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The Occurrence of Asthenopia among Online Gamers in Kupang City, East Nusa Tenggara

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ABSTRACT

Background: Data from WHO shows that asthenopia cases in the world range from 75-90%. Astenopia can result from excessive efforts of the vision system to obtain the quality of vision it should. Excessive online gaming habits have the potential to result in decreased vision quality. This problem needs to be considered because asthenopia is an early symptom sign of more serious visual impairment. This study aimed to discover an overview of the incidence of asthenopia among online game players in Kupang City based on the duration, distance of smartphones, body position, and eye rest while playing online games.
Subjects and Method: It was a descriptive study conducted in Kupang City from March to April 2023. With a total of 378 online game players aged 15-24 years selected by purposive sampling. The dependent variable was the incidence of asthenopia. The independent variables were the duration of playing online games, the viewing distance of smartphone, body position, and eye rest. The data collection techniques used was questionnaires. The data were presented descriptively.
Results: A total of 367 people (97.1%) complained about symptoms of eyestrain (asthenopia), 251 people (66.4%) played online games with a duration of >2 hours and other 127 people (33.6%) played online games <2 hours. 277 people (73.3%) used smartphones with a distance of <30 cm and other 101 people (26.7%) with a distance of >30 cm. 184 people (48.7%) played online games while lying down and 194 people (51.3%) sitting. 187 people (49.5%) did not do eye rest and as many as 191 people (50.5%) did eye rest consisting of 53 people (14.0%) doing micro break, 55 people (14.6%) doing mini break and 83 people (22.0%) doing maxi break.
Conclusion: Different types of asthenopia have been discovered. The most common incidence of asthenopia is experienced by online game players with risky viewing distance of smartphone.

Keywords: asthenopia, online games, eyestrain, adolescence.

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BACKGROUND

Smartphone is one of the technologies that is currently developing very rapidly and has become an inseparable part of human daily activities. Smartphones provide many advantages of various features that make them more dependable to support activities. Not only functioning as a tool to ex-

change news with people in distant areas, now Smartphones can also be used as entertainment media such as accessing news, both domestic and international more easily and quickly, online marketing, a very good promotional media, capturing important moments in life easily and also to play games. The circulation of smartphones is very rapid, it is proven by a lot of children who already have their own smartphones nowadays (Anggraini et al., 2022)

Online games are software created as a medium of entertainment in leisure time for smartphone users (Anggraini et al., 2022). The enthusiasts are almost all ages, both children and adults. Online games make users lose the time because they are always challenged to continue playing, hence, it is no longer an entertainment in their spare time, instead, it is misused, accordingly, a lot of time is wasted due to forgetting time while playing. It was reported that in 2014, more than 25 million Indonesians played online games (Khalid, 2019). The use of online games may inflict negative impacts, such as visual impairment (Firdaus & Muflih, 2017).

Vision is an important aspect to support people's activities, including the educational process. Deterioration of vision conditions begins with eyestrain or as thenopia. Asthenopia is a set of symptoms in the eyes such as soreness, red eyes, itchy, blurred, and tense eyes due to excessive efforts of the vision system during unfit condition to obtain the proper visual acuity (Anggraeni, 2017). Staring at a smartphone for too long, can cause sore and watery eyes up to blindness because the electromagnetic waves produced by the smartphone generates radiation that can damage the retina (Purnama et al., 2015). WHO in Gumunggilung & Mantjoro (2021), states that cases of asthenopia in the world range from 75%-90% and 285 million (4.24%) of the world's population experience visual impairment such as decreased visual acuity. The high prevalence of asthenopia is due to the use of digital technology that continues to grow in line with the development of modernization (Pratama et al., 2021).

Based on the preliminary survey, out of 29 online game players, there were 21 people complained of eye strain and 9 people experienced red eyes. In addition, in the interviews related to the duration and viewing distance of smartphones while playing online games, it was discovered that 16 people played games with a duration of >2 hours, 10 people played games with a smartphone viewing distance of <30 cm without knowing the adverse effects of as thenopia. In fact, during the interviews conducted, almost all of them revealed that they never had eye rest while playing online games with a duration of ≤ 2 hours and they had eye rest when they had done playing game. This study targeted online game players in Kupang City with an age range of 16-24 years based on the results of a Decision Lab survey in 2018 which recorded the highest average online game players in the range of 16-24 years with a percentage of 27% (Lokadata, 2018). This study aimed to discover an overview of the incidence of asthenopia among online game players in Kupang City.

SUBJECTS AND METHOD

1. Study Design

It was a descriptive study to discover an overview of the incidence of asthenopia that occured in online game players in Kupang City. This study was conducted from March 1, 2023 to April 1, 2023 in Kupang City.

2. Population and Sample

The population in this study was online game players in Kupang City aged 15 to 24 years with a total of 21,437 people. This study used the Lameshow formula to deter-

mine the sample size thus the sample size in this study was discovered to be 378 people. The study used purposive sampling as the sampling technique with the following criteria: Domiciled in Kupang City, actively playing online games via smartphone and aged 15-24 years.

3. Study Variables

The dependent variable in this study was the incidence of asthenopia (eyestrain). The independent variables in this study were: 1) duration of playing online games, 2) viewing distance of smartphone, 3) body position and 4) eye rest.

4. Operational Definition of Variables

Perceived vulnerability is the As thenopia is a set of subjective complaints in the eyes during online gaming, such as sore eyes, red eyes, itchy eyes, blurred eyes, strained eyes, watery eyes, dizziness and headaches and double vision. It was measured using questionnaires.

The duration of playing online games is the length of time used to play one online game in a day. It was measured using a questionnaire.

Smartphone viewing distance is the distance between the smartphone and the eyes when playing online games. It was measured using a questionnaire.

Body position is the state of body position when playing online games that affect the direction of eye muscle pull, to discover which sitting position makes the eyes more comfortable because the direction of eye gaze is downward, while in the lying position the direction of the eye pull is upward. It was measured using a questionnaire.

Eye rest is an activity to rest the eyes from the smartphone screen for some time. Where the eye muscles also require stretching to restore eye comfort to function optimally. It was measured using questionnaires.

5. Study Instruments

The data collection technique used in the study was questionnaires in the form of a google form, disseminated using WhatsApp media to determine the behavior and complaints of eyestrain among online game players consisting of 17 questions.

6. Data Analysis

The data of the study were processed through editing, coding and tabulating. The variables that had been studied were then analyzed descriptively using the frequency distribution formula.

7. Research Ethics

This study was conducted by initially elaborating about the study and then informed consent and respondents involved in this research were given souvenirs and also maintaining the confidentiality of the respondents' identity data. This study has passed the ethical test by the Health Research Ethics Commission, Faculty of Public Health, Nusa Cendana University with ethical clearance number: 2023023-KEPK.

RESULTS

1. Sample Characteristics

The results of the study discovered that the most respondents played online games with a risky duration (>2 hours) with a total of 251 people (66.4%), and the fewest respondents played online games with a non-risky duration (<2 hours) as many as 127 people (33.6%).

Based on the results of the study, it was discovered that the most respondents played online games with a risky viewing distance (<30 cm), namely 277 people (73.3%), and the fewest respondents played online games with a non-risky viewing distance (>30 cm) as many as 101 people (26.7%). Based on the results of the study, it was discovered that the frequency distribution of eyestrain (asthenopia)

among online game players in Kupang City showed that out of 378 respondents there were 367 people (97.1%) with complaints of asthenopia and 11 people (2.9%) who did not experience asthenopia (Table 1).

Table 1. Frequency Distribution of Respondents based on age, gender, duration of playing game, smartphone viewing distance, eyestrain, body position, and eye rest among online game players in Kupang City.

Characteristics	Category	Frequency	Percentage
Age	15	36	9.5
	16	27	7.1
	17	34	9.0
	18	18	4.8
	19	27	7.1
	20	27	7.1
	21	37	9.8
	22	56	14.8
	23	61	16.1
	24	55	14.6
Gender	Male	271	71.7
	Female	107	28.3
Duration of Playing Game	Non-Risky	127	33.6
	Risky	251	66.4
Smartphone viewing distance	Risky (<30 cm)	277	73.3
	Non-Risky (>30 cm)	101	26.7
Eyestrain	Occur	367	97.1
	Not Occur	11	2.9
Body position	Non-Risky	194	51.3
	Risky	184	48.7
Eye rest	Non-Risky	191	50.5
	Risky	187	49.5

Table 2. Complaints of Eyestrain based on Variables.

Variables	Category	Eyestrain			
		Occur		Not Occur	
		n	%	n	%
Duration	Risky	245	97.6	6	2.4
	Non-Risky	122	96.1	5	3.9
Viewing Distance	Risky	270	97.5	7	2.5
	Non-Risky	97	96.0	4	4.0
Body Position	Risky	181	97.8	4	2.2
	Non-Risky	187	96.4	7	3.6
Eye Rest	Risky	183	97.9	4	2.1
	Non-Risky	184	96.3	7	3.7

Table 2 showed the risky duration of online gaming contributed 245 (97.6%) complaints of eyestrain, risky smartphone viewing distance contributed 270 (97.5%) complaints of eyestrain, risky body position contributed 181 (97.8%) complaints of eyestrain, and resting eyes at risk contributed 183 (97.9) complaints of eyestrain.

Table 3 below showed that almost all online game players had at least 1 complaint of eystrain. It was discovered that 308 people (81.5%) respondents complained of sore eyes, 211 people (55.8%), red

eyes, 244 people (59.3%) itching eyes, 185 people (48.9%) blurred vision, 240 people (63.5%) strained eyes, 253 people (66.9%) watery eyes, 294 people (77.8%) dizziness and headaches, and 146 people (38.6%) double vision.

Table 3. Complaints of Asthenopia Symptoms among Online Game Players in Kupang City

Variables	Category	Frequency (n)	Percentage (%)
Sore eyes	Yes	308	81.5
	No	70	18.5
Red eyes	Yes	211	55.8
	No	167	44.2
Itching eyes	Yes	244	59.3
	No	154	40.7
Blurred Vision	Yes	185	48.9
	No	193	51.1
Strained eyes	Yes	240	63.5
	No	138	36.5
Watery eyes	Yes	253	66.9
	No	125	33.1
Dizziness & Headaches	Yes	294	77.8
	No	84	22.2
Double Vision	Yes	146	38.6
	No	232	61.4

DISCUSSION

1. Duration of playing game online.

Based on the results of the study, it was discovered that the majority of online game players in Kupang City with a total of 251 people (66.4%), played online games in risky durations and 245 people (97.6%) of them experienced asthenopia with symptoms of eyestrain of as follows: 207 people complained of sore eyes, 147 people complained of red eyes, 147 people complained of itching eyes, 122 people complained of blurred vision, 164 people complained of strained eyes, 170 people complained of watery eyes, 198 people complained of dizziness and headaches and 101 people complained of double vision. While the remaining 127 (33.6%) online game players played games with a non-risky duration and 122 people (96.1%) of them experience asthenopia with symptoms of eyestrain as follows: 101 people complained of sore eyes, 64 people complained of red eyes, 77 people complained of itching eyes, 63 people complained of blurred vision, 76 people complained of strained eye, 83 people complained of watery eyes, 96 people complained of dizziness and headaches and 45 people complained of double vision. Thus, it can be interpreted that the higher the duration of playing online games, the risk of asthenopia incidences also increases.

Excessive use of online games without eye rest can result in the occurence of symptoms of strained eyes and red eyes. Therefore, for online game players in Kupang City it better to take the time to rest their eyes for a few moments while playing online games.

This is in line with a study conducted by Zaldi (2022), which states that the higher the duration of playing smartphones, the risk of eyestrain is also higher. Similar with a study conducted by Fadhillah (2013), which states there is an association between the duration of exposure to smartphone monitors > 2 hours with fatigue among online game players. To minimize

the risk of asthenopia due to playing online games, it is necessary to pay attention to the duration when playing online games.

Sinurat et al. (2022), Suggest a good duration of smartphone use, which is a maximum of 2 hours in one use. Asthenopia can occur when the eyes are forced to look at moving objects on a smartphone for too long that makes the eyes concentrate so much that they do not realize that their eyes blink less frequently. Focusing the eyes on the monitor screen for too long can cause small muscles in the eyes to continue to be forced to continue to contract and work, resulting in the eyes becoming tired and over time it becomes difficult to focus. This situation triggers the increased evaporation of tears and as a result the eyes become dry and less comfortable. The smartphone screen emits relatively high radiation. The longer you interact with the smartphone screen, the physiological ability of the eye muscles will decrease in function and resulting in eyestrain (Fauzia, 2012).

2. Smartphone viewing distance.

Based on the results of the study conducted on online game players in Kupang City, the majority of respondents 277 people (73.3%) online game players had risky viewing distance, 270 people (97.5%) of them experienced asthenopia with symptoms of eyestrain as follows: 233 people complained of sore eyes, 155 people complained of red eyes, 167 people complained of itching, 143 people complained of blurred vision, 181 people complained of strained eyes, 192 people complained of watery eyes, 217 people complained of dizziness and headaches, and 116 people complained of double vision. While the remaining 101 people (26.7%) played games with a non-risky viewing distance, 97 people (96.0%) of them had asthenopia with symptoms eyestrain as follows: 75 people complained of sore eyes, 56 people complained of red eyes, 57 people complained of itching eyes, 42 people complained of blurred vision, 59 people complained of strained eyes, 61 people complained of watery eyes, 77 people complained of dizziness and headaches and 30 people complained of double vision. Thus, it is discovered that the viewing distance of smartphone that is too eyes, increases the risk of asthenopia.

The results of this study are in line with a study by Chandraswara & Rifai (2021), which states that workers with a viewing distance of <30 cm are at greater risk of experiencing asthenopia than workers with a viewing distance of >30 cm. Smartphone viewing distance is the distance between the eyes and the smartphone screen when playing online games. As thenopia is prone to occur when the eye muscles work prolonged especially when the viewing distance is too close, in this case it is less than 30 cm. The size of the object on the smartphone display also affects the smartphone viewing distance, because the size of the object is relatively small it requires closer viewing distance to be able to see more clearly.

If this habit continuously occurs, it is not impossible to affect the occurrence of asthenopia. Similarly, a study by Zaldi (2022) states there is a significant association between the viewing distance of smartphone and eyestrain which means that the closer the viewing distance of smartphone, the higher the risk of eyestrain. However, the results of both studies are in contrast to a study conducted by Nourmayanti (2009), which stated that there was no association between monitor viewing distance and asthenopia incidence that may be caused by other variables. An effort that can be made to prevent asthenopia are paying attention to the viewing distance between the eyes and the smartphone screen. The recommended viewing distance of the smart-

phone is at least 30 cm (Sinurat et al., 2022).

3. Body position.

From the results of the study conducted on online game players in Kupang City, it discovered 194 respondents (51.3%) who played online games in a non-risky body position, 187 people (96.4%) of them experienced asthenopia with symptoms of eyestrain as follows: 158 people complained of sore eyes, 100 people complained of red eyes, 120 people complained of itching eyes, 90 people complained of blurred vision, 121 people complained of strained eyes, 133 people complained of watery eyes, 144 people complained of dizziness and headaches and 63 people complained of double vision. Meanwhile 184 (48.7%) respondents played online games in a risky position and 180 people (97.8%) of them experienced asthenopia with symptoms of eye strain as follows: 150 people complained of sore eyes, 111 people complained of red eyes, 104 people complained of itching eyes, 95 people complained of blurred vision, 119 people complained of strained eyes, 120 people complained of watery eyes, 150 people complained of dizziness and headaches and 83 people complained of double vision. Although the percentage of online game players with non-risky body positions was higher, the difference in frequency numbers between non-risky and risky positions in this study did not show a significant difference. Moreover, several previous studies showed that the less appropriate body position while using smartphone has a major effect on the function and quality of vision.

Zaldi (2022), states the higher the use of smartphones with a sitting body position, the lower the incidence of asthenopia. This also means that the lying position also plays a role in the occurrence of asthenopia This is certainly worth paying attention because it is at great risk of causing interference to eye function. Improper body position when playing online games also has a major effect on eye function. When playing online games in a sitting position, the eyes are in the optimum position, the eyes only need to look down, unlike a sleeping position, where the eye muscles are forced to be pulled up, causing tension in the eye muscles and if the habit repeatedly happens, then asthenopia can occur. To minimize the risk of asthenopia due to the wrong body position when playing online games, it is necessary to pay attention to the body position according to the recommendation. The recommended body position when playing online games is a sitting position, thus, the eye muscles are not pulled up which shortly tire out (Sinurat et al., 2022).

4. Eye rest.

Based on the results of the study conducted on online game players in Kupang City, it was discovered that 191 (50.5%) online game players did eye rest and 184 people (96.3%) of them experienced asthenopia with symptoms of eyestrain as follows: 155 people complained of sore eyes, 111 people complained of red eyes, 108 people complained of itching eyes, 96 people complained of blurred vision, 117 people complained of strained eyes, 125 people complained of watery eyes, 141 people complained of dizziness and headaches and 61 people complained of double vision. While the other 187 people (49.5%) did not do eye rest at all, 183 people (97.9%) of them experienced asthenopia with symptoms of eyestrain as follows: 153 people complained of sore eyes, 100 people complained of red eyes, 116 people complained of itching eyes, 89 people complained of blurred vision, 123 people of strained eyes, 128 people complained of watery eyes, 153 people complained of dizziness and headaches and 85 people complained of double vision.

The study on eye rest above also discovered that out of 191 (50.5%) online game players who did eye rest, 14.0% did micro break, 14.6% did mini break and 22.0% of online game players did maxi break. The results of this study are in line with a study conducted by Pratiwi (2020), Which states there is a significant association between eye rest and the incidence of asthenopia and discovered there are more respondents who do eye rest under 10 minutes, and even do not do eye rest at all, than respondents who do eye rest more than 10 minutes. These results are in contrast to the study by Nourmayanti (2009), which states that there was no significant association between eye rest and the incidence of asthenopia. It might happen due to the influence of other variables such as excessive duration of playing games and even the viewing distance of smartphone that is too close to the eyes. Eye rest for online game players is very important to do, considering that the eyes of online game players are always focused on the smartphone screen. The limitation of this study is that the eye complaints are subjecttive complaints from the respondents themselves and do not go through a medical examination to confirm the diagnosis. It can be concluded that the high incidence of as thenopia in this study is related to the improper behavior of online game players when playing online games.

AUTHOR CONTRIBUTION

Anggie Elzha Yulindri Welkis compiled the basic ideas of the research, then discussed with Noorce Christin Berek. All authors agreed with the main focus of this article which was asthenopia in online game players. After the main focus was determined, then conducted a discussion related to writing rules with Agus Setyobudi.

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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