PARENTAL KNOWLEDGE, ATTITUDE AND PRATICE TOWARDS DIGITAL EYE STRAIN IN CHILDREN IN OVIA NORTH-EAST, EDO STATE

BY

CHINENYE VERONICA NNENNA

LSC1806903

FACULTY OF OPTOMETRY

UNIVERSITY OF BENIN

BENIN CITY, EDO STATE

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CERTIFICATION AND APPROVAL

This is to certify that this research project titled: **PARENTAL KNOWLEDGE, ATTITUDE AND PRATICE TOWARDS DIGITAL EYE STRAIN IN CHILDREN IN OVIA NORTH-EAST, EDO STATE** was carried out by **CHINENYE VERONICA NNENNA** in the Faculty of Optometry, University of Benin in partial fulfillment of the requirement for the DOCTOR OF OPTOMETRY (OD) degree in the 2024/2025 Academic Session.

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DR. R. UKHUEDOBAH	**DATE**
(PROJECT SUPERVISOR)	
…………………………………	……………………..
DR. (MRS) J. OKUKPON	**DATE**
(PROJECT COORDINATOR)	
…………………………………	……………………..
PROF. (MRS) E. OGHRE	**DATE**
(DEAN)	
…………………………………	……………………..
EXTERNAL EXAMINER	**DATE**

DEDICATION

I dedicate this project to God Almighty, my Creator and Sustainer, for His grace, love, and constant presence throughout my journey at the University of Benin.

I also dedicate it to my amazing parents, Mr. and Mrs. Onwuka Chinenye, whose love, prayers, and unwavering support have been my greatest strength and motivation.

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ABSTRACT

This study examined Parental Knowledge, Attitude, and Practice toward Digital Eye Strain (DES) in Children in Ovia North-East Local Government Area, Edo State. Digital eye strain, has become a growing concern due to increased screen exposure among children for both educational and recreational purposes. The study adopted a cross-sectional descriptive survey design, and data were collected from 387 parents or primary caregivers of children aged 5 to 15 years using a structured self-administered questionnaire adapted from the Computer Vision Syndrome Questionnaire (CVS-Q). Descriptive and inferential statistics were used for data analysis. The results revealed that most parents (70.5%) were aware of digital eye strain, and 87.9% believed that excessive screen time could harm children's eyes. The majority demonstrated good awareness of preventive measures such as maintaining correct sitting posture (86.6%), proper viewing distance (87.9%), and regular breaks during device use (83.7%). However, awareness and utilization of antiglare screens were relatively low (52.5%). Smartphones were the most frequently used devices (61.0%), and over half of the children (58.9%) spent between 3 to 6 hours daily on screens. Commonly reported symptoms among children included eye itching (18.1%), redness (12.1%), and fatigue (14.5%). While 42.4% of parents sought professional care when symptoms occurred, 18.6% relied on home remedies. Overall, the study concludes that although parental awareness of DES is high, consistent implementation of preventive practices remains inadequate. It recommends increased public health education, periodic pediatric eye examinations, school-based interventions, and policy-driven community awareness programs to enhance preventive behavior among parents and caregivers.

Keywords: digital eye strain, screen time, computer vision syndrome, optometric health, preventive eye care

CHAPTER ONE

1.0 INTRODUCTION

Digital eye strain also known as computer vision syndrome (cvs) is a group of vision problems that result from prolonged use of digital devices such as computer, smartphone, tablets and televisions. Individuals with Digital eye strain experience symptoms such as eye strain, headaches, blurry vision, dry eyes and discomfort in the neck , shoulders and back which can affect daily activities, learning and quality of life (American Optometric Association, 2017; Sheppard & Wolffsohn, 2018). DES is a growing public health concern, particularly among children and adolescents, due to the increasing reliance on digital devices for education, recreation, and social interaction (Tsang et al., 2023).

The integration of digital devices into the daily routines of children has created both opportunities and challenges. While these devices provide educational resources, entertainment, and connectivity, their excessive use has been linked to the development of visual discomfort and other health-related problems. Studies have shown that long hours of device use, poor posture, inadequate lighting, and close viewing distances are among the major contributors to DES (Ganne et al., 2021; Ranasinghe et al., 2016). Moreover, the COVID-19 pandemic amplified these issues as remote learning and increased screen time became commonplace, resulting in higher rates of eye strain among students (Almousa et al., 2022).

Research across different countries highlights the prevalence of DES and its impact. For example, in Saudi Arabia, a significant proportion of students reported experiencing eye discomfort, dryness, and pain after using smartphones for several hours each day, with men reporting slightly higher rates than women (Turkistani et al., 2021; Issa et al., 2021). Similarly, studies in India found that over half of students used smartphones for academic work, while many also engaged in leisure activities such as video streaming and gaming, often adopting postures that contributed to visual and musculoskeletal discomfort (Ichhpujani et al., 2019). These findings illustrate that DES is not only widespread but also influenced by behavior, device type, viewing habits, and environmental conditions.

Several factors contribute to the development of DES. Prolonged digital device use reduces blinking frequency, which can lead to evaporative dry eye and discomfort. Poor posture during device use can cause neck, shoulder, and back pain, while improper lighting and screen glare exacerbate visual strain. Other contributing factors include uncorrected refractive errors, pre-existing ocular conditions, contact lens use, and systemic health issues such as diabetes or migraine susceptibility (Lurati, 2018; Arif & Alam, 2015). In addition, medications like antihistamines, beta blockers, and antidepressants can reduce tear production or alter ocular function, further increasing the risk of DES.

Preventive measures and interventions play a critical role in reducing the burden of DES. Ergonomic practices such as maintaining proper posture, adjusting screen height and distance, ensuring appropriate lighting, and taking regular breaks following the 20-20-20 rule (looking at an object 20 feet away for 20 seconds every 20 minutes) have been shown to alleviate symptoms. The use of antiglare screens, blue-light filtering glasses, and lenses optimized for screen distance can also provide protection (Lurati, 2018). Despite awareness of these measures, studies indicate that many users, including students and young adults, fail to consistently apply them, highlighting gaps between knowledge, attitude, and actual practice (Altwaijri et al., 2021; Kharel Sitaula & Khatri, 2018).

Parents play a pivotal role in preventing DES among children. They are often the first line of defense in regulating screen time, monitoring viewing habits, and ensuring children adopt healthy practices when using digital devices. However, research indicates that parental knowledge and implementation of preventive strategies may be inconsistent, particularly in semi-urban and rural areas where access to information is limited (AlHarkan, 2023). Understanding parents' knowledge, attitudes, and practices (KAP) toward DES is therefore crucial for developing effective health education programs and policies aimed at protecting children's visual health.

1.1 Background to the Study

The use of digital devices has become an essential part of everyday life. Many people use these devices in almost every aspect of their vocational as well as non-vocational activities. Furthermore, use of digital devices continues to increase each year (Coles-Brennan *et al.,* 2019). In children, there is increasingly rate of exposure to digital screens through televisions, smartphones, tablets, and computers, both at home and in school. The prolonged use of computers may lead to the development of a group of symptoms, collectively termed as "digital eye strain", "computer vision syndrome", or "visual fatigue (VF)" (Al Dandan *et al.,* 2021; Sheppard and Wolffsohn, 2018).

Digital eye strain is a condition characterised by visual disturbance and/or ocular discomfort related to the use of digital devices and resulting from a range of stresses on the ocular system, including glare, defocus, accommodation dysfunction, fixation dis parity, dryness, fatigue and discomfort(Coles-Brennan *et al.,* 2019).

1.2 Pathophysiology of digital eyestrain

Our eyes have little problem focusing on most printed material, which is characterized by dense black characters with well-defined edges. Healthy eyes can easily maintain focus on the printed page. Characters on a computer screen, however, don't have this contrast or well-defined edges. These characters (pixels) are brightest at the center and diminish in intensity toward their edges. This makes it very difficult for our eyes to maintain focus and remain fixed onto these images (Arif and Alam, 2015) . We normally blink about 20-22 times per minute. During computer use our blinking rate is decreased to 4-6 times per minute, causing evaporative dry eye. Prolonged viewing is another important factor which is not only unnatural for the human optical system causing strain but also contributes to dry eye. Dry eye causes people to arch their foreheads in an effort to see better and cause headache. At workplace many people assume an awkward or unnatural posture during using computer/tab/mobile which causes back-ache, stiff neck and hurting shoulder. Air conditioning of our office/computer section is another cause of evaporative dry eye (Arif and Alam, 2015).

1.3 Types of digital eye strain

Computer vision syndrome, a phenomenon associated with the use of visual display terminals VDTs, has symptoms of eyestrain, headaches, dry eye, diplopia, and blurred vision, and is also referred to as asthenopia. The first component involves Ocular-surface related watering, irritation, dry eye; the second component involves internal symptoms (e.g., headaches or diplopia) (Lurati, 2018). Musculoskeletal symptoms, neck and back pain, and shoulder, wrist, and finger discomfort can also be part of CVS. Postural demands of computer work as well as less static demand on the muscles contribute to eye fatigue) (Arif and Alam, 2015; Lurati, 2018).

1.4 Diagnosis of Causes

As with any examination, accurate history and symptom-taking is essential. However, an understanding of the tasks and working conditions under taken with particular digital devices is also important in order to correctly assess the underlying cause(s) (Coles-Brennan *et al.,* 2019).

Table 1: Types, symptoms and sources of digital eyestrain. Table adopted from Management of digital eye strain by Coles-Brennan et al.,(2019)

Eye strain types	Symptoms	Cause/source
Vision-related	• Frontal headache • Sore eyes • Heaviness • Diplopia	• Astigmatism • Hyperopia • Myopia • Presbyopia • Accommodative anomalies
Oculomotor-related	• Focusing difficulty • Other symptoms similar to vision-related eye strain • Diplopia	• Fixation disparity • Poor convergence
Dry eye or ocular surface-related	• Dryness • Itchiness • Irritation/scratchiness • Redness • Burning • Blurred vision • Tearing/sore eyes	• Dry eye • Contact lens wear • Corneal, conjunctival and/or eyelid pathology • Reduced/poor blinking • Environment • General health • Changes in medication • Age
Extraocular or environmental factor-related	• Neck/shoulder/back pain • Glare • Headache	• Posture • Lighting • Temperature/humidity
Device-related	• Depends on type of digital device • Most symptoms similar to vision-related eye strain	• Small screen • Reduced working distance and font size • Screen illumination and spectrum of light • Screen resolution and contrast • Reduced blink rate • Incomplete blinks

Diagnosis of computer vision syndrome is chiefly done by taking a detailed history and eye examination(Arif and Alam, 2015):

a) Is the patient suffering from any other disease that may cause headache?

b) Computer use

   i. How long have you been using computer? .... months/years.

   ii. Average duration of computer use in a day .... hours.

   iii. Are you aware that prolonged use of computer has had effects on the eyes?: yes/no.

c) Ask about eye strain (irritation, heaviness)/ tiredness of eyes/watering of eyes/redness of eyes/blurring of vision/dry eye/discomfort/double vision/headache/backache/neck pain/shoulder pain/ no symptoms.

d) Use of Medications/Drugs responsible for headache

1.4.1 Objective methods include

1.4.2 Accommodation and vergence parameters

Accommodation parameters should be assessed in patients who report asthenopia. This assessment involves measuring the near point of accommodation, accommodation lag, accommodative microfluctuations, and accommodative facility. Individuals who use video display terminals (VDTs) may show a greater lag of accommodation compared to those reading printed materials; however, findings across studies remain inconsistent. Additionally, evaluation for squint or strabismus and investigation of vergence abnormalities should be conducted (Tripathy *et al.,* 2025).

1.4.3 Critical Flicker Fusion Frequency (CFF)

CFF refers to the frequency at which a flickering light is perceived by the human visual system as a steady, continuous light. A reduction in CFF following extended computer use may be linked to subjective symptoms of computer vision syndrome (CVS), although some studies have reported no such correlation (Tripathy *et al.,* 2025).

1.4.4 Blinking

Tasks involving computer use or high levels of concentration are known to decrease blink rate, thereby prolonging ocular surface exposure and contributing to dry eye symptoms. Blinking is essential for maintaining ocular surface health and tear film stability by redistributing, draining, and renewing tears across the eye's surface. Computer use has also been linked to incomplete blinks, in which the upper eyelid fails to completely cover the cornea, further aggravating dry eye symptoms (Tripathy *et al.,* 2025).

1.4.5 Pupil Size

An enlarged pupil can lead to visual fatigue due to a decreased depth of focus. Visually intensive activities, such as computer work, may result in increased pupil size. Approximately one-third of individuals may experience pupillary constriction after completing such tasks or extended near work, possibly as a result of spasm of the pupillary sphincter and ciliary muscles (Tripathy *et al.,* 2025).

1.5 Risk factors

According to Lurati (2018) - attributes, characteristics, conditions, behaviors, or exposure that increase the likelihood of developing digital eyestrain include

a) Allergies and atopic disorders
b) Contact lens usage
c) Diabetes
d) Eye surgeries
e) Irritable bowel syndrome
f) Migraines
g) Osteoarthritis
h) Sjogren's disease
i) Cigarette smoking

Also Lurati (2018) highlighted some medications that present with side effects similar to symptoms of DES, they include:

a) Antidepressants
b) Antihistamines
c) Beta blockers
d) Corticosteroids

e) Diuretics

f) Hormone replacement therapies

According to Lurati (2018) beta blockers can have negative effects on the eye by lowering lysozyme levels that protect the cornea, immunoglobulin A, and aqueous production. Diuretics reduce lacrimation. Antihistamines reduce mucous and aqueous production, especially when combined with anticholinergics, and can cause mydriasis and decrease papillary response in bright lights. Hormone replacement therapy is believed to decrease the aqueous component of precorneal tear film. Antidepressants may have anticholinergic effects. Nonsteroidals may cause refractive changes and narcotics decrease tear secretions. Vitamin A derivatives, used for acne treatment, may reduce oil production. Proton pump inhibitors may cause dry eyes due to H2 receptor antagonistic effects. Chemotherapy may cause less tear and oil production.

1.6 Intervention

Prevention of DES is the best strategy for minimizing the negative impact on eye, mental, and general health. Various strategies can reduce the negative effects of prolonged computer use and digital eye strain. Colored filters and antireflection screens help reduce glare and improve visual comfort. Adjusting screen brightness to match the environment, using blue-light blocking glasses, and prescribing lenses suited to screen distance and gaze angle can also minimize eye fatigue. Polycarbonate, trivex, and gray-tinted lenses, as well as contact lenses that block harmful radiation, offer additional protection(Lurati, 2018).

Proper monitor placement—at or below eye level—and maintaining a comfortable viewing distance (45–60 cm) help prevent strain. Frequent breaks, high-resolution displays, and minimizing glare by avoiding direct light sources also contribute to visual comfort. Ensuring adequate humidity, reducing dust, and avoiding low-pressure environments are important for eye health, especially for individuals prone to dry eyes (Lurati, 2018).

Parents have a critical role in preventing health problems, including DES in children. To imbibe healthy practices in children, parents should be more aware of the available preventive measures. Parents serve as the first line of defense in regulating screen time, enforcing healthy viewing habits, and seeking professional care when necessary. However, their level of knowledge, attitude, and practices (KAP) regarding DES may be inadequate or inconsistent, especially in semi-urban and rural communities(AlHarkan, 2023).

1.7 Ergonomics

The ideal ergonomic setup for computer use involves maintaining proper posture and positioning to prevent discomfort and reduce the risk of strain. The top of the monitor should be positioned at or slightly below eye level, as higher placement can lead to strain in the neck and upper trapezius muscles. The head and neck should remain aligned with the torso, while the shoulders should be kept relaxed. Elbows should stay close to the body and be adequately supported, with the lower back also properly supported to maintain spinal alignment. The wrists and hands should be positioned in line with the forearms to minimize strain, and there should be sufficient space to comfortably use both the keyboard and mouse (Tripathy *et al.,* 2025).

Feet should rest flat on the floor to promote stability and proper posture. The recommended distance from the computer screen is approximately an arm's length, as sitting too close can cause eye strain. The monitor should be placed so that the user's gaze is slightly downward rather than straight ahead or upward. Research indicates that a viewing distance of around 90 centimeters combined with a 10-degree downward gaze helps reduce ocular discomfort (Tripathy *et al.,* 2025).

To further enhance visual comfort, a humidifier can be used to increase room moisture levels. Adjusting the ambient lighting and increasing the contrast of the computer screen can also help alleviate eye strain. Additionally, the use of a matte screen filter may reduce glare and improve visual comfort during extended computer use (Tripathy *et al.,* 2025).

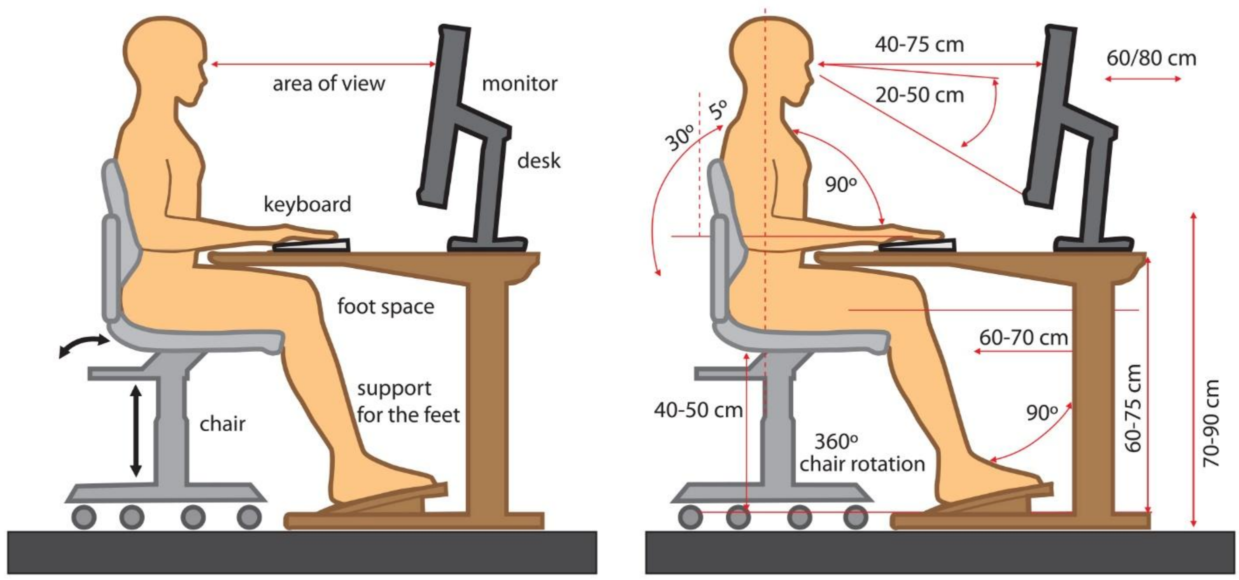

Figure 1.1: Proper body positioning for computer use. (American Optometric Association, n.d.)

1.7.1 Lighting at the Workspace

Light sources that cause glare should be minimized. Excessive illumination from nearby windows can be reduced by closing blinds or using shades, while overhead lights—especially fluorescent ones—that produce glare should be turned off when possible. If the light source cannot be altered, repositioning the monitor or workstation to a more suitable location is advised. The use of antiglare filters can decrease contrast, reflection, and glare, although they may not necessarily reduce symptoms of asthenopia (Tripathy *et al.,* 2025).

1.7.2 Breaks During Work

Prolonged exposure to digital screens should be minimized, and reliance on smartphones should be reduced whenever feasible. Individuals who spend long hours at computer screens are encouraged to take regular breaks and blink more frequently to alleviate symptoms of

Computer Vision Syndrome (CVS). Such breaks help relax and restore the accommodative system, thereby reducing digital eye strain. The widely recognized 20-20-20 rule recommends that after every 20 minutes of screen use, one should look away from the screen for about 20 seconds and focus on an object approximately 20 feet away. Taking regular breaks not only prevents eye strain but also improves overall productivity by compensating for time lost during the breaks. Short physical activities such as walking, stretching, or performing simple workstation exercises can relieve muscle fatigue, lessen monotony, and promote overall comfort. The National Institute for Occupational Safety and Health (NIOSH) has emphasized that frequent short breaks are more effective in reducing discomfort and improving productivity than the conventional longer breaks taken only in the morning and afternoon (Tripathy *et al.,* 2025).

Several software applications are available to remind users to take breaks during extended computer use, such as Sightkick, EyeLeo, Awareness, Big Stretch, PC Work Break, Workrave, EyeCare for Chrome, and Eye-Pro (Tripathy *et al.,* 2025).

1.7.3 Glasses

Even minor uncorrected astigmatism (ranging from 0.50 to 1.00 diopters) can contribute to visual discomfort in individuals with CVS and should therefore be corrected. Residual astigmatism in contact lens wearers may exacerbate discomfort during video display terminal (VDT) work, while higher degrees of uncorrected astigmatism (1.00 to 2.00 diopters) significantly increase the likelihood of task errors. Uncorrected cylindrical errors are especially problematic among individuals using over-the-counter reading glasses. The complexity of prescribing lenses for such individuals arises from the need for multiple working distances, necessitating customized glasses designed for specific visual tasks. For presbyopic individuals engaged in prolonged VDT work, progressive addition lenses with wide intermediate corridors are preferred. These lenses eliminate abrupt transitions between visual zones, facilitating smoother intermediate vision for computer tasks. However, the peripheral distortion present in such lenses requires the user to adapt by viewing primarily through the central region. Accurate measurement of interpupillary distance is crucial during lens preparation. Since contact lens use can worsen symptoms of CVS, eyeglasses are often a better choice for computer-related work (Tripathy *et al.,* 2025).

1.7.4 Blinking

Various software tools can remind users to blink or take short microbreaks while working. The American Optometric Association recommends following the 20-20-20 rule and taking at least a 15-minute rest after every two hours of continuous computer use. Blink training exercises can also help alleviate symptoms of CVS (Tripathy *et al.,* 2025).

1.7.5 Management of Vergence or Accommodation Problems

Any associated issues related to binocular vision or accommodation should be properly addressed as part of comprehensive CVS management (Tripathy *et al.,* 2025).

1.8 Statement of the Problem

In Nigeria, particularly in Ovia North East Local Government Area of Edo State, digital literacy is rising, but there is limited research assessing how well parents understand the implications of prolonged digital device use on children's eye health. This research aims to investigate parental knowledge, attitude, and practice toward digital eye strain in children, thereby providing a foundation for targeted health education and policy development.

1.9 Aim and Objectives of the Study

1.9.1 Aim of study

To assess parental knowledge, attitude, and practice toward digital eye strain in children in Ovia North East Local Government Area, Edo State.

1.9.2 Objectives of study

a) To evaluate the level of knowledge parents have about digital eye strain in children.

b) To examine parents' attitudes toward digital device usage and its impact on their children's eye health.

c) To assess the practices parents adopt to prevent or manage digital eye strain in their children.

d) To determine the relationship between parental knowledge and their preventive practices regarding digital eye strain.

1.10 Research Questions

a) What is the level of knowledge among parents regarding digital eye strain in children?

b) What are parents' attitudes toward digital device use and its impact on eye health?

c) What practices do parents engage in to prevent or manage digital eye strain in their children?

d) Is there a significant relationship between parental knowledge and their practices toward preventing digital eye strain?

1.11 Significance of the Study

This study will provide valuable insights into the role of parental knowledge and behavior in preventing digital eye strain among children. The findings will be useful for:

a) Health professionals, in designing community-based eye health education programs.

b) Educators and school administrators, in incorporating screen-use guidelines into school policy.

c) Parents, by raising awareness of the importance of their role in preventing DES.

d) Policymakers, in formulating child-focused digital use and health guidelines in local communities.

1.12 Scope of the Study

This research will be conducted in selected communities within Ovia North East Local Government Area of Edo State. It will focus on parents or primary caregivers of children aged 5–15 years. The study will assess their knowledge, attitude, and practices regarding digital eye strain, excluding other causes of visual impairment not related to digital device use.

1.13 Definition of Terms

For the purpose of this study, the following terms are defined as:

- **Asthenopia:** Another term for eyestrain, which can include symptoms like headaches, dry eye, diplopia (double vision), and blurred vision.
- **Attitude (Parental):** Refers to the parents' beliefs and perceptions regarding digital device usage and its potential impact on their children's eye health.
- **Children:** Refers to individuals within the age range of 5 to 15 years.
- **Computer Vision Syndrome (CVS):** A group of symptoms resulting from the prolonged use of computers or other digital devices. It is also referred to as "digital eye strain" or "visual fatigue".
- **Digital Devices:** Electronic screens such as televisions, smartphones, tablets, and computers. In this study, smartphones were the most frequently used devices by children.
- **Digital Eye Strain (DES):** A condition characterized by visual disturbance and/or ocular discomfort related to the use of digital devices. It results from various stresses on the ocular system, including glare, defocus, accommodation dysfunction, dryness, fatigue, and discomfort.

- **Knowledge (Parental):** The level of awareness and understanding parents have about digital eye strain, its symptoms (e.g., eye itching, redness, fatigue), and preventive measures like maintaining correct posture, proper viewing distance, and the importance of regular breaks.

- **Parents/Primary Caregivers:** The target population of the study, consisting of parents or primary caregivers of children aged 5 to 15 years residing in Ovia North East LGA.

- **Practice (Parental):** The observable actions and habits parents adopt to prevent or manage digital eye strain in their children. This includes practices such as adjusting screen brightness, enforcing breaks during digital use, or seeking professional care.

- **Screen Time:** The total amount of time a child spends on digital devices, measured in this study in hours per day.

- **20-20-20 Rule:** A preventive measure for digital eye strain which recommends that after every 20 minutes of screen use, the user should look away from the screen for about 20 seconds and focus on an object approximately 20 feet away.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Parental Knowledge, Awareness, and Practices toward DES in Children

AlHarkan (2023) did a study assessed parental awareness of preventive measures against digital eye strain (DES) among Saudi students who engaged in one year of online learning due to the COVID-19 pandemic. Recognizing the growing public health concern of digital eye strain,DES, among students - the study aimed to understand the awareness level of parents, who are critical stakeholders in health behavior regulation during school closures.

A web-based cross-sectional survey was conducted in December 2021 involving 704 parents from Buraidah City, representing the Qassim region. The parents responded to a 15-question survey about preventive measures for DES. Awareness scores were calculated based on correct, incorrect, and "don't know" responses, and were categorized into four levels: very poor, poor, good, and excellent. The results revealed that 80.4% of parents had excellent awareness, although specific knowledge gaps were noted. Awareness was low regarding key prevention strategies such as the 20-20-20 rule (43.8% awareness), frequent blinking (56.7%), use of eye lubricants (56%), limiting screen use beyond academic tasks (57.4%), and avoiding screen use in a lying position (69.6%). Higher awareness was significantly associated with having male children, children in primary school, a history of ophthalmic consultation, and children with diagnosed DES. Additionally, parents with excellent awareness expressed dissatisfaction with online learning and noted perceived deterioration in their children's eye health and academic performance(AlHarkan, 2023).

Abioye *et al.,*(2025) did a study to investigate the effect of parent-child interaction on mitigating screen-related eye problems in children residing in Oyo East Local Government, Nigeria. The study aimed to explore how factors such as parental education, engagement, and awareness influence children's screen time and resulting eye health, particularly in light of the increasing use of digital devices among young children. The study adopted a descriptive survey research design and utilized a multi-stage sampling technique to recruit approximately 200 parent-child pairs. Data were collected using structured questionnaires, basic clinical eye assessments, and focus group discussions with parents(Abioye *et al.,* 2025).

The results of the study showed that most parents (60%) engaged in daily interactions with their children, and such frequent interactions were associated with significantly reduced screen time and fewer eye-related complaints. A direct correlation was observed between prolonged screen exposure (5+ hours per day) and increased reports of eye problems such as smartphone vision syndrome (SVS). Children who experienced low-quality parent-child interaction exhibited more screen time and higher incidence of eye strain and related issues. Regression analysis demonstrated a statistically significant negative relationship between the quality of parent-child interaction and the occurrence of screen-related eye problems. Similarly, the chi-square analysis showed a strong association between higher parental awareness and a lower incidence of eye problems. The study concluded that parent-child interaction plays a vital role in reducing screen-related visual issues among children (Abioye *et al.,* 2025).

In another study by Ikefuna *et al.,*(2022) the screen media viewing practices among children and adolescents, along with the level of caregivers' knowledge regarding the health-related effects of prolonged screen viewing was investigated. The study was conducted in a tertiary hospital in Enugu, Southeast Nigeria, the descriptive cross-sectional study involved 205 caregiver-child/adolescent pairs attending outpatient clinics. Data were collected using a pretested semi-structured questionnaire assessing socio-demographic characteristics, screen media habits, caregivers' knowledge of health-related risks, and control measures for screen time(Ikefuna *et al.,* 2022).

The results showed that children watched an average of 2.35 hours of screen media daily, with some reaching up to 10 hours. The average duration the television was on in households was about 5 hours, and parents themselves averaged over 3 hours of daily screen viewing. Notably, more than half of the children began using screen media before the age of two. Despite high educational attainment among caregivers—67.8% of fathers and 76.1% of mothers had tertiary education—only 47.3% demonstrated good knowledge of the health risks associated with prolonged screen use. The most recognized consequence was sleep disturbances (69.8%), while awareness of more severe risks such as impaired neurocognitive development (23.9%), cardiovascular disease (17.1%), and reduced life expectancy (13.2%) was notably low(Ikefuna *et al.,* 2022).

While 89.3% of caregivers modeled healthy screen behavior and 82% limited screen time and encouraged outdoor play, only 72.2% used positive reinforcement, and just 71.7% removed TVs from children's bedrooms. Statistically, higher caregiver knowledge and higher socio-economic status significantly predicted better implementation of screen-time control measures, including limiting viewing time ($p = 0.001$), rewarding adherence to reduction plans ($p = 0.001$), and promoting outdoor activities ($p = 0.001$). However, socio-economic status alone did not predict the removal of TVs from bedrooms, though knowledge did ($p = 0.000$)(Ikefuna *et al.,* 2022).

2.2 Prevalence, Symptoms, and Risk Factors of DES in Children

In a study by Demirayak *et al.,*(2022) the prevalence of digital eye strain (DES),symptoms and the contributing factors among children engaged in distance learning during the COVID-

19 pandemic was examined. To achieve this, the researchers also conducted an online survey using Google Forms, which was distributed to parents of children under 18 years old who were participating in online learning. The questionnaire captured data on the types of display devices used, frequency and duration of device usage, and the symptoms and severity of digital eye strain experienced by the children. A total of 692 children were included in the final analysis, with a mean age of 9.72 ± 3.02 years(Demirayak *et al.,* 2022).

Results revealed that personal computers were the most used devices for academic purposes (61.7%) while smartphones were mostly used for nonacademic activities (57.8%). The average daily screen time was 7.02 ± 4.55 hours, and most children used screens for more than 30 minutes without a break. The most commonly reported symptom was headache (52.2%), followed by eye fatigue and redness (both at 49.3%). Nearly half (48.2%) of the children experienced three or more symptoms. Multivariate analysis showed that being male and older in age were independent risk factors for experiencing multiple symptoms(Demirayak *et al.,* 2022).

The study concluded that the increased use of digital devices among children during the COVID-19 pandemic has led to a higher prevalence of DES. The authors emphasized the urgent need for increased public awareness regarding the risks of prolonged screen time in children(Demirayak *et al.,* 2022).

De-Hita-Cantalejo *et al.,*(2021) did a study to examine the Accommodative and binocular disorders in preteens with computer vision syndrome .The study aimed to assess the prevalence and impact of computer vision syndrome (CVS) in preteens, particularly focusing on its association with accommodative and binocular vision disorders. The authors sought to evaluate how the use of digital devices affects visual function in children aged 10 to 12 by using a questionnaire originally validated for adults and adapted for younger populations(De-Hita-Cantalejo *et al.,* 2021).

A total of 309 preteens were initially recruited, but 33 were excluded due to conditions like strabismus, amblyopia, inadequate visual acuity, or incomplete responses. Ultimately, 226 participants were analyzed. Each child completed a modified version of the Computer Vision Symptom Scale (CVSS17), which was linguistically and structurally adapted for preteens. In addition, participants underwent a set of optometric tests, including visual acuity, accommodative amplitude and posture, accommodative facility, near point of convergence (NPC), phorias, and both negative and positive fusional vergences (NFV and PFV) (De-Hita-Cantalejo *et al.,* 2021).

Based on questionnaire results, students were divided into two groups: mild CVS (score ≤2) and severe CVS (score >2). At the end of the study it was discovered that there was a significant statistical differences between the groups, especially regarding NPC break and recovery (P = 0.03 and P = 0.02, respectively) and distance NFV break and recovery (P = 0.02 and P < 0.01, respectively). Although near NFV showed a trend toward significance, it did not reach statistical thresholds. Children with severe CVS also reported higher levels of ocular surface symptoms, such as eye strain, pain, dryness, and redness, as well as more severe ergonomic complaints, including headaches and neck pain. The severe CVS group showed increased digital device usage time and a higher incidence of symptoms that could impair school performance, such as blurred vision and diplopia (De-Hita-Cantalejo *et al.,* 2021).

Ichhpujani *et al.,*(2019) did a study aimed at evaluating digital device usage, reading habits, and the prevalence of eyestrain (asthenopia) among Indian school children aged 11–17 years. In this cross-sectional pilot study, 576 urban school students were surveyed. The researchers administered a questionnaire on digital device habits and conducted basic ocular exams to exclude students with pre-existing ocular pathologies(Ichhpujani *et al.,* 2019).

Findings revealed that as age increased, so did the frequency and duration of digital device usage, with only 20% of 11-year-olds using devices daily compared to 50% of 17-year-olds. Smartphones were the most commonly used device (58.3%), and 66.7% of students reported using digital devices for school projects. Around one-third of participants used digital devices for reading instead of textbooks. Regarding posture, 77% of students preferred sitting on a chair while reading, while 21% lay on the bed; those who read while lying down were more likely to report eyestrain(Ichhpujani *et al.,* 2019).

Eyestrain was reported by 17.9% of the participants, particularly after using digital devices. Though 36.1% wore spectacles, only 13.9% reported a prescription change following prolonged device usage. The study also found that eyestrain increased significantly after reading from paper books for more than 6 hours. Additionally, 19.3% of students used smartphones at bedtime with the lights switched off, a behavior more common with increasing age(Ichhpujani *et al.,* 2019).

Chu *et al.,*(2023) did a study to investigate the prospective association between smartphone usage and digital eye strain (DES) among Hong Kong Chinese school-aged children aged 8 to 14 years. A total of 1,508 students who provided valid baseline data were enrolled, and 1,298 completed follow-up assessments after one year. DES was measured using a validated 10-item symptom scale, and smartphone usage was self-reported in minutes per day. Other variables such as BMI, physical activity, tablet usage, and socioeconomic factors were controlled in the analysis(Chu *et al.,* 2023).

The results revealed a positive association between higher baseline smartphone use and higher DES scores at both baseline and one-year follow-up. Participants who used smartphones for over 241 minutes per day had significantly higher baseline DES scores (3.21) compared to those who used smartphones for 0–60 minutes daily (2.44, $P < .001$). At follow-up, students who used smartphones for 181–240 minutes per day showed significantly higher DES scores (3.50) than those in the lowest use group (2.80, $P = .003$). The most frequently reported symptoms were eye fatigue, blurred vision when changing focus, and burning or irritated eyes. These findings persisted even after adjusting for confounding variables (Chu *et al.,* 2023).

The authors concluded that there is a cumulative effect of smartphone usage on DES symptoms among school-aged children, with implications for long-term ocular health. They emphasized that early detection and prevention are essential, especially since children are increasingly adopting smartphones at a young age(Chu *et al.,* 2023).

Bozzola *et al.,*(2024) conducted a comprehensive literature review to assess the relationship between media device use and vision disorders in children and adolescents. The study aimed to synthesize current scientific evidence about the potential risks that screen viewing time (SVT) poses to pediatric eye health, focusing particularly on conditions such as pre-myopia, myopia, digital eye strain (DES), and acute acquired comitant esotropia (AACE) (Bozzola *et al.,* 2024).

The authors carried out the review following PRISMA 2020 guidelines, using databases such as PubMed, Embase, Web of Science, and Scopus. They searched for studies from 2014 to 2024 that examined the effects of media devices on eye health in individuals aged 0–18 years. After applying eligibility criteria and removing duplicates, 26 relevant articles were selected, with 4 obtained from direct searches and 22 from references within these articles (Bozzola *et al.,* 2024).

The findings indicated that myopia was the most consistently reported condition linked to prolonged screen exposure. Multiple studies demonstrated a statistically significant association between increased SVT—especially with smartphones and computers—and myopic progression. Factors such as early exposure (under age one), reduced physical activity, urban lifestyle, high socioeconomic status, and COVID-19-related confinement were found to contribute to worsening refractive errors and axial length increases in children. The evidence further showed that excessive use of screen devices during the pandemic corresponded with a notable spike in pediatric myopia(Bozzola *et al.,* 2024).

Digital eye strain (DES) emerged as another prevalent concern, characterized by symptoms such as dry eyes, blurring, headaches, redness, and fatigue. The studies reviewed highlighted that prolonged and close-up use of digital devices led to a reduction in blink rate and tear film evaporation, which significantly contributed to DES. Smartphones and video games were particularly implicated, with risk heightened by duration of use and proximity to the eyes. The literature also identified a protective role for outdoor activity and rural living conditions in mitigating DES(Bozzola *et al.,* 2024).

Acute acquired comitant esotropia (AACE), although less frequently reported, was also linked to prolonged close-range screen use, particularly smartphones. Evidence suggested that increased convergence demand from sustained near work led to abnormalities in ocular alignment, particularly in children with latent hyperopia and low fusional divergence. This condition was especially evident during the COVID-19 lockdown period (Bozzola *et al.,* 2024).

Analysis by age group showed that children under 12 years experienced an increased incidence of eye disorders during and after the pandemic due to heightened screen time. Adolescents showed similar patterns, with high SVT contributing to DES and myopia. Across all age groups, reduced outdoor activity and improper device usage habits were common contributing factors(Bozzola *et al.,* 2024).

In conclusion, the review established that prolonged and improper media device use is significantly associated with an increased risk of pre-myopia, myopia, digital eye strain, and acute acquired comitant esotropia in children and adolescents(Bozzola *et al.,* 2024).

2.3 DES in Adult or Occupational Populations (Background / Comparative Evidence)

The study by Al Dandan *et al.,*(2021) aimed to estimate the prevalence of digital eye strain (DES) among radiologists and to identify associated contributing factors. Recognizing that radiologists are particularly vulnerable due to prolonged screen exposure while analyzing medical images, the researchers conducted a cross-sectional, survey-based study across hospitals in the Eastern Province of Saudi Arabia. The anonymous survey assessed demographics, workload, workstation ergonomics, personal eye care habits, and symptoms of DES, and employed both Chi-square tests and logistic regression analysis for statistical evaluation(Al Dandan *et al.,* 2021).

A total of 198 radiologists participated in the survey, with the majority being under 40 years old and primarily consisting of residents, senior registrars, and consultants. The results revealed that 50.5% of respondents experienced symptoms of digital eye strain, including tired eyes, blurred vision, burning sensations, and headaches. The prevalence was significantly higher in female radiologists, who had nearly four times the odds of reporting symptoms compared to their male counterparts. Additionally, residents reported more symptoms than their senior colleagues, and those who took breaks only once or twice per day were more likely to experience DES compared to those who took frequent breaks(Al Dandan *et al.,* 2021).

The study concluded that digital eye strain is a prevalent issue among radiologists, independent of subspecialty. Being female and not taking frequent screen breaks were identified as key risk factors. The authors recommended the implementation of gender-sensitive and ergonomics-focused strategies to mitigate the symptoms of DES. They also highlighted the need for further studies with larger, more diverse populations and objective assessments of workstation ergonomics and eye health to better understand and address this occupational health issue(Al Dandan *et al.,* 2021).

Sánchez-Brau *et al.,*(2020) did a study to estimate the prevalence of computer vision syndrome (CVS) among presbyopic video display terminal (VDT) workers who wear progressive addition lenses (PALs), and to examine its association with sociodemographic, ergonomic, environmental, and refractive factors(Sánchez-Brau *et al.,* 2020).

This was a cross-sectional study involving 109 university workers aged over 45 years, selected through simple random sampling from a population of 1,934 eligible participants at the University of Alicante, Spain. Participants included those who used a VDT for more than four hours a day, five days a week, and habitually wore PALs. Exclusion criteria encompassed ocular or systemic treatments, recent ocular surgery, contact lens use, and use of laptops. The Computer Vision Syndrome Questionnaire (CVS-Q©), a validated tool with strong psychometric properties, was used to assess CVS, with a cut-off score of ≥6 used to define its presence(Sánchez-Brau *et al.,* 2020).

Measurements included refractive assessments, environmental parameters (such as lighting, humidity, and temperature), ergonomic assessments (like screen angle and neck posture), and the duration and nature of VDT use. Most workers used VDTs for over six hours per day, with an average daily use of 6.5 hours for work and 8.7 hours when including leisure use. Despite the majority of the workplace conditions aligning with recommended standards, humidity and illumination levels were often found to be at the lower end of acceptable ranges, and a notable proportion of participants exhibited altered neck posture and suboptimal screen adjustment(Sánchez-Brau *et al.,* 2020).

The study found that 74.3% of participants met the diagnostic criteria for CVS. The most frequently reported symptoms were itching, difficulty focusing at near vision, and the sensation of worsening vision. Notably, women had a significantly higher prevalence of CVS (85.1%) compared to men (66.1%). In multivariate logistic regression, being female (OR = 3.40), having a non-neutral neck posture (OR = 3.27), and experiencing suboptimal lighting (OR = 3.64) were independently associated with a higher likelihood of having CVS(Sánchez-Brau *et al.,* 2020).

Dessie *et al.,*(2018) conducted a research to assess the prevalence of computer vision syndrome (CVS) and its associated risk factors among government-employed computer users in Debre Tabor town. The authors recognized that although CVS is a global occupational health issue affecting nearly 70% of computer users, there was insufficient data from Ethiopia, especially among diverse computer user groups outside academic and banking institutions(Dessie *et al.,* 2018).

A cross-sectional study was conducted between February and March 2016 involving 607 randomly selected participants from 20 government offices out of a total of 60. Eligible participants had used computers as part of their daily work for at least one year. Data were collected using a structured, self-administered questionnaire and observational checklists, assessing sociodemographic details, work environment, computer usage behavior, and knowledge of computer safety practices. CVS was identified based on self-reported symptoms lasting for at least one week in the past year, including blurred vision, eyestrain, irritation, and other visual complaints(Dessie *et al.,* 2018).

The study found that the prevalence of CVS was 69.5% (95% CI: 65.6–73.0%), with blurred vision, eyestrain, and eye irritation being the most common symptoms. Multivariate logistic regression analysis revealed several significant predictors. Occupation was a strong determinant, with secretaries (AOR = 9.17) and officers (AOR = 4.74) more likely to experience CVS compared to coordinators and managers. Daily computer usage exceeding 4.6 hours increased the odds of CVS (AOR = 2.29). Other risk factors included having a prior eye illness (AOR = 3.19) and poor knowledge about computer safety measures. Protective factors included higher monthly income, taking regular health breaks, and having good knowledge of computer ergonomics and safety(Dessie *et al.,* 2018).

In 2013 Akinbinu and Mashalla did a study to the evaluate the level of knowledge and prevalence of computer vision syndrome (CVS) among computer users employed at the Securities and Exchange Commission (SEC), Abuja, Nigeria. The researchers sought to determine how well employees understood CVS, assess its occurrence among them, and identify preventive measures being practiced(Akinbinu and Mashalla, 2013).

The study sampled 100 staff members, aged 18 to 40 years, through simple random sampling. A semi-structured questionnaire was administered, and data were analyzed using Epi-info software. Findings revealed that while 40% of participants reported being aware of CVS, only 27% demonstrated accurate knowledge about the condition. Awareness was defined as having heard of CVS, whereas knowledge was established by identifying the correct combination of symptoms (headache, eyestrain, and blurred vision) associated with prolonged computer use(Akinbinu and Mashalla, 2013).

The results further indicated that 74% of respondents had experienced at least one symptom of CVS, with the most common being headache and eyestrain (each 30.94%), followed by double vision (12.95%), watery eyes (10.79%), blurred vision (10.07%), and redness of the eyes (4.31%). A correlation was noted between increased duration of daily computer use and the frequency of CVS symptoms. Employees who worked on computers for 6–8 hours daily reported the highest symptom occurrence (48.9%), while those working for 1–2 hours had the least (0.72%)(Akinbinu and Mashalla, 2013).

In terms of preventive measures, the majority of participants selected taking regular breaks (32%), undergoing regular eye checks (31.2%), and using glare screens (31.2%) as the most common strategies. Surprisingly, frequent blinking—a simple and effective measure—was the least acknowledged (5.6%)(Akinbinu and Mashalla, 2013).

The authors concluded that despite high levels of computer usage, the awareness and knowledge of CVS among the studied population were low, signaling a significant knowledge gap that may extend to the wider public. The study recommended large-scale research across various sectors to better understand the burden of CVS and inform the development of targeted awareness campaigns and preventive strategies. Such interventions, the authors emphasized, could help mitigate the negative impact of CVS on workplace productivity and individual well-being(Akinbinu and Mashalla, 2013).

Bou Ghannam *et al.,*(2024) did a study to investigate how online learning during the COVID-19 pandemic affected ocular health due to increased digital device use among university students in Lebanon. The researchers adopted a cross-sectional survey-based design and gathered data from 255 students at the American University of Beirut. Participants completed a 20-question online questionnaire assessing their screen time, awareness of digital eye strain (DES), and associated symptoms. Those with pre-existing ocular conditions such as glaucoma, contact lens use, or previous refractive surgery were excluded (Bou Ghannam *et al.,* 2024).

The findings revealed a marked increase in digital device use for educational purposes during the pandemic, with 47% of participants reporting screen time of 12 or more hours daily, up from just 6% pre-pandemic. The majority of respondents (92%) reported an increase of 3–5 hours in daily screen time. Awareness of DES was initially low, with only 28.6% having heard of it before the pandemic. However, 84.3% reported increased frequency and severity of DES symptoms during online learning, the most common being headaches, burning sensation, blurry vision, and eye dryness. Notably, symptom severity was significantly associated with screen time duration and was most prevalent among the 18–26 age group. Additionally, participants who took regular breaks or used artificial tears reported milder symptoms (Bou Ghannam *et al.,* 2024).

Poudel and Prasad Khanal (2020) studied the prevalence and determinants of computer vision syndrome (CVS) among IT professionals in Kathmandu, Nepal. The authors aimed to identify how common CVS was and what factors were associated with its occurrence in a high-risk occupational group. A cross-sectional survey was carried out among 263 IT office workers, selected from five IT companies using proportionate stratified random sampling. Data collection involved a self-administered questionnaire and direct observation, and the diagnosis of CVS was based on the presence of at least one symptom following or during the use of visual display terminals (VDTs). The analysis included bivariate and multivariate logistic regression to determine significant predictors (Poudel and Prasad Khanal, 2020).

The results revealed that 82.5% of participants experienced CVS, with the most frequently reported symptoms being headache (48%), tired eyes (47%), and eye strain (43%). The average duration of computer use was 10.42 hours per day, with 7.7 hours at work and 2.7 hours at home. Significant predictors of CVS included not taking breaks (OR: 7.3), not massaging eyes (OR: 7.5), improper viewing distance (OR: 9.0), poor body posture (OR: 3.6), using computers for more than 10 hours daily (OR: 5.4), and lack of awareness about CVS

(OR: 7.2). Preventive measures were inconsistently adopted, with only 53.2% using protective goggles and 21.7% taking screen breaks.

The authors concluded that CVS is a highly prevalent condition among IT workers in Kathmandu. They recommended raising awareness about CVS, promoting preventive habits such as regular breaks, eye massage, maintaining proper viewing distance and posture, and limiting daily screen time to mitigate CVS risk. The study emphasized the need for occupational health interventions and public health strategies to protect visual health in technology-driven work environments(Poudel and Prasad Khanal, 2020).

2.4 Effect of contact lens use on Computer Vision Syndrome

Tauste *et al.,*(2016) carried out a cross-sectional study among 426 civil-service office workers in Alicante, Spain, 22% of whom were contact lens wearers to investigate to effect of contact lens use on Computer Vision Syndrome. The participants completed the Computer Vision Syndrome Questionnaire (CVS-Q) and provided details about their lens type, wearing habits, and daily exposure to video display terminals (VDTs). A CVS-Q score of 6 or more indicated CVS. Logistic regression analyses were used to assess associations between CVS, contact lens use, and work-related factors, adjusting for age and sex(Tauste *et al.,* 2016).

The findings showed that contact lens wearers were more prone to CVS (65%) than non-wearers (50%). Workers using contact lenses and spending over six hours daily on the computer had a significantly higher likelihood of experiencing CVS compared to non-wearers with similar exposure (aOR = 4.85; 95% CI, 1.25–18.80; p = 0.02). The results suggested that lens material may play a role, with silicone hydrogel lenses showing a higher trend toward CVS, although this did not reach statistical significance after adjustment(Tauste *et al.,* 2016).

The authors concluded that regular contact lens use increases the risk of CVS, especially after six or more hours of computer work. They suggested that poor lens maintenance, particularly with multipurpose cleaning solutions, and the physical properties of silicone hydrogel lenses (such as higher stiffness and lipid accumulation) might exacerbate symptoms. They recommended that contact lens wearers who use computers for long periods be closely monitored, and that lens manufacturers develop silicone hydrogels with lower elasticity modulus to improve comfort and reduce CVS symptoms(Tauste *et al.,* 2016).

2.5 The effect of Spectacle use on Computer Vision Syndrome

Jaschinski *et al.,*(2015) did a study investigated how different types of spectacle lenses worn by computer users in the early and established stages of presbyopia influence the occurrence of computer vision syndrome (CVS), examining both visual complaints and ergonomic conditions.

A total of 175 office workers aged 35 years and older (mean age 52 ± 6.7 years) participated in this office field study. Participants completed a detailed questionnaire that assessed the type of spectacle lenses habitually worn during computer work, workplace visual conditions, and the extent of various complaints such as ocular strain, musculoskeletal strain, and headaches. Additionally, ergonomic conditions were analyzed using workplace photographs taken in natural working postures. Factor analysis of the questionnaire responses identified five specific complaint factors: vision at the monitor, ocular strain, musculoskeletal strain, dizziness, and dynamic vision(Jaschinski *et al.,* 2015).

The results showed that among the subgroup of 25 participants aged 36–57 years (mean 44 ± 5 years) who wore distance-vision lenses and performed demanding visual tasks, the severity of ocular strain, musculoskeletal strain, and headaches increased significantly with daily computer use, explaining up to 44% of the variance ($r_s = 0.66$). In other subgroups, this relationship was weaker, and in the total sample the correlation was about rs = 0.2. Among 85 users of general-purpose progressive addition lenses (PALs), head inclination was approximately 7° higher than among users of single-vision lenses, but this increased inclination did not correspond to more reported complaints(Jaschinski *et al.,* 2015).

The study concluded that the absence of near-vision addition in individuals at the early stage of presbyopia is a key risk factor for developing CVS symptoms during prolonged and visually demanding computer work. It also demonstrated that the questionnaire was sensitive in distinguishing symptoms associated with different spectacle lens types. The authors recommended that early presbyopic computer users consider appropriate optical correction to prevent visual and musculoskeletal discomfort, and highlighted the importance of evaluating ergonomic posture alongside optical factors in computer-related visual strain (Jaschinski *et al.,* 2015).

2.6 The association between computer exposure time and the development of dry eye disease (DED)

De-Hita-Cantalejo *et al.,*(2021) did a study was to assess the association between computer exposure time and the development of dry eye disease (DED) in individuals diagnosed with computer vision syndrome (CVS).

A cross-sectional study was conducted among 108 office workers aged 18 to 45 years from the Autonomous University of Puebla, Mexico. Participants were grouped based on their average daily computer use: less than 4 hours, 4–7.9 hours, and more than 8 hours per day. Each participant completed a questionnaire detailing exposure time and device type, along with the Computer Vision Symptoms Scale (CVSS17) and Ocular Surface Disease Index (OSDI). Ocular surface damage and tear film parameters were assessed using tear break-up time (TBUT), ocular surface staining (OSS) with sodium fluorescein and lissamine green, and the Schirmer I test. Data were analyzed using Spearman correlation, chi-square, and Kruskal–Wallis ANOVA tests(De-Hita-Cantalejo *et al.,* 2021).

The findings revealed that the average daily computer exposure time was 5.96 ± 2.5 hours, and all participants experienced some degree of CVS symptoms. The study found that 97.4% of participants presented DED in at least one diagnostic test. TBUT was altered in 97.2%, ocular surface damage in 44.4%, and aqueous tear production in 26.9% of cases. A significant negative correlation existed between computer exposure time and TBUT (rho = −0.463, $p < 0.001$), while a positive correlation was observed between exposure duration and ocular surface staining (rho = 0.404, $p < 0.001$). However, no correlation was found between exposure time and Schirmer test values. The differences in DED symptoms between computer exposure groups were statistically significant ($p < 0.016$), especially when comparing mild and severe exposure groups(De-Hita-Cantalejo *et al.,* 2021).

The authors concluded that prolonged computer exposure is significantly associated with DED, particularly reflected in tear film instability and ocular surface damage, but not in aqueous tear production. They emphasized that exposure exceeding six hours per day contributes to ocular surface alterations and the manifestation of DED symptoms among CVS sufferers(De-Hita-Cantalejo *et al.,* 2021).

The study acknowledged its limitations, including the absence of a control group and limited diagnostic tools. Nonetheless, it contributed new evidence that excessive visual display terminal use is not harmless and can induce or worsen DED. The authors recommended reducing daily computer exposure to below 6 hours per day or 31.7 hours per week, maintaining proper posture and viewing distance, consciously blinking, using anti-glare lenses, taking visual breaks, and minimizing prolonged near-vision tasks to prevent CVS and DED(De-Hita-Cantalejo *et al.,* 2021).

2.7 Demographic and Computer Related Factors that Predispose User to Get Computer Vision Syndrome

The study by Rahman and Sanip (2011) investigated the relationship between computer use and the development of Computer Vision Syndrome (CVS) among staff of a Malaysian university. The purpose was to identify the sociodemographic and computer-related predictors for CVS.

A cross-sectional study was conducted involving 436 university staff who used computers for at least two hours daily. Data were collected through face-to-face interviews guided by a questionnaire and workstation assessments. The questionnaire included sections on demographic information, use of corrective lenses, computer workstation setup, duration of computer use, and rest habits(Rahman and Sanip, 2011).

The results showed that 68.1% of respondents reported CVS symptoms. The analysis revealed significant predictors: female gender (OR=2.3), age under 27 years (OR=2.89), use of corrective spectacles or lenses (OR=1.91), lack of regular rest breaks (OR=1.78), and computer use exceeding seven hours daily (OR=2.01). Education level, job type, and workstation setup were not significantly associated with CVS(Rahman and Sanip, 2011).

The study concluded that CVS is a common problem among computer users, with a prevalence of more than two-thirds of participants. It emphasized that prolonged computer use and visual correction increase susceptibility to CVS, while taking regular breaks helps reduce risk(Rahman and Sanip, 2011).

The authors recommended that computer users limit their screen time to less than seven hours daily and take frequent task breaks to rest their eyes. Those wearing corrective lenses should be particularly cautious and adopt preventive measures. The researchers highlighted the need for awareness and preventive strategies to mitigate CVS and its potential effects on work performance and well-being(Rahman and Sanip, 2011).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Design

This study adopted a cross-sectional descriptive survey design.

3.2 Study Area

The study was conducted in Ovia North East Local Government Area, located in Edo State, Nigeria.

3.3 Study Population

The target population consisted of parents or primary caregivers of children aged 5 to 15 years, residing in selected communities within Ovia North East LGA.

3.4 Study Period

The study was conducted for two months. During this period development of instruments, data collection, analysis, and reporting will be done

3.5 Sample Size Determination

Using Fischer's formula:

$$n_0 = \frac{Z^2 \, x \, P(1-P)}{d^2}$$

Where;

n_0 = minimum sample size

Z = Z statistic level of confidence of 95% (1.96 z score)

P= Prevalence, which is 35.4%. according to Abuallut *et al.,*(2022)

n_0 = == 351.47; approximately 352

Accounting for 10% non-response rate:

0.1 x 352 = 35.2

Approximately 35

Final sample size = 352 + 35 = 387

A total of 387 participants took part in the study.

3.6 Sampling Technique

A convenient sampling technique was used; parents were provided written informed consent. Parents who agreed to participate were included in the current study.

3.7 Instrument and Materials of Study

a) **Instrument for Data Collection**: A structured, self-administered questionnaire was used for data collection.

b) **Materials of study:** Google form, stationery materials, consent forms, and printed questionnaire were used for subjects who couldn't access the Google form

3.8 Inclusion and Exclusion Criteria

3.8.1 Inclusion Criteria

a) Parents or primary caregivers of children aged 5–15 years.

b) Residents of Ovia North East LGA for at least six months.

c) Individuals who provide informed consent to participate in the study.

3.8.2 Exclusion Criteria

a) Parents or caregivers with a professional background in optometry or ophthalmology.

b) Individuals unwilling or unable to complete the questionnaire.

c) Caregivers of children with diagnosed eye conditions unrelated to digital screen use.

d) Children with a history of ocular surgery or contact lens use

3.9 Ethical Considerations

Ethical approval was obtained from the University of Benin's Ethics Review Committee. Participants were informed about the purpose of the study, the voluntary nature of participation, and their right to withdraw at any time without consequences. Written informed consents were obtained before data collection. Anonymity and confidentiality of responses were ensured by not including names or identifying information on the questionnaire.

3.10 Description of Procedure

To assess DES-related symptoms and parental understanding, an adapted Computer Vision Syndrome Questionnaire (CVS-Q) by Demirayak *et al.,*(2022) was used. The survey was created using Google Forms and was accessible for ten days. The questionnaire was divided into three major sections: demographic characteristics and digital device usage, awareness of digital eye strain (DES) and its symptoms, and parental attitudes and practices toward preventing or managing DES in children.

The target respondents were parents or primary caregivers of children aged 5–15 years, particularly those whose children had engaged in regular digital device use for learning or recreation. Selected schools within Ovia North East LGA were approached, and with the assistance of school administrators, the Google Forms survey link was shared via WhatsApp parent–teacher communication groups.

Parents were encouraged to complete the questionnaire in consultation with their children where necessary. To ensure data integrity, the survey was designed to prevent multiple submissions from the same IP and email address. Parents with more than one child were advised to complete separate entries from different devices if they wished to respond on behalf of each child.

Informed consent was obtained at the beginning of the online form before any responses were collected. Only fully completed questionnaires were included in the final analysis. Responses from children with a history of ocular surgery or contact lens use were excluded from the study, in line with the study's exclusion criteria.

3.11 Data Analysis

Data were entered into Microsoft Excel and will be analyzed using Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics such as frequencies, means, and standard deviations will be used. Inferential statistics, including Chi-square tests and Pearson's correlation, will be employed to examine relationships between variables. Significance will be set at $p < 0.05$.

CHAPTER FOUR

4.0 RESULTS AND DATA ANALYSIS

TABLE 4.1: Demographic Characteristics of Parents

		Frequency	Percentage (%)
Age of Parent	18–25 years	12	3.1%
	26–35 years	72	18.6%
	36–45 years	178	46.0%
	Above 45 years	125	32.3%
	Total	387	100.0%
Gender of Parent	Female	241	62.3%
	Male	146	37.7%
	Total	387	100.0%
Parent's highest educational level	Postgraduate	116	30.0%
	Primary/Secondary	79	20.4%
	Tertiary (College/University)	192	49.6%
	Total	387	100.0%

The results in Table 4.1 show that the majority of parents (46.0%) were within the age range of 36–45 years, followed by 32.3% who were above 45 years, while 18.6% were between 26–35 years. Only 3.1% were within the youngest age group of 18–25 years. In terms of gender distribution, most respondents were female (62.3%), while males accounted for 37.7%. Concerning educational attainment, nearly half (49.6%) of the parents possessed tertiary education, 30.0% had postgraduate qualifications, and 20.4% had completed only primary or secondary education.

TABLE 4.2: Demographic Characteristics of Children

		Frequency	Percentage (%)
Age of child	13–15 years	98	25.3%
	5–8 years	192	49.6%
	9–12 years	97	25.1%
	Total	387	100.0%
Gender of child	Boy	181	46.8%
	Girl	206	53.2%
	Total	387	100.0%
School level of child	Higher Elementary (e.g., Primary 4–6)	82	21.2%
	Intermediate (e.g., Junior Secondary)	71	18.3%
	Lower Elementary (e.g., Primary 1–3)	178	46.0%
	Secondary (e.g., Senior Secondary)	56	14.5%
	Total	387	100.0%
Type of school attended	Homeschool	2	0.5%
	Private school	234	60.5%
	Public school	151	39.0%
	Total	387	100.0%

Table 4.2 reveals that 49.6% of the children were between 5–8 years old, 25.3% were aged 13–15 years, and 25.1% were aged 9–12 years, suggesting a predominance of younger school-aged children. Slightly more girls (53.2%) than boys (46.8%) were represented in the study. Regarding educational level, 46.0% of the children were in lower elementary school (Primary 1–3), 21.2% in higher elementary (Primary 4–6), 18.3% in junior secondary, and 14.5% in senior secondary school. The majority (60.5%) attended private schools, while 39.0% were in public schools, and only 0.5% were homeschooled.

TABLE 4.3: Child's Vision Health and Eye Care History

		Frequency	Percentage (%)
Does your child use spectacles (glasses) for vision correction?	No	279	72.1%
	Yes	108	27.9%
	Total	387	100.0%
Has your child experienced any eye problems in the past?	No	227	58.7%
	Yes	160	41.3%
	Total	387	100.0%
Has your child been taken to an eye doctor (optometrist/ophthalmologist) in the past?	No	258	66.7%
	Yes	129	33.3%
	Total	387	100.0%

The findings in Table 4.3 show that 27.9% of the children used spectacles for vision correction, while the majority (72.1%) did not. About 41.3% of children had experienced eye problems in the past, and 33.3% had been taken to an eye doctor (optometrist or ophthalmologist) previously.

TABLE 4.4: Parental Awareness and Perceptions of Digital Eye Strain

		Frequency	Percentage (%)
Have you ever heard about digital eye strain/computer vision syndrome in children?	No	114	29.5%
	Yes	273	70.5%
	Total	387	100.0%
Do you think excessive use of digital devices can harm children's eyes?	No	33	8.5%
	Not sure	14	3.6%
	Yes	340	87.9%
	Total	387	100.0%
Awareness of antiglare screens for children’s devices	No	150	38.8%
	Not sure	34	8.8%
	Yes	203	52.5%
	Total	387	100.0%
Importance of maintaining correct sitting posture	No	26	6.7%
	Not sure	26	6.7%
	Yes	335	86.6%
	Total	387	100.0%
Importance of proper viewing distance	No	15	3.9%
	Not sure	32	8.3%
	Yes	340	87.9%
	Total	387	100.0%
Importance of regular breaks during use	No	11	2.8%
	Not sure	52	13.4%
	Yes	324	83.7%
	Total	387	100.0%

Table 4.4 demonstrates that 70.5% of the parents were aware of digital eye strain or computer vision syndrome in children, while 29.5% were not. The majority (87.9%) believed that excessive use of digital devices could harm children’s eyes, and 52.5% were aware of antiglare screens for children’s devices. Additionally, 86.6% recognised the importance of correct sitting posture, 87.9% understood the importance of maintaining proper viewing distance, and 83.7% acknowledged the need for regular breaks during device use.

TABLE 4.5: Patterns of Digital Device Use among Children

		Frequency	Percentage (%)
Main digital device used by child	Laptop	30	7.8%
	Multiple devices	75	19.4%
	Smartphone	236	61.0%
	Tablet/iPad	46	11.9%
	Total	387	100.0%
What distance does your child usually maintain from the screen?	20–25 inches	215	55.6%
	Less than 20 inches	134	34.6%
	More than 25 inches	38	9.8%
	Total	387	100.0%
What is the level of the screen compared to your child's eyes?	Above eye level	37	9.6%
	At eye level	238	61.5%
	Below eye level	112	28.9%
	Total	387	100.0%
How many hours per day does your child spend on digital devices for academic purposes?	3–6 hours/day	109	28.2%
	Less than 3 hours/day	256	66.1%
	More than 6 hours/day	22	5.7%
	Total	387	100.0%
Does your child take regular breaks during digital device use?	No	55	14.2%
	Yes	332	85.8%
	Total	387	100.0%
How many total hours per day does your child spend on digital devices?	3–6 hours/day	228	58.9%
	Less than 1 hour/day	92	23.8%
	More than 6 hours/day	67	17.3%
	Total	387	100.0%
Duration (years) child has used digital devices	3–5 years	159	41.1%
	Less than 3 years	144	37.2%
	More than 5 years	84	21.7%
	Total	387	100.0%

According to Table 4.5, smartphones were the most commonly used digital devices (61.0%), followed by multiple devices (19.4%), tablets/iPads (11.9%), and laptops (7.8%). Over half of the children (55.6%) maintained a viewing distance of 20–25 inches, while 34.6% kept a distance of less than 20 inches. In terms of screen position, 61.5% viewed at eye level, 28.9% below eye level, and 9.6% above eye level. For academic purposes, 66.1% of children spent less than 3 hours daily on digital devices, while 28.2% spent 3–6 hours. Most children (85.8%) took regular breaks during device use. Overall, 58.9% spent a total of 3–6 hours per day on digital devices, and 41.1% had used digital devices for 3–5 years.

TABLE 4.6: Parental Response to Children's Eye Discomfort

	Frequency	Percent	Cumulative Percent
Give self-medication/home remedies	72	18.6	18.6
Stop the child from using the device immediately	151	39.0	57.6
Take the child to an eye specialist	164	42.4	100.0
Total	387	100.0	

Table 4.6 indicates that when children experience eye discomfort, 42.4% of parents reported taking their children to an eye specialist, 39.0% stopped the child from using the device immediately, and 18.6% resorted to self-medication or home remedies.

TABLE 4.7: Symptoms of Digital Eyestrain

		Responses		Percent of
		N	Percent	Cases
Symptoms of Digital Eyestrain	Feeling tiredness/fatigue of the eyes	127	14.5%	32.8%
	Burning sensation in eyes	69	7.9%	17.8%
	Itching in eyes	158	18.1%	40.8%
	Foreign body sensation in eyes	23	2.6%	5.9%
	Excessive watering from eyes	47	5.4%	12.1%
	Excessive blinking	29	3.3%	7.5%
	Eye redness	106	12.1%	27.4%
	Pain in or around the eyes	76	8.7%	19.6%
	Dry eye(s)/gritty sensation in the eye	20	2.3%	5.2%
	Increased sensitivity to light	27	3.1%	7.0%
	Blurred vision	63	7.2%	16.3%
	Double vision	15	1.7%	3.9%
	Difficulty in focusing for near vision	14	1.6%	3.6%
	Headache, shoulder, or neck pain	60	6.9%	15.5%
	Not sure	39	4.5%	10.1%
Total		873	100.0%	225.6%

The most commonly reported symptom of digital eye strain among children was itching of the eyes (18.1%), followed by eye redness (12.1%), feeling of tiredness or fatigue (14.5%), and pain around the eyes (8.7%). Other symptoms included burning sensation (7.9%), blurred vision (7.2%), headache or neck pain (6.9%), and excessive watering (5.4%). Less frequent symptoms included double vision (1.7%) and difficulty focusing for near vision (1.6%).

TABLE 4.8: Sources of Parental Information on Digital Eye Strain

		Responses		
		N	**Percent**	**Percent of Cases**
Source of information about digital eye eyestrain	Awareness campaign	99	20.2%	25.6%
	Internet/Social media	117	23.9%	30.2%
	Doctor/Optometrist	119	24.3%	30.7%
	Friends/Family member	81	16.5%	20.9%
	Book/Lecture	31	6.3%	8.0%
	Not sure	43	8.8%	11.1%
Total		490	100.0%	126.6%

Table 4.8 reveals that parents primarily obtained information about digital eye strain from doctors or optometrists (24.3%) and social media or the internet (23.9%). Awareness campaigns (20.2%) and friends or family members (16.5%) were also common sources. Books or lectures (6.3%) and uncertain sources (8.8%) contributed less.

TABLE 4.9: Parental Enforcement of Eye Care Practices during Device Use

		Responses		Percent of Cases
		N	**Percent**	
Parental enforcement of children's eye care practices during device use	Antiglare screen	9	2.2%	2.3%
	Adjustment of screen brightness	206	50.2%	53.2%
	Breaks during digital use	105	25.6%	27.1%
	None	90	22.0%	23.3%
Total		410	100.0%	105.9%

The most frequently enforced eye care practice was adjustment of screen brightness (50.2%), followed by encouraging breaks during digital use (25.6%). Only 2.2% of parents enforced the use of antiglare screens, while 22.0% reported not enforcing any eye care practices at all.

TABLE 4.10: Relationship between Source of Information and Parental Eye Care Practices

			Parental enforcement of children's eye care practices during device use				
			Antiglare screen	**Adjustment of screen brightness**	**Breaks during digital use**	**None**	**Total**
Source of information about digital eye eyestrain	Awareness campaign	Count	7	66	9	26	99
	Internet/Social media	Count	8	70	46	7	117
	Doctor/Optometrist	Count	8	68	50	7	119
	Friends/Family member	Count	9	36	7	40	81
	Book/Lecture	Count	7	12	9	10	31
	Not sure	Count	0	12	8	25	43
Total		Count	9	206	105	90	387

Parents who obtained information from doctors or social media were more likely to adjust screen brightness (68 and 70 respondents, respectively) and encourage breaks (50 and 46 respondents, respectively). Those informed through awareness campaigns also showed a strong tendency to adjust screen brightness (66 respondents). In contrast, parents who were unsure of their information source were less likely to implement any eye care measures (25 respondents reported none).

CHAPTER FIVE

5.0 DISCUSSION

5.1 Demographic Characteristics of Parents and Children (Tables 4.1 and 4.2)

The majority of parents (46.0%) were aged between 36–45 years, while 32.3% were above 45 years. Most respondents were female (62.3%), and nearly half (49.6%) possessed tertiary education. This distribution indicates that a considerable portion of respondents were adults with adequate educational exposure. The gender composition reflects the active role of mothers in child health supervision, similar to findings by Ikefuna *et al.,*(2022), who noted greater maternal participation in studies concerning child screen habits and eye health.

Among the children, 49.6% were aged 5–8 years, while 25.3% were 13–15 years, suggesting that early school-aged children are the most frequent users of digital devices under parental supervision. This pattern aligns with Demirayak *et al.,*(2022), who found that younger children increasingly engage in screen-based learning, especially following the shift to digital education during the pandemic.

5.2 Child's Vision Health and Eye Care History (Table 4.3)

Findings showed that 27.9% of the children used spectacles, while 41.3% had experienced eye problems, and 33.3% had visited an eye doctor. These values suggest moderate awareness of pediatric eye health. The results are comparable to Abioye *et al.,*(2025), who reported that frequent parent-child interaction reduced visual complaints through early detection and medical consultation. However, the proportion of children who had never undergone an eye examination (66.7%) indicates gaps in preventive eye care utilization, similar to the pattern reported by Akinbinu and Mashalla (2013), where awareness did not always translate into proactive eye care behavior.

5.3 Parental Awareness and Perceptions of Digital Eye Strain (Table 4.4)

The majority of parents (70.5%) were aware of digital eye strain, and 87.9% believed that excessive digital use could harm children's eyes. This high level of awareness mirrors the findings of AlHarkan (2023), who reported that over 80% of parents demonstrated good awareness of DES. However, only about half (52.5%) were aware of antiglare screens, and a similar proportion understood the importance of regular breaks (83.7%), suggesting partial awareness of key preventive measures. These results indicate that although general awareness is high, knowledge of specific preventive techniques remains limited, echoing AlHarkan's (2023) observation that awareness of the 20-20-20 rule and blinking exercises was relatively poor among parents.

5.4 Patterns of Digital Device Use among Children (Table 4.5)

Smartphones were the most frequently used devices (61.0%), and 58.9% of children spent between 3–6 hours daily on digital devices. Most children (55.6%) maintained a 20–25 inch viewing distance and used screens at eye level (61.5%), while 85.8% took regular breaks. These findings are consistent with Chu *et al.,*(2023), who linked prolonged smartphone use to increased DES symptoms, and Bozzola *et al.,*(2024), who reported smartphones as a major contributor to DES due to close viewing distance and extended screen time.

While the majority adhered to recommended ergonomic practices, nearly one-third viewed screens at improper distances or angles, potentially increasing the risk of ocular fatigue. This reinforces the need for enhanced parental supervision and guidance in applying ergonomic measures, as highlighted by Lurati (2018) and Coles-Brennan *et al.,*(2019), who emphasized correct posture and appropriate viewing distance as essential in minimizing DES symptoms.

5.5 Parental Response to Children's Eye Discomfort (Table 4.6)

When children experienced eye discomfort, 42.4% of parents sought professional care, 39.0% temporarily stopped device use, and 18.6% administered home remedies. These findings suggest that while many parents demonstrate positive health-seeking behavior, self-medication practices remain prevalent. This observation is comparable to the findings of Abioye *et al.,*(2025), where parental education and engagement significantly influenced appropriate responses to eye-related complaints.

5.6 Symptoms of Digital Eye Strain among Children (Table 4.7)

The most frequently reported symptoms were eye itching (18.1%), redness (12.1%), fatigue (14.5%), and pain (8.7%). These findings correspond with the symptom patterns reported by Demirayak *et al.,*(2022) and Ichhpujani *et al.,*(2019), who both observed that headache, redness, and ocular fatigue were predominant in children exposed to prolonged screen time. The relatively high symptom frequency underscores that DES remains a growing concern among school-aged children in the digital era.

5.7 Sources of Parental Information on Digital Eye Strain (Table 4.8)

Doctors and optometrists (24.3%) and the internet/social media (23.9%) were the main information sources. Awareness campaigns also contributed substantially (20.2%). The increasing role of digital platforms in disseminating health information aligns with Bou Ghannam *et al.,*(2024), who noted that the pandemic era expanded online health education accessibility. However, reliance on informal sources such as friends or family (16.5%) may contribute to misinformation, emphasizing the need for professional-led awareness programs.

5.8 Parental Enforcement of Eye Care Practices (Table 4.9)

Adjustment of screen brightness (50.2%) and enforcing screen breaks (25.6%) were the most common practices, whereas the use of antiglare screens was rare (2.2%). These practices are consistent with findings by Poudel and Prasad Khanal (2020), who reported that only half of computer users regularly adopted protective measures despite awareness of computer vision syndrome. Similarly, Akinbinu and Mashalla (2013) observed that regular breaks were among the most commonly practiced preventive habits. The low adoption of antiglare screens reflects a gap between awareness and implementation of recommended optical interventions.

5.9 Relationship between Information Sources and Eye Care Practices (Table 4.10)

Parents who received information from doctors or social media were more likely to enforce protective behaviors such as adjusting screen brightness and encouraging breaks. This positive relationship between credible information access and preventive action supports Ikefuna *et al.,*(2022), who emphasized that higher parental knowledge predicts better implementation of screen-time control measures. The current finding thus reinforces the role of targeted education by eye care professionals in fostering evidence-based practices among parents.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study investigated Parental Knowledge, Attitude, and Practice toward Digital Eye Strain (DES) in Children in Ovia North-East Local Government Area, Edo State. The findings revealed that most parents were aware of digital eye strain and recognized its potential harm to children's eyes. The majority of parents demonstrated positive perceptions of healthy digital practices, such as maintaining correct sitting posture, proper viewing distance, and taking regular breaks during screen use. However, gaps were identified in the application of specific preventive measures, including the use of antiglare screens and professional eye consultations.

The demographic profile showed that most respondents were middle-aged and well-educated, indicating a population capable of understanding and acting on preventive information. Despite this, about one-third of children had never been taken to an eye doctor, suggesting that awareness does not always translate into preventive behavior. The study also found that smartphones were the most commonly used digital devices among children, with an average daily usage of 3–6 hours. This prolonged exposure was associated with symptoms such as itching, eye redness, fatigue, and pain, consistent with the established manifestations of digital eye strain.

Information sources played a critical role in shaping parental behavior. Parents who obtained information from health professionals or credible digital platforms were more likely to enforce appropriate screen-use practices. Nonetheless, a notable proportion of parents still relied on informal sources, indicating the need for more structured awareness programs.

In summary, while general awareness of digital eye strain among parents in Ovia North-East is commendably high, the translation of this knowledge into consistent preventive practices remains limited. Continuous parental education, regular pediatric eye screenings, and professional guidance are therefore essential for reducing the prevalence and impact of digital eye strain in children.

6.2 Recommendations

1. **Public Health Education**: Continuous health education programs should be organized by optometrists and public health agencies to strengthen parental knowledge of digital eye strain, focusing on simple preventive measures such as the 20-20-20 rule, regular blinking, and limiting non-academic screen time.
2. **School-Based Interventions:** Schools should integrate digital eye health education into their curriculum and establish policies that regulate students' screen exposure during and after school hours.
3. **Professional Eye Screening**: Periodic eye examinations should be encouraged for all children, especially those with prolonged digital device exposure, to enable early detection and management of vision problems related to digital eye strain.
4. **Community Awareness Campaigns**: Awareness initiatives should be extended to rural and semi-urban communities through media, community outreaches, and social campaigns to reach parents with limited digital literacy.
5. **Parental Supervision:** Parents should monitor their children's screen use by ensuring proper posture, maintaining adequate viewing distance, encouraging breaks, and adjusting screen brightness to match environmental lighting.
6. **Policy Implementation:** Government agencies and educational authorities should develop policies to promote safe digital use among children, incorporating eye health

guidelines and time limits for digital exposure in both educational and recreational settings.

7. **Collaboration with Eye Care Professionals**: Optometrists and ophthalmologists should collaborate with local health workers and educators to provide evidence-based guidance and training on preventive eye care for families.

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APPENDIX I

ETHICAL APPROVAL

APPENDIX II

QUESTIONNAIRE

PARENTAL KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS DIGITAL EYE STRAIN IN CHILDREN IN OVIA NORTH EAST LOCAL GOVERNMENT AREA, EDO STATE

Dear Sir/Ma,

This questionnaire is part of an undergraduate research project being conducted at the University of Benin, Edo State, Nigeria. The study is titled **"Parental Knowledge, Attitude and Practice Towards Digital Eye Strain in Children in Ovia North East local government area , Edo State."** The aim is to assess the awareness, attitudes, and preventive practices of parents or caregivers regarding **Digital Eye Strain (DES)** in children aged 5–15 years.

Your participation in this survey is completely voluntary, and all responses will be kept strictly confidential and used solely for research purposes. You will not be required to provide your name or any identifying information. The survey is expected to take approximately **10–15 minutes** to complete.

By proceeding with this questionnaire, you are giving your informed consent to participate in the study. We greatly appreciate your valuable time and contribution toward improving awareness and prevention of Digital Eye Strain in children.

Thank you for your participation.

Researcher: Chinenye Veronica Nnenna

Faculty of Optometry, University of Benin

Supervisor: Dr. R. Ukhuedobah

1. Age of Parent: 18–25 years [ ] 26–35 years[ ] 36–45 years[ ] Above 45 years[ ]

2. Gender of Parent: Male [ ] Female[ ]

3. Highest Level of Education

Primary/Secondary[ ], Tertiary (College/University) [ ], Postgraduate[ ]

4. Age of Child *(select the child under your care within 5–15 years)*

5–8 years[ ], 9–12 years[ ], 13–15 years[ ]

5. Gender of Child: Boy[ ], Girl[ ]

6. School Level of Child

   Lower Elementary (e.g., Primary 1–3)[ ]

   Higher Elementary (e.g., Primary 4–6)[ ]

   Intermediate (e.g., Junior Secondary)[ ]

   Secondary (e.g., Senior Secondary)[ ]

7. School Type of Child: Public school[ ], Private school[ ], Homeschool[ ]

8. Does your child use spectacles (glasses) for vision correction? Yes[ ], No[ ]

9. Has your child experienced any eye problems in the past? Yes[ ], No[ ]

10.Has your child been taken to an eye doctor (optometrist/ophthalmologist) in the past?

Yes[ ], No[ ]

Parental Knowledge of Digital Eye Strain in Children

11. Have you ever heard about digital eye strain/computer vision syndrome in children?

Yes[ ], No[ ]

12. Do you think excessive use of digital devices can harm children's eyes? Yes[ ], No[ ]

Not sure[ ]

13.Are you aware of the use of antiglare screens for children's digital devices? Yes[ ], No[ ]

Not sure[ ]

14. Do you think maintaining correct sitting posture is necessary for children while using digital devices? Yes[ ], No[ ], Not sure[ ]

15. Do you believe maintaining a proper viewing distance from the screen is important for children? Yes[ ], No[ ], Not sure[ ]

16. Is taking regular breaks during children's digital device use important to reduce eye strain? Yes[ ], No[ ], Not sure[ ]

17. Which of the following symptoms has your child experienced due to digital device use? *(select all that apply)*

Feeling tiredness/fatigue of the eyes[ ]

Burning sensation in eyes[ ]

Itching in eyes[ ]

Foreign body sensation in eyes[ ]

Excessive watering from eyes[ ]

Excessive blinking[ ]

Eye redness[ ]

Pain in or around the eyes[ ]

Dry eye(s)/gritty sensation in the eye[ ]

Increased sensitivity to light[ ]

Blurred vision[ ]

Double vision[ ]

Difficulty in focusing for near vision[ ]

Headache, shoulder, or neck pain[ ]

18. Where did you first learn about digital eye strain in children? ***(select all that apply)***

Awareness campaign[ ]

Internet/Social media[ ]

Doctor/Optometrist[ ]

Friends/Family member[ ]

Book/Lecture[ ]

Parental Attitude and Practices Towards Children's Digital Device Use

19. Which digital device does your child mainly use?

Computer/Desktop[ ], Laptop[ ], Smartphone[ ], Tablet/iPad[ ], Multiple devices[ ]

20. Do you ensure your child applies any of the following while using digital devices? *(multiple choice allowed)*

Antiglare screen[ ], Adjustment of screen brightness[ ], Breaks during digital use[ ], None[ ]

21. What distance does your child usually maintain from the screen?

Less than 20 inches[ ], 20–25 inches[ ], More than 25 inches[ ]

22. What is the level of the screen compared to your child's eyes? *

Mark only one oval.

At eye level[ ], Below eye level[ ], Above eye level[ ]

23.How many hours per day does your child spend on digital devices for academic purposes (schoolwork/study)? Less than 3 hours/day[ ], 3–6 hours/day[ ], More than 6 hours/day[ ]

24.Does your child take regular breaks during digital device use? Yes[ ], No[ ]

25. How many total hours per day does your child spend on digital devices (including school, social media, games, entertainment)? Less than 1 hour/day[ ], 3–6 hours/day[ ], More than 6 hours/day[ ]

26. For how long has your child been using digital devices? Less than 3 years[ ], 3–5 years[ ] More than 5 years[ ]

27.If your child develops eye-related problems from digital device use, what do you usually do?

Stop the child from using the device immediately[   ]

Give self-medication/home remedies[   ]

Take the child to an eye specialist[   ]