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FACTORS AFFECTING THE USE OF DIGITAL DEVICES ON EYE HEALTH AMONG PATIENTS ATTENDING EYE CLINIC IN MBALE REGIONAL REFERRAL HOSPITAL, A CROSS-SECTIONAL STUDY.

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Abstract
Background
Prolonged use of digital devices can lead to digital eye strain, causing symptoms like dry eyes, blurred vision, and headaches. Blue light exposure may also affect sleep and eye health. This study aimed to find the factors affecting the use of digital devices among patients attending the eye clinic in Mbale Regional Referral Hospital.

Methodology
A cross-sectional descriptive study design was employed to collect quantitative data, where forty (40) respondents were chosen for the study. Data was analyzed using Microsoft Excel. The results were presented in tables, figures, and statements using Microsoft Excel.

Findings
40 respondents participated in this study, 24(60%) males and 16(40%) females. 5(12.5%) were below 20 years, 16(40%) were 12-35 years, 10(25%) were 36-44 years and 9(22.5%) were above 45 years. Smartphones are the most used digital devices affecting the eyes, with a percentage of 27% computers with a percentage of 20%. Television with a percentage of 12.5%, and iPads with a percentage of 7.3%. Factors associated with the use of digital devices included social media, entertainment, Research study, and secretarial activities. The common eye health problems included eye irritation, eye strain, and eye fatigue. Burning sensation and blurring vision.

Conclusion
Following the study, it was established that digital devices like smartphones, computers, Television, and iPads are common digital devices affecting the eyes, causing eye irritation, eye strain, and eye fatigue. Burning sensation and blurring vision, which are associated with social media use, entertainment, Research activities, and secretarial activities.

Recommendations
All digital device users should be advised to use the 20-20-20 rule while working on these digital devices. Every 20 minutes, take a 20-second break and focus your eyes on something at least 20 feet away so that it increases the production of tears.

Key words: *Use of Digital Devices, Eye Health, Eye Clinic, Mbale Regional Referral Hospital.*
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Background
Digital devices are electronic devices that can create, generate, send, share, communicate, receive, store display or process information, and such electronic devices shall include, but not limited to desktops, laptops tablets, smart phones and only similar storage devices which currently exists or may exist as technology developed or such comparable items as technology develops. (Law Insider,2019). The 21st century is often regarded as an era of technology. Technology plays a very important role in our lives. It is seen as the basis of the growth of an economy. An economy that is poor in technology can never grow in today's scenario. This is because technology makes our work much easier and less time-consuming. (R. Raja, P.C. Nagasubramani, 2018). The digital technologies (e.g., mobile phone, tablet, notebook, etc.) and social media (e.g., Facebook, YouTube, Blogs, Twitter, LinkedIn, etc.) have become increasingly popular in recent years. The most common digital technology is the mobile phone. Nowadays, the majority of mobile phones are called „smartphones" as they have more advanced computing power and connectivity than a contemporary mobile phone (Osman, Talib, Sanusi, Shiang-Yen, &Alwi, 2012). Globally, according to a survey conducted by the Vision Council in Saudi Arabia, 70%of the adults say they have experienced some of the symptoms of digital eye strain. It is becoming a widespread problem as more people spend hours each day looking at computers, cell phones, iPods, tablets, and other electronic devices. (Alfahad,2012). In Africa, the study carried out in Ghana on computer vision syndrome caused by digital devices showed that the prevalence of CVS was 64.36%. %, Most common symptoms reported were teary eyes (40.06%), eye fatigue (35.36%), and eye strain (34.81%). (Prince KwakuAkowuah et al,2021) In East Africa, mobile phone penetration has been increasing, with Kenya having a 91% penetration of mobile subscriptions compared to Africa's average of 80%. This makes it have the highest penetration of effects of digital devices. (Elliot, 2019) Dr Anil Agarwal, an ophthalmologist in Uganda, reveals he is receiving more

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patients suffering from headaches, eye strain, and blurred vision. Although they are from different age groups, they usually have one thing in common: they spend a lot of time (more than six hours) looking at a screen. He added that the diagnosis is computer vision syndrome, a common eye condition that describes vision problems and ocular discomfort due to extended periods of time in front of the computer. (Daily Monitor, 2020)

In recent decades, we have witnessed a sharp increase in the availability and use of personal electronic devices (digital devices) such as laptops and handheld computers, smartphones, and institutions' computers, tablets, and similar associated devices. (Chesley N, 2014)

With the increasing popularity of electronic devices, youths spend significant time on smartphones and other ICT, thereby developing addictive tendencies. Research concludes that youths are not only addicted but are also developing significant behavioural problems, visual discomfort, and symptoms owing to excessive electronic device usage. All staring from frequent phone use, computer use, and TV watching can lead to eye strain, a visual health issue that, when found in this context, is often called computer vision syndrome (Klamm Tarnow KG, 2015)

Methodology

Study design

A cross-sectional descriptive study design was employed because it involved both a quantitative method of data collection. This study design also took a short period of time during data collection and analysis.

Study Area

The study area was the eye clinic of the MRRH Eye Clinic. Bale Regional Referral Hospital is a government founded that was funded by the government. It is located 250km east of Kampala in the Centre of Mbale Town.

MRRH serves a population of over 4 million people in 16 districts of Mbale, Busia, Tororo, Butaleja, Pallisa, Budaka, Bududa, Sironko, Manafwa, Namisindwa, Butebo, Kapchorwa, Kibuku, Bukwo, Kween, and Bulambuli. The hospital was started in the 1920s and has grown to an over 494-bed hospital.

Study Population

The study population included all ocular patients at the eye clinic at Mbale Regional Referral Hospital.

Sample size determination

The sample size was determined using Button's (1965) formula to calculate the sample size.

S=GR/O

Where S=Sample Size

G=Number of people interviewed per day=4

R=Maximum number of days for data collection=4 weeks

O=Maximum time the interviewer spends on each respondent=0.5 hours

There S=5 x4/0.5 = 40. Therefore, the sample size was 40. Forty (40) respondents will be used in the research project.

Sampling technique

A simple random sampling was used to pick the 40 respondents

Sampling procedure

With the help of health workers at the department, 80 papers written on Y and X were given to patients, and only 40 respondents with papers written on Y were involved in the study.

Inclusion criteria

Only patients who attended the eye clinic at Mbale region referral hospital were involved in the study and had consented to release their information.

Exclusion criteria

All patients who were mentally ill, those who did not consent, and attended the eye clinic from MRRH.

Definition of variables

Independent variables: These included age, marital status, education level, and occupation.

Dependent variables

Digital devices used by the respondents

Eye Health issues as a result of digital devices.

Research instruments

The researcher formulated a questionnaire under supervision, addressing the research questions. The questionnaire consisted of both open and closed-ended questions used to collect data

Data collection methods

Data was collected using a questionnaire

Data Collection Procedure

Before giving out the questionnaires, the researcher fully explained the questions to the respondents. Questionnaires contained both open and closed-ended questions used to collect data. Each filled-in questionnaire was checked for accuracy and completeness and kept in a safe place by the researcher.

Data quality control

This was done through pre-visiting, training of research assistants, and pretesting of data.

Pre-visiting

Prior to the study, I visited MRRH to obtain permission to allow me to carry out my research project in the department.

Pre-testing

The study tools were tested on a few patients attending the eye clinic, and necessary adjustments were made to ensure validity and reliability.

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Data Management

After collecting the data, it was processed and stored in a personal notebook, a computer, and a flash disk as a backup copy.

Data Analysis and Presentation of Results

After collecting the data, it was analyzed using Microsoft Excel. The results were presented in tables, figures, and statements using Microsoft Excel.

Introductory letter

A permission letter of introduction was provided by the Principal of Ophthalmic Clinical Officers Training School, and then it was delivered to the hospital director of Mbale Regional Referral Hospital, who introduced the researcher to the in-charges of the ophthalmic unit. He then introduced the researcher to the respondents to get their consent. The respondents were assured of absolute confidentiality.

Informed consent

Verbal consent was sought from the respondents after the explanation of the topic of the study.

Ethical Consideration

Results

Socio-demographic data of the respondents

Table 1 shows the Socio-demographic data of the respondents.

Variables	Category	Number of respondents	Percentages (%)
Age (years)	Below 20	05	12.5
	21-35	16	40
	36-44	10	25
	Above 45	09	22.5
	Total	40	100
Sex	Male	24	60
	Female	16	40
	Total	40	100
Tribe	Gishu	14	35
	Mugwere	08	20
	Iteso	04	10
	Musoga	05	12.5
	Other	09	22.5
	Total	40	100

Common digital devices affecting eye Health

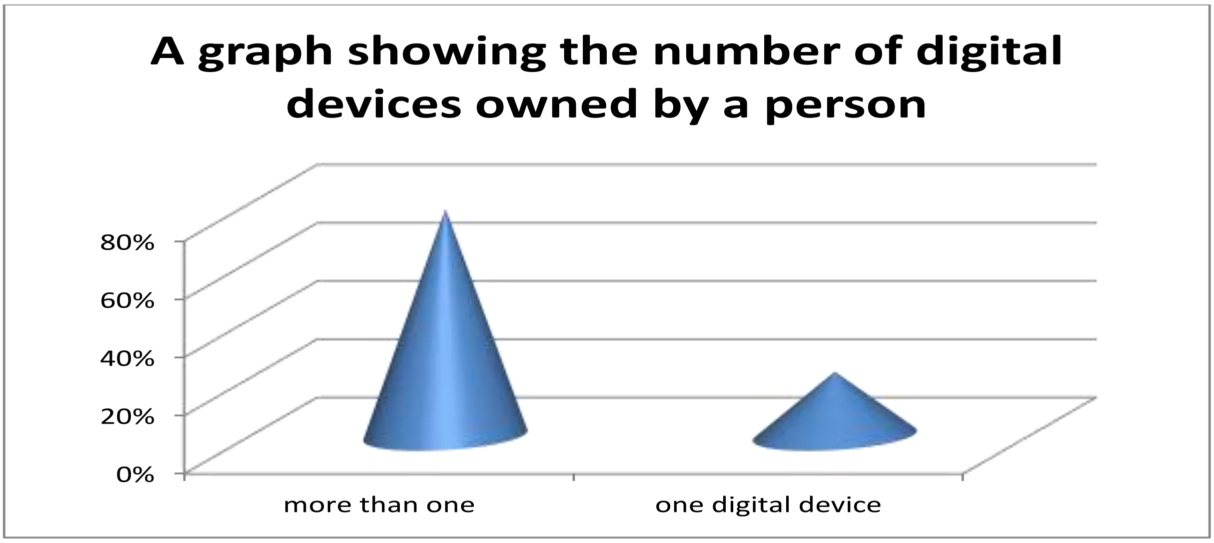
Table 2 shows the Common digital devices affecting eye Health.

Digital devices	Frequency	Percentage
Television	5	12.5%
Smart phones	11	27.5%

ipads	3	7.5%
Computers	8	20%
Others	6	15%

The results showed that smartphones are the most used digital devices affecting the eyes, with the percentage of 27% followed by computers in the second position, with the percentage of 20%. Television is in the third position, with a percentage of 12.5% and iPads are in the fourth position, with a percentage of 7.3%. Other examples of digital devices were also mentioned, which carried the percentage of 15%.Figure 1 shows the number of digital devices owned by the respondents.

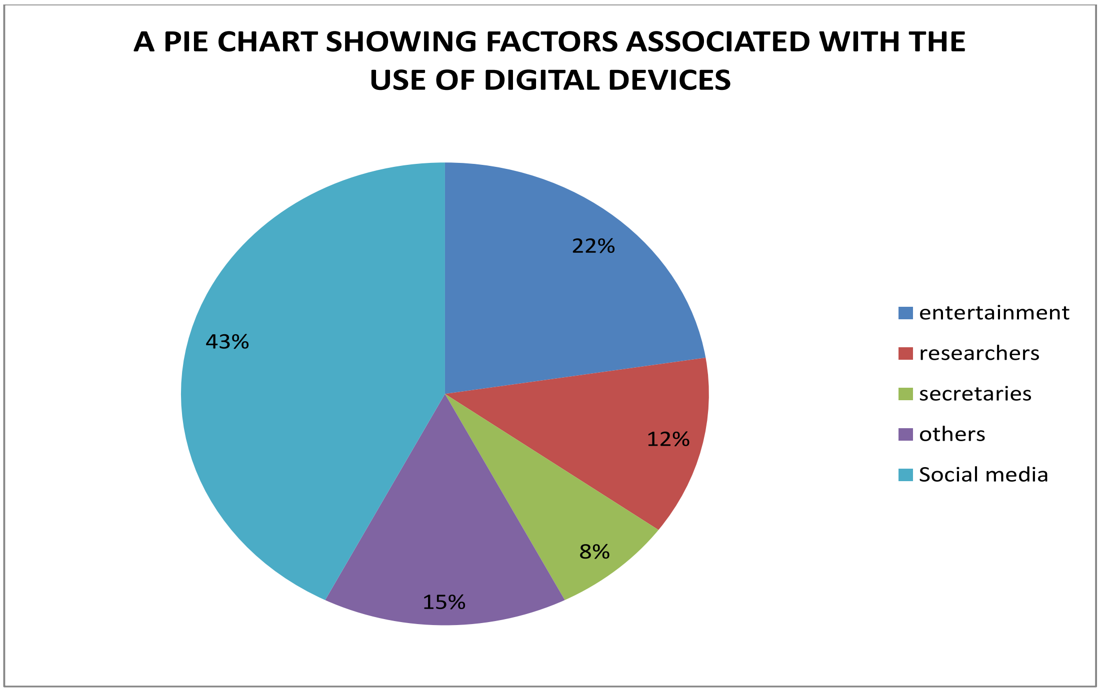
Number of digital devices owned by the respondents



The results showed that 78% of the respondents owned more than one digital device, and 22% of the respondents had only one digital device.

Factors associated with the use of digital devices.

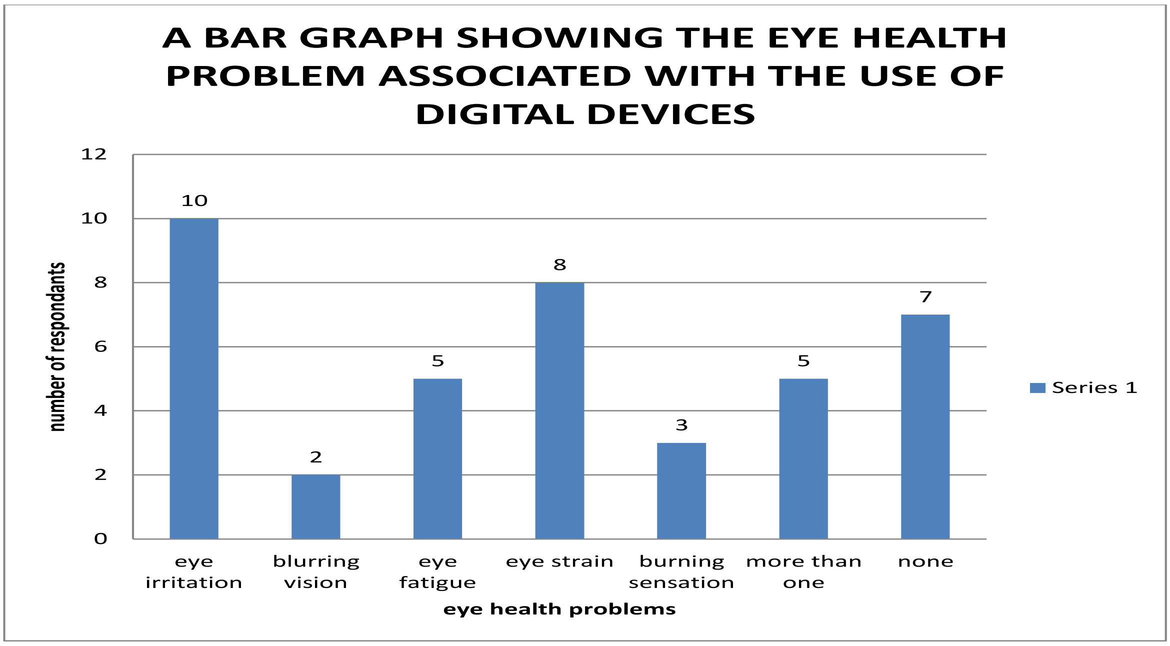
Figure 2 shows the Factors associated with the use of digital devices.



The result showed that social media was the greatest factor for the use of digital devices, followed by entertainment in the second place. Research was also mentioned in the third position, followed by secretarial activities. Other factors were also mentioned by the respondents.

Eye health problems caused by digital devices

Figure 2 shows the Eye health problems caused by digital devices.



The results showed that eye irritation was the most common problem, followed by eye strain. Only seven (7) respondents did not have any eye problems, while eye fatigue and those with more than one eye problem had the same number of respondents. Burning sensation and blurring vision had the least number of respondents.

Discussion

To determine the common digital devices affecting eye health among patients attending the eye clinic of Mbale regional referral hospital.

The study revealed that 27.5% of the respondents use computers, Television (20% smart phones, 12.5% iPads, 7.5% others, which were mentioned by respondents were 15%. In the same study, it was revealed that most respondents had more than one digital device (78%), while those who had only one were 22% who used it daily in their different activities. This is probably because most people get attracted to the new upcoming technology in the world, which makes them acquire these digital devices for their different purposes. It was similar to a study by Yurtcanli, where almost all respondents (99.5%) used smartphones, with 87.7% additionally using devices for education and 73.8% for gaming. Nearly half (47.8%) used devices more than 6 hours per day (Yurtcanlı et al., 2024).

To evaluate the factors associated with the use of digital devices among the patients attending the eye clinic of Mbale Regional Referral Hospital

The objective of the study was to evaluate the factors associated with the use of digital devices, which revealed that social media was the greatest factor for the use of digital devices, followed by entertainment in the second place. A research study for educational use was also mentioned in the third position, followed by secretarial activities. Other factors were also mentioned by the respondents. These findings indicated that social media was the major factor, followed by entertainment on digital devices, and others include research studies for educational purposes and secretarial activities. This is probably because most people use social media for communication with their friends and family members, while others use it for conducting different businesses and advertising. Most digital devices have games, music, and film videos, which are used as a source of entertainment. These results agree with the research which was carried out in India on the impact of the use of digital devices on eyes during the lockdown period of the COVID-19 pandemic, which showed that the Maximum respondents were mobile users spending major times on social media (89.70%) following netsurfing, E-reading, gaming, TV serials, and office work. (Ugam Usgankar, Shet Parkar, and Aksha Shetty,2021).

To determine the eye health problems caused by the use of digital devices among patients attending the eye clinic of Mbale regional referral hospital

The results showed that eye irritation was the most common problem, followed by eye strain. Only seven respondents did not have any eye problems, while eye fatigue and those with more than one eye problem had the same number of respondents. Burning sensation and blurring vision had the least number of respondents. These results have similarities with those of the research, which was conducted in Ghana between January and March 2020; the most common symptoms reported were teary eyes (40.06%), eye fatigue (35.36%), and eye strain (34.81%), and others, which were a result of prolonged use of digital devices. (Prince Kwaku Akowuah et al,2021). During the research, it was also revealed that these symptoms were associated with the time they spent using these digital devices. Many patients (85%) of these people who experienced these symptoms spent over eight hours (8hours) while working using these digital devices.

Conclusion

The study established that computers are the most used digital devices affecting the eyes, with the percentage of 27% followed by Television in the second position, with the percentage of 20%. Smartphones are in the third position with a percentage of 12.5% with iPads in the fourth position with a percentage of 7.3%. Other examples of digital devices were also mentioned, which carried the percentage of 15%. The result showed that social media was the greatest factor for the use of digital devices, followed by entertainment in the second place. Research was also mentioned in the third position, followed by secretarial activities. Other factors were also mentioned by the respondents. The results showed that eye irritation was the most common problem, followed by eye strain. Only seven (7) respondents did not have any eye problems, while eye fatigue and those with more than one eye problem had the same number of respondents. Burning sensation and blurring vision had the least number of respondents.

Recommendation

The ministry of health and policy makers should advices all the Engineers to start producing digital devices which have Auto screen savers and regulators which reduces on the amount of light produced by these digital devices OCOs and Ophthalmologists together with the optician should encourage the digital devices use to get eye protective glasses (anti-glares) which cuts off the blue light from the screens of these digital devices. This makes the eyes get protected from these lights. All digital device users should be advised to use the 20-20-20 rule while working on these digital devices. Every 20 minutes, take a 20-second break and focus your eyes on something at least 20 feet away so that it increases the production of tears.

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List of Abbreviations
CVS: Computer vision syndrome

LED: Light-emitting diode

DES: Dry eye syndrome

US: United States

AOA: American Optometry Association

WHO: World Health Organization

DVS: Digital vision syndrome

Source of funding
The study was not funded.

Conflict of interest
The author declares no conflict of interest.

Author contributions
Cyrus Naliku, principal investigator and analyzed the data.
Violet Alimwendwa supervised the data.

Data availability
Data is available upon request.

Informed consent
All the participants consented to this study.

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