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Perceptions of Intern Doctors and Postgraduate Students About Neuroanatomy Education in Bangladesh

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Abstract

Objective: *To explore the perception of intern doctors and postgraduate students of Neurology, Neurosurgery and Psychiatry about neuroanatomy education at the undergraduate and postgraduate levels in Bangladesh.*

Participants and methods: *Eight intern doctors and fourteen postgraduate students were selected on the basis of their willingness to participate in the study. The intern of a public medical college hospital who almost completed their training and final part postgraduate students of Neurology, Neurosurgery and Psychiatry of different medical institutions of Dhaka were invited for the study. Qualitative research methods involving two focus group discussions (FGDs) were used. FGDs were modelled using some preselected agenda. The discussions were audiotaped and handwritten transcripts were analysed for identifying themes representing the perception.*

Results: *Neuroanatomy was perceived as a difficult but important subject by the participants. Inappropriate timing, as well as the limited use of radiological images, visual aids, clinical correlation and a lack of discipline-specific approach were perceived as the causes of the difficulties. The suggested ways of improving better understanding included enhanced functional, clinical and radiological orientation, and increased use of multimedia and online resources in the teaching-learning of neuroanatomy.*

Conclusion: *The perception of intern doctors and postgraduate students of Neurology, Neurosurgery and Psychiatry about their neuroanatomy education indicates the need for redesigning teaching-learning at the undergraduate and postgraduate levels. Enhancement of radiological images, 3-D visual aids, clinically-oriented and discipline-specific approach in neuroanatomy teaching-learning may be helpful in applying relevant knowledge and skills in clinical practices.*

Keywords: *perception, neuroanatomy education, focus group discussion, intern doctors, postgraduate students.*

Introduction

Medical curricula around the globe are being altered continuously because of the changing demands of the professional life as well as of the findings of the relevant research on medical education. In recent times, the time allocation for teaching anatomy has been reduced which has put newer challenges for the students in building a concept of complex biological structures[1]. This concern is particularly applicable for neuroanatomy, because the nervous system is one of the most complex systems of the human body[2]. In order to meet the demands of time, the learning of anatomy is being made clinically-oriented and more problem-based. The complex nature of neuroanatomy and reduced time allotted for anatomy have been associated by some authors with the reported deterioration of the knowledge of neurology after completing the pre-clinical years of the undergraduate medical course[3,4]. Several studies

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have reported that neurology has a reputation among medical specialties of being particularly difficult. Jozefowicz introduced the term 'neurophobia' to define it as a fear of the neural sciences and clinical neurology which related to the students' inability to apply their knowledge of basic sciences to clinical situations[5]. The main factors responsible for this fear have been identified by Schon as 'poor teaching' followed closely by 'problems related to neuroanatomy'[3]. Recent studies show that medical students, residents and junior physicians in Europe, Asia and Australia have particular difficulties in diagnosing and managing patients with neurological disorders and the same picture has been revealed in case of the US trainees[3,6,7,8,9]. The residents and medical students demand improved neuroanatomy teaching as well as use of online resources as the ways out[9]. The assistance of similar fear and difficulties can be assumed in case of the junior physicians and postgraduate students in Bangladesh; informal communications with these groups on the issue indicate such possibilities. However, systematic study on the issue seems to be lacking.

In Bangladesh, the undergraduate level neuroanatomy teaching-learning and assessment takes place in the later part of the 1½-year period allotted to anatomy in a 5-year MBBS (Bachelor of Medicine and Bachelor of Surgery) course. Although indicated in the curriculum to be clinically-oriented, this neuroanatomy teaching-learning and assessment is highly dependent on the prevailing learning environment (manpower, resources etc.) and motivational status of the teachers in individual institutions. No specified, implementable structured mechanism has been developed for ensuring meaningful clinical orientation in every institution. In some institutions, the postgraduate students of anatomy are lagging behind due to several practical reasons. The course of MS (Master of Surgery) in Anatomy at Bangabandhu Sheikh Mujib Medical University (BSMMU) has tried to orient neuroanatomy in a clinical way, but direct exposure to patients has not been introduced. Problem-based assessment has been limited to one question in the written exam and one in oral-practical exam as mandatory.

The postgraduate programmes of Neurology, Psychiatry and Neurosurgery contain neuroanatomy as half of a 100-marks paper. However, due to the absence of specific guidelines and mandate, the clinical correlation of its teaching-learning and assessment depends mostly on the attitudes of the respective teachers and examiners. Clinical residency courses opened at BSMMU for these disciplines are vague regarding the incorporation of neuroanatomy as one of their essential components in any effective clinically customised fashion.

The visibly weak undergraduate background of clinically meaningful neuroanatomy, coupled with virtually unorganised postgraduate exposure to neuroanatomy in terms of clinical relevance to specific disciplines, is unlikely to produce competent clinicians capable of using neuroanatomy in the physical examinations, diagnoses and treatments of neurological, psychiatric or neurosurgical disorders.

All the above call for deeper thinking and insight into the issue and bringing appropriate changes in the undergraduate curriculum regarding neuroanatomy teaching-learning. It also highlights the need for developing postgraduate neuro-anatomy course(s) meant for establishing a firm neuroanatomical basis for the teaching competency of anatomists and clinical competency of neurologists, psychiatrists and neurosurgeons. There is no systematic study in Bangladesh regarding junior doctors' and future specialists' perceptions about undergraduate or postgraduate neuroanatomy education. Therefore, it is not known what they actually need, what difficulties they face, how these difficulties can be overcome and how the teaching-learning and assessment in neuroanatomy should be improved. For improving or redesigning curriculum feedback from the stakeholders & including the learners is an important prerequisite. We chose interns as the junior doctors and postgraduate students of Neurology, Neurosurgery and Psychiatry as the future specialists because they have to apply their knowledge and skills of neuroanatomy that they

had acquired at undergraduate and/or postgraduate levels. Understandably, their perceptions and suggestions should be relevant to the curriculum designers. The present study was aimed to explore the perception about neuroanatomy education and to find the ways for improving neuroanatomy teaching-learning and assessment at the undergraduate and postgraduate levels from a Bangladeshi perspective.

Methods

Study design

Qualitative research methods comprising two focus group discussions (FGDs) were chosen for the study as a means for understanding the 'why's and 'how's of the research issue.

Participants

For exploring the perception of the junior doctors and postgraduate students of relevant disciplines about neuroanatomy education, the MBBS intern doctors and the Masters-level – Doctor of Medicine (MD) or Master of Surgery (MS) – students of Neurology, Psychiatry and Neurosurgery were selected for the FGDs. Eight participating intern doctors were from a public medical college hospital of Dhaka. Only these intern doctors who had almost completed all the rotations of their internship training and who had dealt with clinical cases in the three concerned clinical disciplines were approached for the study. The participants for the FGD among the postgraduate students were selected from three medical institutions of Dhaka. They belonged either to Phase B (last 3 years of the 5-year course) of the Neurology/Neurosurgery/ Psychiatry residency courses or to the final (thesis) part of the respective non-residency courses. Fourteen students of the aforementioned disciplines participated in the FGD.

The medical college hospital in which the participating intern doctors were working was selected on the basis of convenience from the leading medical college hospitals of Bangladesh having undergraduate MBBS and postgraduate courses. The intern doctors and the postgraduate students who obtained their medical Bachelors from abroad were excluded from this study.

Postgraduate students were selected from all of the three medical institutions of Bangladesh where all the three above mentioned postgraduate courses (residency or non-residency) were run simultaneously. The selection was based on their willingness to participate.

Procedure

Two FGDs were conducted in separate venues and on different dates. The FGD among the intern doctors was held in the Department of Surgery of Sir Salimullah Medical College and Mitford Hospital, Dhaka and lasted for 132 minutes. The FGD among the postgraduate students was held in the Department of Graduate Nursing of BSMMU and lasted for 133 minutes.

Facilitator guide questions were given to each of the focus groups. The questions were prepared on the basis of the agenda. The importance of neuroanatomy as an undergraduate medical subject and the requirements of the knowledge and skills of neuroanatomy in clinical practice, difficulty in grasping neuroanatomy as an undergraduate, reasons behind the difficulty, adequacy of knowledge or skills of neuroanatomy presently acquired by the Bangladeshi medical undergraduates for the problems to be dealt with as clinicians and measures to improve the inadequate knowledge and skills at the undergraduate level were the agenda of the FGD among the intern doctors. The agenda of the FGD among the postgraduate students were the importance of neuroanatomy as a medical subject for the concerned disciplines, the extent and type of requirement of the knowledge and skills of neuroanatomy in their clinical practice, difficulty in grasping neuroanatomy as a postgraduate student, adequacy of knowledge and skills of neuroanatomy presently acquired by the postgraduate students and measures to improve the inadequate knowledge and skills of neuroanatomy at the postgraduate level.

After an introductory note regarding the ground rules and basic intention of the FGD, a copy of the questions based on the agenda was supplied to each of the participants. The facilitators role was primarily supportive, prompting discussion where

required, using an inductive approach to the topics discussed by the doctors. Digital voice recorders were used to record the group discussions. The first and third authors of this article facilitated the FGD. In addition, a co-facilitator took hand notes of important points of the discussion.

Data analyses

The data were analysed thematically. The recorded discussion was transcribed into written form in Microsoft Word and translated into English where the respondents expressed their opinion in Bangla. The Word documents were converted into plain texts and the data were analysed by using the software 'ATLAS.ti 5.2'. The plain text formats were uploaded as primary documents in 'ATLAS.ti 5.2'. The primary documents were coded. The output of individual code was taken. The core theme(s) regarding each agendum of each FGD was/were identified. This process was verified by a second analyst, the second author of this article for consistency.

Ethical issue

Each participant signed an informed consent form for participating in one of the two FGDs and allowing future use of the comments and ideas anonymously in the thesis research and in reports and other publications. The consent form indicated that the participation in the FGD was entirely voluntary and would not affect the participants' professional future by any means nor would they be benefitted by it in any way.

Results

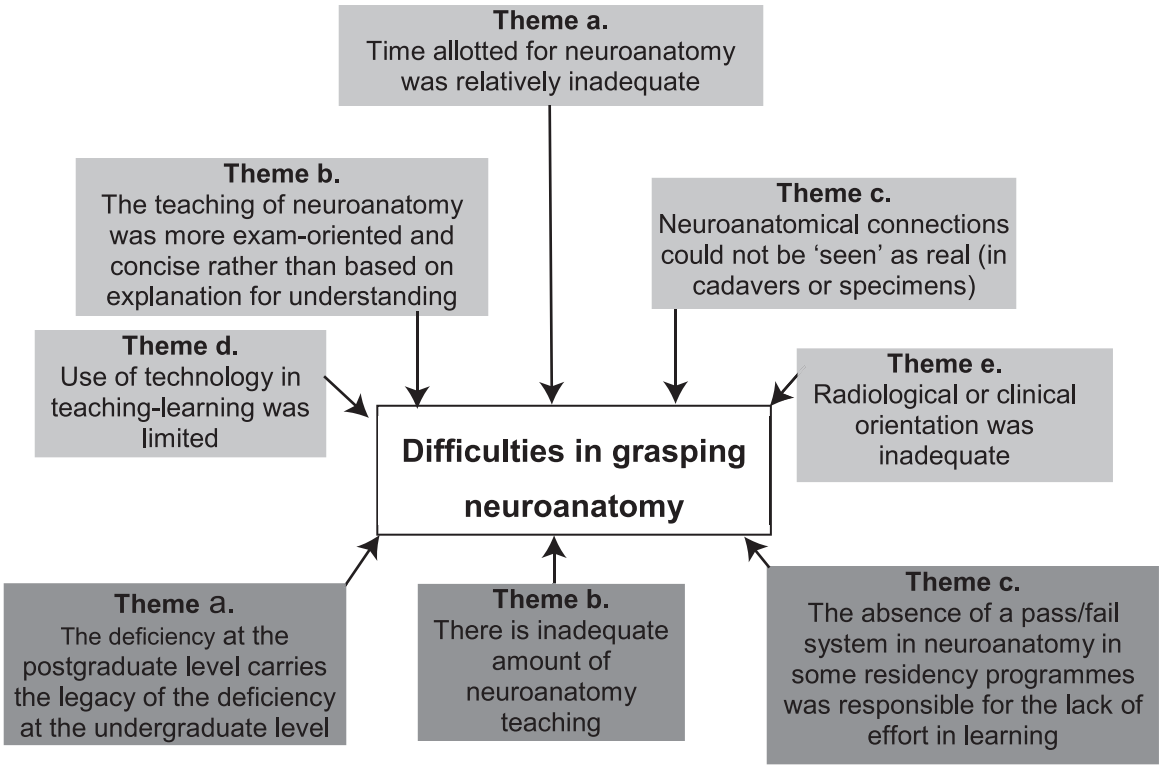
All the participants of the study considered neuroanatomy as an important but difficult subject. Highlighting the various aspects of neuroanatomy teaching-learning on the basis of their personal experiences, they pointed out the difficulties they had faced in their own professional life while applying their knowledge and skills of neuroanatomy in diagnosing, investigating and managing patients. Through discussion, they came up with suggesting different ways of improving neuroanatomy teaching-learning and assessment to overcome the obstacles they had faced. The views of the intern doctors and postgraduate students of Neurology, Neurosurgery and Psychiatry about neuroanatomy education selected from the two FGDs are described below.

Importance and requirements of neuroanatomy knowledge and skills in clinical practice

The participant internee doctors considered neuroanatomy as an important subject because they had attended to a lot of patients with neurological problems. They cited various examples of patients they had received in Medicine and Paediatrics. Moreover, they felt the need for the knowledge of neuroanatomy for attending most of the patients as the nervous system along with the endocrine system control the functions of the whole body. According to them, knowledge and skills of neuroanatomy is important for the examination, diagnosis, management and referral of patients. They explained this importance in case of various neurological disorders. Besides clinical diagnoses, several participants also mentioned the necessity of the knowledge and skills of neuroanatomy for radiological diagnoses. Identification of lesions in specific areas of the brain like the internal capsule, and brain stem, in CT scan and MRI were mentioned in this regard. One of the participants pointed out the importance of neuroanatomy in anaesthesia. For example, the knowledge of the extension of the spinal cord is essential for spinal anaesthesia and caudal block the intern added. The courses, distributions and relations of nerves were considered as important for working in the casualty words:

"Neuroanatomy of course is important for applying in general practice. As for example, when I will work in an Upazilla *Health Complex, I will get many casualty patients, and victims of (road traffic) accidents, violence, cuts and I will have to manage those patients. In such cases, if I am not able to recognise which is a tendon and which one is a nerve, then what will I do? Neuroanatomy is important in differentiating between arteries, veins and nerves in the total management of those patients. If I have the knowledge of neuroanatomy, I would do lumbar puncture for an early diagnosis if I receive a patient with convulsion. Thus, we need the knowledge and skills of neuroanatomy not only for the diagnosis, examination or referral of patients, but also for their management."*(FGD participant 6: Intern Doctor)

Themes emerged from the FGDs regarding the difficulties in grasping neuroanatomy



Themes in light boxes emerged from FGD with intern doctors and in deep boxes emerged from FGD with postgraduate students regarding difficulties in grasping neuroanatomy

Almost all of the participant postgraduate residents/ students asserted that according to their experience, a precise knowledge of neuroanatomy is necessary for the diagnosis of diseases. Most of the participants from Neurology claimed that they required the knowledge and skills of both 'traditional' (according to the participants, the undergraduate neuroanatomy was traditional neuroanatomy) and clinical neuroanatomy to correlate the clinical findings of their patients. A strong base of neuroanatomy is the most important requirement for such correlation. Examples cited were lesion in the cerebellar vermis and multiple cranial nerve palsies due to vascular lesions. Recapitulating their own experiences, they felt that when the patient's history or complaints did not match the clinical findings, the knowledge of neuroanatomy proved to be essential for making a proper diagnosis. It had also been applicable in situations when an imaging report did not comply with the clinical findings, some participants argued. Most of the participants from Neurology found neuroanatomy as important for deciding on the investigations.

"Knowledge of neuroanatomy is needed (when you have to suggest) a diagnostic imaging. Getting a CT scan done when an MRI was necessary results in a wastage of time and money. Again, if we understand that the lesion is in the cervical region of the spinal cord, but we have an MRI of thee lumbosacral or thoracic region, the diagnosis or identification (of the lesion) is delayed. So, if we do not know the neuroanatomy, it will not only increase the morbidity and mortality of the patients, but also cause economic loss." (FGD participant 8: MD Neurology Student)

All of the trainee neurosurgeons believed that they required the knowledge and skill of surgical

anatomy in their professional life and half of them did not really feel the need for knowing of 'traditional' anatomy. In their opinion the anatomy of the brain in different positions of the patients is vital for surgery:

"Positioning the patient and orientation of the brain would make 50% of the surgery" (FGD participant 5: MS Neurosurgery Resident)

Participants from Psychiatry felt that they would have to understand the neuroanatomy of the complex functions of the brain, like emotion, motivation, and behaviour. They added that the structures and connections of the frontal cortex, amygdala and hippocampus, the Pepez circuit etc., would be very important to their clinical practice. One participant from Psychiatry mentioned that they required the knowledge of neuroanatomy to exclude the organic causes or to confirm the diagnoses of some somatic disorders like Obsessive Compulsive Disorder or Convulsion Disorders:

"Previously psychiatric disorders were treated as functional disorders, but recently the view has changed. Psychiatric disorders do have relations with brain anatomy and also with neurotransmitters. So, it is important to know the structural abnormalities- what happens in the disorders especially in chronic disorders like Schizophrenia, Obsessive Compulsive Disorder and similar disorders. It is also very important for us because in many psychiatric disorders there are options for various types of operations in the brain structures." (FGD participant3: MD Psychiatry Resident)

Difficulties in grasping neuroanatomy

All of the eight intern doctors recalled difficulties in grasping neuroanatomy as undergraduate students. They went on to discuss these difficulties and tried to figure out the possible reasons behind them. The points emerging from their discussions included problem with time allocation, invisibility of the neuronal connection in the cadavers, and inadequate teaching-learning methods. The time allotted for teaching neuroanatomy, they felt, had been inadequate, and it had been taught immediately before the First Professional exam (the summative examination at the end of the medical undergraduate course). Therefore, there had not been enough time available for revision. Three of the discussants found neuroanatomy difficult because while it is a connection-based subject, neuroanatomical connections cannot be seen in cadavers or in the brain or spinal cord specimens. Its learning had mainly been based on imagination and the diagrams used in textbooks.

"Difficult, I don't know where it starts and where it ends. As the eyes can't see the connections, the mind does not know" (FGD participant 5: Internee Doctor)

One internee doctor viewed their undergraduate teaching of neuroanatomy as exam-oriented rather than based on explanations for understanding. Almost all of the participant intern doctors felt that they had seen very limited use of technology in their neuroanatomy teaching-learning. There had not been enough multimedia presentations. The lack of those presentations deprived them of visual experiences of the neuronal connections or the functional aspects of the nervous system to a considerable extent, they added. One intern held inadequate radiological or clinical orientation in the teaching-learning of neuroanatomy as responsible for the difficulties.

The postgraduate students pointed out that the reasons behind the problems in grasping neuroanatomy at the postgraduate level carried on the legacy of deficiencies at the undergraduate level. All except one mentioned that they had deficiencies in neuroanatomy at the undergraduate level. They attributed different reasons to these deficiencies. Most of the participants mentioned that in the undergraduate course, the 'Brain and Eyeball Card' (one of the six parts of regional anatomy at the undergraduate level in Bangladesh) had been taught immediately before the final examinations in anatomy. This had not allowed enough time for learning a complex subject like neuroanatomy. One Neurology postgraduate student said that the 'Brain and Eyeball Card' had been taught somewhat haphazardly completing the 'Card' just before the final examinations in anatomy. However, one FGD participant had a different perspective:

"We have doubts about our learning in the 'Brain and Eyeball Card' at the undergraduate level. It does not matter whether it was placed at the end or in the middle (of the anatomy course). The card was there just for completion. We dissected much from the neck to toe, but the head was not dissected at all, except for a few facial muscles. No brain was dissected. Again, it remains unknown whether some others (specimens) were also there (for us) apart from the two sections of the brain- one sagittal and one coronal. Our undergraduate knowledge was in such a state- I would doubt whether our teachers seriously thought about it. We ourselves also carried on with our learning in a similar fashion. For these reasons, I suppose all of us have some sort of fear regarding the brain." (FGD participant 12: MS Neurosurgery Resident)

Most of the participants from Neurology and Psychiatry claimed that their postgraduate anatomy classes had been inadequate relative to their requirements. One MD Neurology student mentioned that they had not had discipline-specific classes in anatomy. The classes had been combined for all the postgraduate students of all disciplines together. Understandably, the students had not felt interests in these classes and, consequently, they had not been able to apply their knowledge and skills pertaining to neuroanatomy in their clinical life appropriately. Moreover, the absence of a pass/fail system in neuroanatomy in some residency programmes was responsible for the lack of effort in learning on the part of the students. They acknowledged that these classes had been informative, but they had not paid attention as their learning had previously always been exam-driven. Due to this reluctance, they felt difficulties in the final part of the course when they were required incorporating their understanding of neuroanatomy into their clinical practice.

Adequacy of neuroanatomy knowledge and skills in clinical practice.

All the participant intern doctors considered the knowledge and skills that they had acquired in neuroanatomy as medical undergraduates to be inadequate for their present requirements as those teaching session had not been adequately clinically-oriented. The use of radiological images of the brain and spinal cord had been very limited, they added.

Almost all the postgraduate participants from Neurology and Psychiatry also deemed their present knowledge and skills related to neuroanatomy as inadequate for their professional requirements. They felt that they were not able to apply their present understanding of neuroanatomy in the wards. Insufficient number of classes, lack of discipline-specific approach and lower degree of clinical-orientation had been responsible, they would believe.

Measures to improve the inadequate neuroanatomy knowledge and skills

Twelve points emerged from the FGD among the intern doctors regarding the measures to improve the knowledge and skills in neuroanatomy at the undergraduate level.

Time allocation for neuroanatomy teaching: The interns believed that neuroanatomy should be taught in the middle of the anatomy course rather than at its later part and its teaching time should be increased by reducing the time allocated for the extremities. This, they felt, would allow students adequate time to learn neuroanatomy even if they had deficiencies or failed the formative assessment exams.

Use of technology: Almost all the intern doctors demanded enhanced use of multimedia and other audio-visual aids in teaching neuroanatomy. They agreed that the tracts and other connections of the nervous system should be taught using animated presentations. In their opinion, videos on different phenomena of the nervous system would be helpful in understanding the complex aspects of neuroanatomy. Additionally, 3D views of different areas of the brain and spinal cord in different positions, which cannot be seen in the viscera, can be shown to the student using digital devices.

Use of radiological images: From the interns' viewpoint, a greater number of radiological images should be used in teaching neuroanatomy than it currently is. One participant added that since in clinical situations, a doctor sees the patient's brain

principally through the images like CT and MRI scans, the use of radiological images at the undergraduate level would increase the efficiency of future physicians.

"I have to recognise the brain (parts) in CT/MRI (scans)in my clinical life. So, if radiological correlation is enhanced in neuroanatomy teaching-learning, it will be helpful for better understanding of neuroanatomy in my professional life" (FGD participant 3: Internee Doctor)

Structure-function relationship approach: Some intern doctors suggested that structures should correlate with the functions in neuroanatomy teaching-learning at the undergraduate level.

Clinically-oriented teaching-learning approach: Majority of the participants were in favour of a clinically-oriented neuroanatomy teaching-learning strategy. They pointed out that neuroanatomy would correlate with the clinical conditions commonly encountered in our country, such as Stroke, different types of paralysis, GB (GuillianBarre) syndrome, Extrapyramidal Syndrome, PLID (prolapsed lumbar intervertebral disc), Parkinsonism etc.

Principle-oriented approach: Some participants remarked that if the teachers taught the principles of neuroanatomy, and the students were asked to apply these principles in dealing with different information or conditions, then students' participation in the learning process would increase.

Interaction between teachers and students: One participant emphasised on the importance of teacher-student relationship. According to the intern, the interaction between teachers and students should be enhanced for better understanding of neuroanatomy.

Neuroanatomy teaching by teachers with special interest in the subject: One participant commented that neuroanatomy should be taught only by the teachers having special interest in the subject.

Reduction of exam time: One participant pointed out that more than adequate time was spent for exams in anatomy. The exam-time should be reduced and extra time should be allotted for learning.

Special classes on terminology: Most of the participant interns demanded for special classes on terminology at the undergraduate level. According to them, with this approach it would be easier for the students to understand complex subjects like neuroanatomy. However, one participant opposing this notion argued that terminology should be learnt in the course of learning whenever a new term would appear. There is no need for such special classes.

Introduction of medical terms written in English at the Secondary and Higher Secondary levels: Two-thirds of the participants demanded that the medical terms should be written in English in the textbooks of secondary and higher secondary levels. Had they been exposed to the medical terms earlier in life, they felt that it would give them a head start in understanding neuroanatomy at the undergraduate level.

Introduction of pre-med orientation: Some of the participants felt that a pre-med orientation should be introduced for those aspiring to enter into the undergraduate medical (MBBS) course for ensuring proper early exposure to subjects like neuroanatomy.

The following ideas were derived from the FGD among postgraduate students regarding improvement of neuroanatomy education at the postgraduate level:

Discipline-specific neuroanatomy classes: Almost all of the participants from Neurology and Psychiatry demanded for discipline-specific neuroanatomy classes for the final part students of their disciplines.

Special course on neuroanatomy: All the participants agreed that they required a special course on neuroanatomy. Different options regarding the nature, duration and timing of the course were suggested by the participants. Two from Neurosurgery suggested two or three continued medical education programmes/ workshops to be run in a year.

Arrangement of cadaver surgery for the future neurosurgeons: All except one participant from Neurosurgery asked for the provision of doing surgery on the cadaver or virtual surgery on dummies (interactive mannequins). Most of the participants from Neurosurgery felt that they can learn neuroanatomy in their department but they would need a 'Brain-lab'.

Clinically-oriented neuroanatomy teaching-learning: Most of the participants had a view that a clinically-oriented approach to neuroanatomy teaching-learning would help them in understanding neuroanatomy better in applying their knowledge and skills meaningfully in the clinical practice. They also regarded such an approach as helpful.

Introduction of an integrated approach to neuroanatomy teaching-learning: Most of the participants from Neurosurgery and Psychiatry demanded integration of neuroanatomy with neurophysiology and neurobiochemistry as well as with clinical disciplines for better understanding and more applicable knowledge among clinical students for their clinical requirement.

Discussion

This study explored the perception of the junior medical graduates and future specialists of Neurology, Neurosurgery and Psychiatry about neuroanatomy education in Bangladesh at both undergraduate and postgraduate levels. The participants' undergraduate experiences, present demands and future recommendations regarding neuroanatomy education were revealed. We selected the intern doctors of a public medical college hospital of the capital, Dhaka, because this hospital treats the usual as well as the critical and referral cases of neurological disorders, and therefore, these intern doctors had the practical experiences to deal with such cases. In addition, we got the scenario of undergraduate neuroanatomy teaching-learning throughout the country as we asked about that to the postgraduate students who had completed their undergraduate studies under the same curriculum from different medical colleges of Bangladesh. Although the undergraduate medical curriculum is same for almost all the public and private medical colleges of Bangladesh, the nature and quality of teaching-learning activities are dependent upon the teaching manpower, experience and enthusiasm of the teachers as well as the number and nature of patients and resources available in the institutions. In this study, we have got perceptions about undergraduate neuroanatomy education in the public medical colleges. It would have been more informative, if it was possible to include interns from the private medical colleges as well.

For the FGD among the postgraduate students, we selected all the three medical institutions of Dhaka where the postgraduate courses on Neurology, Neurosurgery and/or Psychiatry are run to have a countrywide perspective of neuroanatomy education at the postgraduate level. We wanted to know about the neuroanatomy teaching-learning activities of the aforementioned disciplines, whether they receive generalised or special arrangement and in case where it is generalised, if they need special one. Although the FGD ensured the participation from all the institutions having postgraduate programmes of the aforementioned disciplines, it is also possible that the perception about neuroanatomy education of some of the postgraduate students were not reflected as in this single FGD only a few of them from each discipline participated. There was no gender preference in this study.

The findings of our study were similar to those of other studies in some aspects, but we also noted some features that are different indicating some local phenomena. Almost all participants of both FGDs felt alike regarding the importance of neuroanatomy knowledge and skills in their professional life. Most of them expressed that they had felt difficulty in neuroanatomy. This finding conforms to the study results of Schon et al. about the perception of neurology among the British medical students, senior house officers, and general practitioners[3]. The finding also supports the theme 'neurophobia' hypothesis informally proposed by Jozefowicz[5]. In our study, the postgraduate students of Neurology and Psychiatry had often felt difficulties in clinical practice as they found their knowledge and skills in neuroanatomy

inadequate for the clinical situations they had to face. The intern doctors also had similar difficulties. This study also revealed some probable reasons behind the difficulties in the application of knowledge and skills regarding neuroanatomy in clinical practice as pointed out by the participants of both the FGDs. It was observed that the reasons behind the difficulties may vary from institution to institution due to issues with the availability and nature of resources even within the same teaching-learning strategies and assessment policy. However, some common trends could be identified. Inadequate time, inappropriate placement of neuroanatomy in the course calendar, limited use of visual aids, models and radiological images and insufficient clinical correlation were highlighted as the possible reasons at the undergraduate level. At the postgraduate level, the legacy of weak base of neuroanatomy carried along from the undergraduate level, lack of discipline-specific teaching approach and limited clinical correlation were the principal reasons identified by the postgraduate students. Moreover, insufficient use of viscera and models of the brain and lack of brain dissection exercises added to the difficulties as identified by the Neurosurgery postgraduates students. Another reason emerging from the study is the absence of assessment exams in anatomy in the postgraduate clinical residency courses - leading to reluctance in learning neuroanatomy.

The present study has also gathered some valuable suggestions from the FGD participants for overcoming the difficulties in neuroanatomy. Some suggestions were similar to those of the previous study findings abroad while others were unique for Bangladesh. The demand for increased incorporation of diagnostic images in the teaching-learning of neuroanatomy is consistent with the justification of the development of a short intensive course on clinically-oriented neuroimaging principles for psychiatric residents made in Downar et al[10]. In addition, the intern doctors suggested a 3-dimensional (3-D) approach in neuroanatomy teaching-learning. This view conforms to the finding of Estevez et al. where the 3-D physical modelling activity has been regarded as an effective method for teaching spatial relationships of brain anatomy[2]. It also echoes the suggestion for introducing interactive 3-D atlas computer software in overcoming the dramatic decrease in time allocation for learning neuroanatomy in various courses abroad in recent times[1,11]. In our study, the majority of the participants from Neurosurgery were in favour of the provision of cadaver dissection facilities for increasing skills of the would-be neurosurgeons. This view is similar to that of Collins, who felt the usefulness of cadaver dissection for the future surgeons in enhancing their skills[12].

Besides developing such insight related directly to the problems with neuroanatomy, our study has shed some light on a lateral aspect of the issue. In the FGD, interns agreed on keeping the medical terms written in English at the secondary (8^{th} to 10^{th} grades) and higher secondary (11^{th} and 12^{th} grades) levels. In Bangladesh, the medium of instruction in the national curriculum of secondary and higher secondary levels is Bangla (though there are some English medium schools). English is taught separately as a second language. On the other hand, all medical books and the written assessment exams are in English though the practical exams are often conducted in a mixture of Bangla and English. There is no pre-med or other preparatory course for the would-be medical students. Although there is an English language course for medical undergraduate, run in medical colleges, its utility is often questioned by the teacher and student community because of its nature. The change of medium of instruction may be a factor behind this demand of introducing the medical terms in English in biological sciences at those levels. The participants also pointed out that even the laymen also use the English terms of different body parts and biological processes instead of Bangla.

Vast increase in legal claims in the affluent countries associated with the supposed lack of anatomical knowledge could be a warning for the future situation with the health sector in Bangladesh[12, 13]. In the present status of the postgraduate (MD/MS) residency programmes of clinical disciplines (including Neurology, Psychiatry and Neurosurgery), access to formal anatomy teaching-learning remains limited and assessment in anatomy is almost non-existent. Although the provision for anatomy teaching-learning and assessment still prevails in the non-residency MD/MS programmes, run in different medical institutions of the country, there was a lack of defined course curricula customised for different disciplines. Moreover, these courses are now being

converted into residency programmes, and are likely to face the same fates as those of BSMMU. In the fellowship (FCPS) programmes of clinical disciplines, exposure to anatomy is only directed towards passing in the Part-I MCQ (multiple choice questions) exam. No practical exposure to the human body, models or other 3D tools is involved even in the surgical disciplines. In this situation, the findings of the present study will be helpful for the medical curriculum specialists of Bangladesh in reviewing the existing one.

Conclusions

The perceptions of the participants indicate that there are needs for curricular changes regarding neuroanaotmy in the medical undergraduate course as well as Neurology, Psychiatry and Neurosurgery postgraduate courses. This would enable the general physicians and specialists to diagnose, investigate and treat neurological, psychiatric and neurosurgical patients more competently. In this regard, issues like timing, strategies, use of specific teaching methods and practical and clinical orientation should be taken care of.

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