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Evaluation of the Teaching Approaches of Biochemistry for Medical Students: A Sri Lankan Case Study

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Abstract

Teaching Biochemistry courses is extremely difficult in preclinical medical education because of monotonous use of lectures, tutorials, practical and end semester load with end semester examination which is a burden for undergraduates. Purposes of this study are to identify the effectiveness of teaching methods and implementation of the best method of teaching Biochemistry course. Participants of this study were second year medical student (n=177) of Faculty of Medicine, University of Rajarata, Sri Lanka. Two non-compulsory evaluating questions were administered with each of the candidates when they sat for 2nd MBBS Objective Structured Practical Examination (OSPE). The students gave high positive rating for the lectures. The preferred order of the teaching method includes lectures as the first preference and other methods include Student Staff interaction, panel discussion and the least preference was seminar. To conclude it is found that still students prefer lectures because they get more knowledge easily with face to face contact.

Keywords: Biochemistry; OSPE; Teaching; Lecturer

Introduction

Medicine is a complex and demanding field of study in any part of the world, Biochemistry knowledge is very important. Biochemistry itself started as a component of Physiology in the Medical Faculty in Colombo, Sri Lanka in the early 1900 and has now evolved as a separate subject. Medical schools worldwide use different methodologies in teaching which have been mainly in the form of lectures with laboratory practical and tutorials to reinforce what has been learnt [1]. Teaching medical students is a big investment of institutes and the government and it considered as a personal investment of time and money for an enrolled student [2]. Jacob and Lefgren concluded as assessments of teachers' measures and the quality of their teaching. The quality of teachers is assumed by their effectiveness and ineffectiveness in classroom teaching which is reflected through students' academic achievement [3]. The quality of education is assumed by their effectiveness of transfer the knowledge and ineffectiveness in classroom teaching which is reflected through students' academic achievement [4]. In this study the main objective was to evaluate the teaching methods of Biochemistry for medical undergraduates practiced in the newly built medical faculty at University of Rajarata, Sri Lanka. The laboratory practical classes have undergone changes to include problem-based learning, and tutorials have been revised to include student seminars. In addition, panel discussions and direct student-staff interactions have been used as other learning teaching strategies. The primary objective of the present study was to examine the preferred learning methods of medical students and also to find out ways and means of improving lectures at the Faculty of Medicine, University of Rajarata, Sri Lanka.

Structure of Biochemistry

The Biochemistry curriculum aims to make students independent, self-directed and lifelong learners [5]. The curriculum consists of General Biochemistry, Clinical Biochemistry and Nutritional Biochemistry. General Biochemistry consist a module "Introduction to the Study of Man." Clinical Biochemistry is taught with system based modules of, Cardiovascular System, Respiratory System, Musculoskeletal System, Body Fluids, Gastrointestinal System, Urinary System, Endocrine System, Reproductive System and Nervous System. Nutritional Biochemistry is conducted as a comprehensive course that includes modules of energy, protein, fat, mineral and vitamin metabolism, anthropometry and diet therapy. Learning objectives are made available to the students via the library where they make copies at the photocopying unit. The specific learning objectives provide guidance to the students on the expected goals. They are expected to achieve the learning objectives through lectures, tutorials, small group discussion, practical classes, clinical demonstrations, seminars, text books and journal articles.

Lectures are conducted by the Head of the Department, probationary lecturers and temporary lectures. The time allocated for lectures is 50-55 minutes whilst for tutorials and practical classes it is 2 hours per class. Students must have more than 80% attendance for tutorials, seminars and practical to be eligible to sit for the 2nd MBBS examination. Seminars are conducted in the 3rd semester.

The whole course consists of 3 semesters that includes 15weeks. In between there are 2 vacations. There are 3 mid semester formative examinations conducted in semester I, II and III and two summative examinations conducted at the end of the first and the second semesters. The 2nd MBBS examination which is a bar examination is held 4 weeks after the end of the 3rd semester. Performance in Biochemistry is evaluated in terms of distinction, pass and failure. A

prize is offered for the best student in Biochemistry based on the results obtained at the 2nd MBBS examination.

Materials and Method

The sample of this study consists of one hundred and seventy seven students (96 males and 81 females). The sample included second year students of the Faculty of Medicine and Allied Sciences, University of Rajarata, Sri Lanka, which is located in Saliyapura, Anuradhapura, Sri Lanka. All were enrolled in the medical education course. The faculty is a socially and economically diverse community in Northern Province of the country. It is the only medical faculty in that province which was built in 2006. The students had followed Biochemistry and sat for the selection examination (an examination conducted by the Faculty for 2nd MBBS) after completing their 2-yr courses to qualify for the final examination conducted by the Faculty. Two non-compulsory evaluating questions were administered with each of the candidates when they were sitting for the 2nd MBBS Objective Structured Practical Examination (OSPE) in Biochemistry at the Medical Faculty, University of Rajarata. The OSPE was a walk around type examination comprising of 40 questions of 3 minutes each. The answer to the evaluating questions was deposited by the candidates maintaining anonymity in the 2 boxes kept at the respective places. There was on compulsion to answer the questions. The first question was a fixed response question whilst the second was a free response question. Care was taken to avoid any exchange of information or ideas among students. To address the research questions likert scale questions were used. We analysed our data as percentage of application. For statistical analysis, all data was transformed using the basic statistical analysis package.

State the order of preference of the following teaching methods (Question 1)

Teaching Method	Lecture	Tutorial	Practical	Seminar	Panel Discussion	Direct Student Staff Interaction
Preference Order						

Question 1: State the order of preference of the following teaching methods. Use a number 1 to 6 when stating preferences (1 being the highest and 6 being the lowest).

Question 2: What recommendations would you make to improve learning from lectures in Biochemistry?

Results

As per tabulated resulted in Table 1, the preference order of teaching method include 1) lecture, 2) tutorials, 3) Student Staff interaction, 4) panel discussion and the least preference was seminar (Table 1). Out of the 177 candidates 93 answered the question one. In spite of the deficiencies attributed to passive learning the students appear to take a greater liking towards lectures. This probably reflects the difficulties they may have encountered when gathering information from text books written in English. This may perhaps emphasize the importance of learning English in the Medical Faculty. Tutorials are conducted in groups of 30 and moderated by the lecturers. Questions, mainly data interpretation and problem solving type are made available to the students few days before the date of the tutorials. Students read the answers which are then subjected to discussion and correction. This activity enables students to gain experience in writing answers and also gain knowledge on different approaches. A likely reason for choosing it as the 2nd preference may be related to its help in making students to pass the examination (Table 1).

Teaching-Learning Method	Preference Order (%)[a]					
	1	2	3	4	5	6
Lecture	38	16	14	8	10	5
Tutorial	28	40	13	5	4	1
Practical	13	23	37	11	7	2
Seminar	3	1	0	11	13	63
Panel Discussion	4	8	17	25	33	3
Direct Student-Staff Interactions	7	4	8	31	23	17
[a]It was taken as the percentage of students who have not answered (10% in the population)						

Table 1: Students' responses on teaching learning methods.

Practical include tests to be carried out manually and problem base learning. The latter appears to be gaining interest and curiosity of the students as there is lot of discussion which is continued even after the classes ended. They are carried out as small group activities of 5-6 students per group. Student-staff interaction is one to one type learning. This facility is not much used, expect to clarify doubts. When students do come, mostly girls, they come in groups of 2-3. This may indicate lack of confidence of students to meet their tutors, individually. This may perhaps be related to the weakness of using expression in English (Table 1).

Panel discussion is a new concept that was introduced, where panel of lecturers discuss questions posted around 180 students. This is usually done at the end of a semester and at the end of a programme. The students bring questions, usually from past examinations and tutorials for clarification and open discussion. Students are hesitant to ask questions directly, but they submit questions anonymously. This may be because they have a high level of apprehension. Seminars are conducted by groups of 35 students on "hot topics" that are of local, global and medical importance. This activity enhances leadership training, team work, IT application and enables them to look at health problems in a holistic way. The work carried out by students is not duplicated in the teaching programme and is tested at the 2nd MBBS examination conducted at the end of the programme. The rating given by the students is the lowest. This is understandable as they are keen on whether that whether learning activities that could make them and pass the 2nd MBBS examination, which is a barrier (Table 1).

Second question was answered only by 41 students out of 177. This question was focused on type of lectures, the preferred form of learning according to the survey. The objective was to find ways of improving learning from lectures. The suggestions offered by students are listed in Table 2.

Comments	Number
Give lecture notes prior to the lecture	26
Increase the number of lectures by professors	5
Discuss questions to ask questions at the end of the lecture	5
Give a chance to ask questions at the end of the lecture	3
Reduce the speed of lectures	1
Increase the use of Sinhala words during lectures	1

Table 2: Recommendations to improve teaching-learning methods on biochemistry.

Discussion

Medicine is considered to be the longest and most stressful course of undergraduate study [6]. Our result findings depict that still a high percentage of students is more favourable towards old fashioned lecture centred method [7]. There are various types of publications during the same period describing the increased interest in medical research on teaching [8]. Giving lecture notes is a debatable question. Objectives of the different course modules are made available in the library. It is possible for students to gather information on these prior to attending lectures. However, because of deficiency of students in understanding new terminology they may yet find it difficult. It may be possible for the Department to give the references in a more specific manner, such as books, chapters, and page numbering, etc. after each objective. This could be implemented to a limited extent. Another possible alternative could be to get the other lecturers of the Department to attend lectures of the Professor and see how they could improve their style of teaching. This could be done at the end of the lecture. But due to time limitation of a lecture of 50 minutes this could be done only as an MCQ type question and answer. It is worthwhile applying this. Because of time limitation it is difficult this to carry out. But an alternative approach will be to allow the student to write the question if possible along with their e-mail address, which they wish to ask on a white board in the Department or to drop in a post office type box to be displayed outside the Department entrance. Slowing down lectures could mean more lecture hours. This is limited by the number of lecture hours available. But with the new curriculum this could be done. Further, whatever to be done beyond the lecturing time could be given as a reading assignment. It is the request of only one. But this could be a concern of the silent majority. Improving common usage to be thrown in between lectures to clarify and importance point may be helpful in putting the students at ease. It should be noted that there are Tamil medium students who also may need assistance. The only way this issue could be dealt is by having close student-staff interactions, especially in the self-study time allowed in the time table. There are several limitations in the present study. Although teaching methods at Department of Biochemistry have been evaluated in this study, this could be a potential area of future research to uplift the quality of teaching Biochemistry in this country.

Conclusions

There is an increasing number of teaching methods of medical students. The various method of teaching doesn't improve the quality of producing doctors in this nation. Medical schools and staff should strive to enhance the quality and quantity should be maintained by selecting the best teaching methods. Therefore, we would like to encourage medical schools to ensure proper information to be given and to conduct teaching according to the tailor made system that matches with students' needs.

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