

Original Article

Neurophobia and its Correlates among Undergraduate Clinical Students in a Nigerian Private University

Chukwuma Okeafor¹, *Ernest Nwazor²

¹Department of Neuropsychiatry, University of Port Harcourt, Port Harcourt, Nigeria.

²Department of Internal Medicine, Rivers State University, Port Harcourt, River's state, Nigeria.

Abstract

Background: The fear of neurology and neurosciences has been referred to as neurophobia. Neurophobia is a global phenomenon, that is worse in sub-Saharan Africa due to its impact on the already established huge gap in the neurologist-to-population ratio. The need to identify modifiable factors that could curb neurophobia stirred the current study, which aimed to determine the correlates of neurophobia among undergraduate clinical students.

Methodology: A cross-sectional design was adopted involving 173 undergraduate clinical students selected via stratified sampling. Content validated, self-administered questionnaire was utilized to obtain data on the perception of neurology, neurophobia, and demographic/academic-related characteristics. Bivariate and multivariate analyses were performed at the 0.05 significant level.

Results: The mean age (\pm SD) of the participants was 25.8(\pm 2.2) years with a male-to-female ratio of 1:1.2. More than half of the undergraduate clinical students perceived neurology as being badly taught (77.5%), difficult to learn (83.2%), and with complex clinical examination (85.5%). The prevalence of neurophobia was 76.3% (n=132). The significant correlate of neurophobia was perceived poor knowledge of neurology. Students with poor perceived knowledge of neurology were about two times more likely to have neurophobia than those with perceived good knowledge (AOR=2.14; 95%CI: 1.04-4.41).

Conclusion: Approximately 8 in 10 undergraduate clinical students in Nigeria have neurophobia and the significant determining factor is their perceived poor knowledge. The need to adopt educational models that would strengthen academic prowess in neurology is strongly advocated as most of the students felt that the course was being badly taught.

Keywords: Neurophobia; Neurology; Clinical Students; Medical Education.

Key Messages: Neurophobia among clinical undergraduate students is rampant, and without timely educational intervention, the existing wide gap in the neurologist-to-population ratio could worsen. Our findings highlight the dire need to institute educational models tailored to attaining better teaching aids, peer discussions, and bedside teaching among clinical undergraduate students.

Corresponding Author: *Ernest Nwazor, Department of Internal Medicine, Rivers State University, Port Harcourt, River's state, Nigeria. ernestnwazor@yahoo.com

This is an open-access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non-Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given, and the new creations are licensed under the identical terms.

How to cite this article: Okeafor C, Nwazor E. Neurophobia and its Correlates among Undergraduate Clinical Students in a Nigerian Private University. Niger Med J 2023;64(2):251-258.

Quick Response Code:



Introduction

Neurophobia has been described as the fear of neurology and neurosciences by medical students and doctors.¹ The word ‘Neurophobia’ originated from Jozefowicz, who noted that such fear of neurology could result in anxiety, dislike, and disinterest in the subject.² Certainly, such negative sentiments have implications on the practice of neurology, which ultimately affects the quality of care for patients with neurological diseases.¹ These negative ripple effects are further compounded by the existing issues of neglect, stigma, and disability associated with neuro-psychiatric disorders. Globally, neurological and psychiatric disorders account for at least one-quarter of the burden of disability.³ The World Health Organization (WHO) identifies education in neurology as a vital component for the reduction of the burden of neurological diseases.⁴

Neurology training at the undergraduate level is essential as 20-30% of a population have been reported to be vulnerable to neurological diseases.⁵ Furthermore, as demographic transition is presently shifting to an up rise in the aging population, neurological disorders are expected to double.⁶ In spite of the glaring importance of neurology to present and future health systems; research in both high and low-middle income countries have reported neurophobia as being prevalent among undergraduates.^{1,7,8,9} Presence of undergraduates with neurophobia translates to practitioners who are hesitant, nervous and lack confidence in undertaking neurological examination and diagnosis.⁸ Neurophobia unchecked and unmanaged has a long term sequel of shortage of experts in the field of neurology, especially in low and middle income countries that are worst hit by ‘brain drain’.

The neurologist to population ratio in Africa shows a huge gap of 0.03 per 100,000 population, thus having the widest gap across the globe.¹⁰ On the other hand, sub-Saharan Africa is the worst hit for neurological diseases stemming from both communicable and non-communicable sources.¹¹ This double tragedy necessitates evidence-based interventions in reversing the unpleasant scenario. Thus, the need to investigate the prevalence and determinants of neurophobia in a bid to institute evidence-based teaching policies and intervention formed the focus of the present study. An earlier Nigerian study highlighted the interests and perceived difficulties by undergraduate students to Neurology, as well as their proffered recommendations.⁹ Although this earlier study provided useful information, it had gaps regarding demographic and academic related determinants, which the index study seeks to fill in order to further enrich the body of knowledge. More importantly, the index study will serve as a basis for evidence-based educational policies and programs targeted at curbing neurophobia among undergraduates. This study sought to identify the perception of neurology as a subject, neurophobia and correlates among clinical undergraduate students in a private medical institution in Nigeria.

Subjects and Methods

Study design and study population: A cross-sectional descriptive study design was employed in the study. The study population comprised of undergraduate clinical students at Madonna University Teaching Hospital, who consented to the study.

Sample size calculation and sampling method: Sample size formula for cross-sectional studies involving single proportion was utilized in this study.¹² Based on the proportion of 13% of medical students reporting Neurology as being very difficult from a Nigerian study,⁹ a standard normal deviate of 1.96, which corresponds to 95% confidence level, and an acceptable error limit of 0.05, a sample size of 173 was obtained. Stratified sampling was employed in the study. Clinical students were stratified by study level into 3 strata namely, 400 level, 500 level, and 600 level.

Ethical considerations: The principles of ethics were upheld in the research. Informed consent was obtained from the respondents prior to their inclusion into the study. Anonymity and confidentiality of information were ensured in the study. The respondents were free to withdraw at any point in the course of responding to the questionnaire, without any form of penalty.

Data collection: Data were collected using a self-administered, structured and content-validated questionnaire to obtain information on demographic variables, academic-related characteristics and neurophobia. The demographic variables of interest were age, sex, marital status, and religion. The academic related characteristics included level of study, and previous basic medical degree. Perception on neurology, and recommendations to improve learning were also obtained from the respondents.

Statistical analysis: The Statistical Package for Social Sciences (SPSS) version 21.0 was employed for statistical analysis. Univariate tables, pie chart and horizontal bar charts were used to express frequencies and proportions. Bivariate analysis was performed using neurophobia as the dependent variable, and the independent variables were demographic and academic related characteristics. Statistical tests employed in Bivariate analysis were Pearson's Chi Square test and Fisher's Exact. Fisher's Exact test was applied in cross tabs with expected values below five in at least twenty percent of the cells. Statistical significance was set at $p < 0.05$. Variables with $p < 0.05$ on bivariate analysis were subjected to binary logistic regression model to adjust for confounding influences. Statistically significant variables with collinearity were not included in the model. Odds ratios were determined at the 95% level.

Results

A total of 173 clinical students participated in the study. The mean age (\pm SD) of the participants was 25.8 (\pm 2.2) years. The Male to Female ratio was 1:1.2. Higher proportion of the participants were females (55.5%), singles (89.1%), Christians (97.1%), and in 600 level in their course of study. Concerning academic related findings, slightly less than one-tenth of the participants had undergone a degree in the previous basic sciences (9.8%), about half of them were interested in Neurology course work (52.6%) and perceived their knowledge of neurology as poor (56.6%). Table 1 shows the demographic and academic related findings of the clinical students in the study.

Table 1: Demographic and Academic Related Findings of Undergraduate Clinical Students

Variables	Frequency (n)	Percentage (%)
Age category (years)		
20-24	45	26.0
25-29	117	67.6
30-34	111	6.4
Sex		
Male	77	44.5
Female	96	55.5
Marital status		
Single	154	89.0
Married	19	11.0
Religion		
Christianity	168	97.1
Islam	5	2.9
Study Level		
400 Level	17	9.8
500 Level	68	39.3
600 Level	88	50.9
Previous degree in basic medical science		
Yes	17	9.8
No	156	90.2

Interest in Neurology

Interested	91	52.6
Not interested	82	47.4
Perceived knowledge of Neurology		
Good	75	43.4
Poor	98	56.6

Clinical students' perception of neurology

Figure 1 depicts the perception of clinical students to Neurology. More than four-fifths of the clinical students responded that Neurology has a complex clinical examination (85.5%), is difficult to learn (83.2%) and has a large number of diagnoses (82.7%). More than half of the clinical students reported that Neurology was being badly taught (77.5%).

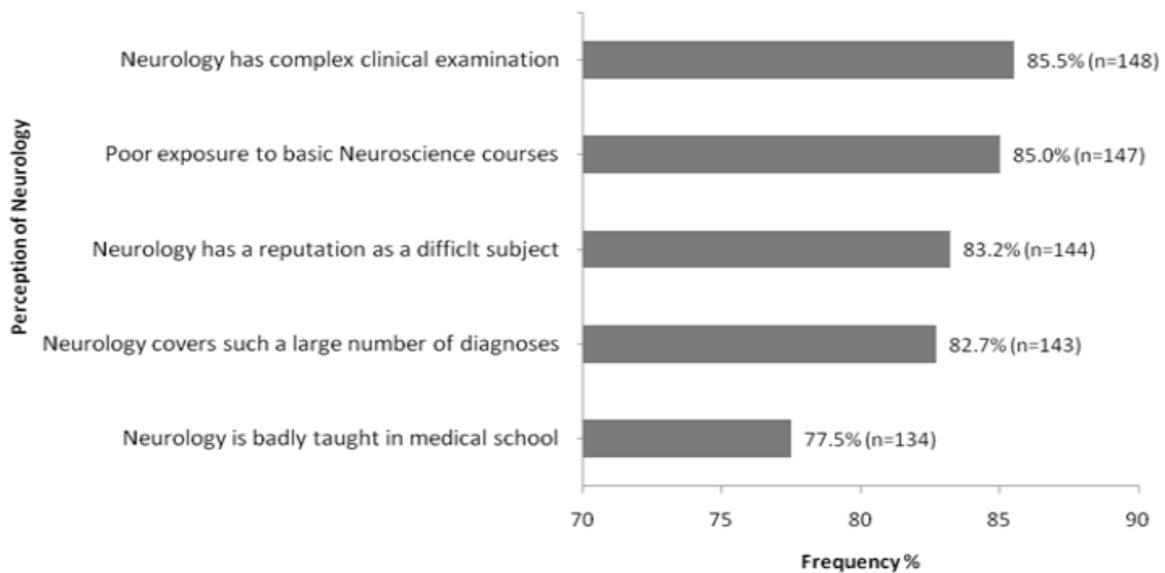


Figure 1: The perception of Clinical Students to Neurology

Neurophobia

More than three-quarters of the clinical students had neurophobia (76.3%; n=132) as shown in Figure 2

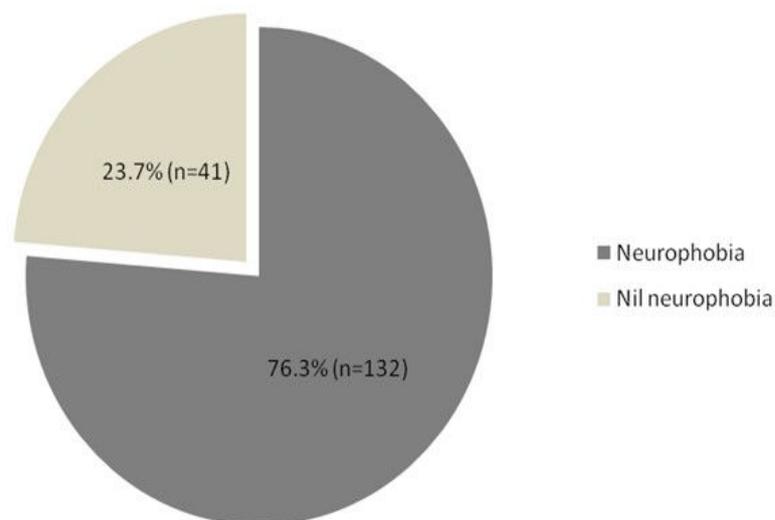


Figure 2: Prevalence of neurophobia among clinical undergraduate students

Concerning neurophobia and age of the clinical students; clinical students in the age category of 20-24 years had the highest proportion of neurophobia (88.9%) while those aged 30-34 years had the lowest proportion (63.6%). The difference in proportion of neurophobia by the age categories was not significant ($p=0.053$). For comparison by sex, the proportion of neurophobia was almost the same in both male (76.6%) and female (76.0%) clinical students ($p=0.929$). There was no significant relationship between neurophobia and marital status ($p=0.253$), and religion (0.339) as presented in Table 2.

Table 2: Bivariate analysis of factors associated with neurophobia among the undergraduate clinical students

Variables	N	Neurophobia	
		Yes n (%)	No n (%)
	173	132 (76.3)	41 (23.7)
Age category (years)			
20-24	45	40 (88.9)	5 (11.1)
25-29	116	84 (72.4)	32 (27.6)
30-34	11	7 (63.6)	4 (36.4)
		<i>Chi-Square =5.863; p-value =0.053</i>	
Sex			
Male	77	59 (76.6)	18 (23.4)
Female	96	73 (76.0)	23 (24.0)
		<i>Chi-Square =0.008; p-value =0.929</i>	
Marital status			
Single	154	120 (77.9)	34 (22.1)
Married	19	12 (63.2)	7 (36.8)
		<i>Fisher's Exact=1.304; p-value =0.253</i>	
Religion			
Christianity	168	129 (76.8)	39 (23.2)
Islam	5	3 (60.0)	2 (40.0)
		<i>Fisher's Exact p-value =0.339</i>	
Study level			
400	17	10 (58.8)	7 (41.2)
500	68	58 (85.3)	10 (14.7)
600	88	64 (72.7)	24 (27.3)
		<i>Chi-Square =6.535; p-value =0.038*</i>	
Previous degree in basic clinical science			
Yes	17	12 (70.6)	5 (29.4)
No	156	120 (76.9)	36 (23.1)
		<i>Fisher's Exact p-value =0.555</i>	
Interested in Neurology subject			
Not interested	82	69 (84.1)	13 (15.9)
Interested	91	63 (69.2)	28 (30.8)
		<i>Chi-Square =5.307; p-value =0.021*</i>	
Perceived knowledge on Neurology			
Poor	98	81 (82.7)	17 (17.3)
Good	75	51 (68.0)	24 (32.0)
		<i>Chi-Square =5.045; p-value =0.025*</i>	

Neurophobia was highest among 500 level clinical students (85.3%), followed by 600 level (72.7%) and the least proportion was observed among those in 400 level (58.8%). The differences in proportion of neurophobia by study level was significant ($p=0.038$). Having a previous degree in basic medical science showed no significant relationship with neurophobia (0.555).

Students uninterested in Neurology had a significantly higher proportion of neurophobia in comparison to those with interest in Neurology (84.1% versus 69.2%; $p=0.021$). For the perceived knowledge of Neurology by clinical students, the proportion of neurophobia was higher among those with poor knowledge (82.7%) in comparison to those with good knowledge (68.0%). This difference was significant ($p=0.025$).

On multivariate analysis, perceived knowledge showed significant association with neurophobia after adjusting for the study level of clinical students. The study showed that those with perceived poor knowledge were about two times more likely to experience neurophobia in comparison to those with good knowledge (Adjusted Odds Ratio=2.14;95% CI: 1.04-4.41; $P=0.040$). (Table 3)

Table 3: Multivariate Analysis of Factors Associated with Neurophobia Among The Undergraduate Clinical Students

Independent Variables	Neurophobia – Dependent Variable			
	Coefficient(B)	Adjusted Odds ratio (AOR)	95% CI	p-value
Study level				
600 level	-0.274	0.76	0.37–1.58	0.461
400 and 500 levels ^R		1	1	
Perceived knowledge on Neurology				
Poor	0.760	2.14	1.04–4.41	0.040*
Good ^R		1	1	

Undergraduate Clinical students' recommendations for addressing neurophobia

Figure 3 shows the students response to recommendations to address neurophobia. The most commonly affirmed recommendation was the need for teaching aids for Neurology (78.0%; $n=135$), followed by improved and more frequent peer discussions on Neurology (76.3%; $n=132$) and more bedside tutorials on Neurology (70.5%; $n=122$).

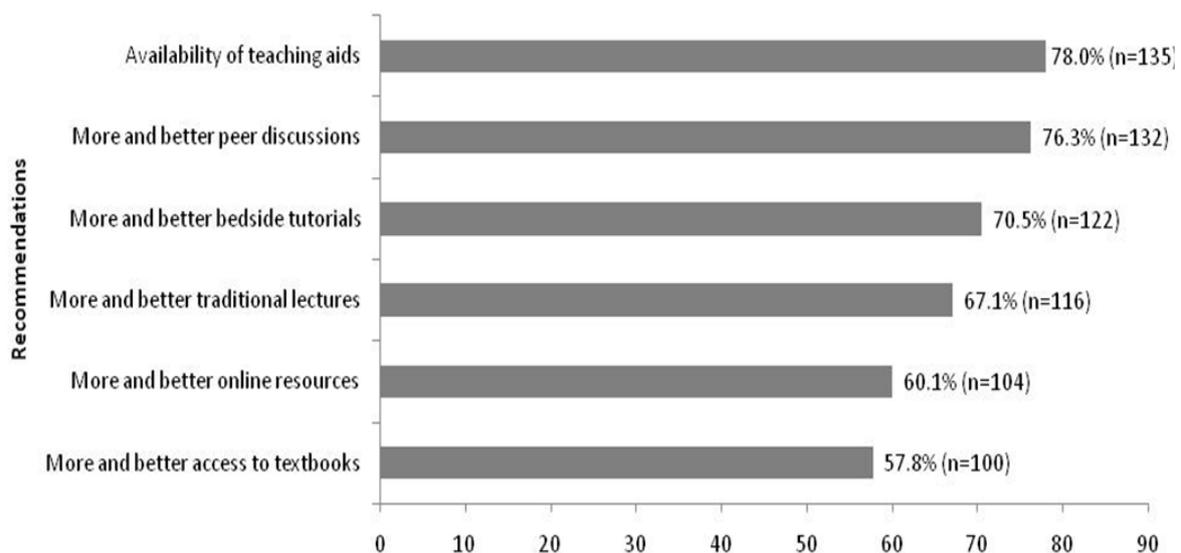


Figure 3: Students' Response to Recommendations to Address Neurophobia

Discussion

The investigation on neurophobia and its correlates among undergraduate clinical students in this study revealed a worrisome high prevalence, irrespective of age, sex, marital status, study level and presence of a previous degree in basic medical sciences. Perceived poor knowledge on neurology was the only determinant of neurophobia. Also, the study noted that majority of the undergraduate clinical students perceived neurology as being difficult to learn and was being badly taught.

Several researches corroborates with the index study's finding on the occurrence of neurophobia among clinical students.^{7,9,13,14} Notably, these corroborating studies cut across both developed and developing nations. This possibly reveals that intrinsic aspects of the course contribute to its phobia. The complex clinical examination and large number of diagnoses in neurology, which were noted by greater proportion of participants, are some of the intrinsic factors. In spite of these cogent findings on neurology, the course still needs to be well understood by students for them to effectively practice clinical care. Therefore, the modification of neurology teaching among undergraduates is inevitable. The availability of teaching aids, peer discussion and bed side teaching recommended by the participants in this study, have also been reiterated by other researchers.^{9,14}

Although, the assessment and evaluation of educational models for optimal learning of neurology was beyond the scope of this study, our finding that neurology knowledge is a correlate of neurophobia clearly exposes the need to modify learning methods to reverse the trend. This is further buttressed by the report of about two-thirds of the study population affirming that neurology course was being badly taught. Certainly, the lack of an educational intervention to address this worrisome pattern, which has been noted globally, will negatively impact on the practice of neurology and possibly neuropsychiatry. Expectedly, the institution of evidence based methods of teaching rather than the traditional models has been reported as a stratagem to promote neurophillia and eliminate neurophobia.¹⁵

Several education models for optimizing neurology learning have been proposed from the literature. Khurshid *et al* noted a significantly higher improvement in neurology performance using Team Based Learning (TBL) approach.¹⁴ The TBL method is an educational strategy that is student-centered and subject specialist-directed that enables learning and practice through combination of individual work, team work, feedback and problem solving tasks.^{14,16} Furthermore, TBL fosters learning collaboration, which is vital due to the rapidly changing trends in clinical practice.¹⁷ Another study that utilized a mixed design advocates the implementation of a strategy that involves the dissemination of neurology skills and knowledge via several sessions all through the curriculum duration to enhance learning and minimize neuroamnesia.¹³ Shelley *et al* identifies technology-enhanced education and digital classrooms in adoption of the Miller's pyramid as the indisputable means to tackle neurophobia.¹⁵ The Miller's pyramid is a progressive pedagogical approach, which commences from “knows” (knowledge of basic neurosciences) to “know how” (integrating basic knowledge to clinical problems) to “shows how” (neurological examination demonstrated by the learner and observed by the neurology tutor in a patient with a problem), and “does” (independently having the proficiency to examine and reach a diagnosis) through the reiteration of intentional methods and skills, as well as constructive feedback from tutor and mentor.¹⁵

The use of a single centre study serves as a limitation to the study; however, the study appears to be the first to investigate neurophobia in a private medical educational institution in Nigeria. Social desirability bias was minimized by explaining the benefit of the research and reassurance of confidentiality of received information. The inclusion of a qualitative design either through focus group discussion or in-depth interview sessions could have enriched the study. Also, the focus on the clinical students in this study without exploring the perspective of their tutors provides a gap in knowledge. Thus, we recommend further studies to adopt a more robust design and be all encompassing, and not limited to clinical students.

Conclusion

More than three-quarter of undergraduate clinical students have neurophobia. This is supported by the negative perception towards neurology, as most of them felt it was difficult, had complex clinical examination, too many diagnoses, and was being badly taught. Evidence-based educational methods to promote neurology knowledge are required as this was a significant correlate of neurophobia this study noted. We recommend measures to attain optimal neurology knowledge among clinical students, as this will invariably impact on neurology practice in Africa and beyond.

References

1. Matthias AT, Nagasingha P, Ranasinghe P, Gunatilake SB. Neurophobia among medical students and non-specialist doctors in Sri Lanka. *BMC Med Educ.* 2013; **13**:1–7.
2. Jozefowicz RF. Neurophobia: the fear of neurology among medical students. *Arch Neurol.* 1994; **51**:328–9.
3. Silberberg D, Katabira E. Neurological Disorders. Disease Mortality Sub-Saharan Africa. International Bank Reconstruction and Development World Bank, 2006 p.2295. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK2295/>[cited 2022 Jul 4];
4. World Health Organization (WHO). Neurological Disorders: Public Health Challenges. Geneva, Switzerland. 2006 p. 1–209. Available from: https://books.google.com.ng/books?hl=en&lr=&id=Z8uwPwIPUw4C&oi=fnd&pg=PR1&dq=NEUROLOGICAL+DISORDERS+public+health+challenges&ots=ghqGw60wXl&sig=g6RW1BDnfhgcN3QTmfwb1FJTtA&redir_esc=y#v=onepage&q=NEUROLOGICAL+DISORDERS+public+health+challenges&f=false [cited 2022 Jul 4].
5. European Federation of Neurological Societies. The Education Committee of EFNS: activities and work in progress. *Eur J Neurol.* 2003; **10**:205–211.
6. Béjot Y. Neurological disorders and age: The demographic transition. *J Neurol Sci.* 2021; **429**:118028.
7. Zinchuk AV, Flanagan EP, Tubridy NJ, Miller WA, Mccullough LD. Attitudes of US medical trainees towards neurology education: “Neurophobia” - A global issue. *BMC Med Educ.* 2010; **10**:1–7.
8. Schon F, Hart P, Fernandez C. Is clinical neurology really so difficult? *J Neurol Neurosurg Psychiatry* 2002; **72**:557–9.
9. Sanya EO, Ayodele OE, Olanrewaju TO. Interest in neurology during medical clerkship in three Nigerian medical schools. *BMC Med Educ.* 2010; **10**:42.
10. Bergen DC. Training and distribution of neurologists worldwide. *J Neurol Sci.* 2002 Jun 15; **198**:3–7.
11. Aarli JA, Diop AG, Lochmüller H. Neurology in sub-Saharan Africa: a challenge for World Federation of Neurology. *Neurol.* 2007; **69**:1715–8.
12. Kirkwood BR Sterne JAC. Calculation of required sample size. *Essentials Medical Statistics* 2nd Ed. UK Blackwell Science. 2003;p.420-1.
13. Fantaneanu TA, Moreau K, Eady K, Clarkin C, DeMeulemeester C, Maclean H, et al. Neurophobia inception: a study of trainees’ perceptions of neurology education. *Can J Neurol Sci.* 2014; **41**:421–9.
14. Anwar K, Shaikh AA, Sajid MR, Cahusac P, Alarifi NA, Al Shedoukhy A. Tackling student neurophobia in neurosciences block with team-based learning. *Med Educ Online.* 2015; **20**:28461.
15. Shelley BP, Chacko TV, Nair BR. Preventing “neurophobia”: Remodeling neurology education for 21st-century medical students through effective pedagogical strategies for “neurophilia.” *Ann Indian Acad Neurol.* 2018; **21**:9.
16. Bosman FT, Arends JW. Teaching pathology in a problem-oriented curriculum: The Maastricht experience. *J Pathol.* 1989; **159**:175–8.
17. Parmelee D, Michaelsen LK, Cook S, Hudes PD. Team-based learning: A practical guide: AMEE Guide No. 65. *Med Teach.* 2012 May; **34**:e275–87.