Original Research Article

Neurophobia: How do Nigerian Medical Students Perceive Neurology?

Abstract

Background: The fear of Neurology among medical students has become a common phenomenon. This has significant implications for the availability of Neurological specialists in developing countries like Nigeria. With the increasing burden of neurological diseases and few neurologists, more homegrown neurologists are needed. However, this may not be achievable without interest in neurology by medical students. This study evaluated this issue among Nigerian medical students.

Methodology: The study was a cross-sectional study among 128 medical students using an online questionnaire. The responses were analyzed using Statistical Package for the Social Sciences (SPSS) version 25.

Results: The majority (68.8%) of respondents have limited knowledge of Neurology and low interest. Of the total respondents, 69.5% perceived Neurology as a difficult speciality, and 86.7% attributed their lack of interest to poor teaching. 78.9% attributed the difficulty to poor knowledge of neuroanatomy, 66.4% agreed that limited exposure to neurological patients reduced their interest in the speciality, and 61.7% believe neurological diseases are difficult to diagnose. Most participants inclined that improved neuroanatomy teaching, more patient exposure, and bedside teaching are the most important strategies to improve Neurology interest and competence.

Conclusion: Neurology was the most challenging course in our study. In order to ensure that students have a better understanding of the subject and to produce medical doctors who are qualified to handle neurological complaints, we, therefore, encourage medical schools in Nigeria to take action in this regard, such as adopting new teaching techniques that are linked to students' needs and assessment feedbacks.

Keywords: Neurophobia, Medical Student, Neurology.

Introduction

Neurology is the medical speciality concerned with the nervous system and its functional or organic disorders (1). Jozefowicz first described Neurophobia in 1994 as the fear of neurosciences and clinical neurology attributed to the students' incapability to apply their knowledge of basic sciences to clinical practice (2). This has, however, been observed to stem from difficulty in understanding neuroanatomy (3, 4), poor teaching of neuroscience subjects (5), low exposure to neurological cases, the low numerical strength of neurology teachers(3) and complex clinical examination (6).

Neurological disorders contribute to about 2.9% of Africa's global disease burden. They are responsible for 16.8% of deaths in low-and middle-income countries and 12% globally (7) hence the need for adequate measures to stem the trend. In Nigeria, the epidemiology of neurological disorders as seen in the outpatient department of three tertiary healthcare facilities was 48.7 per cent in the University of Nigeria Teaching Hospital, Enugu, from January 2007 to August 2008,(8) 39.41 per cent in Lagoon Hospitals, Lagos, from July 2014 to December 2017(9) and about 43 per cent from a 12-year survey at the University College Hospital, Ibadan(10). Also, a survey by Sanya et al. of 3 first-generation, second and third-generation medical colleges about the interest of medical students in neurology showed that most students believed that making a diagnosis in neurology is complex, and few of them engage in peer discussion groups on neurology topics(3).

Most studies showed that medical students ranked neurology the least preferred course compared to other specialities, such as rheumatology and geriatrics,, that were just being developed in most

countries(6). Only 4% of the students indicated an interest in neurology practice in the study by Sanya et al. in Nigeria(3), 11.8% by Ahmad et al. in Saudi Arabia(4) and 9.4% by Abdelhaleem et al. in Khartoum, Sudan(6). The knowledge of neuroanatomy has however been found to have a significant impact on the interest of medical students in neurology(11, 12) and therefore suggests the need to reiterate and integrate basic neuroanatomy and physiology in clinical practice.

Some methods addressed in improving neurology teaching include increased tutorials and improved use of online resources. Philip et al. also employed small group learning sessions as a traditional way of teaching neurology (13) which fostered a keen interest in the field.

Medical students have also been observed to show low confidence in handling neurological cases (11). This reason for neurophobia resulted from difficulty in understanding neurology and a low level of knowledge in the field. Risdale et al., however, employed the use of team-based learning, and an increase in student confidence was observed(14). Team-based learning involves a permanent team created by the instructor to involve ideally 5-7 members whose knowledge is tested with a readiness assurance test. Other educational interventions, such as case-based training and problem-based learning, have increased self-reported knowledge(15). However, little is known about neurophobia among Nigerian medical students. This study aimed to assess clinical medical students' perception of neurology and shed the light on factors governing this perception.

Methodology

Study Setting

The study was carried out among medical students at the College of Health Sciences, Ladoke Akintola University of Technology, LAUTECH, Ogbomoso, Nigeria. The institution is owned by Oyo state with over twenty-five thousand undergraduates with the main University campus, College of Health Sciences and Teaching Hospitals located in Ogbomoso on Latitude 8o 08' 00" East and Longitude of 4o 16' 00" North of the Equator, within the savannah region and a gateway to the Northern part of Nigeria from the Western region.

Study Design

The study was a cross-sectional descriptive design conducted between October to December 2022.

Technique

The study involved only students in the clinical years that have undergone at least one rotation in the Clinical departments of Surgery, Internal Medicine, Pediatrics and Obstetrics/Gynecology. At the time of the study, there were one hundred and forty-one clinical students available for the study, only in 400 and 500 levels.

Data were obtained through an electronic form using an online questionnaire adapted from a previous study(16) which sought demographic data, specialty interests and perception of neurosurgery. The electronic form link was sent to each student via email and directly to their

WhatsApp number through each class representative. A period link reminder was sent to each class group page on weekly basis. Their responses were obtained within eight weeks for analysis.

Data Analysis

Data were imported into SPSS version 25 and analyzed using descriptive statistics. Differences were considered to be statistically significant at $p \leq 0.05$.

Results

At the end of the data collection, 128 medical students with an age range of 20-32yeras participated in the study. The respondents were distributed by their level of study as follows: 57 (44.5) from the 400 level and 71 (55.5) from the 500 level of the university.

Table I: Demographic data of the participants

Variation	**Frequency**	**Percent**
Gender		
Male	**62**	**48.4**
Female	**66**	**51.6**
Level		
400	**57**	**44.5**
500	**71**	**55.5**
	Mean (SD)	**Range**
Age (Mean)	**23.94 (1.85)**	**20 – 32**

Regarding students' knowledge of medicine, the respondents were asked to rank seven specialties from "very limited" to "very good." The students need to gain more knowledge of neurology 88(68.8), moderate knowledge of cardiology 60(46.9) and a very good knowledge of Nephrology 71(55.5), with neurology ranking last in these sections.

Table II: Level of knowledge in the medical specialties

Variables	**400**	**500**	**Total**				
	Mean (SD)	**Mean (SD)**	**Very Limited (%)**	**Limited (%)**	**Moderate (%)**	**Good (%)**	Very Good (%)
Cardiology	**3.18 (0.95)**	**3.30 (0.89)**	**2 (1.6)**	**22 (17.2)**	**60 (46.9)**	**31 (24.2)**	13 (10.2)
Respiratory	**3.14 (0.95)**	**3.24 (1.02)**	**6 (4.7)**	**24 (18.8)**	**47 (36.7)**	**41 (32.0)**	10 (7.8)
Neurology	**2.04 (1.03)**	**2.20 (1.15)**	**45 (35.2)**	**43 (33.6)**	**23 (18.0)**	**13 (10.2)**	4 (3.1)
Rheumatology and Dermatology	**2.60 (1.11)**	**2.82 (1.10)**	**18 (14.1)**	**39 (30.5)**	**40 (31.3)**	**23 (18.0)**	8 (6.3)
Endocrinology	**3.30 (0.82)**	**3.63 (0.76)**	**1 (0.8)**	**14 (10.9)**	**43 (33.6)**	**62 (48.4)**	8 (6.3)
Nephrology	**3.33 (0.93)**	**3.65 (0.91)**	**3 (2.3)**	**15 (11.7)**	**39 (30.5)**	**56 (43.8)**	15 (11.7)
Gastroenterology	**3.14 (0.95)**	**3.59 (0.96)**	**3 (2.3)**	**20 (15.6)**	**46 (35.9)**	**42 (32.8)**	17 (13.3)

In contrast to other medical disciplines used in the study, neurology received the least number of interests from participants, with the highest rating in the "not interested" section of the survey 55(43.0) and the lowest rating in the "interested" section of the survey 34(26.6).

Table III: Interest in different medical specialties

Variables	**400**	**500**	**Total**				
	Mean (SD)	**Mean (SD)**	**Not Interested (%)**	**Disinterested N (%)**	**Neutral N (%)**	**Interested N (%)**	**Very Interested N (%)**
Cardiology	**3.42 (1.03)**	**3.28 (1.16)**	**8 (6.3)**	**21 (16.4)**	**36 (28.1)**	**45 (35.2)**	**18 (14.1)**
Respiratory	**3.23 (1.10)**	**3.31 (1.02)**	**8 (6.3)**	**17 (13.3)**	**52 (40.6)**	**34 (26.6)**	**17 (13.3)**
Neurology	**2.46 (1.39)**	**2.73 (1.33)**	**42 (32.8)**	**13 (10.2)**	**39 (30.5)**	**21 (16.4)**	**13 (10.2)**
Rheumatology and Dermatology	**2.91 (1.24)**	**2.83 (1.23)**	**24 (18.8)**	**23 (18.0)**	**38 (29.7)**	**32 (25.0)**	**11 (8.6)**
Endocrinology	**3.04 (0.98)**	**3.37 (1.02)**	**8 (6.3)**	**21 (16.4)**	**43 (33.6)**	**47 (36.7)**	**9 (7.0)**
Nephrology	**3.18 (0.95)**	**3.42 (1.04)**	**8 (6.3)**	**14 (10.9)**	**48 (37.5)**	**46 (35.9)**	**12 (9.4)**

Gastroenterology	**3.23 (1.09)**	**3.41 (0.95)**	**6 (4.7)**	**19 (14.8)**	**44 (34.4)**	**45 (35.2)**	**14 (10.9)**

Regarding the level of difficulty of the seven specialties used in the study, the students were asked to rank each specialty from the easiest area to the most difficult. Neurology was the most difficult area of specialty 89(69.5), while nephrology was found to be the easiest area of specialty 35(27.4). Additionally, endocrinology and nephrology have the same level of difficulty, 39(30.5), with gastroenterology being the least difficult area of specialty 30(23.4).

Table IV: Level of perceived difficult specialty

Variables	**400**	**500**	**Total**				
	Mean (SD)	**Mean (SD)**	**Very Easy**	**Easy**	**Moderate**	**Difficult**	**Very Difficult**
Cardiology	**2.96 (0.73)**	**3.28 (0.74)**	**1 (0.8)**	**20 (15.6)**	**72 (56.3)**	**30 (23.4)**	**5 (3.9)**
Respiratory	**2.77 (0.80)**	**3.32 (0.94)**	**3 (2.3)**	**32 (25.0)**	**53 (41.4)**	**32 (25.0)**	**8 (6.3)**
Neurology	**3.79 (1.11)**	**4.04 (0.98)**	**2 (2.3)**	**10 (7.8)**	**26 (20.3)**	**43 (33.6)**	**46 (35.9)**

Rheumatology and Dermatology	**3.32 (0.99)**	**3.56 (1.00)**	**1 (0.8)**	**20 (15.6)**	**51 (39.8)**	**32 (25.0)**	**24 (18.8)**
Endocrinology	**3.04 (0.76)**	**3.25 (0.95)**	**1 (0.8)**	**27 (21.1)**	**61 (47.7)**	**29 (22.7)**	**10 (7.8)**
Nephrology	**2.95 (0.90)**	**3.17 (0.88)**	**2 (1.6)**	**33 (25.8)**	**54 (42.2)**	**32 (25.0)**	**7 (5.5)**
Gastroenterology	**2.88 (0.80)**	**3.21 (0.94)**	**3 (2.3)**	**27 (21.1)**	**68 (53.1)**	**19 (14.8)**	**11 (8.6)**

In the survey, major contributions to neurology being a difficult subject include neuroanatomy 101 (78.9), poor or not enough teaching 111 (86.7), limited exposure to neurological patients 85(66.4), and many complex diagnoses 79 (61.7).

Table V: Reasons for Neurology being a difficult subject

Variables	**400**	**500**	**Total**

	Mean (SD)	Mean (SD)	Not at all N (%)	Minor contribution N (%)	Major contribution N (%)	p-value
Neuroanatomy	**2.75 (0.43)**	**2.79 (0.48)**	**2 (1.6)**	**25 (19.5)**	**101 (78.9)**	**0.677**
Poor/Not Enough Teaching	**2.75 (0.51)**	**2.93 (0.26)**	**2 (1.6)**	**15 (11.7)**	**111 (86.7)**	**0.002**
Neurological Examination	**2.46 (0.63)**	**2.62 (0.60)**	**8 (6.3)**	**42 (32.8)**	**78 (60.9)**	**0.813**
Neurophysiology	**2.51 (0.57)**	**2.58 (0.58)**	**5 (3.9)**	**48 (37.5)**	**75 (58.6)**	**0.542**
Many Complex diagnoses	**2.63 (0.56)**	**2.52 (0.61)**	**6 (4.7)**	**43 (33.6)**	**79 (61.7)**	**0.204**
Limited exposure to Neurological patients	**2.70 (0.57)**	**255 (0.58)**	**6 (4.7)**	**37 (28.9)**	**85 (66.4)**	**0.185**
Neurology has a reputation for being difficult	**2.54 (0.60)**	**2.46 (0.69)**	**11 (8.6)**	**42 (32.8)**	**75 (58.6)**	**0.180**

The students also felt that improved neuroanatomy teaching 91(71.1), more patient exposure 85(66.4), more lectures 83(64.8) and more bedside teaching 82(64.1) would be beneficial in improving neurological teaching.

Table VI: Views on Improving Neurological Teaching

Variables	**400**	**500**	**Total**				
	Mean (SD)	**Mean (SD)**	**Very Unhelpful**	**Unhelpful**	**Moderately Helpful**	**Helpful**	**Very Helpful**
More bedside teaching	**3.77 (1.13)**	**4.25 (1.12)**	**5 (3.9)**	**5 (3.9)**	**36 (28.1)**	**16 (12.5)**	**66 (51.6)**
More patient exposure	**3.89 (1.11)**	**4.18 (1.18)**	**6 (4.7)**	**4 (3.1)**	**33 (25.8)**	**19 (14.8)**	**66 (51.6)**
More Lectures	**3.84 (1.08)**	**4.03 (1.07)**	**4 (3.1)**	**6 (4.7)**	**35 (27.3)**	**31 (24.2)**	**52 (40.6)**
Improved Neuroanatomy teaching	**4.07 (1.03)**	**4.31 (1.15)**	**4 (3.1)**	**5 (3.9)**	**28 (21.9)**	**15 (11.7)**	**76 (59.4)**

For all participants, the major factors affecting their interest in a career in neurology include their ability to make a significant difference in patients' lives 46(34.9), prestige 42(32.8), and financial reward 40(31.3).

Table VII: Factors affecting the perception of a career in neurology

Variables	Do not know N (%)	Very Poor N (%)	Poor N (%)	Okay N (%)	Good N (%)	Very Good N (%)
Financial reward	**13 (10.2)**	**3 (2.3)**	**15 (11.7)**	**34 (26.6)**	**23 (18.0)**	**40 (31.3)**
Job Satisfaction	**14 (10.9)**	**3 (2.3)**	**19 (14.8)**	**36 (28.1)**	**24 (18.8)**	**32 (25.0)**
Ability to make a significant difference in patient's lives	**8 (6.3)**	**6 (4.7)**	**13 (10.2)**	**26 (20.3)**	**29 (22.7)**	**46 (35.9)**
Ability to maintain work-life balance	**7 (5.5)**	**17 (13.3)**	**30 (23.4)**	**25 (19.5)**	**23 (18.0)**	**26 (20.3)**
Prestige	**12 (9.4)**	**3 (2.3)**	**12 (9.4)**	**33 (25.8)**	**26 (20.3)**	**42 (32.8)**

Finally, the survey's most significant finding was the likelihood of pursuing a career in neurology, which was rated as unlikely 33(25.8) in contrast with a likelihood rating of 13(10.2).

Table VIII: Respondent’s likelihood of a career in Neurology

Question	Not N (%)	Unlikely N (%)	I do not know yet N (%)	Likely N (%)	Definitely will N (%)
Likely to pursue a career in neurology	25 (19.5)	33 (25.8)	51 (39.8)	13 (10.2)	6 (4.7)

Discussion

Our results corroborate other research findings that medical students believe neurology to be the hardest specialty (17). In our study, as in many other earlier studies, poor teaching was the primary factor in influence neurology's difficulty (17, 18). Poor understanding of neuroanatomy and neurophysiology, which have previously been identified as major variables contributing to the difficulty of neurology, received high ratings in our study. All of these research results from the literature highlight the need to reevaluate how neurology is taught globally. Many researches, including ours, have shown that more hands-on teaching, lectures, and more clinical-based learning practices with patient exposure are the factors that students believe will improve neurology teaching (19).

Numerous studies have focused on examining how integrating new training methods and teaching strategies may enhance neurology education and lessen the problem of neurophobia (19, 20). The implementation of an interactive electronic textbook in addition to the regular neurology lectures increased student satisfaction with the subject's teaching, according to a study done in Chicago, Illinois (21), and another one done in Australia (22) found that case-based instruction helped students connect fundamental neuroscience to clinical neurology and enhanced their clinical skills. In a study conducted in Singapore, videotapes were also discovered to be a helpful tool for enhancing clinical knowledge and medical communication skills (23).

Some studies also suggested different approaches to teaching neurology, such as the up-down approach, which begins by teaching the clinical neurological signs and phenomena before

teaching the scientific basis behind them (17, 24, 25). These studies claimed that this approach would aid integration and draw students' attention to neurological signs and diseases. The association of British neurologists also suggested a different approach to instruction, emphasizing the need to simplify instruction by employing a core curriculum that focuses on common neurological illnesses and the best teaching strategy, the problem-based approach (26). It should be emphasized that the educational system in Nigeria is comparable to that in the UK; thus, we propose that UK methods may be more appealing in addressing neurophobia in Nigeria.

Despite its difficulty, a few students still chose neurology as a viable career option. This is consistent with earlier studies' findings that students' interest in neurology is not influenced by the subject's perceived difficulty, indicating that they will welcome any measures taken to combat neurophobia and desire those measures to deepen their understanding of the subject (27). We looked into elements that would most influence or deter students from choosing neurology as a career to have a thorough understanding of the factors determining students' interest in the field. The ability to significantly improve patients' lives, which has also been found to be a significant factor in studies from the UK and the University of Bahri, Sudan, prestige, and financial security were the most critical factors in our study that encouraged students to choose a career in neurology (28).

Other significant factors reported in previous work include interest in the field, increased opportunities for neurology research, and increased salaries. Instead, the top factors deterring students from careers in neurology in our survey were financial reward, status, and the potential to impact a patient's life significantly. Some students view neurology as a way to enhance

patients' lives, while others believe that neurological diseases have poor outcomes and that there is no way to enhance patients' lives. Previous studies discovered that this belief that neurological diseases have poor outcomes and no proven treatments is what deters students the most from studying neurology (27, 28). Such an idea might be motivated by the fact that students acquire their clinical training and abilities at hospital yards crowded with patients suffering from severe diseases. By exposing more students to outpatient clinics and educating them about new technology and scientific data that have expanded the variety of treatments available for neurological illnesses, this idea can be modified.

Every medical school should, in general, look at how students feel about the field of neurology and potential careers in it, as evidenced by the literature, which contends that medical schools are a significant factor in the development of the condition known as neurophobia. It is crucial to understand the causes of students' fear of neurology and the perceptions that discourage them from pursuing a career in the field because there is evidence that teaching developments in neurology made in response to students' assessments and feedback can reduce the development of neurophobia. It should be noted that medical students are the future general practitioners who will treat common neurological symptoms like headache, epilepsy, and neuropathies (caused by diabetes, alcohol, nutritional deficiencies, and entrapment) that present in primary healthcare facilities. Medical students are also the ones who should treat chronic neurological illnesses like Parkinson's disease at the primary care level, among whom neurophobic patients are included. Because relying on primary healthcare providers to treat neurological issues is the most economical way, it is crucial that all medical students, not just those who want to specialize in the field, feel comfortable with neurological symptoms.

Due to the need for more infrastructure and communication with other schools, this study could only include only a medical school. Hence the conclusions may not be applied to all Nigerian medical students. Therefore, we advise that additional research on this subject be done in Nigeria among all medical students.

Conclusion

We conclude that despite decades of progress, neurology is still viewed as a challenging subject, with poor teaching playing a significant role in this difficulty. This contrasts with ageing populations' continually shifting needs for neurological services and the growing toll that neurological illnesses are taking on healthcare systems. In order to ensure that students have a better understanding of the subject and to produce general practitioners who are qualified to handle neurological complaints at the primary healthcare level, we, therefore, encourage medical schools to take action in this regard, such as adopting new teaching techniques that are linked to students' needs and assessment feedbacks.

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