THE EFFECTIVENESS OF FLASH CARD GAMES AND THE 20-20-20 RULE AGAINST EYE FATIGUE DURING GADGET USE AT SMPN 12 PEKANBARU

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Abstract
The rapid progress of era has given rise to various kinds of technological development phenomena aimed at providing convenience for its users, many children spend a lot of time playing with gadgets every day, excessive use of gadgets can cause various health problems, one of which is visual fatigue. This research aims to determine the effectiveness of the 20-20-20 rule through educational media flash cards in reducing eye fatigue in students at SMPN 12 Pekanbaru. This research used a quasi-experimental method with a one group pre-test and post-test design, involving 45 students as respondents. Data was collected using a visual fatigue questionnaire and analyzed using the paired t-test statistical test. The results of the study showed a significant reduction in the level of eye fatigue after the intervention, with an average pre-test score of 12.62 decreasing to 9.68 at post-test ($p = 0.000$). This significant result ($p<0.05$) shows that the 20-20-20 rule using flash cards is effective in reducing eye fatigue due to excessive use of gadgets. It is recommended to apply the 20-20-20 rule as part of a health education strategy to improve eye health in students, especially to overcome eye fatigue caused by using gadgets. Future research can develop similar interventions with more sophisticated media and a larger number of respondents.

Keywords: Gadgets, Rule 20-20-20, Flash Cards, Visual Fatigue.

INTRODUCTION

In today's digital era, gadgets are inseparable from children's daily lives. Rapid technological advancements have given rise to various new phenomena aimed at providing convenience for users. According to data, children spend almost 7 hours per day using their devices. Approximately 93% of children aged 12–17 are familiar with the internet, and 71% of them already own smartphones. Like a double-edged sword, gadgets have both positive and negative sides. While they provide benefits and convenience, they also have the potential to harm their users. In Indonesia, 93.52% of school-age children who use devices are between 9 and 15 years old (Mariyama et al., 2023). Data from the Central Statistics Agency (BPS) shows that 66.48% of Indonesia's population had internet access in 2022, up from 62.10% in 2021 (BPS, 2023). The Ministry of Communication and Informatics of the Republic of Indonesia also reported that 93.52% of social media users in Indonesia are between 9 and 19 years old, and 65.34% of individuals have used the internet (Fajria, 2024). Internet and gadget addiction can cause various physical problems, such as dry eyes, eye fatigue, watery eyes, and headaches (Kusuma Rini & Huriah, 2020). According to 2014 data from the World Health Organization (WHO), the incidence of eye fatigue (asthenopia) worldwide ranges from 75% to 90% (Gumunggilung et al., 2021). Excessive gadget use can also lead to radiation exposure, which can potentially damage nerve and brain tissue, especially in children (Aminingrum, 2023). One way to prevent eye fatigue from gadget use is to adopt healthy habits, such as using night mode, maintaining a viewing distance of 40–50 cm between the eyes and the screen, wearing anti-

radiation glasses, reducing screen brightness in low-light environments, limiting gadget use, and taking eye breaks using the 20-20-20 rule (Zulkarnain et al., 2021).

The American Optometric Association (2017) recommends implementing the 20-20-20 rule because it has been proven effective in minimizing symptoms of Visual Fatigue (VF) or eye strain (Wulandari et al., 2023). The 20-20-20 rule is a simple exercise based on the principle that for every 20 minutes of screen time, the eyes are shifted to look at an object 20 feet (approximately 6 meters) away for 20 seconds. This exercise helps maintain eye flexibility, strengthens the muscles around the eyes, and prevents fatigue from screen exposure. Furthermore, it is recommended to take a 15-minute break for every two hours of screen time (Tjandra, 2021).

A preliminary study at SMPN 12 Pekanbaru showed that 71.43% of students used gadgets for more than 6 hours per day, and most experienced symptoms of eye fatigue, such as watery eyes, stinging, and pain around the eyes. This situation indicates the need for education on preventing eye fatigue through non-pharmacological methods. Therefore, researchers were interested in examining the effectiveness of the 20-20-20 Rule Flash Cards as a simple, inexpensive, and effective intervention to reduce eye fatigue in adolescent gadget users.

METHODS

This quantitative research design employs a quasi-experimental approach with a one-group pre-test-post-test design. The study will be conducted at SMPN 12 Pekanbaru, Senapelan District, Pekanbaru City. A sample of 45 students was selected using a probability stratified random sampling technique. The visual fatigue (VF) questionnaire was used to measure eye fatigue. Data analysis used a paired t-test. This research has received ethical clearance from the KEPK Institute of STIKES PAYUNG NEGERI PEKANBARU with No. 023/IKES PN/KEPK/XII/2024.

RESULTS

a. **Analisa Univariat**

Tabel 1. Distribution of Respondents by Age at SMP Negeri 12 Pekanbaru

No.	Age	Frekuensi	Presentase (%)
1.	13 Years	14	31.1
2.	14 Years	31	68.9
	Total	**45**	**100**

Source: primary data

The results of the analysis show the distribution of respondent characteristics. From the analysis results, it was found that the majority of respondents were aged 14 years, as many as 31 respondents (68.9%) and 14 respondents were aged 13 years, as many as 14 (31.1%).

Tabel 2. Distribution of Respondents by Gender at SMP Negeri 12 Pekanbaru

No.	Ketegori	Frekuensi	Presentase (%)

1.	Man	21	46.7
2.	Women	24	53.3
	Total	**45**	**100**

Source: primary data

The results of the analysis show that the distribution of respondent characteristics shows that the majority of respondents are female, 24 (53.3%) respondents, and a small proportion are male, 21 (46.7%) respondents.

Tabel 3. Distribution of Respondents Based on the Duration of Gadget Use Before the 20-20-20 Rule was Implemented at SMPN 12 Pekanabaru

No.	Duration of Gadget	Amount	Presentase (%)
1.	1 – 3 Hour	5	11.1
2.	4 – 5 Hour	15	33.3
3.	6 - 8 Hour	25	55.6
	Total	**45**	**100**

Source: primary data

It is known that the duration of pretest gadget use is divided into 3 categories, namely 1-3 hours as many as 5 respondents (11.1%), 4-5 hours as many as 15 respondents (33.3%), and the majority 6-8 hours as many as 25 respondents (55.6%).

Tabel 4. Distribution of Respondents Based on the Duration of Gadget Use After the 20-20-20 Rule at SMPN 12 Pekanabaru

No.	Duration of Gadget	Amount	Presentase (%)
1.	1 – 3 Hour	18	40.0
2.	4 – 5 Hour	25	55.6
3.	6 - 8 Hour	2	4.4
	Total	**45**	**100**

Source: primary data

Based on the results of table 4.4, it is known that the duration of gadget use in the post-test is divided into 3 categories, namely 1-3 hours for 18 respondents (40.0%), 4-5 hours for 25 respondents (55.6%), and the majority is 6-8 hours for 2 respondents (4.4%).

b. Analisa Bivariat

The results of the study showed that the data was normal so the test conducted was a Paired T Test to see whether the provision of the 20-20-20 rule was effective against eye fatigue in gadget use at SMPN 12 Pekanbaru.

Tabel 5. The Effectiveness of Flash Card Games Rule 20-20-20 on Eye Fatigue During Gadget Use at SMPN 12 Pekanbaru

Eye Fatigue Score	N	Mean	Standar Deviasi (SD)	Standar Eror (SE)	Difference in Average Value	t-hitung	P (value)
Pre	45	12.62	1.230	1833	294	16.739	0.000
Post	45	9.68	874	1303			

Source: primary data

Based on the table above, the results of the paired t-test show a p value of 0.000, which means the p value <α 0.05, so Ho is rejected, which means that the 20-20-20 rule is effective against eye fatigue in gadget use at SMPN 12 Pekanbaru.

DISCUSSION

A. Analisa Univariat

1) Distribution of Respondents by Age
The analysis results show that the distribution of characteristics shows that the majority of respondents were 14 years old (31 respondents (68.9%), and 14 (31.1%) were 13 years old. Based on the data above, the 13-14 age group is the age group where adolescents are most curious about using gadgets.
2) Distribution of respondents by gender.
The analysis results show that the distribution of respondent characteristics showed that the majority of respondents were female (24 respondents (53.3%), and a small proportion were male (21 respondents (46.7%). Gender refers to the differences in biological form, characteristics, and functions between men and women, which determine different roles. According to the researcher's assumptions, the composition of female respondents in this study supports the conclusions of previous research, namely that women tend to reflect the trend of using gadgets for social and creative activities, while male respondents use gadgets for online gaming.
3) Duration of Gadget Use.
The analysis results obtained before the 20-20-20 rule was implemented among 45 respondents showed that the majority (25 respondents) used gadgets for 6-8 hours (heavy), 15 respondents (33.3%) for 4-5 hours (moderate), and 5 respondents (11.1%) for 1-3 hours (short and infrequent). However, after the 20-20-20 rule was implemented among 45 respondents, there was a change in the duration of gadget use, with 25 respondents (55.6%) using gadgets for 4-5 hours (moderate), 25 respondents (18 respondents (40.0%) for 1-3 hours (short and infrequent), and 2 respondents (4.4%) for 6-8 hours.

B. Analisa Bivariat

The results of the paired t test showed that the average score before the 20-20-20 rule was higher, namely 12.62, while the average after the 20-20-20 rule was given decreased, namely 9.68, where the p value = 0.000 <0.05, then Ho was rejected, which means that the 20-20-20 rule was effective against eye fatigue in gadget use at SMPN 12 Pekanbaru. The researcher's assumption, this study is in accordance with previous research in strengthening the 20-20-20 rule method with flash cards media is very

influential in reducing eye fatigue, after the intervention, there was a real change in the respondent's eye health condition, including a significant decrease in the duration of excessive gadget use and symptoms of eye fatigue especially pain around the eyes, frequent eye massage and watery eyes. This shows that the provision of the 20-20-20 rule is effective against eye fatigue in gadget use

CONCLUSION

The analysis results show that the distribution of respondent characteristics shows that the majority of respondents were female (24 respondents (53.3%), and a small proportion were male (21 respondents (46.7%). The analysis results show that the average age of the majority was 14 years old (31%) and 14 (31.1%) were 13 years old. The results of the pretest gadget usage duration were divided into three categories: 1-3 hours (5 respondents) with 5 respondents (11.1%), 4-5 hours (15 respondents (33.3%), and the majority 6-8 hours (25 respondents (55.6%). The posttest included 1-3 hours (18 respondents (40.0%), 4-5 hours (25 respondents (55.6%), and the majority 6-8 hours (2 respondents (4.4%). In analisa bivariat from the results of the study, there were 45 respondents who were given the 20-20-20 rule against eye fatigue in the use of gadgets, which obtained an average value with a p value <0.000 smaller <α 0.05 so that ho was rejected, meaning that the provision of the 20-20-20 rule was effective against eye fatigue in the use of gadgets at SMPN 12 Pekanbaru

REFERENCES

Mariyama, M., Lestari, I. P., & Sari, I. P. (2023). Pengaruh Intensitas dan Jenis Pemakaian dalam Penggunaan Gadget terhadap Tingkat Emosional pada Anak Usia Sekolah. *Indonesian Journal of Nursing and Health Sciences*, *4*(2), 113–120.

Fajria, L. (2024). *Intensitas Penggunaan Gadget*. https://www.google.co.id/books/edition/INTENSITAS_PENGGUNAAN_GADGET_Pengaruhnya/YMkcEQAAQBAJ?hl=id&gbpv=1&dq=penggunaan+gadget&pg=PA55&printsec=frontcover

Kusuma Rini, M., & Huriah, T. (2020). Prevalensi dan Dampak Kecanduan Gadget Pada Remaja: Literature Review. *Jurnal Keperawatan Muhammadiyah*, *5*(1), 185–194. https://doi.org/10.30651/jkm.v5i1.4609

Gumunggilung, D., Doda, D. V. D., & Mantjoro, E. M. (2021). Hubungan Jarak Dan Durasi Pemakaian Smartphone Dengan Keluhan Kelelahan Mata Pada Mahasiswa Fakultas Kesehatan Masyarakat Unsrat Di Era Pandemi Covid-19. *Jurnal Kesehatan Masyarakat Universitas Sam Ratulangi Manado*, *10*(2), 12–17.

Aminingrum, A. (2023). *Pengaruh Paparan Radiasi Gelombang Elektromagnetik dari Gadget Terhadap Perkembangan Anak Usia Dini*. *01*(01), 171–178.

Zulkarnain, B. S., Budiyatin, A. S., Aryani, T., & Loebis, R. (2021). The Effect of 20-20-20 Rule Dissemination and Artificial Tears Administration in High School Students Diagnosed with Computer Vision Syndrome. *Jurnal Pengabdian Kepada Masyarakat (Indonesian Journal of Community Engagement)*, *7*(1), 24. https://doi.org/10.22146/jpkm.54121

Wulandari, A. A., Subekti, T., & Simanjuntak, H. P. (2023). *TINGKAT PENGETAHUAN SISWA / I TENTANG METODE 20-20-20 PADA SAAT MENGGUNAKAN GADGET DI SMP SURYA KENCANA BAKTI BANDUNG TAHUN 2023*.

Tjandra, C. (2021). *Eye-Smart (Safety masrtermind And Refreshing Technology) : aplikasi kesehatan mata pencegah CVS.*

https://www.google.co.id/books/edition/10_Karya_Terbaik_Miracle_Public_Health_C/TlPJEAAAQBAJ?hl=id&gbpv=1&dq=aturan+20-20-20&pg=PA22&printsec=frontcover

Talens-Estarelles, C., Cerviño, A., García-Lázaro, S., Fogelton, A., Sheppard, A., & Wolffsohn, J. S. (2023). The effects of breaks on digital eye strain, dry eye and binocular vision: Testing the 20-20-20 rule. *Contact Lens and Anterior Eye*, *46*(2). https://doi.org/10.1016/j.clae.2022.101744

Souchet, A. D., Lourdeaux, D., Pagani, A., & Rebenitsch, L. (2023). A narrative review of immersive virtual reality's ergonomics and risks at the workplace: cybersickness, visual fatigue, muscular fatigue, acute stress, and mental overload. In *Virtual Reality* (Vol. 27, Issue 1). Springer London. https://doi.org/10.1007/s10055-022-00672-0

Statistik, B. pusat. (2023). *Statistik Telekomunikasi Indonesia 2022*. https://www.bps.go.id/id/publication/2023/08/31/131385d0253c6aae7c7a59fa/statistik-telekomunikasi-indonesia-2022.html