# RISK FACTORS FOR COMPUTER VISION SYNDROME (CVS) IN HOSPITAL ADMINISTRATION WORKER

*Faktor Risiko Computer Vision Syndrome (CVS) pada Pekerja Administrasi Rumah Sakit*

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## ABSTRAK

*Computer Vision Syndrome (CVS) adalah gangguan pada mata yang disebabkan oleh penggunaan komputer atau perangkat elektronik. Kondisi ini mengacu pada kumpulan gejala kelelahan mata yang timbul akibat kebiasaan menatap layar komputer atau gadget dalam durasi yang panjang. Pekerja administrasi rumah sakit merupakan bagian penunjang pelayanan pasien yang bekerja selama 8 jam per hari di depan layar komputer yang dituntut untuk mengerjakan pekerjaan administrasi secara cepat. Penelitian ini bertujuan untuk menganalisis faktor risiko CVS pada pegawai administrasi rumah sakit di Surakarta. Faktor risiko CVS pada penelitian ini yaitu usia, masa kerja, jarak mata dengan layar, penggunaan kacamata, durasi menggunakan komputer dan durasi istirahat mata. Penelitian ini merupakan penelitian kuantitatif analitik dengan desain cross sectional. Sampel peneltian ini yaitu pegawai administrasi rumah sakit X dan Y di Surakarta sebanyak 128 responden dengan menerapkan metode pengambilan sampel acak. Instrumen penelitian yang dipakai terdiri dari kuesioner faktor risiko CVS yang telah melalui uji validitas dan reliabilitas, serta kuesioner CVS-Q yang disebarkan melalui Google Form. Penelitian ini menggunakan uji Chi Square untuk analisis data. Hasil penelitian menunjukkan bahwa faktor risiko usia berhubungan signifikan dengan CVS (p = 0,028 < 0,05), sedangkan faktor risiko masa kerja, jarak mata dengan layar, penggunaan kacamata, durasi menggunakan komputer dan durasi istirahat mata tidak berhubungan dengan CVS (p>0,05). Kesimpulan penelitian ini menunjukkan bahwa usia merupakan faktor risiko CVS pada pegawai administrasi rumah sakit X dan Y di Surakarta. Oleh karena itu, responden sebaiknya melakukan senam mata untuk menurunkan gejala CVS.*

***Kata kunci**: CVS, faktor risiko, pegawai administrasi rumah sakit*

## ABSTRACT

Computer Vision Syndrome (CVS) is an eye condition caused by prolonged use of computers or gadgets. It involves symptoms of eye fatigue caused by staring at screens for extended periods. Hospital administration workers, as part of patient service support, work 8 hours daily in front of computers and must complete tasks quickly. This study aimed to analyze risk factors for CVS among hospital administration workers in Surakarta. The risk factors examined were age, work duration, screen-eye distance, glasses usage, computer use duration, and eye rest duration. This research employed a quantitative analytical approach with a cross-sectional design. The sample for this research was the administrative employees of hospitals X and Y in Surakarta, totaling 128 respondents. Data collection instruments included a validated and reliable CVS risk factor questionnaire and the CVS-Q questionnaire distributed via Google Forms. This research uses the chi-square test for data analysis. The results showed that the risk factor age was significantly related to CVS (p = 0,28 < 0,05), while the risk factors working period, distance between the eye and the screen, use of glasses, duration of using a computer, and duration of eye rest were not related to CVS (p>0,05). The conclusion of this study shows that age is a risk factor for CVS in administrative employees of hospitals

X and Y in Surakarta. Therefore, respondents should do eye exercises to reduce CVS symptoms.

## INTRODUCTION

In the workplace, interactions between humans, work tools, and environmental conditions are unavoidable. This interaction often triggers workplace accidents or occupational diseases. One example is the relationship between the eyes, as a bodily organ, and computer use. While computer use can increase productivity and work efficiency, prolonged and continuous use can lead to health problems such as Computer Vision Syndrome (CVS), Occupational Overuse Syndrome, and psychosocial stress. [1]CVS is one of the major occupational hazards of the 21st century, affecting 65-70% of all computer users[2].

*The American Optometric Association* (AOA) describes digital eye strain or CVS as an eye and vision disorder that arises due to the use of devices such as tablets, computers, cell phones, and e-readers for long periods of time, which causes increased stress on near vision[3]. Computer Vision Syndrome (CVS) is a common condition experienced by hospital administration workers due to prolonged computer use. This condition can cause eyestrain, dry eyes, blurred vision, headaches, and neck and shoulder pain. In the long term, CVS can lead to myopia, macular degeneration, chronic dry eye syndrome, and musculoskeletal disorders such as back pain and cervical spondylosis. Furthermore, CVS can trigger chronic headaches, sleep disturbances, and increased stress[4].

Globally, an estimated 60 million people suffer from Computer Vision Syndrome (CVS), with an additional 1 million new cases occurring annually. CVS cases in developing countries are thought to be higher due to high workloads and lack of rest time[5]. In today's world of work, employees are required to be able to use computers in their work because computers are considered capable of increasing the efficiency of the obligations that companies give to their employees[6]. In general, factors that cause CVS include environmental, personal, and device factors[2].

A hospital is an institution that provides comprehensive medical services, including outpatient services, in-hospital care, and emergency services [2]. Hospitals X and Y in Surakarta are type A and type C hospitals. In an effort to provide professional, safe health services and focus on patient safety and customer satisfaction, hospitals X and Y are equipped with adequate facilities, medical equipment, and medical support and are supported by professional and specialist staff in their fields. In addition to medical and paramedical staff, hospital administration staff are professionals who play an important role in the hospital.

Hospital administrative staff play an essential role in supporting hospital operations and patient services. They work an average of eight hours per day using computers and are required to complete administrative tasks quickly and accurately. Prolonged screen exposure increases their risk of developing Computer Vision Syndrome (CVS). Therefore, this study aims to examine the relationship between several risk factors—age, length of service, eye-to-screen distance, use of glasses, duration of computer use, and duration of eye rest—and the occurrence of CVS among hospital administrative staff who are susceptible to this work-related condition.

## METHODS

This research was a quantitative analytical study using a cross-sectional method. Participants in this study were administrative employees of hospitals X and Y in Surakarta with a population of 190 people. Sampling was carried out using a simple random sampling technique with a minimum sample size determined using the Slovin formula, resulting in 128 respondents. Data collection was conducted in May 2023 at

both hospitals. The independent variables in this study include age, length of service, distance from the eye screen, use of glasses, duration of eye rest, and duration of computer use. Meanwhile, the dependent variable analyzed was Computer Vision Syndrome (CVS).

The instrument used was the CVS-Q questionnaire, which consists of 16 symptom parameters that are assessed based on frequency and intensity. Frequency is divided into three categories: never, sometimes, and often or always, with each category valued at 0, 1, and 2. Meanwhile, for intensity assessment, there are two categories: moderate and severe, with each score of 1 and 2. Frequency and intensity scores are calculated by multiplying the scores for each parameter. A total score equal to or greater than 6 indicates a possible CVS[7]. In addition, this study also used a questionnaire on respondent characteristics to obtain data on age, length of service, distance from the eyes to the screen, use of glasses, duration of computer use, and duration of eye rest. The data obtained were analyzed bivariately using the Chi-square test using the SPSS version 26 program. The Health Research Ethics Commission of Dr. Moewardi Regional Hospital has granted ethical approval for this study with certificate number 1.153/V/HREC/2024.

**RESULT**

**Table 1. Frequency Distribution of Research Variables**

| Variables | Category | n = 128 | % |
|---|---|---|---|
| Age | < 40 years | 73 | 57.0 |
| | ≥ 40 years | 55 | 43.0 |
| Length of employment | ≥ 4 years | 101 | 78.9 |
| | < 4 years | 27 | 21.1 |
| Distance between eyes and screen | At risk (< 50 cm) | 74 | 57.8 |
| | No risk (≥ 50 cm) | 54 | 42.2 |
| Use of glasses | Yes | 76 | 59.4 |
| | No | 52 | 40.6 |
| Duration of using computer | > 4 hours | 128 | 100.0 |
| Eye rest duration | < 4 hours | 0 | 0.0 |
| Computer Vision Syndrome (CVS) | Every ≥ 20 minutes | 121 | 94.5 |
| | Every < 20 minutes | 7 | 5.5 |
| | Experiencing CVS | 108 | 84.4 |

Based on Table 1, most respondents were <40 years old (57%) and had a work duration of ≥4 years (78.9%). The majority had an eye-to-screen distance of <50 cm (57.8%) and used glasses (59.4%). All respondents used computers for >4 hours per day, and most took eye rest ≥20 minutes (94.5%). Overall, 108 respondents (84.4%) experienced CVS.

**Table 2. Relationship between Risk Factors and CVS in Administrative Employees at Hospitals X and Y in Surakarta**

| Independent Variables | CVS | | | | p* |
|---|---|---|---|---|---|
| | Not Experiencing CVS | | Experiencing CVS | | |
| | n | % | n | % | |
| Age | | | | | 0.028 |
| < 40 years | 16 | 21.9 | 57 | 78.1 | |
| ≥ 40 years | 4 | 7.3 | 51 | 92.7 | |
| Length of employment | | | | | 0.467 |
| < 4 years | 3 | 11.1 | 24 | 88.9 | |
| ≥ 4 years | 17 | 16.8 | 84 | 83.2 | |
| Distance between eyes and screen | | | | | 0.829 |
| No risk (≥ 50 cm) | 8 | 14.8 | 46 | 85.2 | |
| At risk (< 50 cm) | 12 | 16.2 | 62 | 83.8 | |

| Independent Variables | CVS | | | | p* |
| | Not Experiencing CVS | | Experiencing CVS | | |
| | n | % | n | % | |
|---|---|---|---|---|---|
| Age | | | | | 0.028 |
| < 40 years | 16 | 21.9 | 57 | 78.1 | |
| ≥ 40 years | 4 | 7.3 | 51 | 92.7 | |
| Use of glasses | | | | | 0.577 |
| No | 7 | 13.5 | 45 | 86.5 | |
| Yes | 13 | 17.1 | 63 | 82.9 | |
| Eye rest duration | | | | | 0.242 |
| ≥ 20 minutes | 20 | 16.5 | 101 | 83.5 | |
| < 20 minutes | 0 | 0 | 7 | 100 | |

*Chi-Square Test

The bivariate analysis in Table 2 shows a significant relationship between age and CVS (p = 0.028), with 92.7% of respondents aged ≥40 years experiencing CVS. No significant relationships were found for length of service (p = 0.467), eye-to-screen distance (p = 0.829), glasses use (p = 0.577), or eye rest duration (p = 0.242). Although not statistically significant, CVS remained more common among respondents with ≥4 years of service (83.2%), eye distance <50 cm (83.8%), glasses users (82.9%), and those resting their eyes ≥20 minutes (83.5%).

**DISCUSSION**

Based on the Chi-Square test, age showed a significant relationship with CVS (p<0.05). Respondents aged ≥40 years were more likely to experience CVS. This finding aligns with the natural decline in visual function that begins around the age of 30–40, when individuals commonly report difficulty focusing on near objects due to reduced accommodative ability and early presbyopia[8]. The aging process contributes to eye function degeneration, increasing susceptibility to CVS, and prolonged computer use in older adults can further exacerbate visual discomfort and impairment[8]. Tear production also decreases with age. A study by Bhanderi et al. (2008) showed a significant association between age and increased frequency of CVS. The results showed that individuals over 45 years of age were twice as likely to experience CVS as those aged 15 to 25 years[9]. Therefore, it is recommended that respondents perform eye exercises to reduce the risk of CVS. Regular eye exercises have a positive impact in significantly reducing CVS symptom scores[10]. Eye exercises have been proven effective in improving the eye's ability to adjust focus and clarity of vision, making the eyes more flexible and relaxed[11]. Eye exercises also help train the eye muscles to be more flexible, reducing stiffness in the eye muscles[12].

The work period variable in this study was not found to be associated with CVS. Bhanderi et al. revealed that the incidence of CVS was more common in individuals who had used computers for less than five years[9]. In this study, 391 respondents had used computers for more than 5 years, and 136 respondents who had used them for less than that. Based on this information, it can be concluded that tenure is not related to CVS complaints. This result aligns with Sugarindra's research, which also found no correlation between tenure and CVS[8]. In the study, respondents regularly engaged in physical activity, maintained their physical and mental health by regulating their sleep patterns, and consumed nutritious foods. These habits likely helped them stay healthy.

In this study, there was no significant relationship between eye-screen distance and the occurrence of CVS. The majority of respondents were in the at-risk category (<50 cm), but this was not associated with the occurrence of CVS. This was due to the use of anti-glare screen filters on the computers used by respondents, which help reduce light reflection (glare) from the screen. The use of matte screen filters can help reduce glare[13]. The results of this study are in line with Sugarindra's research, which also

showed no significant relationship between the distance between the eyes and the screen and the occurrence of CVS[8]. In this context, understanding the ergonomics of digital devices is crucial for eye health. Using devices that can reduce excessive light exposure from screens also plays a crucial role in maintaining eye comfort. Furthermore, positioning the screen at the correct angle and ensuring it is at an adequate distance can help reduce eye strain[14].

No significant association was found between eyeglass use and CVS, with a p-value of 0.577 (p>0.05). Using eyeglasses to correct refractive errors is also a risk factor that may influence the onset of CVS. Researchers assume that the absence of an association between eyeglass use and CVS is due to the anti-reflective (AR) coating on the glasses respondents wear. This coating can prevent glare and reflections, which helps reduce the eye's effort in refocusing when viewing a screen[13]. Glasses with anti-reflective (AR) coating can provide greater comfort for screen users over long periods of time, as this coating reduces light reflection and minimizes eye fatigue[15]. These results are in line with research conducted by Sugarindra, which also found no significant relationship between eyeglass use and CVS[8].

Furthermore, there was no significant relationship between eye rest duration and CVS, with a p-value of 0.242 (p>0.05). This is likely due to respondents' habit of blinking frequently when working in front of a computer screen. Blinking helps maintain eye moisture, preventing dryness and irritation. Frequent blinking maintains the moisture of the eye's surface, which prevents dryness and irritation[13]. Taking regular short breaks can help relax the eye's accommodation process and prevent fatigue. Applying the 20-20-20 rule, which means after 20 minutes of computer use, look at an object 20 feet away for 20 seconds, is a simple method to prevent CVS[2]. Furthermore, respondents' workspaces were designed to ensure comfort even during prolonged computer work. Device screens should be optimally adjusted for lighting, contrast, and brightness before starting work. Ideally, room lighting should be brighter than the device screen, but not exceed three times the average luminance of the screen. Light sources that can cause glare should be minimized, while excessive light from windows near the monitor should be reduced. Lights that can cause glare, such as fluorescent lamps, should be turned off. If lighting adjustments are not possible, the monitor or work area can be repositioned to achieve more comfortable and eye-safe lighting[16]. In addition, a comfortable workspace with proper screen positioning and optimal lighting can help reduce visual stress, improve work comfort, and increase overall productivity[17].

A limitation of this study is that it focused solely on risk factors for Computer Vision Syndrome (CVS) in hospital administrative workers, so these findings cannot be generalized to workers in other departments. Further research is needed to explore CVS risk factors in groups of workers with different job characteristics. There were no significant obstacles in implementing this study. The entire research process proceeded according to plan without any obstacles in data collection, analysis, or reporting of results.

## CONCLUSION

This study indicates that age was a risk factor associated with CVS in hospital administration staff in Surakarta. It is recommended that respondents perform eye exercises to help reduce CVS symptoms. For further research, it is recommended that eye exercises be administered to respondents to reduce CVS symptoms.

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