

Low vision and influencing factors of visual acuity among students

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ABSTRACT

Aim: To determine the prevalence of low vision and factors influencing visual acuity among students.

Materials & Methods: This descriptive study was carried out within 3 months in a tertiary institution in eastern part of Nigeria. A non-probability purposive sampling technique was used to select 120 volunteered subjects which included only students (individuals using corrective lens and had undergone eye surgery were excluded). The visual acuity of the selected subjects was measured using Snellen chart. Data obtained was analyzed using SPSS version 25.

Results: Among the 120 selected volunteers aged 15 – 35 years; 40% were males and 60% were females. Greater proportion (79.17%) had mild vision loss with 50.83% having visual acuity of 6/9, 23.33% having visual acuity of 6/12 and 5.00% having visual acuity of 6/18; while 20.83% had normal vision with visual acuity of 6/6. Factors that may influence visual acuity among students includes; light (tube light: 77.50%, dim light: 10.83%, other light: 11.67%), period of exposure to light (30 – 40 minutes exposure: 22.50%, exposure for 40 minutes – 1 hour: 55.83%, above 1 hour exposure: 21.67%) as well as exposure to computer screen, television screen and phone screen. This study finding also suggests that heredity and congenital factors may also influence visual acuity.

Conclusion: There was high prevalence of low vision among the studied student population, which may be due to influencing factors of visual acuity mentioned in this study. Hence, sensitization on the impacts of factors influencing visual acuity and personal eye care is needed among students to prevent loss of vision.

Keywords: Visual acuity, Low Vision, Visual impairment, Eye defects

INTRODUCTION

Eye is a special sense organ of sight (visual system) which receives visual signals that are carried to the brain for processing of the visual details; hence providing vision to living organisms. Vision occurs when light is detected by the eye and converted to electrochemical impulses in nerve cells (Zhang, 2019; Nowik, 2020). Visual acuity is the evaluation of the potentials of the eye to differentiate the details of shapes or objects at a given position or distance. Visual acuity can be classified into; normal vision (6/6), mild vision loss (<6/12 – 6/18), moderate vision loss (<6/18 – 6/60), severe vision loss or blindness (<6/60); where the numerator refers to the point or distance in meters at which an individual sees clearly on the Snellen chart, while denominator refers to distance in meters at which an individual with normal sight can see on the chart (Ehrlich et al., 2021).

Low vision, characterized as inability to clearly see an object that is far (myopia) or inability to clearly see near objects (hyperopia or hypermetropia) can be mediated by factors that influence visual acuity adversely (Gopalakrishnan et al., 2020). Influencing factors of visual acuity capable of inducing loss of vision includes; exposure to light, computer screen, television screen and phone screen (Alvarez-Peregrina et al., 2020; Lai et al., 2020; Mylona et al., 2020). Hereditary and congenital factors could also influence visual acuity as they influence lots of genetic variance and traits (Manotas et al., 2019; Nwosu et al., 2022a). Knowing the prevalence of vision impairment and its influencing factors would form basis for campaigning against certain factors that will cause loss of vision as well as enhancing personal eye care among individuals to improve their visual acuity. Hence, this study was carried out to evaluate the prevalence of low vision and factors influencing visual acuity among students in an institution in Eastern Nigeria.

MATERIALS AND METHODS

This is a descriptive study that involved 120 volunteered students in a tertiary institution in Eastern part of Nigeria and performed in accordance to ethical consideration; participants were informed of study's relevance and procedure, consent was obtained and subjects' confidentiality was maintained. This study was carried out within 3months, non-probability purposive sampling technique (Ajuzie et al., 2023) was used to select volunteered subjects which included only students (individuals using corrective lens and had undergone eye surgery were excluded). Socio-demographics were obtained as described by Ajuzie et al., (2022a). Snellen chart was used to determine the visual acuity of the subjects and data obtained was used to classify subjects into normal vision (6/6), mild vision loss (<6/12 – 6/18), moderate vision loss

(<6/18 – 6/60), severe vision loss or blindness (<6/60); where the numerator refers to the point or distance in meters at which an individual sees clearly on the Snellen chart, while denominator refers to distance in meters at which an individual with normal sight can see on the chart (Ehrlich et al., 2021). Questionnaire-based methodology as was described by Ajuzie et al., (2022b) and Nwosu et al., (2022b) was used to evaluate factors influencing visual acuity among the selected students studied. Data obtained was analyzed statistically using SPSS version 25 and result was expressed as frequency (n) and percentage (%).

RESULTS

Socio-demographics

The study included only students in the studied area with age range of 15 – 35 years; 40% were male, 60% were female, greater proportion (68.33%) came from a nuclear family and higher proportion (62.5%) having 2 siblings (Table 1).

Table 1: Socio-demographics

Variables	Frequency (n)	Percentage (%)
Age (years)		
15 - 20	35	29.17
21 - 25	73	60.83
26 - 30	11	9.17
31 - 35	1	0.83
Gender		
Male	48	40.00
Female	72	60.00
Family type		
Nuclear	82	68.33
Polygamous	38	31.67
Number of siblings per family		
1	20	16.67
2	75	62.50
> 2	20	16.67
0	5	4.17

Visual acuity and low vision prevalence among students

Greater proportion 95(79.17%) had mild vision loss with 61(50.83%) having visual acuity (6/9), 28(23.33%) having visual acuity (6/12) and 6(5.00%) having visual acuity (6/18); while 25(20.83%) had normal vision with visual acuity (6/6) (Table 2).

Table 2: Visual acuity among volunteered students

Visual acuity	Frequency (n)	Percentage (%)	Vision classification	Total n (%)
6/6	25	20.83	Normal vision (6/6)	25 (20.83)
6/9	61	50.83		
6/12	28	23.33	mild vision loss	95(79.17)
6/18	6	5.00	(<6/12 – 6/18)	
Total	120	99.99		120(100)

Influencing factors of visual acuity among students

Factors that may influence visual acuity among students include; reading position, distance between eyes and book during reading, exposure to light, computer screen, television screen, phone screen, hereditary and congenital factors (Table 3a and 3b).

Table 3a: Influencing factors of visual acuity; light, reading posture, computer, television and phone screen exposure

Variables	Frequency (n)	Percentage (%)	Total n (%)
Light exposure			
Tube light	93	77.50	
Dim light	13	10.83	120 (100)
Other light	14	11.67	
Duration of exposure to light			
30 - 40 minutes	27	22.50	
40 minutes - 1 hour	67	55.83	120 (100)
Above 1 hour	26	21.67	
Reading position			
Sitting	79	65.83	
Lying	31	25.83	120 (100)
Semi-Sitting	10	8.33	
Distance between eyes and books during reading			
Normal distance (30 cm)	48	40.00	
Near (Below 30 cm)	72	60.00	120 (100)
Far (Above 30 cm)	0	0.00	
Exposure to computer screen			
Doing homework	20	16.67	
Playing games	40	33.33	120 (100)
Others	60	50.00	
Exposure to television screen			
Everyday	95	79.17	
Weekend	22	18.33	120 (100)
Only during vacation	3	2.50	
Television exposure duration per day			

Only for an hour	5	4.17	
Less than 3 hours	17	14.37	120 (100)
More than 3 hours	98	81.67	
Television placement			
Below the eye level	1	0.83	
At the eye level	90	75.00	120 (100)
Above the eye level	29	24.17	
Position for watching television			
Sitting	36	30.00	
Lying	60	50.00	120 (100)
Semi-sitting	24	20.00	
Distance between eye and television			
Very near (below 2 meters)	0	0.00	
Near (2 – 3 meters)	5	4.17	120 (100)
Far (4 meters and above)	115	95.83	
Exposure to phone screen			
1 hour	0	0.00	
Less than 5 hours	2	1.67	120 (100)
More than 5 hours	118	98.33	
Hurting eye experience after exposure to phone screen			
Always	36	30.00	
Sometimes	44	36.67	120 (100)
Never	40	33.33	

Table 3b: Influencing factors of visual acuity; hereditary and congenital

Heredity factors	Frequency (n)	Percentage (%)	Total n (%)
Family history of wearing spectacles			
Yes	47	39.17	120 (100)
No	73	60.83	
Reason for wearing spectacles			
Long sightedness	9	19.15	
Short sightedness	17	36.17	47 (100)
Others	21	44.68	
Age at 1st spectacles			
At child age	4	19.00	
Adult age	32	68.08	47 (100)
Old age	11	23.40	
Congenital factors			
Difficulty in reading in dim – light	12	10.00	
No difficulty in reading in dim – light	99	82.50	120 (100)
sometimes difficult in reading in dim light	9	7.50	

DISCUSSION

This study finding showed that greater proportion 95(79.17%) had mild vision loss which suggest a high prevalence of low vision among the studied student population. This is similar to studies (Lyu et al., 2019; Xie et al., 2021) that also reported high prevalence of low vision among studied student population. This could be as a result of exposure of the students to certain factors that may have affected their visual acuity.

In this study it was observed that; reading position, distance between eyes and book during reading, exposure to light, computer screen, television screen, phone screen, hereditary and congenital factors (Table 3a and 3b) may have influenced the outcome of the study as high proportion (60%) read near (below 30 cm) to the books; which is in accordance to reports that distance and font size can influence visual acuity of the eye (Legge et al., 2016). Exposure to light can affect visual acuity which may predispose to low vision (Wang et al., 2013) as it was observed in this study that greater proportion (77.50%) use tube light and 55.83% are exposed to light at least 40 minutes to 1 hour daily while reading. It was observed that low vision outcome of the participants may be as a result of their exposure to computer screen, television screen and phone screen (Table 3a) as volunteers use computer in doing homework, playing games and others; 79.17% are exposed to television screen every day, 81.67% are exposed to television screen for more than 3 hours and 98.33% are exposed to phone screen more than 5 hours daily. 30.00% always experience eyes hurting after exposure to phone screen and 36.67% feels eyes hurting sometimes suggesting an adverse impact on the eyes. This corresponds to reports that support the fact that visual acuity could be influenced by exposure to computer screen, television screen and phone screen (Lissak, 2018; Şahlı and İdil, 2019). Other factors such as heredity and congenital factors could also influence visual acuity (Shah et al., 2011) as observed in this study (Table 3b).

CONCLUSION

There was high prevalence of low vision among the studied student population, which may be due to influencing factors of visual acuity such as exposure to light, computer, television, phone screen as well as other factors (heredity, congenital) which could predispose individuals to visual impairment. Hence, sensitization on the impacts of factors influencing visual acuity and personal eye care is needed among students to prevent loss of vision.

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