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Medical Students' Perception of the Difficulty of Physiological Courses: A cross sectional Descriptive Study

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Abstract

Introduction: Background knowledge in physiology is essential for clinical practice. Physiology is perceived as a difficult subject. The nature of the subject, the teaching methodologies and student factors are contributing factors for difficulty.
Objective: To elucidate the medical students' perception of the difficulty of topics in the physiology and why those topics are perceived difficult.
Methods: A descriptive cross sectional study design was employed. The third-year undergraduate medical students (n =140) were asked to identify the topics they had difficulty understanding, the reasons for their difficulties and the strategies they used to deal with that difficult topics. Data were entered to Epi data and exported to Stata 14 for further analysis.
Results: The overall satisfaction of students with physiology learning was 62.1%. The majority of students (48%) found that the nervous system is the most difficult course whereas the least difficult is the gastrointestinal system (0.7%). Sixty-three (45.7%) students were believed that the difficulty of the courses is because of the nature of the course and 30.4% of students speculated ways of teaching. Forty seven percent were used online educational videos to support their learning.
Conclusion: In this study students perceived that physiology is not a difficult subject to learn. The most difficult topic was the physiology of the nervous system. The nature of the topic was the perceived reason for topic difficulty. Students were looking at free educational videos for clarification and almost none of them were approaching instructors for help.
Keywords: Physiology, Difficult topics, Ethiopia.

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1. Introduction

Human physiology is a branch of biological sciences that study the normal functions of the human body systems. It is a foundation for clinical medicine and it is considered as an essential subject in any medical curriculum(1]. It constitutes the first and essential expertise to be able to study the underlying pathogenesis of disease processes. Background knowledge in physiology enables a medical student to understand how the different body systems integrate and work together to maintain nearly constant internal body conditions[1,2].

The duration of traditional medical education in Ethiopia is six years. Students are assigned by the ministry of education following their completion of grade twelve. Physiology course is given in full one academic year after students are completed their pre-medical courses and it follows a system based approach. The course has both lecture and laboratory components (one credit hour) with a total of ten credit hours. Students are expected to score C grade in physiology to pass to the next level of their education. The course covers introduction to physiology and cell membrane physiology and excitable tissues, autonomic nervous system, Blood Physiology, cardiovascular and respiratory physiology, renal physiology and regulation of body fluids, gastrointestinal physiology and energy metabolism, endocrine and reproductive systems physiology and the physiology of nervous system including

somatosensory, motor, special senses and integrative functions of the nervous system. Students' learning and understanding are regularly evaluated and assessed with four progressive tests and final examination comprising seventy percent and viva-voce examinations having thirty percent examined by guest physiologists.

Is physiology a difficult subject to easily understand by medical students in Ethiopia? There is no conclusive answer to this question. However, informal talks with medical students and fellow physiology teachers revealed that as physiology is a subject of explaining the mechanisms of body functions students often found interesting to learn and read. However, Joel Michael speculated that many students find physiology to be a difficult subject to learn [3]. His assertion is based on many years of teaching physiology to first-year medical students, conversations with students, and interactions with fellow physiology teachers at all levels. Accordingly, Physiology courses are perceived as challenging for students to understand perhaps because of the highly conceptual nature of it and the effort made by students to acquire knowledge about the course.

Assessing the difficulty level of physiology courses is paramount for the better teaching and learning practices which help students to have good performance and knowledge of the courses for their future clinical practice[4]. Studies outlined that several factors are contributing to the difficulties and performance of students when studying physiology. One important factor is the nature of the subject itself, as causal reasoning and integration are essential in understanding physiology[3]. The teaching method, background knowledge in physics, chemistry, and mathematics and lack of integration are also possible contributing factors increasing the efforts of students to understand physiological concepts[4–6].

Lecturers also perceived physiology as a difficult discipline to teach and learn. This is because the subject is interconnected with other disciplines and exposed to the addition of new knowledge and its flexibility[7]. In support of this, a systematic study of the perception of physiology educators on the difficulty of the discipline summarized three important factors that are contributing to the difficulty of the subject to understand. These factors from most important to least are discipline-related factors, teaching-related factors and teaching-related factors[3]. The purpose of this study was to identify the difficult topics in physiological courses and the reasons perceived them to be difficult and how they overcame their difficulties.

2. Methods and Materials

Participants in this survey were the third-year undergraduate medical students in their 6 years program at the college of medicine and health sciences at the University of Gondar during the 2018/19 academic calendar. We preferred to conduct our survey on third-year students assuming that they are close to physiology as they passed physiology during the second-year course and proceed to the third year and it helps them to remember teaching and learning practices in physiological courses. The questionnaire was developed from articles related to our title. The questioner includes variables such as age, sex, residence, physiology grade of students, most difficult topic and the perceived reason for topic difficulty as well as measures taken by students to understand difficult topics. The pre-test was performed to evaluate the appropriateness of the questions. Ethical approval was obtained from the school of medicine ethical committee and written informed consent was obtained from the participants. A self-administered questionnaire was used to collect data from a total of 200 students just after clarification about the significance of the study for improvement of the teaching and learning practices of physiological courses. Only one hundred forty students completed and returned the questionnaires during the same day. Data were entered to Epi data version 3.1 and exported to Stata 14 for further analysis. Descriptive statistics such as frequency tables and graphs were used to summarize the finding of the study.

3. Results

3.1 Sociodemographic characteristics of respondents

A total of 140 3rd year medical students were included in the study. The mean age of students was 20.8 years with a standard deviation of 1.10 years. Ninety-eight (70%) of them had urban residence and 89(63.6%) of them were males.

Table 1: Sociodemographic characteristics of respondents & Student performance in Gondar, 2019

Variable	Frequency	Percentage
Sex		
Male	89	63.8
Female	51	36.4
Residence		
Urban	98	70.0
Rural	42	30.0
CGPA		
2.00-2.50	1	0.71
2.51- 3.00	13	9.3
>3.00	126	90.0
Physiology grade		
A	29	25.4
B+	29	25.4
B	45	39.5
C+	5	4.4
C	6	5.3

3.2 Subject matter difficulty level and preference on teaching style of students

As shown in table 2, 8 (5.7%) of them perceived as physiology learning is difficult. The majority of students (48%) found that nervous system physiology is the most

difficult course encountered and struggled to understand and perform and the least difficult were gastrointestinal (0.7%) and basics of physiology (5.7%) including membrane physiology, blood physiology, and Autonomic nervous system.

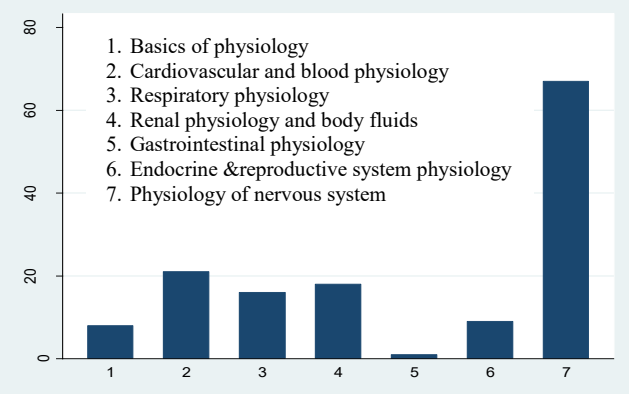

Figure 1: Difficulty level of physiological courses among medical students; Gondar, 2019

The finding of this study showed that 63(45.7%) students were believed that the difficulty of the courses that they encountered is because of the nature of the course (the course that is based on memorization, having too detailed knowledge and the syllabus that is bulky and vast).

Thirty percent of student's respondents (30.4%) also speculated that the reason behind topic difficulty is the ways of teaching methods and strategies practiced by lecturers. The majority of students (47%) were used online educational videos to further clarify the course and only 1.4% of students were approaching teachers for help.

The preferred teaching style for students was chalk and blacked board with a PowerPoint presentation (69.3%). A significant number of students (95%) have agreed that having physiology practical sessions help to better understand the physiological courses and 73(52%) of them perceived that taking lectures in the classroom with a large number of students were not affecting their physiology learning and understanding. Almost all, (97.9%) of respondents perceived that physiology, as a basic science course is applicable for future clinical practices. Frothy five percent of students responded that physiology will be one of their future career options. Overall, 62.1% of respondents were satisfied with the physiology education that was through in during a one-year academic period.

Table 2: Subject matter difficulty level and Perceived Reasons, 2019

Variable	Frequency	Percentage
Is physiology a difficult subject		
Yes	8	5.7
No	132	94.3
Perceived reasons for course difficulty		
The nature of the topic	63	45.7
The ways in which lecturers teach	42	30.4
Learning and studying habits of students	28	20.3
Shortage of resources	2	1.4
Shortage of study times	3	2.1
Strategies to overcome difficulties		
Devote extra study time	37	26.4
Reference books	25	17.9
Online search	3	2.1
Educational videos	66	47.1
Approach fellow students	7	5
Approach instructors	2	1.4
Did you perform better on difficult topics		
Yes	54	38.6
No	86	61.4
Preferred teaching style		
Chalk and blackboard	23	16.4
Power point presentation	20	14.3
Chalk and black board with power presentation	97	69.3
Perception to physiology practicum		
Yes	133	95
No	7	5
Large number of class is affecting learning physiology		
Yes	67	47.9
No	73	52.1
Applicability of physiology for future clinical practice		
Yes	137	97.9
No	3	2.1
Would you consider physiology as a future career		
Yes	63	45
No	77	55
Overall satisfaction on physiology teaching andlearning		
Satisfied	87	62.1
Dissatisfied	53	37.9

4. Discussion

The present study is tried to document student perceptions and experiences of the difficulty of their learning of physiology during their preclinical one studies in the traditional medical curriculum that is primarily teacher-centered education in the six-year study duration. To the researchers' knowledge, this is the first study conducted at the University of Gondar, College of Medicine and Health Sciences, to assess the difficult topics in the physiological course that are perceived by medical students.

4.1 Students' perception of discipline difficulty

Our study revealed that physiology is not perceived as a difficult subject to learn and understand. This finding is in opposition to that of the conclusion of Joel Michael and others. Many students found physiology to be a difficult subject to learn[3,8]. Their assertion is based on many years of teaching physiology to first-year medical students, conversations with students, and interactions with fellow physiology teachers at all levels. In contrary to this, informal communications with fellow physiology instructors and medical students in our school and some other medical schools in Ethiopia ascertained that teaching as well as learning physiology is not hard and rather it is interesting even though it takes more time to internalize and conceptualize.

4.2 Most difficult topic perceived by students

The primary purpose of this study was to document which topic in the physiological courses is perceived the most difficult by students during their physiology learning. The result revealed that the most difficult physiology topic is the physiology of the nervous system (48%). This may be related to the nature of the course as the syllabus is vast which constitutes forty hours of teaching out of 154 hours of lecture hours in a year based curriculum. In addition to this, the physiology of the nervous system traditionally is delivered at the end of the academic calendar which may be affecting students' attitudes towards it as both final and viva voce examination is approaching.

4.2 Perceived Reasons for Topic Difficulty

Students were asked to identify the reasons they found physiology topics difficult. In our study, an important factor for the perceived difficulty of courses in physiology was the nature of the topic (45.7%). The topic that is based on memorization which is forgotten quickly, having too detailed knowledge to conceptualize and vast syllabus is hindering students to easily understand and make the course to be perceived difficult. This finding is in-lined with the study in Australia. According to this study, many students were reported that the topics were unfamiliar, or they had a lack of prior understanding of the physiological processes and topics were too detailed or the processes were difficult to follow[9].

How the lecturer teaches is also another important contributing factor for difficulty. More than 30 % of students responded that the teaching methods of physiology educators which is not clinically integrated are the reason for the difficulty of course. Students were critical of the course content, the lecturers and their teaching methods. However, a significant number of students (20.3%) were blamed themselves for the topic difficulty.

To do better and succeed when faced with difficulties in physiology, students must adapt their learning strategies and behaviors[10]. Students tried to deal with difficult topics by giving more study time, refer physiology text books, searching online notes, looking at educational videos seek social assistance (fellow students) and approach physiology instructors. In this regard the most preferred one was online educational videos (47.1%) followed by devoting more study time (26.4 %) and utilizing reference books (17.9%). This may be attributed to the availability of internet and having individual tablet computers. Only 1.4% of students were approaching teachers for help. A similar finding was indicated in India. According to their finding when students faced with difficulty in understanding the subject only one third of the respondents consulted their teachers, large number of them looked into their reference books, and few of them discussed with their class fellows or seniors[11]. This may be due to the poor culture of student-teacher relationship. Students often afraid of teachers to ask questions both in and out of the class room.

4.3 Performance of students on difficult topics

In our study students were not well performed on the difficult topics. A significant proportion of respondents (61.4%) did not get better scores on those difficult topics that were perceived by students. In contrary to our study, the findings in Australia highlighted that there is a disconnect between students' reporting of difficult courses and their examination performance on those courses. Students who highlight difficulties performing equally well, if not better, than those who do not report difficulties[9]. This may be due to the variations of the teaching and learning environmental conditions and the tradition of students as to withstand challenges by themselves.

4.4 Students' preferred teaching style

Students were also asked regarding their preferred teaching style. The method of teaching in the medical classroom in our set up is usually a traditional teacher-centered with PowerPoint presentation using smart boards and LCDs. In this lecture, students are less engaged in learning and usually passive listeners. The primary reason for this more teacher-centered mode of teaching is perceived to be a large class size. The average class size in the single session is one hundred fifty students. Depending on the condition teachers may teach with chalk and

blackboard, PowerPoint presentation and both chalk and blackboard with a PowerPoint presentation.

One of the important components of teaching and learning in the classroom is the interactions between student and teacher, and student and student. Students should ask questions without fear, share an opinion, agree or to disagree, challenge the teachers and teachers need to listen to students' concerns and allow students to openly discuss with their fellows. These methods are more interactive and interesting to teach and learn and through discussions and debate a new concept can be formed and the learning objectives can be achieved[5,12,13].

In the present study, the preferred teaching style for students was chalk and blackboard with power presentations (69.3%). Our study finding is similar to findings from India and Malaysia. Chalk and blackboard with a PowerPoint presentation was the preferred teaching style for students[13,14]. If the lecturer was given the option of combination teaching methods, most of the students preferred chalk and blackboard with PowerPoint presentation for a better understanding of physiology lectures.

4.5 Class size and the perceived effect on physiology performance

Class size refers to an educational tool that can be used to describe the average number of students per class in a school. It is not arguable that large classes present more challenges for classroom management and proper assessment of learning effectiveness. Large class size leads to poor classroom management, ineffective students' control, poor planning, and assessment and increases strain on teachers[15]. In our study, nearly half of the respondents (47.9%) were concerned about the effect of large class size on their physiology learning and understanding. Students in this classroom were experiencing shyness and shameful of asking instructors during lecture hours. Instead of asking in the classroom they usually preferred to approach after the instructor is leaving the classroom.

4.6 Relevance of Physiology for Clinical Practice

Students should have sound knowledge of the subjects of basic sciences including physiology as they form the foundation of consistent medical practice[1,16]. In the present study, students were asked their perception of the applicability of physiology for their future clinical practice. Almost all respondents (97.9%) were replayed yes for the question 'do you feel that physiology could be relevant for your future clinical practice'. Students in Pakistan and other countries felt that physiological core concepts are relevant for their clinical application and the significance is well appreciated especially when they are exposed to clinical practices[2,16,17].

4.7 Physiology as a future career

Various diverse factors influence medical students' choice of their eventual careers, including student demographics, lifestyle preferences, prestige, expected income, preclinical and clinical experiences, role models and alternate career opportunities[13,18,19].

A surprising finding of this study was that a significant number of students (45%) were considering physiology as their future career options which was not expected. This may be attributed to that students were not exposed to clinical practices yet and may not have background information as it may affect their career preferences. In support of our assumption, a study done in King Saud University, Kingdom of Saudi Arabia, identified that being students in final clinical years and having background information about specialties were the most important determinants of choosing specialties[20]. Several studies indicated that the number of students who want to pursue as a basic science teacher and researcher is rapidly declined [17,21]. In Pakistani study, for example, 44 % of 1st year medical students were considering physiology as a good choice for future career and this attitude was sharply declined with just 24% in the 5th year students[17].

5. Conclusion

The primary aim of this study was to address the perceived difficulty of the physiological course to learn and understand and the plausible reasons for their difficulty. Students generally agreed that physiology is not a difficult subject to learn and the most difficult topic was the physiology of the nervous system. The nature of the topic, the ways lecturers teach and student's personal factors were the contributing factors for their topic difficult. The majority of students were helping themselves to better understand the topics primarily by looking at free educational videos and almost none of them were approaching instructors during free times. The preferred teaching style for students was a mixed method using chalk and blackboard with power presentation. Students agreed that physiology is important for future clinical application and a significant number of respondents were also considering physiology as a future career option. Overall, respondents were satisfied with the physiology education that was through in during a one-year academic period.

6. Recommendation

Physiology is a foundation for bed side practices. Sound knowledge of physiology will let students easily integrate with clinical concepts. Teachers need to aware of this and the teaching methods should be such a way that students better understand the conceptual frame work of the

subject matter and should encourage students and available to them and be friendly so that students can consult where and when ever there is difficulties. Students also should take responsibilities for their own learning by searching educational resources including online videos and refrain from any kind of shyness to communicate and discuss with teachers and fellow students.

7. Limitation of the study

This is study is done with simple descriptive ways which might not indicate any associations between variables and the sample size is small and done only on third year students which might not representing all medical students. The survey relies also on students' self-response. Students' reports may have been limited by the extent to which they remembered the content and how they responded to it in any given course. More studies need to be done on more number of students and even physiology educators and medical schools in the country.

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