Undergraduate Students' Understanding of Physiology Subject, Opinions and Perception: The Case of Bayero University, Kano, Nigeria

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Summary: Human Physiology courses are compulsory in medical education but many students encounter challenges in studying them. This study investigates understandings, opinions and perceptions of students about physiology subject and the challenges they encounter in their study. Two hundred and eighty (280) students were interviewed using structured questionnaire. The data were analyzed using IBM SPSS statistics 22. The mean age of the students was 22.8 ± 4.1 years. Males constituted 174(62.1%), while females were 106 (37.9%). Majority of the respondents were in 300 level of study in the university 178(63.6%) as of the time of conducting this research. Most of the participants 257(91.8%) claimed to have good to excellent understanding of the physiology subjects. One hundred and nine (39.1%) alleged that academic staff had unfriendly attitude like rushing lectures, commencing lectures late and fixing tests and other continuous assessment close to examinations, and that lecturers have poor communication/ teaching skills. Less than one-third (28.7%) believed that the subjects have bulky course contents, and 56(20.1%) were of the opinion that the students' lack of seriousness or interest is among the reasons for failing physiology courses. On binary logistic regression, being of female sex, and in 300 level of study emerged as the independent predictors of the students' perception of physiology. Improving the pedagogy 102(36.4%), good attitude of staff towards students and teaching 73(26.1%), improving infrastructure and equipment 35(12.5%); and instituting guidance and counseling unit for both staff and student 31(11.1%) were the ways suggested by the students for improving performance in physiology subject. Most of the students had poor and negative perception about physiology subjects (83.2%). Guidance and counseling for students, through the level coordinators and the mentor-mentee program should be strengthened in all departments. Basic infrastructure and equipment, and teaching techniques should also be upgraded.

Keywords*:* Undergraduate students, Understanding of Physiology Subject, Opinions, Perceptions, Kano-Nigeria

INTRODUCTION

Physiology is one of the prerequisite courses of medical and allied health disciplines. Courses in physiology subjects provide learners with the knowledge about the normal function of the human body and by so laying the foundation for identifying departures from health. Physiology is discussed repeatedly at all levels of study so that students not only acquire knowledge but recognize how it fits into their future medical practice. The human body is a complex system and physiology is thus acknowledged, from the views of both staff and students as a discipline that presents most students with a challenge (Somjen, 1999; Tufts & Higgins-Opitz, 2009; Tufts & Higgins-Opitz, 2014). According to Sturges & Marer (2014), Physiology is difficult because it makes connections among multiple disciplines, and has boundaries that are not rigid. It is a subject with a rapidly increasing knowledge and complexity (Somjen, 1999; Tufts & Higgins-Opitz, 2009; Sturges & Marer, 2014).

However, the progression of students from the medical and allied health disciplines largely depends on their understanding of physiology courses, even though they may have different and diverse requirements.

The Faculty of Basic Medical Sciences, Bayero University, Kano offers physiology as compulsory course of study for undergraduate students in medical and allied health disciplines. The students were taught and examined based on their disciplines as follows: MBBS and Dentistry, BSc. Physiology, and the Allied programs consisting of B. Physiotherapy, B. Nursing, B. Medical Science and B. Radiography. The performance of these students was generally noticed to be poor across all disciplines during the semester examination conducted in October 2015. This study was planned to assess the perceptions of the different groups of students about their understanding of physiology, and their opinions about the factors associated with the poor performance with a view to proffer solution to the problem.

MATERIALS AND METHODS

Study population:

This comprised of three groups of students in their 200 and 300 levels of study from faculty of basic medical sciences; MBBS and Dentistry, BSc. Physiology, and the Allied programs.

Study design, Sample size and sampling:

A descriptive cross-sectional design was used to study a random sample of 280 students. The sample size was determined using the Fisher's formula for estimating minimum sample size for descriptive studies (Lwanga & Lemeshow, 1991); and an 85% proportion of students that believed that their absence from different academic activities can affect their performance, obtained from a previous study from Sudan (Kaddam *et al*, 2012). The sample size was proportionately divided among the three groups of students based on their sizes. Thus the sample size for MBBS/Dentistry was 112 students, the Allied program was 145, while physiology was 23 students.

Sampling frames for the three (3) groups of students was compiled and the required samples were systematically selected using sampling intervals obtained by dividing the number of students under each group by the required sample from that group. The sampling intervals were used to select respondents from the respective groups until the sample size for each group was met.

Instrument and method of data collection

A self-administered semi-structured questionnaire with mostly opened ended questions was used for data collection. The questionnaire had five (5) sections that elicited information on the respondents' bio-data, their opinions and perceptions of physiology as a course of study and as a subject; and the students 'understanding of physiology.

Pre-testing of the questionnaire was on thirty (30) students from a State University in Kano (Northwest University). Six trained research assistants administered the questionnaires. Data was collected in July/August 2015.

Data analysis

Data were analyzed using IBM SPSS Statistics for Windows, version 22. Armonk, NY: IBM Corp.IBM SPSS statistics 22. Quantitative variables were summarized using appropriate measures of location and variability, whereas categorical variables were presented as frequencies and percentages. Perception about physiology was scored and graded using a Likert scale, with 1 and 5 indicating lowest and highest level of agreement respectively with the items eliciting perception. Respondents that chose to "agree - 4" or "very agree - 5" were considered to have "good perception" about physiology while those that chose "very disagree - 1", "agree - 2" or "indifferent/ neutral - 3" were considered to have "wrong perception". Thus

out of an aggregate points for all responses, the students that scored a minimum of 80 points (4 x 20 items) were considered to have good perception while those that score less than 80 points were considered to have wrong perception about physiology. The scoring and grading system was adapted from a previous study (Iliyasu *et al.*, 2010).

Pearson's chi-square and Fisher's exact probability tests were used to identify factors significantly associated with the students' perceptions about physiology at bi-variate level. $P \leq 0.05$ was considered significant. Covariates that were associated with the student' perceptions (adjusting for age and sex) with $p < 0.2$ were included in the multivariable analysis. Variables were included in model if they resulted in >10% change-in-estimate or a change in log likelihood with p-value<0.2. Variables that resulted in change in coefficient standard errors of already included variables by >20% were assumed to be collinear and excluded from the model.

Ethical considerations

Permission and ethical clearance for the study were obtained from BUK authority and the Institutional Review Board of Aminu Kano Teaching Hospital respectively. Informed consent was sought and obtained from all respondents before questionnaire administration.

RESULTS

Biological and academic characteristics of the students

The age of the students examined ranged from 17 to 40 years with a mean of 22.8 ± 4.1 years. About two-thirds were males 174 (62.1%), and in 300 level of study in the university 178 (63.6%). All the students assessed take courses in Physiology but only 23 (8.2%) of them are studying BSc. Physiology as shown in Table 1.

Table 1: Biological and academic characteristics of the students

Characteristic	Frequency (n = 280)	Percentage
Age (Years)		
17 - 24	208	74.3
25 - 32	61	21.8
33 – 40	11	3.9
Sex		
Male	174	62.1
Female	106	37.9
Programme of study		
BSc. Physiology	23	8.2
MB; BS	112	40.0
Harmonized programme	145	51.8
Level of study		
200 level	102	36.4
300 level	178	63.6

*Allied Sciences include; B. Physiotherapy, B. Radiography, B. Medical Laboratory Science, B. Nursing

Students' understanding of physiology courses

The students were asked questions to elicit their self-assessment about their understanding of physiology based on the content of the courses taught and the scores they obtained in the continuous assessment. Most of the students 257 (91.8%) claimed to have good to excellent understanding of the physiology courses as depicted in Figure 1.When the students were generally asked on the common challenges that affect students' performance in physiology, 80 (28.7%) mentioned that the subjects have bulky course contents, 62 (22.2%) said that the academic staff had unfriendly attitude like rushing lectures, commencing lectures late and fixing tests and other continuous assessment close to examinations, while 47 (16.9%) admitted poor communication/teaching skills of the lecturers; and 56 (20.1%) opined that the students' lack of seriousness or interest is among the challenges faced by students. In the same vein, when the students were asked on the ways to improve performance in
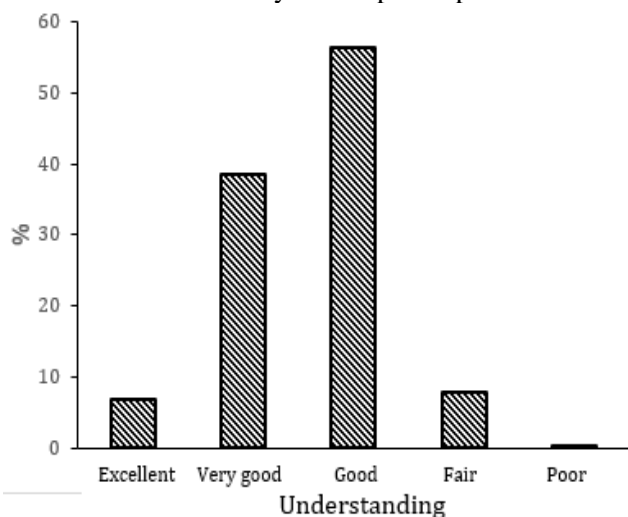
physiology, the most common responses were improving pedagogy 102 (36.4%), improving attitude of staff towards students and teaching and improving infrastructure and equipment 35 (12.5%). Other responses are as shown in Table 2.

Opinions and perceptions of the students about physiology

Table 3 summarizes the parameters used to assess the perceptions of the students about physiology courses, its pedagogy and the academic staff teaching the

Table 2: Students' perceived challenges and ways of improving performance in Physiology

Responses	Freq (%) (n=280)
Challenges	
Bulky course content	80 (28.7)
Negative/ Unfriendly attitude of lecturers	62 (22.2)
Students' lack of seriousness/ interest	56 (20.1)
Poor communication/ teaching skills of the lecturers	47 (16.9)
Inadequate infrastructure and equipment	10 (3.6)
No guidance/ counseling	9 (3.2)
No revision session(s)	1 (0.4)
None	15 (5.4)
Ways of improving performance	
Improving pedagogy	102 (36.4)
Improving attitude of staff towards students and teaching	73 (26.1)
Improving infrastructure and equipment	35 (12.5)
Institute guidance and counseling for both staff and students	31 (11.1)
Capacity building for academic staff	10 (3.6)
Improve the number of experienced academic staff	4 (1.4)
No idea/ don't know	25 (8.9)

Table 3: Parameters used for assessing students' perceptions about physiology

Parameter	Frequency	Percentage
About course content, pedagogy and infrastructure		
Agreed that the course content of physiology subjects is adequate in scope	239	85.4
Agreed that notice for Continuous Assessments are usually given	230	82.1
Agreed that the course content of Physiology subjects is practical and easily understood by students	215	76.8
Agreed that contact hours are adequate in Physiology lectures	210	75.0
Agreed that examinations cover all areas taught	200	71.4
Agreed that Continuous Assessments are adequate in number	182	65.0
Agreed that lecture rooms/ halls are adequately spaced	173	61.8
Agreed that practical sessions in physiology are comprehensive	171	61.1
Agreed that Continuous Assessments cover all areas of teaching	170	60.7
Agreed that teaching aids and illustrations in Physiology is optimum	148	52.9
Agreed that lecture rooms/ hall are well lit	124	44.3
Agreed that temperature in lecture rooms is most times conducive for learning	98	35.0
Agreed that feedback to students on Continuous Assessments and examinations are usually given	89	31.8
About academic staff		
Agreed that the number of academic staff is adequate	236	84.3
Agreed that the academic staff in physiology adequately mastered their areas of teaching	193	68.9
Did not agree that lecturers give unnecessary notes without explanations	189	67.5
Did not agree that lecturers often come late for lectures	142	50.7
Agreed that the communication skill of the lecturers is satisfactory	130	46.4
Did not agree that lecturers commence lectures late into the semester	125	44.6
Perception grades		
Good/ correct	47	16.8
Poor/ wrong	233	83.2

Table 4: Factors associated with the students' perceptions about Physiology

	Bi – variate			Binary logistic regression	
Characteristic	**Positive (n = 47) Freq (%)**	**Total (N = 280)**	**Statistical test (p value)**	**Z test (p value)**	**OR (95%C.I)**
Age > 24 years	15 (20.8)	72	$X^2 = 2.41$ (0.30)	0.88 (0.38)	
Female sex	21 (19.8)	106	Fisher's (0.19)	1.95 (0.05)*	1.99 (1.00; 3.96)
Other programmes	46 (17.4)	257	$X^2 = 6.79$ (0.03)*	1.14 (0.25)	
300 level of study	14 (7.9)	178	$X^2 = 27.8$ (0.001)*	4.51 (0.0001)*	0.21 (0.10; 0.41)
Good understanding of physiology	45 (17.5)	257	Fisher's (0.22)	0.07 (0.94)	

Statistically significant

course. Most of the students agreed that the content of physiology courses is adequate 239 (85.4%), practical and easily understood by students 215 (76.8%), and contact hours for lectures are adequate 210 (75.0%). Although 230 (82.1%) agreed that an advanced notice is usually given before continuous assessments, less than two-thirds 170 (60.7%) and 89 (31.8%) of the students agreed that the continuous assessments cover all areas of teaching, and that feedback is given to students on the continuous assessments and other examinations respectively. The responses on the other aspects of pedagogy and infrastructure are however not encouraging as shown in Table 3.

Except for the numbers of the academic staff in physiology that was adjudged adequate by 236 (84.3%) of the students, the responses on the other parameters used to assess the academic staff are not encouraging as summarized in Table 3. Overall, only 47 (16.8%) of the students were assessed to have good perception about physiology. The overall perception of the students about physiology was significantly associated with being at 300 level of study in the university ($X^2 = 27.8$, p = 0.0001) and being in other academic programmes in the college other than BSc. Physiology ($X^2 = 6.79$, p = 0.03). The perception was however not associated with being more than 24 years $X^2 = 2.41$, p = 0.30), being a female sex (Fisher's p = 0.19) or with the students' self- perception of having a good understanding of physiology (Fisher's p = 0.22). On binary logistic regression in a model consisting of all the five factors, being of female sex, and in 300 level of study emerged as the independent predictors of the students' perception of physiology as shown in Table 4.

DISCUSSION

All students admitted into the undergraduate courses in the college of health science of Bayero University fulfilled the pre-entry cut-off points of 180 minimum in the Joint Admission and Matriculation Board (JAMB) examination for the physiology and allied programs and 220 for the MBBS and BDS programs. The MBBS/BDS applicants who could not secure admission into the respective courses were assigned to study anatomy or physiology courses. Along the line, this category of students tends to lose interest in their new course and hence pay little attention to it. The teaching of physiology subject to all the programs in the faculty is based on the respective curricula, and students are taught and examined separately in three different groups: MBBS/BDS class, Physiology class and Allied Sciences class. The MBBS/BDS students are examined using essay and multiple choice question (MCQ) formats, and the questions are strictly based on their curriculum. On the other hand, the physiology students are examined using essay questions while the allied science students answer MCQ only.

Although most of the students interviewed in this study claimed to have good to excellent understanding of the physiology courses, wrong perception about the subjects prevails (83.2%) indicating having challenges with understanding. Previous studies from a South African medical school reported that students felt that they lacked the basic conceptual foundations essential for the learning and understanding of physiology, since the difficulties that the students identified were mainly terminological and conceptual in nature (Tufts & Higgins-Opitz, 2009). Our findings generally show that the students find physiology relevant to other clinical courses and useful in their future career but somehow face challenges that affect their performance in the course. A similar survey from a Sudanese medical school revealed that most of the students (90.7%) perceived lectures as the most valuable academic activity and 85% believed that their absence from different academic activities could affect their performance (Kaddam *et al*, 2012).

The teaching of physiology in BUK has traditionally been hampered with a lot of negative drawbacks affecting the performances of both the lecturers and the students. Majority of teachers use the traditional face-to-face method largely due to limited resources, lack of adequate ICT knowledge and poor electricity supply. Despite these constraints, many institutions in Africa are increasing students' intake (Sofola, 2014). Mullan *et al.,* (2011) argue that, students enrollment in medical schools ranged from 20 to more than 600, whereas the number of lecturers ranged between 2 and 18, making it difficult for the lecturers to cope with the large volume of work. The situation is worst considering the population expansion in Nigeria and the need to increase internally generated revenue by

most of the Nigerian Universities, further widening the Lecturer – Student ratio and limiting the capacity of the academic staff to impart requisite knowledge on the students. Low lecturer-to-student ratio and large class sizes were identified as common causes of "non-ideal" lecture rooms and facilities as well as poor supervision during practical classes (Mullan *et al.,* 2011). This study observed that lecturer/ teaching factor was the most common factor leading to poor students' performance in physiology (Table 2). This is corroborated by the findings of Anyaehie *et al.,* (2011). Contrarily, previous studies from Europe reported that Lecturers' factor is the least cause of poor performance of students (Micheal, 2007; Carter & Brickhouse, 2004; Sozbilir, 2004). This discrepancy is perhaps due to better technological advancement in teaching that gives students less physical contact with staff but still provides better access to academic resources e.g the use of modern instructional gadgets such as videos, YouTube, and electronic blackboard. Furthermore, well developed structured pedagogy and robust staff welfare and remuneration in the developed countries are among important reasons that shape attitude of staff towards teaching and the students.

Bulky course content, students' factors including lack of seriousness/ interest in the course, and inadequate infrastructure and equipment have severally been cited as sources of poor students' performance in physiology subject (Abour, *et al,* 2004; Carter & Brickhouse, 2004; Sozbilir, 2004; Micheal, 2007). The findings of this study may not be generalizable to all the students studying physiology because participants were only sampled from 200 and 300 level students.

This study observed that most of the students (91.8%) claimed to have scored 50% and above in the continuous assessment for physiology subject, but only 16.8% think positively about the course. The lecturer/teaching factor was identified as the most common factor associated with poor performance of the students in physiology. In view of the finding of the study, guidance and counseling through the level coordinators and the mentor-mentee programme should be strengthened in all departments. Basic infrastructure and equipment, and teaching techniques should also be upgraded.

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