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KNOWLEDGE OF ASTHENOPIA AND AMMETROPIC STATUS AMONG FRESHERS: OPTOMETRIST VISIBILITY IN UNIVERSITY HEALTH CENTER

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Abstract:

The society register a large population of person who has never visited the clinic and most of these subjects suffer asthenopia due to either uncorrected spherical or astigmatic condition. This can lead to other damaging visual disorders like amblyopia and strabismus. Most tertiary institutions seem unaware of these indices and the dangers associated; therefore, do not take deliberate steps in the prevention and correction of these disorders leading to a rise in visual impairment among students. This study wished to close the gap between knowledge of asthenopia and its indices in tertiary institutions. The research adopted an incidental random sampling technique and recruited 258 subjects from the target population. Snellen Visual Acuity Test, Slit Acuity Test and Near Point of Convergence (NPC) were performed on the student and findings recorded. Furthermore, questionnaires were administered to subjects for assessment their level of personal refractive error status awareness. Research observed that the percentage of students who were presumed to have spherical ocular aberrations were 18.2% and those without were 81.8%. Cylindrical ocular aberrations were 15.1% and those without cylindrical ocular aberrations were 84.9%. This study also predicted that students with spectacle prescription (8.5%) are less than students with aberrations (24.8%). Furthermore, study showed a weak negative relationship between spherical and cylindrical aberration when compared to NPC (r = -0.116). Conclusively, this study observed that a greater number of this population were ignorant of their refractive status and therefore, study wish to advocate for a proper ocular health screening on-admission and, periodic medical fitness check which must include a comprehensive eye examination with treatment plans including lens prescription coverage.

Keywords:

spherical ocular aberration, cylindrical aberration, refractive error, lens prescription.

INTRODUCTION

Spherical and cylindrical ocular aberrations are the major cause of visual impairment (Jafer and Girma 2014; WHO 2010). Most institutions are unaware of the dangers that are incurred in this ignorance. The society register a large population of person who has never visited the clinic and most of these subjects are either myopic, hyperopic or astigmatic unknown/uncorrected (Ezelum*et al.*, 2011). This can lead to other damaging visual disorders like amblyopia and strabismus (Elham *et al.*, 2015). Most tertiary institutions seem unaware of these indices and the dangers associated; therefore, do not take deliberate steps in the prevention and correction of these disorders leading to a rise in visual impairment. Ammetropia is a condition where there is abnormality in the focusing of light by the eye on the retina (Isawumi*et al.*, 2016). Spherical ammetropia (refractive errors -myopia or hyperopia) occur when the optical power of the eye is either too large or too small to focus light correctly on the retina, the light-sensitive tissue lining the inner surface of the eye. Cylindrical ammetropia (Astigmatism) occurs when the optical power of the eye is too powerful or too weak across one meridian, due to either unequal curvature of the corneal or crystalline surface or both respectively.

This study wished to close the gap between knowledge of asthenopiaand its indices in tertiary institutions.

Aim of the study

This study determined the indices of spherical and cylindrical ocular aberrations among freshers. Precisely, the study; determined visual acuity and average number of students with spectacle prescription. Study also predicted total number of students with spherical and cylindrical ocular aberrations in both department and compared for each department.

Scope of Study

This study concentrated on Spherical and Cylindrical Ocular Aberrations amongst freshers: Faculty of Basic Medical Sciences, Delta State University, Abraka, Delta State, Nigeria.

MATERAL AND METHODS

A good number of students voluntarily gave consent, and 258 subjects were recruited from the 100-levelclass admitted into the faculty of Basic Medical Sciences (BMS) of the university. BMS has five departments total number of fresshers for this the session were 487 students. The study was carried out in Physiology Department laboratory located at site 3 of the Delta State University (DELSU), Abraka. Delta State. Distance Snellen Chart, Pin hole, Slit, Trial frame, Meter Rule, Pen and Two diopters (2D) concave lens were material used in data collection.

The sample size was estimated adopting …. formular

Sample Size, n=

Here

$Z_{1-a/2}$ = Is standard normal variate (at 5% type 1 error ($P<0.05$) it is 1.96), 1.96

P = Expected proportion in population based on previous studies or piloted,

79.5% or 0.795

d = Absolute error precision-Has to be decided by researcher, 0.05

n===250.44

This research was divided into two based on Department and Visual Acuity:

GROUP A; Based on Departments

Subgroups;

- Physiology, Medical Laboratory Sciences and Nursing
- Pharmacology and Anatomy

GROUP 2; Based on Visual Acuity

Subgroups;

- Within Good Visual Acuity (6/4-6/9)
- Reduced Visual Acuity(6/12-6/60)

Inclusion Criteria

The following criteria were used to include subjects in this study. They are;

i. 100 level students of Physiology and Pharmacology departments,
ii. Subjects with relatively healthy eyes
Exclusion Criteria

The following was used to exclude subjects in this study. They are;

i. Students in 200-400level
ii. Post-graduate students and staff
iii. Freshers with obvious ocular dysfunction

Methodology

Visual Acuity at Far Distance Procedure

Subject Requirements

1. Subject must be compliant,
2. Subject must comprehend what is required,
3. Subject must have the ability to recognize images used on the snellen chart,
4. If subject has previously been corrected for distance aberration, the subject is to present the corrective prescription.

Materials Used

Snellen Chart, Trial Frame, 2D concave cylinder, Slit Pinhole and Occluder.

Procedure

The test is usually carried out at a distance of 6 meters or 20 feet contingent on the chart being used. Subjects who are myopic and typically wear glasses or contact lens was indicated in the results.

Each eye was tested separately; an occluder can be used for this purpose. Adequate illumination is vital; subject read from the top letter and continued pending the subject cannot read the line clearly or

makes multiple errors. If the 6/6 line is not reached, usage of pinholes to check for improvement of vision was employed. Testing was continued if there was improvement, until the subject was unable to clearly recognize further letters/ numbers.

The Slit was inserted into the right part of the trial frame at 180 Meridian, the subject was asked to read from the chart; result was recorded for right eye. The slit was turned to a 90 meridian, and result recorded for right eye. The Subject was tested using a 2D concave Cylinder lens at 180 Meridian and 90 Meridian for both eyes.

Interpretation/ Results

The result of the visual acuity test is expressed as a ratio; X/Y. Where X is the testing distance and Y refers to the line containing the smallest letter that the subject identifies.

Documentation

Visual acuity was recorded for each eye. The following was included if used; pinhole, slit, and -2 CYL.

An example

1. RVA 6/9 LVA 6/6 (with glasses) PH 6/6 Slit 180 6/9

Near Point of Convergence

This is a standard test for convergence ability.

Materials

A fixation target: Pen and a ruler.

Procedure

- The subjects sat down in a comfortable chair and looked directly at the tip of pen that was held in the mid-sagittal plane of the subject's head at the level of his/her nose.
- The room was well illuminated.
- The fixation object was slowly and smoothly moved in the mid-sagittal plane closer to the patient's nose.
- The subject was asked to notify when he/she sees the fixation object in double/blurry

This point is the near point of the convergence (NPC).

Interpretation of Results

The Near Point of Convergence was measured in Centimeters. The normal Near Point of Convergence is 6-10 centimeters.

Data Analysis

The data was collected and compared statistically; SPSS software was used in carrying out the analysis of the data.

PRESENTATION OF RESULTS

Table 1: **Descriptive Statistics of Frequency, Aberrations and Percentage Showing of Spectacle Prescription Based on Departments**

Departments	Prescribed		Not Prescribed		Aberrations	
	Freq	(%)	Freq	(%)	Freq	(%)
Physiology	10	(3.9)	118	(45.7)	33	(12.8)
Pharmacology	12	(4.7)	118	(45.7)	31	(12)
Both departments	**22**	**(8.5)**	**236**	**(91.4)**	**64**	**(24.8)**

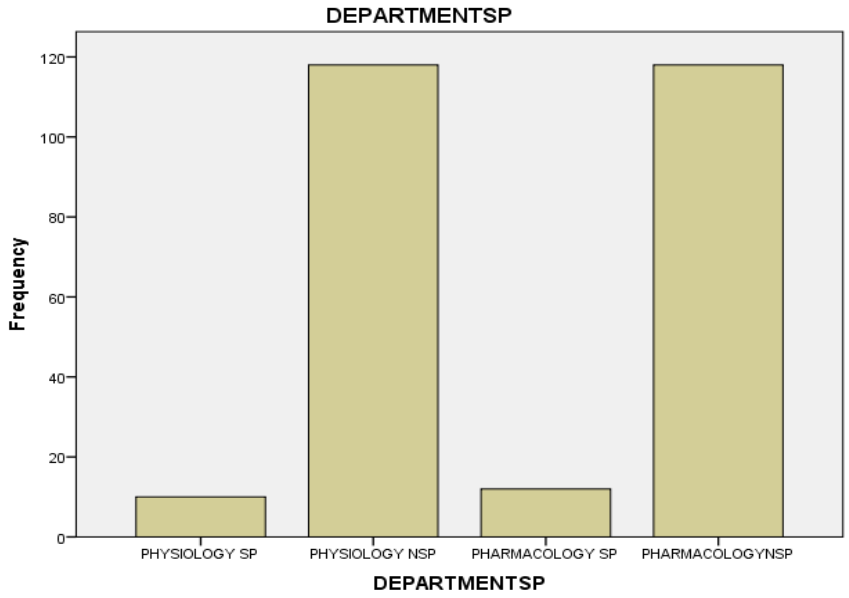

Figure 4.1: Chart showing department distribution

From the figure above, the department of Physiology (n=128, 49.6%) and the department of pharmacology (n=130, 50.4%).

Table 2: Descriptive Statistics of Mean and Standard Deviation Showing Comparison Of Npc Between Spherical/Non Spherical Errors Sample

Groups	N	F%	MEAN	MEANDIFF	SD
spherical	47	18.2	9.083		2.38495
				1.03600	
Non spherical	211	81.88.2725			2.39402

The table shows that respondent with sphericalerror status has a mean NPC of 9.083 with a standard deviation of 2.38495, while those without spherical error status have a mean NPC of 8.2725 , with an SD of 2.39402. Those with spherical error has a higher mean when compared with their counterpart. To determine if the difference is significant, independent sample t-test was used to test ho------ and the result is shown in TABLE 2

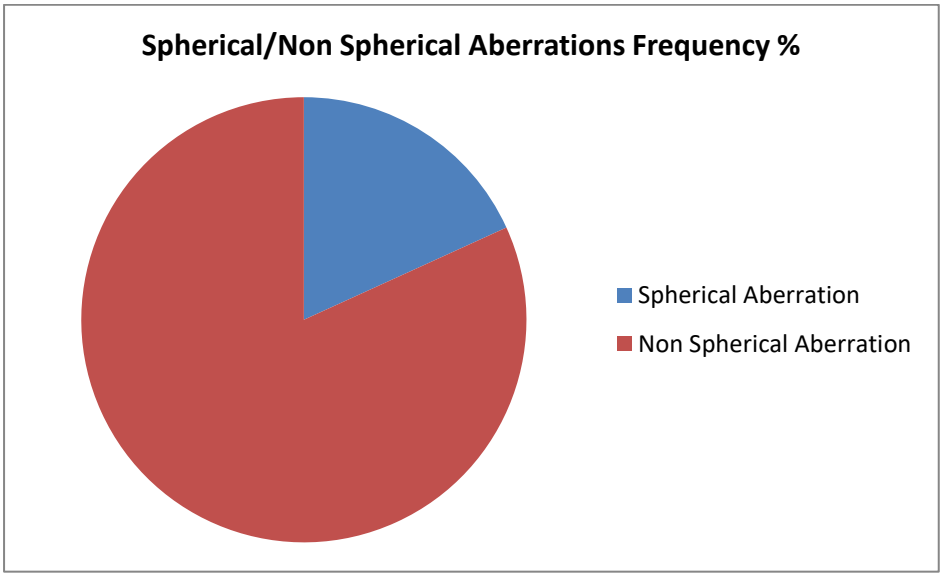

Figure 2 : Chart showing frequency of Participants with Spherical/Non Spherical Aberration
From the figure above, Participants with Spherical Aberration (n=47, 18.2%) and Participants without Spherical Aberration (n=211, 81.

Table 4

3: Independent Sample t-Test Showing Comparison of NPC Between Spherical and Non-Spherical Error Sample

Groups	N	MEAN	MEAN DIFF	SD	dt	t	sig(2tail)
spherical	47	9.3085		2.38495	256	2.689	0.008
			1.03600				
Normal	211	8.2725		2.39402			

The difference observed difference between the NPC of spherical and non-sphericalis significant since the calculate sig value of 0.008 is less than the alpha value of 0.05, with this, the HO which states that -------- is rejected.

Table 4: Descriptive statistics of mean and standard deviation showing comparison of NPC between cylindrical and non-cylindrical sample

Groups	N	F%	MEAN	MEAN DIFF	SD
Cylindrical	39	15.1	9.3874	0.3836	1.10292
Non- cylindrical	219	84.9	8.2945	0.16140	

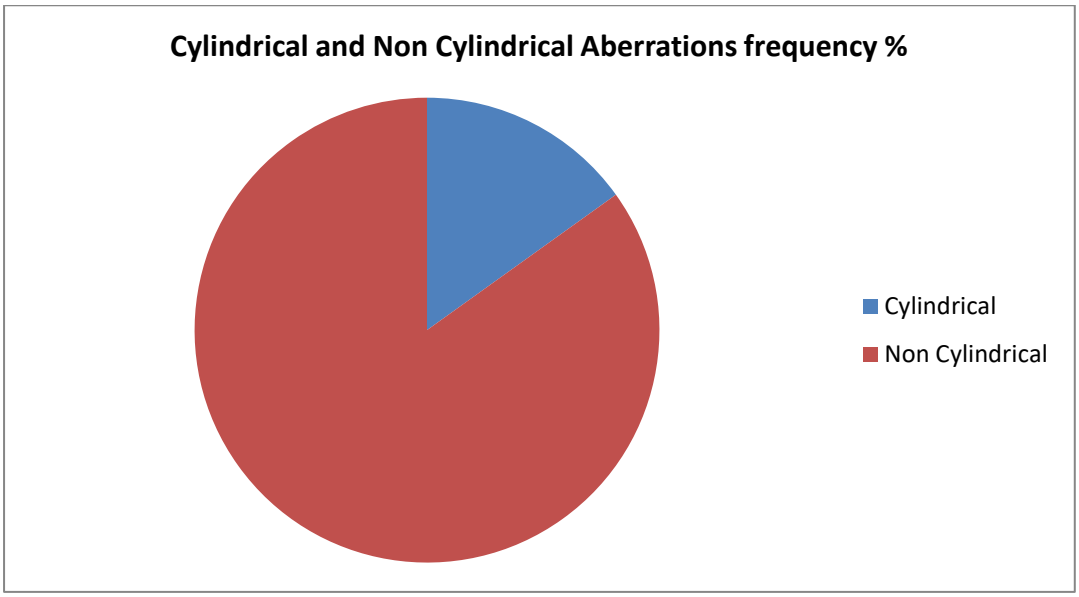

Figure 3: Chart showing Frequency of Participants with Cylindrical and Non-Cylindrical Aberrations

From the figure above, Participants with Cylindrical Aberrations (n=39, 15.1%) and Participants without Cylindrical Aberrations (n=219, 84.9%).

Table 5: **Independent sample t-test statistics of mean and standard deviation showing comparison of NPC between cylindrical and non- cylindrical sample**

Groups	N	MEAN	MEAN DIFF	SD	dtt	Sig (2-tail
Cylindrical	39	9.3874	1.10292	0.38361	256	0.008 2.656
Non- Cylindrical	219	8.2945		0.16140		

Difference Is Significant

Table 6: **Descriptive statistics of mean and standard deviation showing comparison of NPC between spherical error and cylindrical error**

Groups	N	MEAN	MEAN DIFF	SD
Spherical	47	9.3085	2.38495	0.1402
Cylindrical	39	9.3874	0.38361	

Table 7: Independent sample t-test statistics of mean and standard deviation showing comparison of npc between spherical error and cylindrical error

Groups	N	MEAN	MEAN DIFF	SD	dt	tSig.(2tail)	
spherical	47	9.3085	2.38495	0.1402	84 0.266	0.791	
Cylindrical	39	9.3874	0.38361				

Difference is not significant

Table 8 Pearson product moment correlation showing relationship between spherical and cylindrical error NPC

	N	r	sig (2tail)
SPHERICAL - CYLINDRICAL	86	-0.116	0.481

WEAK Negative relationship because r value of -0.116 is far from 1. The relationship is not significant cause calculated sig value of 0.481 is higher than alpha value of 0.05

Discussion

The study focused on assessing the visual acuity and Near Point of Convergence (NPC) of the students of 100level Physiology and Pharmacology departments.

Spectacle prescription had a percentage of 8.5%, from table 1, which was higher than the 3.4% of spectacle coverage of Nigerian Adults (Ezelum*et al.,* 2011). This study revealed, from table 2, that 18% of students of pharmacology and physiology department in their first year had spherical aberrations which was higher than 16.2% in Nigerian adults (Ezelum*et al.,* 2011). This study also revealed from table 1, that 24.8% of students had aberrations

Table 2.Showed that respondent with spherical error status had a mean NPC of 9.083, while those without spherical error status had a mean NPC of 8.2725, those with spherical error has a higher mean when compared with their counterpart, table 4.3 shows the relationship between NPC and Spherical/Non Spherical errors showed was significant ($p<0.05$) meaning subjects with spherical aberration had higher Near Point of Convergence. Table 5 showed that respondent with cylindrical error status had a mean NPC of 9.3874, while those without spherical error status had a mean NPC of 8.2945, those with cylindrical error had a higher mean when compared with their counterpart. The results, table 5, of this research showed a positive significant relationship ($p<0.05$) between NPC and cylindrical/Non cylindrical error sample meaning the subjects with cylindrical error had a higher near point of convergence. This study also revealed, from table 4, 15.1% of students of pharmacology and physiology department in their first year had cylindrical aberrations which was lower than 51.1% in Nigerian Adults (Ezelum*et al.,* 2011). In Hadi *et al.,* 2016 they discovered, while the association with refractive error was no longer significant ($p = 0.109$, coefficient = 0.128) after adjusting for age and gender.

The two main findings are the relatively low prevalence of myopia and the extremely low spectacle coverage (Ezelum*et al.,* 2011). The findings of Ezelum*et al.,* are similar to that of this study, which are relatively low prevalence of spherical and cylindrical errors and extremely low spectacle coverage.

Table 8 showed weak negative relationship because r value of -0.116 is far from 1, the relationship is not significant cause calculated sig value of 0.481 is higher than alpha value of 0.05, the comparison of NPC between spherical errors and cylindrical errors was not significant ($p>0.05$) which is similar to the research conducted by Hadi *et al.,* 2016.

5.2 Conclusion

Indices of spherical and cylindrical aberrations were low. This study predicted the percentage of students with spherical ocular aberration (18.2%) and Cylindrical ocular aberration(15.1%) among freshers of Physiology and Pharmacology departments in comparison to students without spherical aberrations (81.8%) and without cylindrical aberrations(84.9%). This study predicts that freshers that do not have refractive errors (spherical and cylindrical aberrations) are more than students with refractive errors. This study also predicted the students with spectacle prescription (8.5%) are less than students with ocular aberrations (24.8%).Furthermore, study showed a weak negative relationship spherical and cylindrical aberration when compared for NPC because r-value of -0.116 is far from 1.

Recommendation

Students should be encouraged to have an on-admission medical screening and periodic medical fitness check which must include a comprehensive eye examination. A government policy on eye and physical examination and treatment prior to admission into tertiary institutions, as well as regular intervals per session should be advocated and institutional medical health should be thoroughly incorporated into school health programs. Treatment plans for spherical and cylindrical aberrations alongside other medical disorders with spectacle coverage should be readily available to all students.

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