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ASTENOPIA DUE TO COMPUTER VISION SYNDROME OF THE FINAL GRADE STUDENT

Zulfa Mahdiatur Rasyida[1*], Laras Ptri Yani[2], Moch Achnaf Hadyan Al Husain[3], Siska Purnama[4]

[1*]Nursing Departement, Universitas 'Aisyiyah Surakarta, Indonesia
[2,3]Bachelor of Nursing, Universitas 'Aisyiyah Surakarta, Indonesia
[4]Sebelas Maret Hospital, Indonesia
zulfa@unisa-surakarta.ac.id[1], larasputri627@gmail.com[2], mochachnaf12@gmail.com[3], siskap@gmail.com[4]*
**Corresponding author*

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ABSTRACT

Asthenopia, or eye strain, is a visual condition that may be associated with prolonged digital device use. Final-year students frequently use digital devices to complete their theses and may experience visual discomfort related to prolonged screen exposure, poor lighting, and non-ergonomic working postures. Common symptoms include dry eyes, blurred vision, and discomfort in the neck, shoulders, and back. This study aimed to describe the occurrence of asthenopia symptoms among final-year students completing their theses. This study employed a quantitative descriptive approach with a cross-sectional design. The study included 101 final-year students. Of the 101 respondents, 88.1% were female, and 68.3% reported using computers or other digital devices for at least four hours per day. A total of 64 respondents (63.4%) were classified as experiencing asthenopia symptoms. Asthenopia symptoms were common among final-year students completing their theses. These findings highlight the importance of recognizing eye strain symptoms and promoting appropriate eye-health practices during prolonged digital device use.

Keywords: *Asthenopia, computer vision syndrome, final-year students, digital device use, eye strain.*

INTRODUCTION

Asthenopia, often referred to as eye fatigue, is a condition characterized by symptoms such as blurred vision, dry eyes, and visual discomfort. Prolonged visual activities may also be accompanied by musculoskeletal complaints, including neck and shoulder stiffness and back pain (Alpan et al., 2023).

With advancements in technology, the use of digital devices has increased, raising concerns about the occurrence of asthenopia. It has been reported that eye fatigue accounts for 40%–90% of eye complaints, while approximately 285 million people (4.24% of the world's population) experience visual impairment. In Indonesia, approximately 3 million people have been reported to experience vision problems (WHO, 2019). A previous study indicated that 73.3% of respondents experienced eye fatigue (asthenopia). During the COVID-19 pandemic, digital device use increased across various daily activities, with 33% of 1,460 individuals reportedly using digital devices for more than four hours per day (Abusamak et al., 2022).

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Asthenopia is one of the visual complaints that may occur in individuals experiencing computer vision syndrome (CVS), a condition involving eye- and vision-related symptoms associated with the use of computers or other digital devices (Sengo et al., 2023). Computer use for more than seven hours per day has been reported as a potential risk factor for CVS. Furthermore, previous research has suggested that CVS symptoms may be associated with poor lighting, screen glare and reflections, inappropriate viewing distances, improper posture, uncorrected vision problems, or a combination of these factors (Randolph, 2017).

A 2026 meta-analysis published in the *Journal of Global Health* reported that asthenopia affects approximately 51%–60% of the general population, with higher prevalence estimates among frequent digital device users. Specifically, the reported prevalence reached 90% among frequent gadget users and 77% among computer-based professionals. Furthermore, epidemiological evidence suggests that computer vision syndrome (CVS) involves more than ocular discomfort. Visual symptoms, including eye fatigue (65%) and eye strain (47%), may occur alongside musculoskeletal complaints (Song et al., 2026). A 2025 cross-sectional study reported that 72.3% of individuals with CVS experienced neck and shoulder discomfort. Excessive screen time and smartphone use have also been reported as potential risk factors (OR = 1.15). Reduced blinking during digital screen use may affect tear film stability and contribute to dry eye symptoms (Esmaeel et al., 2025).

University students are individuals pursuing education at higher education institutions (KBBI, 2025). During the final stage of their studies, students are generally required to complete an academic paper or thesis (AIPNI, 2021). While completing their final assignments, students frequently use computers and other digital devices. Previous research has reported computer use exceeding six hours per day among final-year students, potentially increasing their exposure to factors associated with computer vision syndrome (CVS) (Sengo et al., 2023). Another study reported that continuous laptop use for more than four hours per day was associated with a 26-fold increase in CVS risk, while computer use for at least four hours per day was associated with a 6.9-fold increase in risk (Pertiwi et al., 2022).

Computer vision syndrome has been reported among university students, particularly those who frequently use digital devices for academic activities. Inappropriate working postures, prolonged screen exposure, inadequate ergonomic arrangements, and the use of multiple digital devices have been discussed as factors potentially associated with CVS symptoms (Sengo et al., 2023). Students may overlook early symptoms of visual discomfort or fail to adopt appropriate ergonomic practices during computer use (Hermawan et al., 2024).

From a religious perspective, maintaining health and appreciating the ability to see may also be understood as important aspects of personal well-being. Surah Yasin, verse 66, refers to the human ability to see (Al-Qur'an, Surah Yasin: 66).

The use of computers and other digital devices has become an integral part of daily activities, including health professional education. Prolonged digital device use may be

accompanied by visual symptoms associated with computer vision syndrome (Munshi et al., 2017). Assessing these symptoms is important for understanding visual discomfort among students who frequently engage in screen-based academic activities. A structured questionnaire can be used to describe the frequency of reported symptoms. However, a descriptive study cannot determine whether screen exposure, ergonomic factors, or other characteristics directly cause asthenopia.

Previous research has examined computer vision syndrome and digital eye strain among students and other digital device users. However, describing asthenopia symptoms specifically among final-year nursing students completing their theses remains relevant because these students frequently engage in screen-based academic activities. This study provides descriptive information on asthenopia symptoms and daily digital device use in this population. It does not investigate causal relationships between potential risk factors and asthenopia. This study aimed to describe the proportion of final-year nursing students experiencing asthenopia symptoms and to summarize their sex distribution and duration of daily digital device use.

RESEARCH METHOD

To determine the seriousness of asthenopia, observations related to the description of eye fatigue complaints among final-year students are conducted, so that prompt management can be provided to maintain eye health and address the condition of asthenopia. The approach used in this research is a quantitative cross-sectional study, selected because it allows for the simultaneous assessment of screen exposure and asthenopia symptoms at a single point in time, which directly examines the signs and symptoms leading to asthenopia and the duration of screening among final-year students.

To obtain data, the study uses a valid Convergence Insufficiency Symptom Survey (CSSI) instrument-*Bahasa Indonesia* to defind asthenopia. By the validity score with Cronbach's α 0.910-0.925, strong validity ($p<0.05$) in total 15 questions with frequency scale to answer were 0 means never, 1 means rarely, 2 means some time, 3 means often, 4 means always. It has applied to 901 respondens in Jakarta student subjects. CSSI explains that if the score is more than 16, it indicates symptoms of asthenopia (Koeswara, et al., 2021). Study discriptive quantitative held by cross sectional approach on 101 samples of final students who doing thesis in their nursing major.

RESULTS AND DISCUSSION

Results

The Dhemographic Characteristic

The demographic characteristics of the 101 final-year nursing students were analyzed based on sex and duration of computer or other digital device use. These characteristics provide an overview of the respondents participating in this study. The frequency and percentage distributions of these characteristics are presented in Table 1.

Table 1. Demographic Characteristics of Final-Year Nursing Students Completing Their Theses

Dhemographic Characteristic	Frequency (f)	Percentage (%)
Sex		
Male	12	11.9
Female	89	88.1
Total	101	100
Duration of Use computer or other digital devices		
Long (≥ 4 hours)	69	68.3
Short (<4 hours)	32	31.7
Total	101	100

Source: Primary Data, 2025

Table 1 shows that most respondents were female (89 respondents, 88.1%), while 12 respondents (11.9%) were male. Regarding digital device use, 69 respondents (68.3%) reported using computers or other digital devices for at least four hours per day, whereas 32 respondents (31.7%) reported using them for less than four hours per day.

Discription of The Symtoms of Asthenopia

The distribution of asthenopia symptoms among the 101 final-year nursing students is presented in Table 2.

Table 2. Distribution of Asthenopia Symptoms Among Final-Year Nursing Students Completing Their Theses

Asthenopia	Frequency (f)	Percentage (%)
Experiencing	64	63.4
Normal	37	36.6
Total	101	100

Source: Primary Data, 2025

Table 2 shows that 64 of the 101 respondents (63.4%) experienced asthenopia symptoms, while 37 respondents (36.6%) did not. These findings indicate that the majority of respondents experienced symptoms of asthenopia.

Discussion

The Dhemographi Characteristic

The duration of computer and other digital device use is an important factor that may contribute to ocular discomfort, particularly among university students who frequently use digital devices to complete academic assignments and research activities. Based on Table 1, the majority of respondents in this study were female (90.5%). This distribution reflects the demographic composition of the final-year students in the Nursing Study Program, Faculty of Health Sciences, Universitas 'Aisyiyah Surakarta, where female students constitute the majority of the student population. Therefore, the

higher proportion of female respondents should primarily be interpreted in relation to the composition of the study population rather than as evidence that female students are necessarily more susceptible to asthenopia.

Nevertheless, previous studies have reported an association between female sex and digital eye strain or computer vision syndrome (CVS). AlDarrab et al. (2022) found that female students had higher CVS symptom scores than male students. Similarly, Ortiz-Toquero et al. (2024), in a study involving 1,009 university community members in Spain, reported that female sex was significantly associated with CVS (OR = 2.10; 95% CI: 1.54–2.88). These findings suggest that sex may be one of the factors associated with digital eye discomfort. However, the relationship may also be influenced by other factors, including visual habits, refractive status, contact lens use, and duration of digital device exposure.

Regarding the duration of digital device use, most respondents in the present study reported using computers or other digital devices for more than four hours per day. This finding may be related to the academic demands of final-year students, particularly the preparation of research proposals, literature reviews, data analysis, and thesis writing. These activities require sustained near-vision tasks and prolonged concentration on digital screens. In addition, students may alternate between laptops, smartphones, and other devices throughout the day, resulting in cumulative exposure to digital screens.

The relationship between prolonged screen exposure and visual discomfort has also been reported in previous studies. AlDarrab et al. (2022) found that students who continuously used digital devices for more than six hours had higher CVS symptom scores. Sharma et al. (2023), in a cross-sectional study of 345 university students in India, reported a digital eye strain prevalence of 45.5% and identified daily screen time as a significant associated factor. Furthermore, Ortiz-Toquero et al. (2024) found that using visual display terminals for at least six hours per day was significantly associated with CVS (OR = 1.96; 95% CI: 1.09–3.52). These findings support the possibility that prolonged digital device exposure contributes to the occurrence of ocular discomfort among students, particularly those with intensive academic activities. The lenght time of operating computeror such other digital device is relate with ocular problem (Kumasela, et al. 2013). That happens on collage students who do every assigments or final project by those devices.

Duration of using computer has significant relevance with fatigue of personal stdent of University of Jember (Pangestu, et al., 2019). The study of one research on University of South Carolina showed that there are 3 categories of using time of computer. First, light (less than 2 hours), moderate (2-4 hours), and heavy (more than 4 hours) (Kumasela, et al., 2013).

Based on tabel 1, shows that female is the major student become respondents of this study. It is becaused of the majority students in final student of Department of nursing, Faculty of Health Science, University of ‘Aisyiyah Surakarta, is female. By the 90.5% proportions is female. For the characteristic of duration using computer of students is more than 4 hours. It is the highest chategory of using computer a day. This could happen

because students must carry out online learning activities in the digital era. Additionally, final semester students must complete their final assignments or theses, which require them to stay in front of a computer or other digital devices for a considerable amount of time (Pangestu, et al., 2019). Doe to the study, the higher of score of the prevalence among students on this reasearch is female. It is because of the more susceptible to severe eye problem was on female (AlQarni et al., 2023).

A 2023 meta-analysis highlights the higher prevalence of CVS among females in Africa and Asia, emphasizing the importance of strengthening self-esteem and life skills to help them resist social and family pressures. The highest prevalence is attributed to increased screen time and inadequate ergonomic practices (Kahal et al., 2025).

Discription of The Symtoms of Asthenopia

The increasing use of electronic devices, such as computers, laptops, tablets, and smartphones, has become an integral part of university students' academic activities. However, prolonged near-vision tasks and continuous screen exposure may increase visual demand and contribute to symptoms of asthenopia. These symptoms may include eye fatigue, eye strain, blurred vision, dryness, burning sensations, and difficulty focusing. Several factors may contribute to these complaints, including prolonged screen exposure, inadequate viewing distance, inappropriate lighting, glare, reduced blinking frequency, uncorrected refractive errors, and insufficient rest periods

During this period of modernization, using electronic devices such as computers, laptops, and other devices has become essential for carrying out daily tasks. Using a computer for extended periods of time can have negative consequences that need to be taken into consideration. There are a few factors that have a significant impact on eye fatigue are eye refraction, age, lighting, , rest of eye, and computer usage duration (Ainy et al., 2024).

Based on table 2, shows that out of 101 final year students in the Nursing Study Program, 64 (63.4%) reported experiencing asthenopia. This figure indicates that the majority of students who are completing their final assignments experience symptoms of visual discomfort during or after intense visual activities. This finding is relate to other studi that among 80.72% students of collage were known as computer vision syndrome (CVS) during pandemic for most of learnings are delivered on digital devices, moreover education cannot be separated from technology, even all both lectures andstudents use the electronic devices, an instance of leptops, computers, and mobile phones (Safaryna et al., 2023).

Therefore, there is increasing number of symtomatic cases of eye discomfort at university students (Nune et al., 2023). Furthermore, extensive global evidence reinforces that asthenopia affects the majority of university populations. Epidemiological investigations among health sciences and medical undergraduates consistently report high prevalence rates, typically ranging between 67.2% and 89.9% (Ccami-Bernal et al., 2024). This elevated occurrence is primarily attributed to sustained visual demands during long study hours, improper viewing distances, and reduced blink frequency, which

collectively strain the ciliary muscles and compromise tear film stability (Al-Mohtaseb et al., 2021).

The phenomena of asthenopia on this research may indicate that high near work volume while preparing theses (reading literature, writing, data analysis) and prolonged use of computer/laptop screens (Ganne et al., 2021). Studies show a strong relationship between the duration of screen use and symptoms of asthenopia. Besides, students spent more time on online learning, causing visual acuity and vision health became worse, those reported that increasing screening time significantly (Ccami-Bernal et al., 2024).

Differences in prevalence between studies may be explained by variations in study populations, duration and purpose of digital device use, environmental conditions, assessment instruments, and operational definitions of asthenopia or CVS. Asthenopia and CVS are closely related terms, but they should not automatically be considered identical outcomes. Asthenopia refers primarily to visual fatigue or discomfort, whereas CVS generally encompasses a broader group of ocular and extraocular symptoms associated with digital device use. Consequently, prevalence estimates should be interpreted according to the specific diagnostic or questionnaire criteria applied in each study.

Several factors may explain the relatively high proportion of asthenopia observed in the present study. First, prolonged near-vision activities during thesis preparation may increase the demand on the accommodation and convergence systems of the eyes. Continuous focusing on text and digital screens may contribute to visual fatigue, particularly when students do not take sufficient breaks. Second, prolonged screen viewing may reduce blinking frequency or lead to incomplete blinking, potentially increasing tear film evaporation and ocular surface discomfort. This mechanism may contribute to symptoms such as dry eyes, burning sensations, and irritation.

The academic context of final-year students may further contribute to this condition. During the preparation of their final projects, students are required to read scientific articles, write academic documents, conduct data analysis, and communicate through digital platforms. Such activities may involve repeated and prolonged near-vision tasks with limited opportunities for visual rest. Therefore, the high proportion of asthenopia in this study may reflect the combination of intensive academic demands and digital device exposure. However, because this study used a descriptive design, these factors should be considered possible explanations rather than confirmed determinants of asthenopia in the study population.

Previous studies have investigated digital eye strain and computer vision syndrome among nursing students, particularly in the context of online learning during the COVID-19 pandemic (Huyhua-Gutierrez et al., 2023; Mrayyan et al., 2024; Rizqi & Fitriawan, 2025). In contrast, the present study specifically describes asthenopia symptoms among final-year nursing students who are completing their theses. This focus provides additional descriptive evidence concerning visual discomfort in the context of thesis-related academic activities. Therefore, the contribution of this study lies in its specific population and academic context rather than in identifying new causal relationships.

The findings of this study have practical implications for promoting eye health among final-year nursing students. The high proportion of respondents experiencing asthenopia symptoms (63.4%) highlights the importance of raising awareness of visual discomfort during thesis preparation. Previous studies have emphasized the importance of appropriate viewing distance, ergonomic posture, regular visual breaks, and eye-health education in addressing digital eye strain (Kaur et al., 2022; Ng et al., 2024; Pucker et al., 2024). Therefore, the findings may serve as preliminary information for universities to develop eye-health education and preventive strategies for students engaged in intensive digital academic activities. Further analytical studies are needed to identify the factors associated with asthenopia in this population.

CONCLUSION

Final year students who are working on their thesis show signs of asthenopia caused by computer vision syndrome. This serves as input for final year students to recognize the symptoms that arise from eye fatigue and understand how to address them. Based on current evidence, the recommended actions to reduce the burden of asthenopia in students include: Comprehensive eye screening and examination (especially for refraction, accommodation testing, and binocular function, as well as assessment of ocular surface/dry eye) to identify and correct intervenable factors. Visual health education: teach the 20-20-20 rule (every 20 minutes of screen time, look at an object about 6 meters away for 20 seconds), conscious blinking techniques, and ergonomic arrangements (screen position, chair/arm height, lighting). Guidelines and reviews suggest these interventions as primary preventive measures. Optimization of the learning environment: appropriate contrast/brightness settings, glare reduction, and work surfaces that promote comfortable posture.

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