

Anatomy education in physiotherapy training in Nigeria: perception of Nigeria trained physiotherapists

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Abstract

Background: Sound anatomy knowledge is prerequisite to effective physiotherapy education and practice. There is need for evaluation of physiotherapists' perception of anatomy education (AE) in Nigerian physiotherapy training programmes in order to introduce appropriate modifications for improved learning and clinical practice.

Methodology: 172 physiotherapists trained and practicing in Nigeria, selected with cluster sampling technique from ten clinical physiotherapy departments in Nigeria, participated in this descriptive survey. They responded to a validated structured questionnaire seeking information on their AE profile, perceived challenges of AE and recommendations for improvement. The data were summarized with descriptive statistics of frequency and percentages.

Results: Most (52.3%) reported that their undergraduate AE was insufficient to support their clinical expertise. Covering vast topics within a short period (68.6%), large class size (63.1%), poor teaching facilities (59.9%) and poor practical class supervision (52.9%) were the major reported challenges to effective AE. Most acknowledged a positive relationship between anatomy and physiotherapy (57.0%) as well the relevance of anatomy knowledge in physiotherapy practice (60.5%). Physiotherapists perceived the impact of anatomy knowledge to be the most relevant in assessment and evaluation procedures (53.9%). Participating in AE in undergraduate programmes (60.5%), increased practical class supervision (50.6%) and the use of electronic aids (44.2%) were reported as the major areas for improvement in physiotherapy training-related AE.

Conclusion: Physiotherapists are sufficiently aware of the relevance of anatomy knowledge in their clinical expertise. AE in Nigerian undergraduate physiotherapy programmes is insufficient to support optimum physiotherapy practice. Improved anatomy teaching-learning processes as well as creating better links between anatomy and core physiotherapy courses are recommended.

Keywords: Physiotherapist, Anatomy knowledge, Nigeria

Disclaimer: The views and opinions expressed in this article are those of the authors.

Introduction

Sound foundation in basic sciences imparts students with good understanding of the structures and functions of the human body [1] and has been traditionally regarded as prerequisite for the education of health professionals. Anatomy is the oldest known medical science and plays a vital role in the foundation of health education [2]. It has emerged prominent among the basic sciences, being of particular importance in some professions and specialties. A deep insight into anatomy related to the structures and functions of the body is required by health professionals to provide quality healthcare. Anatomy has been a major course in the curriculum of Physical Therapy (PT) program [3] with a powerful historical influence on the identity of physiotherapy as it creates an alignment between physiotherapy and the medical profession. It also serves as a gatekeeping tool for ensuring academic standards through the process of sieving out students who are academically unable to continue the professional training [4].

Anatomy is the scientific study of the internal and external structures of the body and the relationships between body parts, including their appearance and position compositions, locations and the relationship with other parts. It involves learning of large volumes of Latin terminology and functions including muscle names, origins and insertions as well as joints, connective tissues, blood supply, innervations cellular mass and micro anatomy. Various approaches are employed in anatomy education, which commonly include the use of textbooks, traditional classroom teaching, post-mortem examinations, computer aided programs, overhead projectors and power point presentations [5]. Recent technologies such as 3D illustrations are also used in anatomy education with recommendations that anatomy education should be adapted to technology [2,6-7]. Computer-assisted anatomy instruction is generally perceived by

students to be enjoyable and helps facilitate learning [8]. Cadaver dissection is extremely important in both medical applications performed on the healthy human body and in pathological situations. However, the greatest handicap in medical colleges, including Physiotherapy, is the limited availability of cadavers and it has been reported that some students graduate from medical colleges without an experience of a post-mortem examination [9] It is not uncommon for students to use the traditional rote or surface learning approaches for anatomy education and this has resulted in the perception of anatomy as 'boring, hard and dull'. [10,11] While discussing the perception of anatomy as a primary subject for health practitioners, Miller et al. [12] also opined that the common misconception in anatomy education is the reliance on memorising words and facts without the understanding of fundamental concepts.

In physiotherapy training, anatomy education plays an integral role and is indispensable as detailed knowledge of the structures of the human body, particularly the musculoskeletal system, is essential for a sound understanding of other pre-clinical and clinical courses as well as safe and efficient clinical practice [1]. Knowledge of human anatomy is a foundation for further study of related basic science courses like biochemistry and physiology as well as other health-related courses, including kinesiology, biomechanics, pharmacology, physical education, and motor learning. Additionally, profound theoretical knowledge of anatomy is prerequisite for several clinical practices such as palpation, soft tissue examination and other evaluation procedures. Thus, the importance of anatomy education to physiotherapists cannot be overemphasized. From its benefit in the comprehension of other pre-clinical and clinical courses, to its vital role in clinical practice, detailed knowledge of anatomy also aids inter-professional team work [13-14]. Current studies advocate the

continuity of anatomy education and emphasize that training after graduation and exams in certain intervals needs to be continuous [2,15].

Anecdotally, in Nigerian medical and allied health professional trainings, anatomy is commonly perceived to be of most relevance to students in Medicine, Surgery and Dentistry departments as well as practicing physicians and surgeons, in comparison to students and clinicians of allied health departments, including physiotherapy, radiography, medical laboratory and nursing sciences. Consequentially, allied health sciences students, physiotherapy students inclusive, have been observed to poorly comply with the requirements of anatomy education and often display a less committed attitude towards anatomy. Negative perceptions and attitude towards any education domain play great roles in modifying the understanding and application of such educational principles in practical situations. An understanding of the anatomy education practices and its challenges in physiotherapy training may trigger modifications in the training of physiotherapy students for improved professional practices. Therefore, this study investigated the perceptions of physiotherapists on anatomy education in Nigerian physiotherapy training programmes.

Materials and Methods

This descriptive survey was carried out in the Physiotherapy departments of 12 randomly selected private and public hospitals in Nigeria. A total of 172 Nigeria-trained physiotherapists who have been involved in at least six (6) months of clinical practice participated in this study. Prior to commencement of the study, ethical approval was sought and obtained from the Health Research and Ethics Committee of the University. Informed consent was obtained from the respondents and a structured questionnaire was used to investigate the physiotherapists' perception of the anatomy

education they undertook in their undergraduate physiotherapy training. Descriptive statistics of frequency counts and percentages were used to summarize data and Statistical Package for Social Sciences (SPSS) (version 21) to analyze it .

Results

Table 1 shows the general characteristics of the respondents. Majority of the respondents were between the ages of 26-35 years (62.2%), males (50.6%), had bachelors degree as their highest qualification (75.4%) and attended University of Nigeria, Enugu, Nigeria (51.6%). A greater percentage of the respondents held job ranks of senior physiotherapists (26.2%), worked at federal government-owned healthcare institutions (54.1%), are Neurology specialists (27.9%) and had less than 5 years working experience (41.9%).

Respondents' anatomy education profiles show that during their undergraduate trainings, most of the physiotherapists undertook anatomy education for less than 4 semesters (57.6%), offered an average of 4 anatomy courses (73.8%) with an average credit load of 3 units per anatomy course (65.1%) and received anatomy lectures for an average of 1-2 hours per lecture session (68.6%) with more than 200 students per class (47.7%) [table 2]. One-fifth of the respondents were not exposed to post-mortem examination (19.8%) and out of the majority that were exposed to dissection classes, less than half (42.4%) were supervised. These of electronic aid for teaching anatomy were relatively poor (34.9%).

Respondents' perception of anatomy education and its impact on clinical practice are presented in tables 3 and 4. More than half (59.3%) of the respondents perceived their undergraduate anatomy education as insufficient (table 3). More so, majority reported a strong impact of anatomy education on their clinical practice (37.8%) with the greatest impact on their clinical assessment

and evaluation skills (53.9%) as well as diagnosis and clinical decision making (50.6%) (table 4).

Table 5 shows the respondents' perceived challenges of physiotherapy-related anatomy education. Two-thirds of the respondents identified covering vast topics within a short period of time (68.6%) and large class size (63.1%)

as the major challenges facing anatomy education for physiotherapists. Major recommendations for improvement in anatomy education included improved supervision of dissection classes (94.2%), use of electronic teaching aids (93.6%) and teaching of anatomy by anatomy-trained physiotherapists (90.7%) [table 6].

Table 1: General characteristics of the respondents (N = 172)

Variables	Frequency	Percentage %
Age (years)		
> 25	8	4.7
26 -35	107	62.2
> 35	57	33.1
Gender		
Male	87	50.6
Female	85	49.4
Highest educational qualification		
Bachelor	130	75.4
Masters	29	17.0
Doctorate	13	7.6
Institution of study (1st degree)		
University of Nigeria	88	51.2
Nnamdi Azikiwe University, Awka	51	29.7
University of Lagos	17	9.9
Obafemi Awolowo University, Ile-ife	11	6.4
University of Ibadan	5	2.9
Category of Primary workplace		
National health services	10	5.8
Federal teaching hospital	93	54.1
State hospital	31	18.0
Private practice	20	11.6
Private hospital	5	2.1
Sports team or council	4	2.3
Others	9	5.2
Job position		
Intern physiotherapist	25	14.5
Corp member physiotherapist	11	6.4
Physiotherapist	13	7.6
Senior physiotherapist	45	26.2
Principal physiotherapist	30	17.4
Chief physiotherapist	30	17.4
Asst. Director physiotherapy services	8	4.7
Deputy director physiotherapy services	5	2.9
Director physiotherapy services	5	2.9
Area of specialization		
Neurology	48	27.9
Women's health	29	16.9
Pediatrics	20	11.6
Sports	18	10.5
Occupational health and ergonomics	8	4.7
Orthopedics	32	18.6
Cardiopulmonary	17	9.9
Working experience (years)		
<5	72	41.9
6 -10	57	33.1
>10	43	25.0

Table 2: Physiotherapists' anatomy education profiles during undergraduate physiotherapy training

Variable	Frequency	Percentage %
Total duration of anatomy education (semester)		
<4	99	57.6
≥4	73	42.4
Total number of anatomy courses offered during training		
4	127	73.8
>4	45	26.2
Average lecture duration of anatomy courses (hours per lecture)		
1 -2	118	68.6
3-4	54	31.4
Average credit load per anatomy course (unit)		
<3	60	34.9
3	112	65.1
Average number of students per anatomy class		
≤50	6	3.5
51-100	32	18.6
101-150	24	14.0
150-200	28	16.3
>200	82	47.7
Exposure to anatomy practical (dissection classes)		
Yes	138	80.2
No	34	19.8
Supervision of dissection classes		
Yes	73	42.4
No	99	57.6
Use of electronic aid in teaching anatomy		
Yes	60	34.9
No	112	65.1

Table 3: Physiotherapists' perceptions of their anatomy education profile.

Variable	Frequency	Percentage
Sufficient anatomy education		
Yes	70	40.7
No	102	59.3
Class size affected learning		
Yes	119	69.1
No	53	30.8
Duration affected learning		
Yes	81	47.1
No	91	52.9

Table 4: Graded responses of Physiotherapists' perceptions of the impact of anatomy education on clinical practice and expertise

Variable	Graded responses [n (%)]				
	1	2	3	4	5
Impact of anatomy education on clinical practice	14 (8.1)	11 (6.4)	20 (11.6)	62 (36.0)	65 (37.8)
Impact of anatomy education on specific areas of clinical practice					
Assessment and evaluation	0	5 (2.9%)	12 (7.0%)	63 (36.6%)	91 (53.9%)
Diagnosis and clinical decision making	0	5 (2.9%)	12 (7.0%)	68 (39.5%)	87 (50.6%)
Treatment planning	1 (6%)	9 (5.2%)	29 (16.9%)	66 (38.4%)	67 (39%)
Prescription of therapeutic modalities	0	6 (3.5%)	21 (12.2%)	63 (36.6%)	82 (47.7%)
Outcome measurement	8 (4.7%)	22 (12.8%)	38 (22.1%)	63 (36.6%)	49 (28.4%)
Multi disciplinary relationship with other health workers	4 (2.3%)	7 (4.1%)	23 (13.4%)	62 (36.0%)	80 (46.5%)
Clinical education	0	31 (7.6%)	31 (8.0%)	69 (40.1%)	76 (44.3%)

1 = no impact, whereas 5 = strong impact

Table 5: Self-reported perceived challenges of physiotherapy-related anatomy education

Variables	Frequency	Percentage
Poor orientation on the relevance of anatomy to physiotherapy training and practice	65	37.8
Lack or poor supervision during practical class	90	52.9
Poor teaching facilities	103	59.9
Covering vast topics within short duration	118	68.6
Poor teaching skills	79	45.9
Large class size	109	63.1
Inadequate duration of anatomy education during training	91	52.9

Table 6: Physiotherapists' recommendations for improvement in anatomy education

Variables	Frequency	Percentage
Increase in number of semesters allocated to anatomy education	92	53.5
Increase in the Number of anatomy courses taught	96	55.8
Increase in the credit unit load	112	65.1
Reduction in the class size	103	59.9
Improved supervision of practical (dissection) class	162	94.2
Supplement traditional teaching methods with electronic teaching aids	161	93.6
Anatomy education should be undertaken by anatomy-trained physiotherapists	156	90.7

Discussion

The perceptions of Nigeria-trained physiotherapists on their undergraduate anatomy training were investigated in this study. The socio-demographic characteristics of the physiotherapists revealed that majority were within 26-35 years, an age range which falls within the Nigerian civil service

age (15-64 years) [16]. Most of the physiotherapists had Bachelors degree in physiotherapy as their highest educational qualification. Surprisingly, physiotherapists practising in Nigeria have been observed to possess negative attitudes towards academic advancement which is possibly a result of the fact that physiotherapists' job position

advancement in Nigerian healthcare institutions are not dependent on academic qualifications but rather on clinical expertise and years of experience only. A great percentage of the physiotherapists in this study trained in the two south-eastern universities offering Physiotherapy degrees in Nigeria (University of Nigeria, Enugu State and Nnamdi Azikiwe University, Anambra State). This was attributed to the typical Nigerian issue of employment bias in ones' training institution as majority of the respondents worked in two of the major teaching hospitals in South-eastern Nigeria. The preponderance of south eastern institution-trained physiotherapists in this study is one of its major limitations.

Majority of the physiotherapists reported that anatomy education during their undergraduate training was covered in less than 4 semesters on average. This is typical of most Nigerian universities as the entire second and part of the third year of undergraduate Physiotherapy trainings constitute the basic medical sciences years/semesters where they are majorly trained in anatomy, physiology and biochemistry before proceeding to the clinical courses. Many responses revealed that an average of four (4) anatomy courses were offered during their entire training with an average lecture duration of 1-2 hours per class. Depending on the credit unit of each course, most anatomy courses are typically taught 3-4 times per week, resulting in about 3-8 hours of anatomy education weekly. This pattern of anatomy education as well as other factors to be further discussed may have possibly led to the perceived insufficiency of anatomy education, as reported by majority of the physiotherapists. The results of previous studies [1,17] showed that anatomy education was perceived as sufficient when classes lasted for about 3-4 hours and the anatomy courses were covered in four (4) semesters.

In the present study, most of the physiotherapists reported exposure to dissection classes which

involved practical explorations and demonstrations of what was taught theoretically. Previous studies [2,18-19] have also reported adequate exposure to post-mortem examinations during anatomy education. Dissection is an indispensable tool for appreciating the complex nature of the human body and demonstrating the anatomical structures. Not only does it provide the opportunity for a hands-on, but also offers a forum for students to engage in content-rich discussions as well as gives the educators the opportunity to explain in practice what they have taught theoretically [20]. According to Rodrigo [21], learning from dissected cadavers is a satisfactory method of study that should be encouraged. However, most of the physiotherapists in the present study reported non-supervision of the attended dissection classes, allowing students to figure out the practical analyses themselves. Poor or lack of supervision of dissection sessions is usually a result of high student-lecturer ratio and limited number of bodies, making it difficult for adequate supervision of the students.

Most of the physiotherapists also reported not having been taught anatomy with the use of electronic aids. This may be attributed to the lack of adequate facilities in Nigerian government-owned universities as well as the epileptic power supply affecting the country in general. The availability of visual imaging is indispensable in obtaining three-dimensional images of the human body and its tissues, allowing better viewing of anatomical structures as well as aiding retention. [5] Use of electronic aids also makes learning fun and interesting. Considering the limited availability of cadavers in Nigerian medical schools, the next best option for visualized and retentive learning should be the electronic visually-aided practical classes. If these facilities are also limited in their availability, then the quality of anatomy education provided will definitely be insufficient. Therefore, the use of electronic aids in anatomy education is necessary

and has also been previously recommended by Duman et al. [2]. Mannequins, models and computer-aided dissections are also recommended for improved teaching-learning experiences.

It is interesting to note that majority of the physiotherapists opined that anatomy education has high relevance and impact on their clinical expertise and practice, particularly in the areas of assessment, diagnosis and clinical decision making. This finding agrees with previous studies [1-2] which showed that good anatomy education is relevant to physical therapy practice. Invariably, most clinical physiotherapy practice domains basically involve the translation of anatomy knowledge to the understanding and management of clinical conditions. Hence, in-depth and appropriate evaluation, diagnosis and clinical decisions are dependent on basic foundational knowledge of the normal human body structures to enable appropriate distinguishing of clinical abnormalities. For instance, sound knowledge of anatomy helps to know the course of the sciatic nerve when performing a straight leg raise test. Another instance is in the assessment of a 55-year-old patient with complaints of severe knee pain for 4 months. Understanding of the anatomical structures around the knee joint will aid in making accurate diagnosis after proper evaluation with tests like drawer's test, valgus stress test or by mere palpation for tenderness, oedema or stiffness of the knee as well as help in planning the appropriate line of treatment.

Further analyzing the anatomy education of the physiotherapists, several challenges of anatomy education were unveiled. Covering vast topics within short periods of time and large class sizes were identified as the challenges of physiotherapy-related anatomy education. This corroborates the findings of Bergman et al. [22] which reported that the designated teaching time for anatomy has been greatly reduced over the years with a resultant negative influence on quality of anatomy

education and knowledge of the students. Duman et al. [2] who carried out a similar research in Turkey also support this finding, pointing out that short duration of anatomy courses, overcrowded classes, lack of anatomists and cadavers as well as opening of physiotherapy departments which are indifferent to anatomy education cause physiotherapists to graduate without a firm grasp of anatomy. Typically, in a Nigerian University, a semester consists of an average of 12-16 weeks and anatomy courses are taught within three semesters. These courses include histology and embryology as well as gross anatomy which comprise head and neck, upper and lower limbs, thorax, abdomen, pelvis and perineum. The contents of these courses are not possible to be completely exhausted within 3 semesters. As mentioned earlier, the frequency of anatomy classes of 2-4 times weekly with a duration of 1-2 hours per class, makes it impossible to completely meet up with all the curricula contents within the stipulated period. However, it may be unrealistic and non-feasible to reduce the anatomy course contents, and remedial measures can be taken to improve the quality of anatomy education instead.

Regarding the challenge of large class sizes, it is justified to assume that with students overcrowded in a classroom, teaching-learning effectiveness will be markedly reduced. In most Nigerian medical colleges, anatomy education is solely undertaken by the anatomists in the anatomy department. Hence, anatomy education is not internalized or taken by anatomy-trained professionals in other clinical departments. In order to meet up with this huge demand on the anatomists, the usual practice is to merge students from all medical and paramedical departments to enable them covering the course contents in the limited time permitted by the semesters. This compensatory practice not only increases class size, but compromises the quality of anatomy education.

Additionally, a large proportion of physiotherapists pointed out the lack of adequate facilities and poor supervision of dissection classes as other challenges of anatomy education in Nigeria. Most government-owned universities lack proper funding which results in the lack of relevant facilities such as cadavers, electronic aids like overhead projectors, public address systems, computer aided programs etc, as well as generator or inverter to combat the constantly distorted power supply which the use of some of these facilities would be dependent on. Also, the poor supervision of practical classes can be traced back to the large class size and limited number of anatomy teachers. The large number of students coupled with the lack of appropriate facilities makes it difficult for the anatomist to adequately supervise the dissection classes largely due to overcrowding. Another challenge encountered by these physiotherapists as revealed by the study is poor orientation on the relevance of anatomy to physiotherapy training and practice. This may infer a gap in the teaching strategies employed by both the anatomy and physiotherapy educators. Ideally, students need to be properly orientated on the objectives and benefits of a subject (pre-clinical or clinical) prior to its teaching. The demonstration of relationships among pre-clinical and clinical courses is of utmost importance as well as their respective and combined relevance on clinical practice. These strategies are definite positive factors of academic motivation and enthusiasm for the students. Improved academic advisory roles of physiotherapy teachers and mentors are highly recommended for adequate sensitization and awareness on the importance of anatomy and other pre-clinical and clinical courses to prevent the common practice of undertaking these courses for the sole purpose of passing examinations and proceeding to the next class. On a long-term basis, implementation of this recommendation will prevent the formation and

dissociation of an existing loop in anatomy-related physiotherapy education. This loop specifies that insufficient and inadequate orientation-based anatomy education compromises the proficiency of a physiotherapy graduate which subsequently affects his clinical, teaching and academic advisory roles as a future physiotherapist. This in turn leads to further outcomes of students with insufficient and inadequate level of anatomy education, and the loop continues. Thus, improvements on the parts of anatomy and physiotherapy teachers are indispensably necessary.

Nevertheless, physiotherapists in this study made some recommendations on areas that needed improvement for better anatomy education. Ranking top were improved supervision of dissection classes, use of electronic teaching aids and teaching of anatomy by anatomy trained physiotherapists. This agrees with the findings of Rodrigo [21] and Duman [2] who strongly advocated improved supervision of dissection classes and opening of basic science departments in physiotherapy to educate anatomy trained physiotherapists respectively. As previously highlighted, the benefits of improved dissection class supervision and use of electronic teaching aids cannot be overemphasized. However, we opine that the strategy of teaching anatomy by anatomy-trained physiotherapists, as recommended by physiotherapists in the present study, may not be a realistic approach to the improvement of anatomy education. A physiotherapist's additional knowledge of anatomy subsequent to a postgraduate course in anatomy cannot be compared to the expert knowledge of a trained anatomist. Implementing the several recommendations of this study as well as improving the undergraduate physiotherapy curriculum seem to be more realistic and ideal options. Modifications in the specifications of anatomy courses offered by physiotherapy undergraduates are recommended as additional

factors for the improvement of anatomy education in Nigeria. For instance, inclusion of functional anatomy and core neuro-anatomy courses in the physiotherapy curriculum will add credence to physiotherapy training and practice.

Limitation of the study

A major limitation of this study is that the sample size was not restricted. Another is that because of the retrospective nature of the information provided by the study, it may be possible that some respondents may have provided uncertain responses, especially those with longer years post graduation.

Conclusion

Considering the characteristics of anatomy education in physiotherapy undergraduate training, most physiotherapists in this study perceived the anatomy education as insufficient. They attested to its huge impact on clinical practice, particularly on assessment, diagnostic and clinical decision-making skills. Covering vast topics within short periods of time and large class sizes were the major challenges of anatomy education identified by the physiotherapists. As a result, recommendations for improved supervision of dissection classes, use of supplementary electronic teaching aids and teaching of anatomy by anatomy-trained physiotherapists were made for the enhancement of anatomy education in physiotherapy undergraduate training programmes.

Disclosure of interest

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