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Research Article

Neurophobia among Medical Students in Sudan

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Abstract

Objective: To describe factors that contribute to students' perception towards neurology, and their views on how to improve neurology training.

Methods: A cross-sectional computerized survey was conducted among 171 medical students from Bahri University, Sudan, in the period from 8th, January 2018 to 30th, January 2018.

The questionnaire included demographic data and 16 statements to assess: their neurology teaching experience, factors that would drive them toward or away from neurology, and their views on how to improve neurology training at their medical school.

Results: Females constituted 87.7% of participants. The mean age was 21.93 (SD +/- 1.24) years. The majority of participants (83%) were not decided on their future career, and 31% of them stated that they would not consider neurology as a career. Almost half of medical students considered neuroscience and neurology teaching unsatisfactory (46%). More than half (56.8%) found neuroanatomy as well as neurological diagnosis to be contributing to neurology being perceived as a difficult subject. Of Our participants, 60% though that there are limited treatment in neurology, and 46% considered neurology outcome to be poor. Among the participants, 64.9% thought that neurology as a career choice provides good financial reward and 85.9% thought that it provides good research opportunities. Most students thought that better lectures (80.7%), better bedside teaching (82.5%), and longer time schedules allocated to neurology (90.7%) would improve their neurology training.

Conclusion: Although there is generally unfavorable behavior towards neurology among our studied group, there was a large percentage that would consider it as a career.

Keywords: *Neurophobia; Medical Students; Sudan; Bahri University*

Background

Concerns are rising about whether neurologists in the future will be able to care for an increasing number of patients with neurological disease in an increasingly aging population [1]. Neurologist-to-population ratio is problematic even in developed countries, in Britain for example; long term plans were implemented to correct the deficit in neurology specialists [2]. In Sudan; a developing country, numbers are far more worrying. Data from 2005 shows that only 3 neurologists are practicing in the entire country. With a population of 36 million, this gives a ratio of 1:12,000,000 [3]. This trend of insufficient neurology specialist numbers is largely owed to a phenomenon called 'Neurophobia'.

Neurology has long been perceived as a complex subject. It has a reputation of being difficult to comprehend by medical students and doctors. The term neurophobia was coined in 1994 to describe this phenomenon [4].

Neurophobia can be defined as "the fear of neural sciences and clinical neurology that originates from the students inability to apply their basic sciences knowledge to clinical practice leading to paralysis of thinking or action", it starts early in medical school affecting approximately 50% of medical students with no gender variation [4]. Many factors have been accused of being the cause of this fear. Authors tend to blame poor teaching of neuroscience and clinical neurology, complex terminologies used, and separation of basic science teaching and clinical application [5].

This is the first study to describe different factors that contribute to Neurophobia in Sudan.

Methods

We conducted a cross-sectional study on 171 medical students from 4th, 5th and 6th grades at Bahri University, which implements a curriculum consisting of three pre-clinical years, followed by three clinical years. Neuroscience is taught in a 5 credit hour course, divided over 16 weeks. Clinical neurology is taught as part of the internal medicine time schedule during 5th and 6th years. In the three clinical years 21.46% of the students were males and 78.54% were females when the study was conducted. We collected data using a structured questionnaire consisting of demographic data, as well as 16 statements to assess their perception of their neurology teaching experience, factors that would drive them toward or away from neurology, and their views on how to improve neurology training at their medical school. Participants were approached using a computerized form of our questionnaire. From a total of 171 completed questionnaires, 44 questionnaires were collected from fourth year students, 65 from fifth year students, and 62 from sixth year students. We sent the questionnaire to students' groups. We cannot guarantee that every student received a copy from the questionnaire but using total number of students at the three clinical years as our population the response rate for fourth year was 44/295 (14.9%), for fifth year 65/250 (26%), and for sixth year 62/233 (26.6%). Total response rate was 21.98%. We analyzed the data using IBM SPSS Statistics 25. We used a 5-point Likert score for our results as follows:

1. A score of 1 was given to the following answers: "no contribution", "strongly disagree", and "very unlikely".
2. A score of 2 was given to the following answers: "little contribution", "disagree", and "unlikely".
3. A score of 3 was given to the answer "neutral".
4. A score of 4 was given to the following answers: "contributes", "agree", and "likely".
5. A score of 5 was given to the following answers: "contributes significantly", "strongly agree", and "very likely".

We used Pearson's Chi-square test to analyze possible associations between variables.

Results

The study included 171 medical students from Bahri University. Females were 150 (87.7%) and males were 21 (12.3%). Mean age was 21.93 years (SD +/- 1.24).

Fourth year students were 44 (25.7%), fifth year students were 65 (38%), and sixth year students were 62 (36.3%). Of our studied group, 142 students (83%) were not yet decided on their future career, however, only 53 students (31%) would not consider Neurology as a career choice.

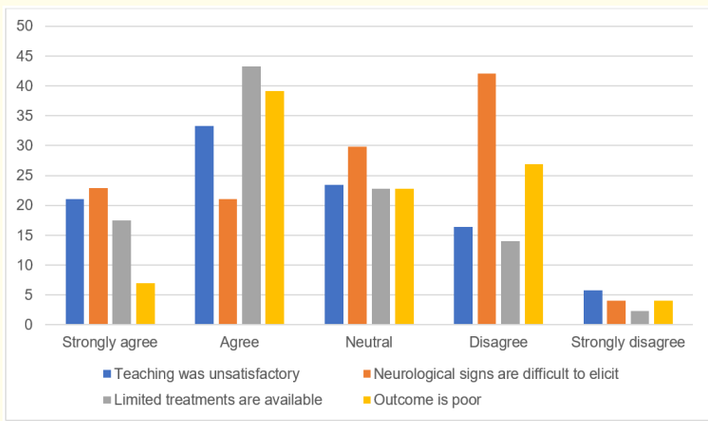

Figure 1: *Students' perception about factors that may negatively influence views on neurology.*

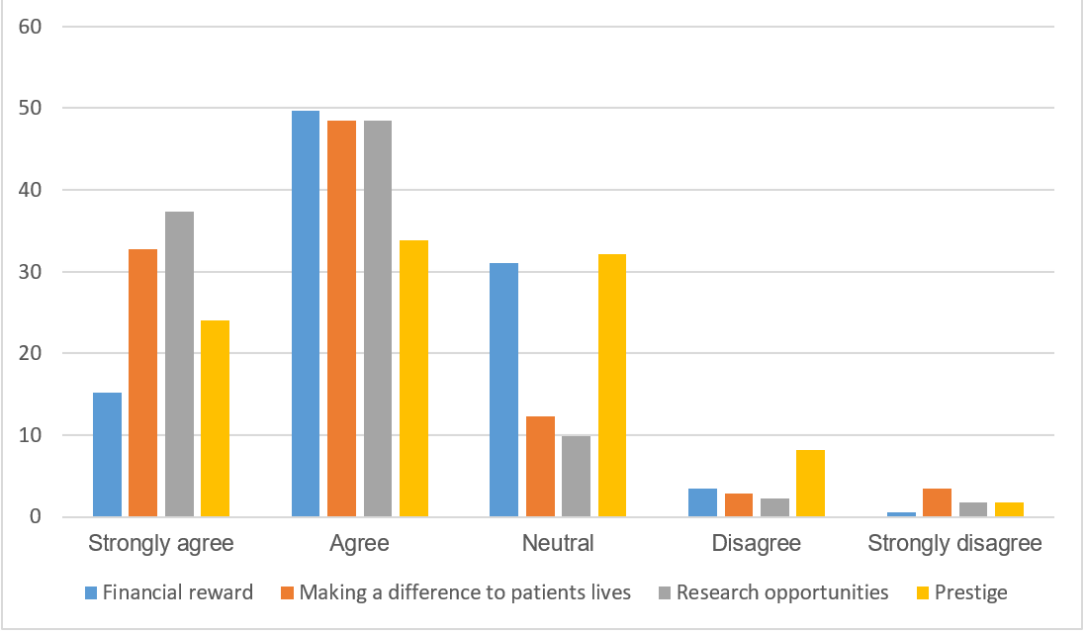

Figure 2: *Students' perception about factors that may positively influence views on neurology.*

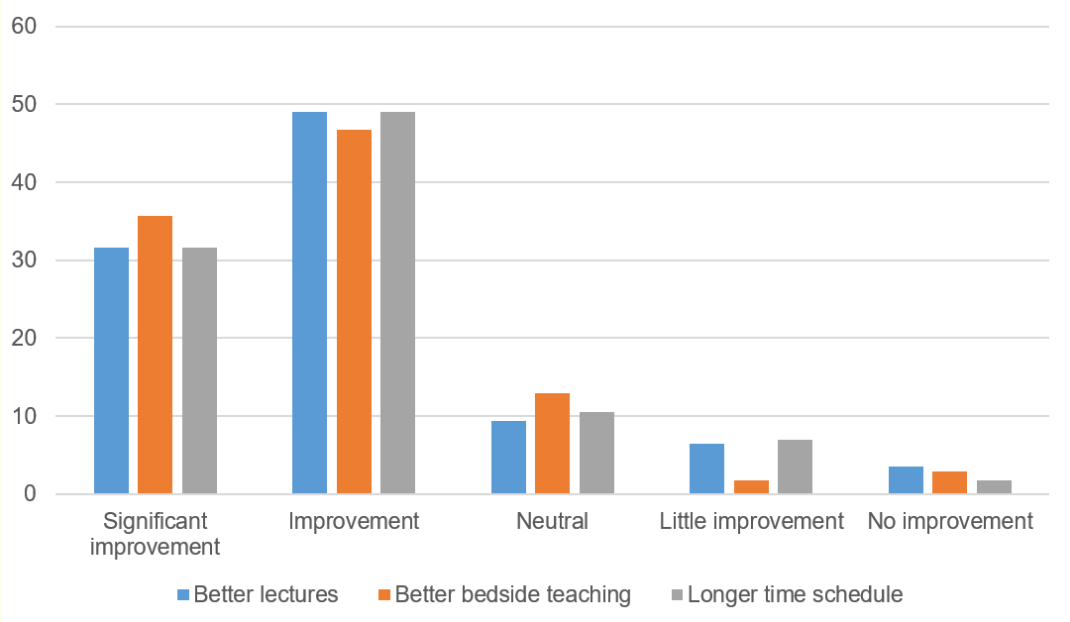

Figure 3: *Describes students' views on strategies to improve neurology training.*

Question	Mean Likert score	Std. Deviation
How likely is a participant to consider neurology as a career	3.34	1.351
Which of the following factors do you think contributes to neurology being perceived as a difficult subject		
Neuroanatomy	3.33	1.173
Neurological history and examination	2.85	1.279
Difficulty of neurological diagnosis	3.26	1.248
Which of the following factors do you think drives you away from neurology		
The amount of teaching you receive in neurology was satisfactory	2.53	1.165
Neurological signs are difficult to elicit	2.77	.929
There are limited available treatments in neurology	3.60	1.009
Neurology outcome is poor	3.18	1.039
Which of the following factors do you think drives you towards neurology		
Neurology as a career provides financial reward	3.75	.773
Working in the field of neurology will help you make a difference to patients' lives	4.04	.942
Neurology as a career provides research opportunities	4.18	.836
Neurology is a prestigious career	3.70	.982
Which of the following factors do you think will improve neurology training at your medical school		
Better lectures	3.99	.994
Better bedside teaching	4.11	.901
Longer time schedule for neurology	4.02	.930

Table 1: *Likert score of the questionnaire statements.*

Discussion

Females constituted the bulk of our studied group (87.7%). This can be due to the higher percentage of females among medical students in Bahri University.

The majority of participants (83%) were not yet decided on their future career, and only one third of them (31%) would not consider neurology as a future career. This shows that medical students are a key demographic in combating Neurophobia and working to improve their perception of neurology as well as training is crucial.

More than half of the students found neuroanatomy (56.8%), as well as neurological diagnosis (56.8%) to be difficult this is similar to the study done by McCarron., *et al* [6].

And more than one third (38.6%) had trouble taking neurological history and performing examination. This is different from the studies done in Saudi Arabia [7], the Caribbean [8] and Ireland [6]. Teaching was considered to be unsatisfactory by most students (46%).

Similar to what was mentioned in Saudi Arabia [7] and Ireland [6]. Many strategies to improve teaching quality were suggested in the literature. Abushouk and Nguyen [5] suggested using a problem-based learning approach to integrate basic neuroscience knowledge with clinical neurology. Although this approach is used in Bahri University, students still largely considered their teaching to be deficient. This suggests that implementing more strategies such as interactive learning and augmented reality, needs to be considered. It also highlights the need to properly assess the methods used to implement the problem-based approach in Sudan.

Most students (60.8%) thought that there are limited treatments in neurology. Similar to Abulaban., *et al.* study [7], however only (46.2%) thought that neurology outcome is poor, which is different from the study done by Abulaban., *et al*. [7], where 88.6% of their studied group stated that poor outcome was a deterring factor.

Of our participants, 64.9% thought that neurology as a career choice provides good financial reward. Doctor income in Sudan is more clinic based than it is hospital based. Owing to the small number of neurologists, neurology in Sudan is one of the high paying medical

specialties. Also, most medical students in Sudan don't have student loans, thus they are less likely than graduates from other continents [9] to get pressured out of their future decisions due To financial reasons.

The majority of participants stated that they thought neurology would help them make a difference to patients' lives (81.8%) and that it provided good research opportunities (85.9%), and more than half (57.9%) thought that neurology is a prestigious career. It is important to capitalize on these perceptions to build a good reputation for neurology and neurologists, which is an important strategy proposed by Lukas., *et al.* [10] and Abushouk., *et al* [5].

The ways most students thought would improve their neurology training were better lectures (80.7%), better bedside teaching (82.5%), and longer time schedules allocated to neurology in their training curriculum (80.7%). These three domains are key towards improving students' knowledge as well as clinical skills. Use of online learning sources, novel teaching techniques such as augmented reality in teaching neuroscience and expanding the allocated settings for clinical teaching by requiring student training in outpatient clinics, as well as properly evaluating the time scheduled for neurology in undergraduate curriculums, should all be considered as ways to combat Neurophobia.

Conclusion

Although there is generally unfavorable behavior towards neurology as a subject, ways used to teach it, and the patient related factors among our studied group, our participants thought that neurology is a prestigious career, provides good financial reward and research opportunities.

Newer learning techniques, longer time schedules and more bedside teaching, as well as building a good reputation around neurology are all ways that would play a role in eliminating Neurophobia.

Limitations of the Study

We distributed the questionnaire to students' groups, but we can't guarantee that all students got the questionnaire, thus the response rate was calculated based on our population group (total students' number in all three years).

The questionnaire used in this study was not validated.

Recommendations

Further studies in other universities and health facilities should be conducted locally to evaluate the status of Neurophobia in Sudan, as well as factors that influence it, and potential strategies that can be implemented to combat it.

Declarations

Ethics Approval and Consent to Participate

Ethics approval for the study was sought from the ethical review committee at Khartoum state ministry of health. Informed consent was obtained from all participants.

Consent for Publication

Consent to include students from Bahri university as well as permission to use and publish the university's name in the study were obtained from Bahri university.

Availability of Data

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest Statement

None of the co-authors have any financial or non-financial competing interests to disclose.

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Authors' Contribution

All authors contributed equally to formation of the study concept and design, developing the questionnaire, and writing the final manuscript. Mohamed K. Elnaiem co-formed the study concept and design, co-developed the questionnaire, and co-wrote all sections of the final manuscript.

Ismat A. Babiker co-formed the study concept and design, co-developed the questionnaire, and co-wrote all sections of the final manuscript.

Awab K. Elnaeim co-formed the study concept and design, co-developed the questionnaire, analyzed the data using IBM SPSS Statisctics, and co-wrote all sections of the final manuscript.

All authors read and approved the final manuscript.

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