux) and Not in accordance with Lighting Standards (<300-1000 lux or> 1000 lux). So the measurement results are obtained, namely Most respondents work in a work environment (Lighting) that does not meet standards as much as 95% of respondents.

Next is the result of identification in knowing Health problems related to eye health disorders. Based on the identification results from 60 respondents, the following data is known:

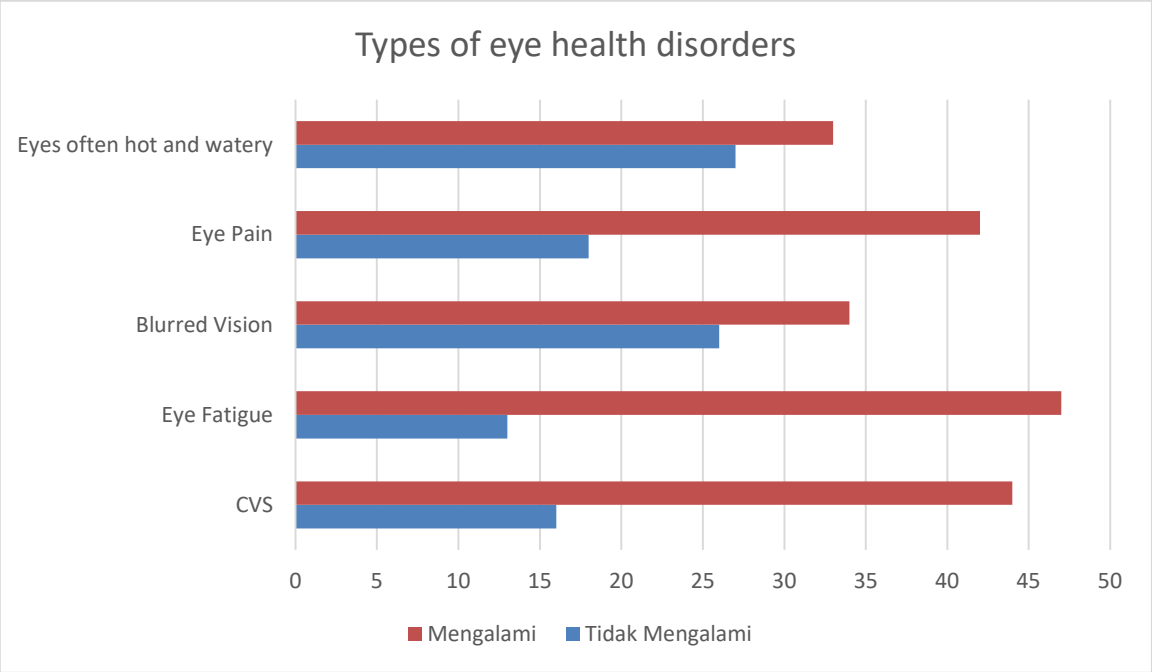

figure 1. Distribution type of Eye Health Disorders

Based on the graph, it is known that most respondents have problems with eye health. This can be seen from several complaints and measurement results from respondents. Some of these complaints include sore eyes, blurred vision, eye fatigue, eyes often hot and watery and computer vision syndrome (CVS). These results are summarized into data on eye health disorders in respondents which can be seen in the following diagram;

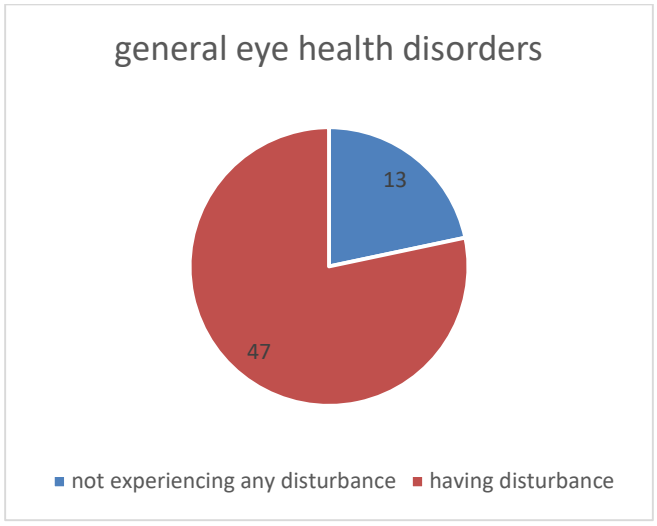

figure 2. Distribution of Eye Health

Based on the results, it is known that in general respondents have complaints regarding eye health problems, namely 47 respondents have these complaints.

3.2 Results of the analysis of the risk factors for eye health disorders

The results of the analysis in the study, is in the table below:

Table 7. Analysis of Factors Affecting eye health disorders

Variabel	Sig	ExpB
Age	0.003	5.210
Gender	0.539	0.000
Work Period	0.019	3.900
Use of visual aids/ Glasses	0.023	2.745
Lighting in the workplace	0.030	1.900

Based on the results of the analysis, it is known that almost all factors have a significant influence on eye health problems experienced by respondents. The age factor has a significance value of 0.003, which means that age has an influence on eye health disorders and with an ExpB value of 5.210, which means that age has the potential to influence the occurrence of eye health disorders. The length of service factor also has a significant influence on the occurrence of eye health disorders with a significance value of 0.019 and an ExpB value of 3.900, which means that length of service has the potential to influence the occurrence of eye health disorders.

Then, the factor of using visual aids or glasses has a significance value of 0.023, which means that the use of visual aids or glasses has an influence on eye health disorders and with an ExpB value of 2,745, which means that the use of visual aids or glasses has the potential to influence the occurrence of eye health disorders. The last factor that influences the occurrence of eye health disorders is the lighting factor in the work environment which has a significance value of 0.030 with an ExpB value of 1,900, which means that lighting in the work environment has the potential to influence the occurrence of eye health disorders. While gender has a significance value of 0.539, which means that gender has no influence on the occurrence of eye health complaints in respondents.

Age is one of the risk factors for eye fatigue. As age increases, the eye lens will experience a decline in its ability to convex or reduced power for accommodation. A person aged 45-50 years will have decreased accommodation power, this is because at the age of 45-50 years the eye lens becomes less elastic and loses its ability to adjust to seeing small work objects (Ilyas. S, 2015). In the study of Sofiati, et al, (2011), it was also stated that there is a relationship between age and complaints of eye fatigue. Age factors are related to a person's vision in the work environment, increasing age can cause the formation of lamellar fibers continuously, causing the lens to enlarge and reduce its elasticity. This can cause ciliary muscle contractions to decrease so that accommodation ability also decreases (Sawitri. et al, 2017).

Based on the results of a 2016 American Optometric Association survey in the United States on Most Americans Experience Digital Eye Strain from Overexposure to Computers According to Survey, the average working time spent working with computers is 5.8 hours or 69% of the total 8 working hours. Excessive computer use often results in an increased risk of work disorders. Data from the 2018 Riskesdas states that 94.6% of workers experience injuries due to negligence/accident. Based on research conducted

by Yulia, et al (2021), the prevalence of eye fatigue in office worker respondents who WFH in Padang City was 56.5%. There is a relationship between the distance of the eye to the risky screen (p = 0.000), insufficient rest time (p = 0.000), working time > 8 hours (p = 0.000), the length of use of a risky cellphone/laptop/etc. (p = 0.000), and the length of work from home (p = 0.001) with the occurrence of eye fatigue in office workers in Padang City. It is recommended for workers who WFH to take sufficient rest or stretch between long periods of using a laptop/cellphone and to practice maintaining a distance when using a laptop/cellphone (Yulia, Y. et al, 2021).

Working period affects workers experiencing eye health complaints such as CVS, that the longer a person works doing work that involves the use of computers/laptops, the higher the worker experiences CVS complaints. The results of this study found that almost all respondents, 48 workers (80%) had a relatively long working period, with a time span of 6-34 years. There were complaints of eye disorders on average after 113 workers worked with a working period of between 3-4 years. Because of this, workers who work more than 3 years will have a higher risk of eye fatigue than workers with a working period of less than or equal to 3 years (Ilyas, 2015).

Lighting sources are an important part of doing work clearly, quickly, comfortably, and safely. The light intensity in the workplace must meet the standards so as not to pose a K3 risk to workers. Lighting conditions that do not comply with the Indonesian Minister of Health Decree number 1405 of 2002 are feared to cause eye fatigue. Based on the research journals used, the average standard light intensity required by workers from various fields is ≥300 lux accompanied by the above factors, so it is necessary to analyze the relationship between the suitability of this light intensity requirement and the occurrence of eye fatigue in workers (Putra RNG. Et al, 2021)

4.Conclusion

Eye health problems in workers are often caused by the working environment and the type of work done. One problem is eye fatigue due to eye muscle tension due to prolonged use of the sense of sight in uncomfortable conditions. Meanwhile, Computer Vision Syndrome (CVS) is a symptom including dry eyes, strained eyes, blurred vision, and headaches caused by prolonged computer use. Eye health disorders in the workplace can include a variety of problems such as computer vision syndrome, eye irritation, eye accidents, dry eyes, photokeratitis, and blurred vision. These problems are generally caused by environmental factors and job demands, such as excessive use of digital devices, exposure to chemicals, dust, and ultraviolet light, and non-ergonomic working positions. These eye health disorders can also increase the workload, make you tired more easily, take frequent breaks, lose work hours, reduce job satisfaction, potentially make more mistakes, and decrease productivity and concentration.

Based on the results of the analysis related to risk factors causing eye health disorders in this study. It is known that almost all factors have a significant influence on eye health problems experienced by respondents. This is known based on the significance value (P-value) obtained <alpha value (α) (0.05), namely age (0.003), length of service (0.019), use of visual aids or glasses (0.023) and lighting in the work environment (0.030). While gender has no influence with a significance value of 0.539.

To prevent eye health problems in the workplace, some preventive measures that can be taken include: Using eye protection that is appropriate for eye conditions such as protective glasses or face shields according to the type of work and risks involved. Ergonomic adjustments by rearranging the position of the monitor, chair, and lighting to reduce eye strain. Taking regular breaks by following the 20-20-20 rule, which is every 20 minutes looking at an object 20 feet (6 meters) away for 20 seconds to reduce eye strain. Adjusting the lighting by ensuring that the workspace has adequate lighting and reducing glare on the computer screen. Adjusting the screen brightness and contrast by adjusting the brightness and contrast of the computer screen to make it comfortable for the eyes. Maintaining eye health by consuming foods that are good for eye health, such as those containing vitamins A, C, and E and omega-3. Then maintaining a clean work environment to reduce exposure

to chemicals and dust, and maintaining air humidity. And finally, if symptoms or eye problems appear, it is important to consult a medical professional or eye specialist for proper diagnosis and treatment.

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Conflict of interest

This research was conducted in 2024 and has never been published anywhere, therefore the author hopes that this article can be published in a reputable journal Scopus.

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