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Ergonomic and Ophthalmic Risk Factors for Ocular Discomfort in Computer Operators: A Case Study in Anambra State

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Abstract **Original Research Article**

Long-term use of computers and cell phones can cause computer visual syndrome, a condition that is of concern worldwide and causes dry eyes. Anambra State computer operators were the focus of the study, which sought to determine the ocular difficulties faced by computer screen users. A sphygmomanometer, Snellen's test chart, and a structured questionnaire were used in this descriptive cross-sectional study, which involved 381 participants in three senatorial zones of Anambra State. SPSS version 25 was used to analyse the data, using both descriptive and inferential statistics. Significant values were set at $p \leq 0.05$. The findings indicated that the most common age group was 21–25 years, OND had 29.9%, and males (51.9%) outnumbered females (48.1%). Although both shortsightedness and longsightedness were the most common eye defects, a low prevalence rate of history of eye defects (15.2%) was suggested, with longsightedness being the most common (5.2%). Impaired vision was one of the most prevalent eye defects (26%), and a good level of awareness (78.5%) of eye defects was indicated. Light sensitivity was the main issue faced, accounting for 11.5% of the low prevalence of ocular challenges (34.6%). The majority (26.3%) had shortsightedness of 20/50, 15% had pterygium, and the highest percentage (35.7%) had near-normal vision. Dust accounted for 47.8% of the environmental challenges faced, and gender significantly correlated with the types of eye defect history ($p = 0.003$) and the history of eye defects ($p = 0.028$). Neither the types of eye defect history ($p = 0.178$) nor the history of eye defects ($p = 0.060$) were significantly correlated with age. Computer use is challenged by a significant correlation between age, gender, and educational attainment ($p = 0.04$, $p = 0.00$, $p = 0.00$). According to the study's findings, there is a low prevalence of ophthalmic challenges and a good level of awareness about eye defects. Gender, age, and educational attainment have all been found to have an impact on these issues since the advent of computers.

Keywords: Computer Operators, Ocular Discomfort, Computer Visual Syndrome, Ophthalmic.

INTRODUCTION

The number of people who spend a lot of time working on computer screens has significantly increased as a result of computers becoming an essential tool in both personal and professional spheres. Following the COVID pandemic, computer use doubled, with the majority of previously physical processes being completed online. This led to a notable rise in the prevalence of computer-induced health issues across all age groups (Danila and Donciu, 2022). Visual impairments are the most prevalent of the frequently reported health issues associated with prolonged computer use (OOS, musculoskeletal disorders, Carpal tunnel syndrome, psychological issues, and ophthalmological diseases) and have recently evolved into a global health concern that demands immediate attention (Sánchez-Valerio *et al.*, 2020). Computer operators, who depend significantly on computer systems to carry out their work duties, are particularly vulnerable to the ocular problems brought on by extended screen time. Concerns about possible ophthalmic problems and the general visual health of this occupational group have been raised by operators' frequent and heavy computer screen use. It is thought that as the amount of time spent in front of visual display terminals (VDTs) increases, so do these ocular defects and/or their symptoms (Bali *et al.*, 2014).

Positively, according to data released by the World Health Organisation, more than 75% of computer-associated ocular defects worldwide are treatable or preventable (WHO, 2019). Therefore, everyone must work together to identify the main risk factors and make sure that preventive measures are strictly followed in order to reduce the prevalence of avoidable ocular defects overall. Programmes for universal access to comprehensive eye care services, educational initiatives, and international action plans for eye health can all represent these efforts. Additionally, prevention measures must be given more attention in the safety and health plans that are to be implemented at the organisational and local levels.

Ocular problems are very common among computer screen users (operators), according to numerous studies. Computer operators have often complained of computer vision syndrome (CVS), a term that encompasses a variety of visual and ocular symptoms. CVS symptoms include headaches, neck and shoulder pain, blurred vision, eyestrain, dryness, and redness (Bogdănici *et al*., 2017; Sheppard and Wolffsohn, 2018). Both general well-being and productivity at work may suffer as a result of these symptoms.

Computer and screen time moderation has been shown to significantly reduce CVS symptoms. implementing the 20/20/20 rule that other employees suggested. This involves a worker looking for 20 seconds at a distance greater than 20 feet after 20 minutes of computer work. It has been demonstrated that doing this increases productivity and avoids eyestrain (Bali *et al*., 2014). However, this rule applies to any time off from work. Moving between tasks actually lessens the musculoskeletal symptoms that are encountered. The National Institute of Occupational Safety and Health (NIOSH) in the United States of America advises computer operators to undergo a thorough eye examination before beginning a computing task, and this recommendation is reiterated every year (Bali *et al*., 2014). Computer monitors have the biggest impact on users, and over time, computer development has advanced to accommodate user needs through a variety of types, screen sizes, and graphics (Pakdee and Sengsoon, 2021).

The relationship between various computer screen sizes and the proper placement of the keyboard and screen was examined in a study. The results showed that lowering the screen height and increasing the screen size improved the viewing distance (Pakdee and Sengsoon, 2021). According to this study, headaches, blurred vision, and dry eyes were significantly reduced when the distance between the eyes and the computer screen was increased (Pakdee and Sengsoon, 2021). Furthermore, prior research has shown that reducing the distance between the eyes and the computer screen significantly reduced the frequency of flashing light, which in turn contributed to visual fatigue (Pakdee and Sengsoon, 2021). Computers come in a variety of sizes and screen styles (Kemp, 2019), but there are few studies comparing the effects of screen sizes on ocular health. It is essential to comprehend the specific factors that contribute to ophthalmic challenges in this occupational group in order to implement targeted interventions and strategies to minimise the detrimental effects on their visual health and general well-being. Therefore, a number of factors, such as screen-related issues, visual discomfort, and diminished visual performance, contribute to ophthalmic challenges. The brightness, contrast, flicker, and glare of computer screens are among the screen-related elements that can lead to visual fatigue and discomfort. Reduced visual performance and increased visual discomfort have been linked to high screen contrast and glare. But the ergonomics and viewing distance: The following recommendations regarding the ergonomic placement of the computer and chair are also crucial: In terms of eye health, viewing distance is very important. Ocular symptoms have been found to be more common at shorter viewing distances. An ergonomic computer monitor should be positioned 40 inches or an arm's length away, with a downward gaze of at least 14°. This seems to help alleviate the symptoms of CVS (Bali *et al*., 2014). Placing the monitor so that the top line of the screen is at or below eye level accomplishes this. Choose a chair made especially for computer use so that the arms, legs, buttocks, and back can get the support they need. According to Bali *et al*., (2014), it ought to assist in avoiding uncomfortable positions, contact stress, and vigourous efforts.

Extended computer use can lead to visual fatigue and a decline in visual performance. Long-term computer use can impair the eye's accommodating function, which allows the eye to change focus and reduce visual comfort (Rosenfield, 2016). Increased computer use has also been linked to symptoms of dry eyes. Promoting computer operators' visual health requires an understanding of and attention to these ocular issues. Ophthalmic issues can be lessened and prevented with the use of efficient intervention techniques, such as improving vision ergonomics, encouraging good eye hygiene, arranging routine eye exams, and spreading knowledge about safe screen usage and eye health. Research on ocular difficulties in computer screen users, with a special emphasis on computer operators, can help identify the causes of these difficulties and create evidence-based treatments to enhance visual health outcomes.

In order to lessen the possible negative effects of computer screen usage on computer operators' visual health, this study sought to increase knowledge, increase awareness, and offer workable solutions and recommendations.

METHODOLOGY

Research Design

A descriptive cross-sectional study was adopted for this research, which measures the outcome and exposures of the subjects of study at the same instance. The study's population was selected based on the study's inclusion criteria. The study design of Akkaya *et al.,* (2018) adopted a cross-sectional study to the effects of long-term computer use on eye dryness in American population.

Research Settings

The study was conducted in Anambra state in South-Eastern region of Nigeria, which three senatorial zones; Anambra central, south and north. The study was conducted in Awka, Enugu-Ukwu, Nnewi, Uli, Onitsha, and Igbariam. It was conducted in both rural and urban settings; the rural region was Igbariam, Enugu-ukwu and Uli, and the urban region was Awka, Onitsha, and Nnewi.

Target Population

The target population for the study is 381 computer operators within the three senatorial zones; Anambra central, south and north. However, it cut across both rural and urban settings; the rural region was Igbariam, Enugu-ukwu and Uli, and the urban region was Awka, Onitsha, and Nnewi. The study was conducted between the period of December 2023 through March 2024.

Sample Size Determination

A sample size of 381 participants which consists of males and females were determined using the formula adopted by Adepoju *et al.,* (2005) as described below with a prevalence of 0.463 on computer-related symptoms.

N=(Z^2 p(1-p))/d^2

Where n = Sample Size

Z = Statistic corresponding to the level of confidence (1.96)

P = expected prevalence (that can be obtained from same studies), eg Ilorin Nigeria with prevalence of computer-related symptoms of 0.463 (Adepoju *et al*., 2005).

d = precision (corresponding to effect size). 5%

Therefore,

n=(1.96〗^2.0.46 (1-0.46))/〖0.05〗^2

n=0.95425344/0.0025

n=381

Sampling Techniques

The participants of this study were selected randomly from three senatorial zones; Anambra central, south and north, which implying an unbiased representation of the total population. It specifies that each population member has the tendency to be chosen as part of the sample size to be employed.

Inclusion Criteria

Workers were included if they used the following; Laptop computers, desktop computers, tablets computers or e-readers working in a Cyber Café. Also, workers within the ages of 15–50 years and participants who regularly work more than two hours with digital devices each day. All participants must be resident in Anambra State.

Exclusion Criteria

Subjects not residing in Anambra State, also those who don't have computers or laptops and can't operate computers efficiently are excluded from the study.

Method of Data Collection

A semi-structured and pre-tested questionnaire were self-administered and filled by each study participant. The questionnaire had six parts, namely; Socio-demographic characteristics such as gender, age and educational qualification. Extraction of users' system information such as computer age, screen size and brightness. Users' preference like font size & use of protective shield. Details of the user's computer operational history, workstation environment, and general computer-related challenges and symptoms of using computer. The challenges studied were light intensity, challenges since using computer, type of challenge, visual acuity, blood pressure and BMI. Symptoms of computer-related challenges were listed and participants were asked to choose those that were likely to affect them.

Instrument for Data Collection

Measurement of Visual Acuity

Snellen's test chart was used in the collection of data to test for visual acuity along with a structured questionnaire. In this study, visual acuity was assessed using the Snellen chart to measure participants distance vision. The assessment was conducted in a well – illuminated room with the Snellen chart positioned at eye level. Participants were instructed to stand at a distance of 20 feet from the charts, and their vision was tested. Prior to testing, participants were briefed on the procedure and asked to confirm if they were wearing corrective lenses. The Snellen chart consisted of lines of progressively small letters, with visual acuity recorded as a fraction representing the distance at which the letters could be read compared to the standard distance of 20 feet. Each participant was asked to read aloud the letters on the charts from the largest line to the smallest line they could accurately identify. Visual acuity measurements were documented, with notation according to the Snellen fraction system.

Measurement of Blood Pressure

In this, blood pressure measurement was done using an and on digital sphygmomanometer. The data collection process was conducted as follow; the Participant was asked to swat comfortably with the arms supported at heart level, in a relaxed state. The Cuff of the digital sphygmomanometer was placed around the upper arm, ensuring proper alignment with the brachial artery. Measurements were taken following a brief period of rest, with multiple readings obtained for each participant to ensure accuracy. Systolic and diastolic blood pressure values were recorded for each participant.

Screen Brightness

Screen brightness ranges from 0 – 100%. Subjects were asked to fill the screen brightness they are comfortable with. A normal screen brightness is from 40 – 60%. Less than 40 and greater 60% is an indication of eye defect (The Vision Council, 2016).

Light Intensity

The light intensity is a measurement of the amount of power either emitted or reflected by a source. For the purpose of this work, Habotest digital light meter was used to measure the light intensity. The unit of the measurement was in LUX (luminous flux).

Steps in measuring light intensity of a room, which was followed by pressing the button to turn power on. The protective cap from the sensor was removed and the sensor in a horizontal position at the measurement location, and the light level on the display was read. The human visual system can adapt to wide range of light levels from being able to see in very dim light to adjusting to bright sunlight. The human eye can detect light levels as low as 0.05lux in very dim conditions and adjust to 100,000 lux in bright sunlight (Pode *et al.,* 2011).

The range of lux is broad. On sunny day, light intensity can exceed 100,000 lux. For indoor lighting, it might be from 100 – 1000 lux. In Moonlight, it might be as low as 0.1 lux.

However, these values vary depending on the environment lightening conditions. The comfortable range for human task ranges from 300 to 500 lux for indoor lightening. < 300lux (Low) or > 500 lux were considered improper illumination level for the human eye (Pode *et al.,* 2011).

Measurement of Eye Distance to Computer & Eye Distance to Documents

Eye Distance to Computer

This was measured using meter rule graduated in centimeters (cm). Subjects were asked to replicate their operational working routine using computer. With the position attained, subjects were told to maintain stability while measurements were taken and recorded.

Eye Distance to Document

Subjects were told to place their documents in their preferred position while using the computer. Measurements were taking for the position attained and recorded.

Validity of Instrument

The content validity of the questionnaire was reviewed by a panel of experts in Neurophysiology. A team of subject matter experts performed questionnaire content validation and access measurement. In specific areas of the instruments, the relevance of the contents, logical accuracy, clarity, and suitability for achieving the study objectives was scrutinised. The researcher makes appropriate suggestions and modifications based on the supervisor's corrections, and remarks before the instrument are approved for data collection.

Method of Data Collection

The researcher had two research assistants, one computer operator and one trained physiologist in the study area who was trained in instrument administration and data collection modalities. The researcher met with the respondents during their various working hours and provided them with the necessary introduction—a brief explanation about the study and how to fill out the questionnaire. The study has a return rate of answered questionnaire as 100%, which 381 answered questions were returned by the participants.

Ethical Approval

Informed consent was obtained from all subjects after clear explanation of the nature of the study before the questionnaires were administered.

Ethical approval was obtained from Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Health Research and Ethics Committee.

Statistical Analysis

Data were analyzed using Statistical Science for Social Sciences (SPSS) version 25 (IBM, 2018, USA). Data for demographic variables were analysed using descriptive statistics using percentages and frequencies. Also, inferential statistics was used to analysed some demographic variables and values were presented as mean and standard deviation. Further, the specific objectives were analysed using both descriptive and inferential (correlation and Chi-square) and values were considered significant at $p \leq 0.05$.

Table 1: prevalence of history of eye defect among computer users

	Frequency (%)	Total (%)
History of eye defect		
Yes	58 (15.2)	381 (100)
No	323 (84.8)	
Types of eye defect history		
None	322 (84.6)	
Blurred vision	11 (2.9)	381 (100)
Light sensitivity	12 (3.1)	
Short sightedness	7 (1.8)	
Glaucoma	4 (1.0)	
Long sightedness	20 (5.2)	
Astigmatism	3 (0.8)	
Trauma	2 (0.3)	
Use of medicated glasses		
Yes	44 (11.5)	381 (100)
No	337 (88.5)	
Type of glasses		
None	338 (88.7)	381 (100)
Cylindrical glasses	15 (3.9)	
Bi-convex	28 (7.3)	
Family history of glass users		
Yes	79 (20.7)	381 (100)
No	302 (79.3)	
Types of family defect		
None	299 (78.5)	
Itching	5 (1.3)	381 (100)
Eye trauma	9 (2.4)	
Differential focus	16 (4.2)	
Short sightedness	18 (4.7)	
Long sightedness	18 (4.7)	
Astigmatism	4 (1.0)	
Blurred vision	12 (3.1)	

Table 2: awareness level and types of defect among computer users

	Frequency (%)	Total (%)
Awareness of eye defect		
Yes	300 (78.5)	381 (100)
No	81 (21.3)	
Type of defect		
None	81 (21.3)	
Light sensitivity	41 (10.8)	381 (100)
Eye fatigue	32 (8.4)	
Double vision	17 (4.5)	
Blurred vision	54 (14.2)	
Impaired vision	99 (26.0)	
Differential Focus	7 (1.8)	
Shoulder pain	4 (1.0)	
Neck pain	7 (1.8)	
Head ache	12 (3.1)	
Eye Itching	5 (1.3)	
Dry eyes	22 (5.8)	

Table 3: prevalence or occurrence of ophthalmic challenges encountered by computer operators

	Frequency (%)	Total (%)
Challenges since usage of computer		
Yes	132 (34.6)	381 (100)
No	249 (65.4)	
Type of challenges		
None	241 (63.3)	
Light sensitivity	44 (11.5)	
Blurred vision	17 (4.5)	381 (100)
Headache	29 (7.6)	
Neck/Shoulder pain	3 (0.8)	
Difference in focus	3 (0.8)	
Eye fatigue	12 (3.1)	
Eye Irritations	11 (2.9)	
Impaired vision	13 (3.4)	
Eye itching	8 (2.1)	
Visual acuity		
20/15 (Near normal vision)	132 (35.8)	
20/20 (Normal vision)	28 (7.6)	381 (100)
20/25 (Long sightedness)	23 (6.2)	
20/30 (Short sightedness)	15 (4.1)	
20/40 (Short sightedness)	11 (3.0)	
20/50 (Short sightedness)	97 (26.3)	
20/70 (Short sightedness)	16 (4.3)	
20/100 (short sightedness)	47 (12.7)	
Pterygium		
Yes	57 (15.0)	381 (100)
No	324 (85.0)	

Table 4: socio-demographic characteristics of participants

	Frequency (%)	Total (%)
Gender		
Male	198 (51.9)	381 (100)
Female	183 (48.1)	
Age in years		
15 – 20	20 (5.2)	
21 – 25	162 (42.5)	381 (100)
26 – 30	122 (32.0)	
31 – 35	62 (16.2)	
36 – 40	9 (2.3)	
41 years and above	6 (1.5)	
Educational Qualification		
SSCE	104 (27.3)	
OND	114 (29.9)	381 (100)
HND	60 (15.7)	
BSC	86 (22.6)	
MSC	17 (4.5)	

Table 5: sociodemographic relationship with types of eye defect history and history of eye defect

		Gender	Age	Educational level
Types of eye defect history	Pearson Correlation	0.154**	-0.069	-0.045
	p-value	0.003	0.178	0.377
	N	381	381	381
History of eye defect	Pearson Correlation	-0.112*	0.097	-0.020
	p-value	0.028	0.060	0.696
	N	381	381	381

Table 6: Association between sociodemographic characteristics and challenges with computer usage

	Challenges since usage of computer Frequency (%0		χ2 (p-value)
	Yes	No	
Gender			
Males	58 (43.9)	137 (55)	*4.23 (1); p=0.04*
Females	74 (56.1)	112 (45)	
Age in years			
15 – 20	0	20 (8)	
21 – 25	63 (47.7)	99 (39.8)	*31.61 (5); p=0.00*
26 – 30	32 (24.2)	91 (36.5)	
31 – 35	29 (22.0)	33 (13.3)	
36 – 40	2 (1.5)	6 (2.4)	
41 years and above	6 (4.6)	0	
Educational level			
SSCE	28 (21.2)	76 (30.5)	
OND	26 (19.7)	88 (35.5)	*25.01 (5); p=0.00*
HND	25 (18.9)	35 (14.1)	
BSc	52 (39.4)	50 (20.1)	
MSc	1 (0.8)	0 (0)	

Table 7: Participants device information and system usage among participant

	Frequency (%)	Total (%)
Manufacturer's Date		
1991 – 1995	10 (2.6)	
1996 – 2000	7 (1.8)	381 (100)
2001 – 2005	21 (5.5)	
2006 – 2010	99 (25.9)	
2016 – 2020	153 (40.2)	
2021 and above	91 (23.9)	
Screen Size		
10 – 12 inches	48 (12.5)	
13 – 14 inches	47 (12.3)	381 (100)
15 – 16 inches	161 (42.3)	
17 – 18 inches	114 (29.9)	
19 – 20 inches	8 (2.1)	
21 – 24 inches	3 (0.8)	
Font Size		
9.5-11.5	27 (7.1)	
12-14	287 (75.3)	
16-18	67 (17.6)	381 (100)
Protective Shield		
Yes	43 (11.3)	381 (100)
No	338 (88.7	
Years of operating computer		
< 1 year	35 (9.2)	
2-5 years	204 (53.5)	381 (100)
6-10 years	142 (37.3)	
Daily usage of computer		
0-2 hours	15 (3.9)	381 (100)
4-6 hours	178 (46.7)	
8-10 hours	188 (49.4)	
Weekly Usage		
0-2 days	24 (6.3)	381 (100)
3-5 days	248 (65.1)	
6-7 days	109 (28.6)	
Operating distance of document from the eyes		
10-30 cm	260 (68.2)	381 (100)
31cm and above	121 (31.8)	

Table 8: Descriptive statistics of participants of the blood pressure, BMI, Light intensity, and temperature

	Minimum	Maximum	Mean±	STD
Systolic blood pressure (mmHg)	63.00	159.00	117.94±	14.83
Diastolic blood pressure (mmHg)	40.00	114.00	77.69±	9.66
BMI (m2/kg)	17.85	46.56	28.52±	5.92
Light intensity	11.20	792.00	247.43±	191.84
Temperature (°C)	22.00	59.00	30.49±	4.31

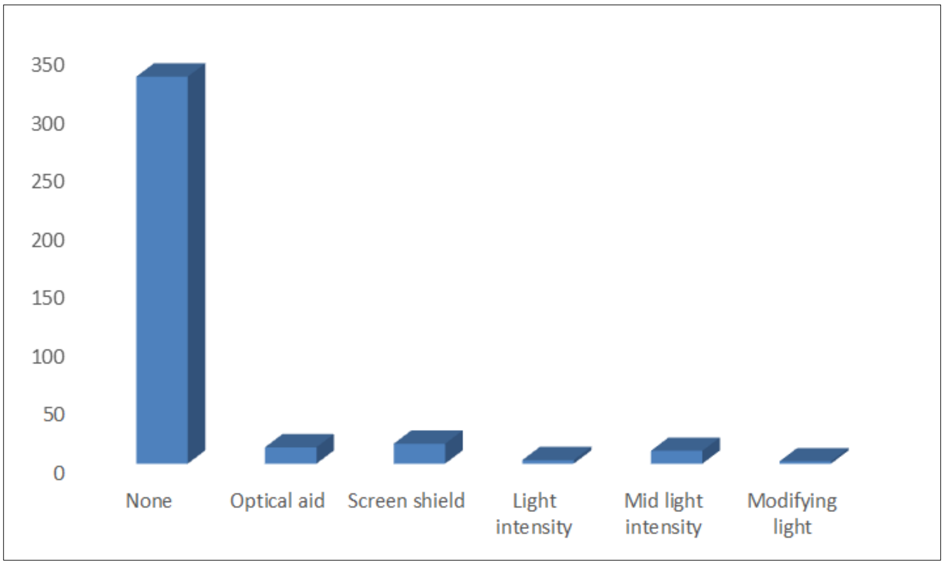

Fig. 1: shield type used among participants

Fig. 1 result showed that out of the 381 participants 331 (88%) had no shield type on their computers, followed by the use of screen shield with 17 (4.5%), and the least was modifying light with 2 (0.5%).

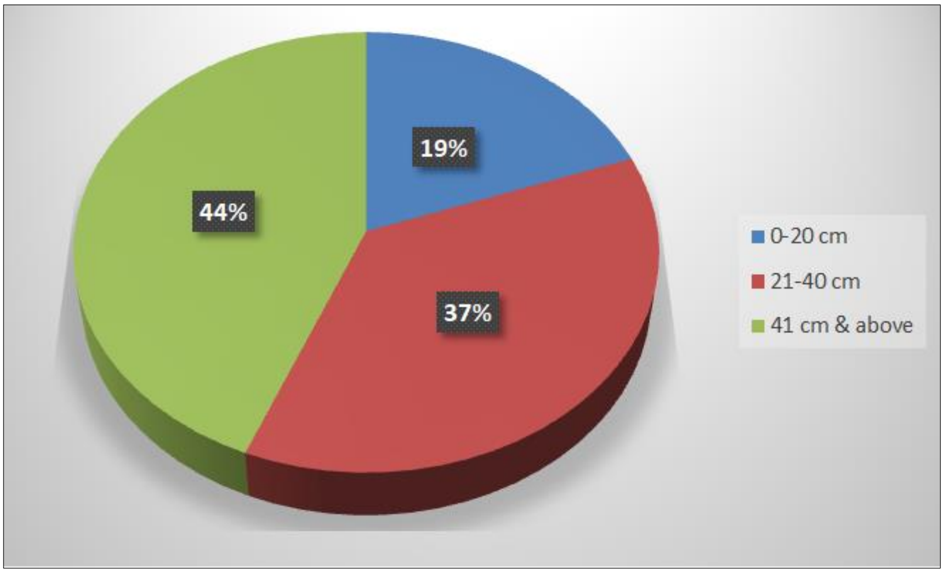

Fig. 2: shows the eye distant from screen

Fig 2 result showed that 44% of the participants were majority who had eye distance from the screen at 41 cm and above and the least were 0-20 cm with 19%.

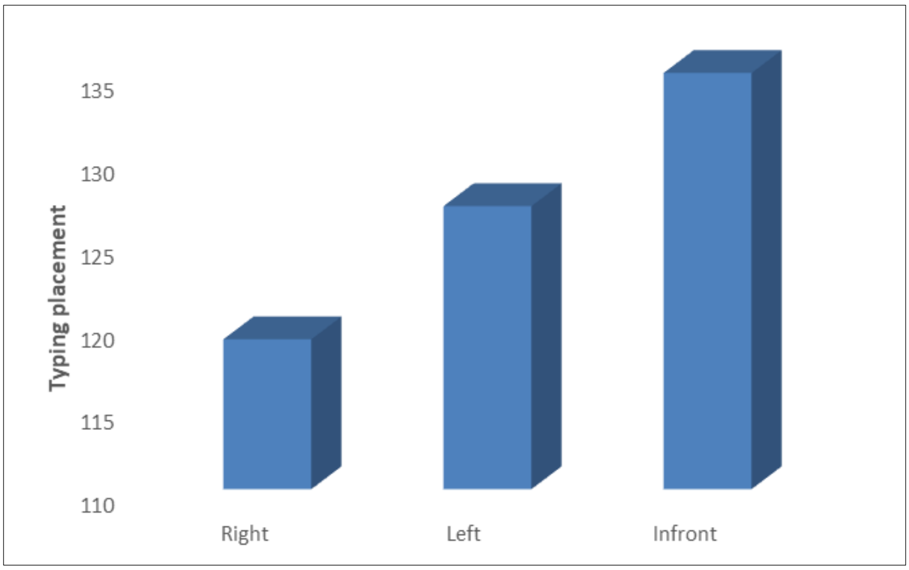

Fig. 3: Typing document position among computer operators

The result of Fig 3 shows that participants who typed in front were majority with 35.3% been majority and the least was right with 31.2%.

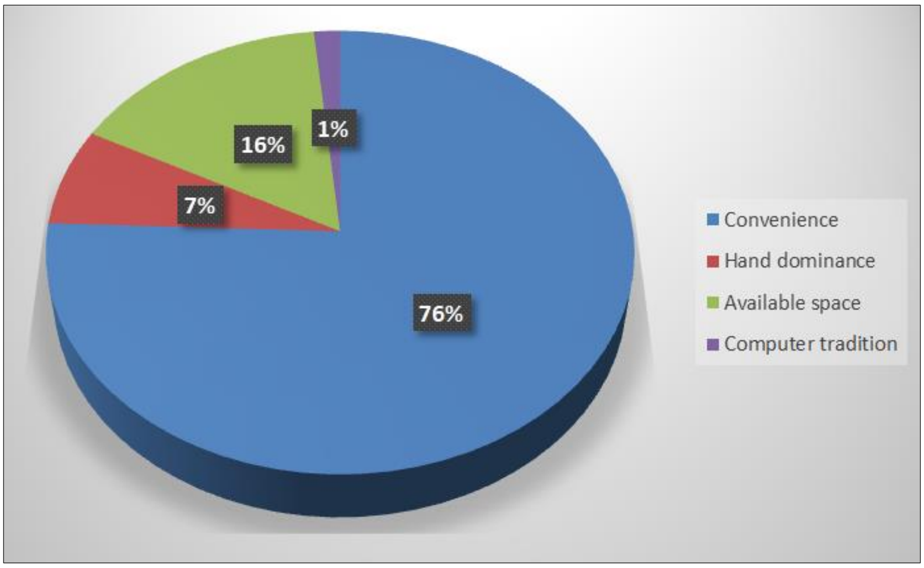

Fig. 4: Reason for placement

Fig 4 result showed that the major reason for placement was convenience with 76% and the least was computer tradition with 6%.

DISCUSSION OF THE FINDINGS

Computer vision syndrome is a digital eye fatigue diseases that is linked to prolonged usage of computer, tablet, and cell phone operators, which has led to dryness of the eyes. However, the symptoms associated with it are eye fatigue, headache, blurred vision, and dry eyes; double vision and head and neck pain (Munshi *et al.,* 2017). The study explores the ophthalmic challenges faced by computer operators, highlighting potential risk factors and suggesting strategies to improve vision ergonomics, promote visual hygiene, encourage regular eye exams, and raise awareness about screen use.

The study showed a low prevalence of history of eye defects among computer operators with 15.2%. Also, none of the participants had an eye defect history; the majority had 84.6%, and the least was trauma with 0.3%. It was further revealed that majority do not use medicated glasses, 11.5% use medicated glasses, greater percentage of the participants do not use any type of glasses, and 3.9% use cylindrical glasses. However, the study revealed no family history of glass users, and 20.7% had a history of glass users, majority had no type of family defect, and 1% had astigmatism. The reason for their low level of prevalence is not well understood but suggesting that most of the participants do not have any form of eye defects and eye defect history in their family. The study contradicts the findings of Patil *et al.*, (2019) demonstrating a high prevalence of eye defects in CVS disorders among computer operators. Also, Zayed *et al.*, (2021) showed a high prevalence of 82.41% eye defect of DES, which disagree to the study findings. Gautam *et al.* (2020) revealed a high prevalence of 92.4% of eye defects, which refutes the study outcome. Logaraj *et al.*, (2013) revealed that neck and back pain, shoulder and wrist pain, CVS, an over use syndrome resulting in ocular and musculoskeletal discomfort, which disagree to the study findings.

The study revealed that majority of computer operator had 78.5%, which were aware of eye defect among computer operators and 21.3% were not aware, and 26% were impaired vision been indicated as the major type of defect and the least was shoulder pain was the least with 1%. Therefore, the participants had a good level of awareness of defect and its types that affect computer operators. Their high level of awareness was attributed to their educational level and no defect of eye disorder in their family history. Muma *et al.*, (2020) and Patil *et al.*, (2019) showed a low level of awareness of eye defect syndrome, which disagree to the study findings.

The study findings showed that 34.6% had challenges since usage of computers and 65.4% did not, while the types of challenges encountered were none, with the majority having 63.3% and the least being 3% each with neck/shoulder pain and a difference in focus. Also, the majority of the participants had a near-normal visual acuity of 35.8%, the least was 3% with 20/40 shortsightedness, 15% had pterygium, and 85% did not. The study findings disagree to the report of Gautam *et al.*, (2020) and Reddy *et al.*, (2013) revealing that eye, headache, ocular irritation and itching and neck, shoulder or back pain been the most common symptoms of computer operators. Verma *et al.*, (2021) reported dry eyes as the major symptoms, which disagree the study findings.

The study findings revealed that males were more than females, the major age ranged of computer operators were between 21-25 years and educational levels were people with OND certification.

The study revealed that gender had a significant positive correlation with types of eye defect history, while age and educational level had a negative correlation with types of eye defect history, which had no significant differences. Also, the gender and educational level had a negative correlation with history of eye defect but indicate a significance in gender and educational level had no significant and age had a positive correlation with history of eye defect, which had no significant. Further, a significant association between gender, age, and educational level challenges with computer usage. Zayed *et al.*, (2021) revealed that females were determinant predictors of ophthalmic challenges, which is in line with the study findings.

However, the study findings revealed that most participants used computer produced between 2016 to 2020, with a screen size of 15-16 inches been majority. Also, a greater percentage uses font size 12-14 inches and majority do not use protective shield a daily usage of 4-6 hours was the dominant hours of operation by computer users. The study also demonstrated that the distance of documents from eyes was 10 to 30 cm, a greater percentage do not use shield type, and distance of eyes from the screen was from 41 cm and above been majority. Further, higher percentage of the participant typed document in front and their reason given was convenience. However, the findings showed similarity to the report of Verma *et al.*, (2020) reveals that 4-6 hours was the major hours of operating computers. Zayed *et al.*, (2021) reported more than 6-hours usage of computer operation, which disagree to the study findings. However, the reports of Johnson *et al.*, (2018) and Smith *et al.*, (2019), emphasizing the importance of maintaining an optimal viewing distance to mitigate eye strain, which is accordance with the study findings. Reddy *et al.*, (2013) revealed that most of the hours spent in computer operators was more than 2 hours, which disagree to the study.

Also, the mean systolic and diastolic blood pressure of the participants were within the normal range as described by WHO standard. Thus, the participant was indicated of obesity and light intensity in their work place was high. The study showed similarity to the report of Verma of *et al.*, (2021), which indicated that males (61) were more than females (39) and also in age range (21-30 years) been the majority. However, Zayed *et al.*, (2021) revealed that females were more than males and were factor for digital eye strain diseases, which disagree to the study findings. Muma *et al.*, (2020) reported lower males than females, which contradict the study findings.

CONCLUSION

The study revealed that there was a good level of awareness of eye defect with impaired vision been the most defect affecting computer operators. However, there was no history of defect and its types among the participants, which indicate a low prevalence of eye defect history among the computer operators within Anambra state. Further, a low prevalence of ophthalmic challenges was encountered and light sensitivity was high and blurred vision was indicated as well. Also, majority of the participants had short sightedness and does have not pterygium. The environmental challenges encountered by the computer operators were dust, and gender had a relationship with types of eye defect history and history of eye defect. Thus, the study demonstrated that gender, age, and educational level had an influence on the challenges since usage of computer.

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