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Comparison of Self Directed Study With Interactive Lecture in Learning Biochemistry

Education

KEYWORDS : Interactive lecture, self-directed learning, biochemistry, medical education

*** Dr. Shifa Kollathody**	Associate Professor, Dept. of Biochemistry, MES Medical College, Perintalmanna, Kerala. India. 676338 * Corresponding Author
Dr. Sebastian Neendukunnel Mani	Associate Professor, Dept. of Community Medicine, MES Medical College, Perintalmanna
Liji Kavuparambil	Assistant Professor, Dept. of Biochemistry, MES Medical College, Perintalmanna

ABSTRACT

Introduction *Interactive lecture and self-directed learning have gained popularity as effective learning methods for knowledge acquisition. These newer learning methods have been introduced in medical curricula. Objective of this study is to assess the effectiveness of self-directed learning in biochemistry compared to interactive lecture.*

Method *A quasi experimental study was conducted on 100 first year MBBS students. Six topics were selected for the purpose. 6 interactive lectures and 6 self directed study sessions were conducted with pre-test and post-test. Feedback was also collected from the students.*

Results *There was statistically significant gain in knowledge for both teaching/learning methods. The mean value of the score of gain in knowledge was 8.84±3.7 for interactive lecture while that for self directed learning was 8.41±3.8.*

Conclusion *Self-directed learning is as effective as interactive lecture for first year medical students in Biochemistry. Students preferred self-directed learning over interactive lecture.*

INTRODUCTION

In most of the medical colleges in India, Biochemistry is taught by lectures, practical classes and tutorials. These are popular teaching methods which can convey a large amount of information to the students. The approach of students towards learning varies with the learning styles, environment and context. Major types of learning styles are surface, deep and strategic.1 Deep learning identifies the general principles, integrates information across subjects and relates ideas to evidence. Two methods that help deep learning in large groups are interactive teaching methods and self-directed learning (SDL). Interactive teaching is the interchange of ideas between teachers, students and the lecture content. It refers to increased discussion among the participants and their active involvement.2 Self-directed learning is a process in which individuals take initiative and responsibility for their own learning.

In self-directed learning, learners select the resources and methods of learning with teachers acting as facilitators.3More over self-directed learning is a characteristic feature of adult learning, in which students can figure things out for themselves. As per theory of self-determination, giving greater responsibility to students for their own learning increases motivation. The proposed Regulations on Graduate Medical Education, 2012 by Medical Council of India recommends 20 hours of self-directed learning for Biochemistry.

Various methods can be used to utilize self-directed learning hours like assignments, projects or problem-based learning. But, the introduction of SDL into undergraduate curricula has not always been successful.4In any given class there will be a heterogeneous mix of students who differ in the skills needed to be effective learners. The method of learning varies from student to student, and this is reflected in their performances in examinations.

Educators have various questions regarding the skills needed to be an effective self-directed learner. The subject matter; the social, cultural and educational setting; past experiences; self-concept and relevant study skills all influence the extent to which self-directed learning is possible.5

An efficient self-directed learner is one who has the personality traits such as goal-setting, information-processing, executive, cognitive processing, and decision-making skills.6 These qualities are most desirable in the field of medical profession.The points against SDL are more imaginary than real based on a lack of familiarity with the concept.7

Self-directed learning has been compared with teacher-directed didactic learning.8 Various studies show a significant advantage for SDL over didactic lecture.9,10,11 These studies suggest that self-directed learning may be an alternative format for teaching Evidence Based Medicine. Several studies show that interactive lecture is a superior way to teach and encourage learning over traditional lecture.12,13 But, there are no studies which compare SDL and interactive lecture.

Although Regulations on Graduate Medical Education, 2012 recommends self-directed learning, it is not known whether our students are indeed self-directed. Moreover, medical teachers are doubtful regarding the effectiveness of self-directed learning.

MATERIALS AND METHODS

Materials and components

Setting of Study- Department of Biochemistry, MES Medical College, Perintalmanna

Study population - First year MBBS students of MES Medical College. Perintalmanna. At the time of the study, the students had completed the first three months of the first-year MBBS course.

Study period - November 2015 to February 2016

Sample size - 100 first year MBBS students

Inclusion criteria- All first year MBBS students who gave consent were included in the study.

Exclusion criteria - Students who were absent in all the sessions were excluded.

Study design - Quasi-experimental study

Procedure

The research proposal was submitted to the Institutional Ethics Committee and the approval was obtained. First year MBBS students were divided into two batches A and B having 50 students each. Six topics were selected. For A batch, three topics (1st, 3rd &5th sessions) were taken as interactive lecture while batch B underwent a faculty-guided self-learning session on the same topics at the same time. 2nd, 4th and 6th sessions were self-directed learning for Batch A and interactive lecture for Batch B. Thus, both the batches get three interactive lectures and three self-study sessions. In the self-directed learning session, students were provided with all the study materials like various text books, power point presentations, related videos e.t.c. Students brought their text books and other reference materials. During the SDL session, students were studying by themselves. A faculty was present in case they need any guidance. A pre and post-test questionnaire (MCQs) were given for all the sessions. A feedback was obtained from the students after all the sessions.

Self-directed learning - The topics were Digestion and absorption of carbohydrates, HMP shunt pathway, galactose metabolism, metabolic derangements in Diabetes mellitus, Complications of Diabetes and Glucose Tolerance test. For the self-directed learning sessions, a case history concerning the topic was prepared and projected on the LCD. The students were requested to find the correlation of the clinical case with the biochemistry using the study materials provided. One faculty supervised the session and provided assistance whenever required. The session lasted one and a half hours. The students were given a pre-test and post-test questionnaire just before and after the SDL sessions with 8 MCQs. Each question carries one mark and the time allotted was 10 minutes. MCQs covered the same content areas as the SDL session and lecture classes. Both pre and post-test answer sheets were collected and evaluated with no negative marking. The results were tabulated.

Interactive Lecture - The interactive lecture classes on the same topic were taken for the other batch. During these classes various interactive methods like brain storming, asking questions, case-based examples were used. At the end of the class, students were asked to summarize the important points of the lectures. A pre and post-test MCQ was given in a similar manner like the SDL session. The answer sheets were collected, evaluated and results were tabulated.

Statistical Test

Statistical analysis of Pre-test and Post-test data done using paired't' test. The difference of scores (Post test - Pre test) of both the teaching methods were compared using unpaired t test. 'p value' is calculated at 0.05 % level of significance.

RESULTS

The knowledge gain in Biochemistry by self-directed learning and interactive lecture is compared. Then the preference of students - interactive lecture or self-directed learning also assessed.Statistical analysis of Pre-test and Post-test data done using paired't' test. There was a significant improvement in knowledge with both the types of learning methods (Table 1).

Table 1:- Paired t test comparing knowledge gain in interactive lecture and self-study

	Pre-test (mean)	Post-test (mean)	t value	Significance (p)
Interactive lecture	2.37	5.39	27.225	<.000
Self study	2.36	5.23	23.007	<.000

For the purpose of analysis, the differences in marks of pre and post test of interactive lectures of each student were added together while the marks of self-study sessions were also added together. The difference in marks of pre and post tests (post test minus pre test) were tabulated and mean calculated (Table 2).

Table 2:– Details of knowledge gain in both teaching methods

Teaching method	Minimum difference	Maximum difference	Mean	Std. deviation
Interactive lecture 1	-1.0	8.0	3.330	1.9404
Interactive lecture 2	-2.0	6.0	3.186	1.7037
Interactive lecture 3	-3	8	2.60	1.998
3 ILs added together	2.0	18.0	8.840	3.6974
Self study 1	-1.0	8.0	3.691	2.3821
Self study 2	-3.0	8.0	2.464	1.9260
Self study 3	-2.0	7.0	2.490	1.8680
3Self Study sessions added together	-4	15	8.41	3.806

Pre test and post test data (difference of scores) were compared using unpaired t test. The mean value for gain in knowledge was 8.84±3.7 in interactive lecture and the mean value was 8.41±3.8 in self-directed learning (Graph 1). Statistical analysis by unpaired t test shows that there is no significant difference in knowledge gain between the two methods (Table 3).

Graph 1 –Comparison of Interactive lecture Vs Self-study

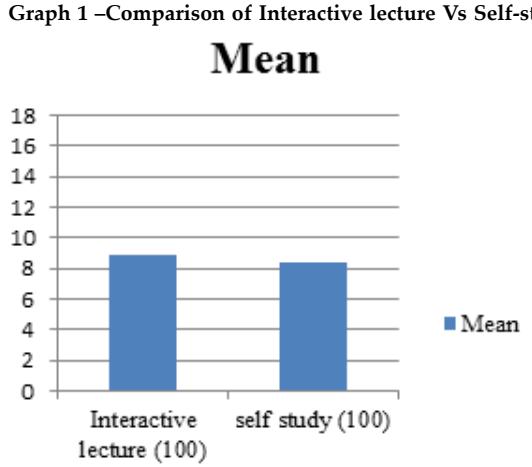

Table 3:- Independent Samples Test

F	Levene's Test for Equality of Variances		t-test for Equality of Means				
	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. Error Difference	

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Total_imp	Equal variances assumed	.012	.914	.810	198	.419	.430	.531
	Equal variances not assumed			.810	197.834	.419	.430	.531

Feedback was taken from the students on both the teaching methods (Table 4). According to students, self-directed learning is more useful in understanding the topic and in scoring more marks in examinations. In their opinion, self-directed learning motivates them and makes them more responsible for their studies. Both the teaching methods were equally helpful in integrating their knowledge in Biochemistry with the clinical situation. Self-directed learning is preferred by the students in learning Biochemistry.

Table 4:- Students' feedback about self-directed learning (SDL) and interactive lecture.

Opinion	Interactive lecture (total score)	Self-study(total score)
Useful to understand the topic	96	109
Motivated to learn further	35	88
Makes more responsible for studying	30	89
Helps to integrate knowledge in Biochemistry	61	63
Useful in scoring more marks in exams	58	98

A scale of -2to2, ranging from 'strongly disagree' to 'strongly agree' was used (-2 = strongly disagree, -1 = disagree, 0 = no opinion, 1 = agree, 2 = strongly agree)

DISCUSSION

The present study shows that the gain in knowledge was significant in both the teaching methods. This shows that faculty-guided self-directed learning is as effective as interactive lecture in those particular topics. Many of the previous studies showed a significant advantage for SDL over didactic lectures.10

A study of self-directed learning in physiology at Kasturba Medical College of Manipal University, India by Kirtana M Pai, K Raghavendra Rao, et al. found that SDL was equally effective as lecture, and it is not necessary to supplement one instructional approach with the other.11 Murad et al. recommend SDL as an effective strategy for medical students in the later years of medical school or residency and doctors in practice.12 This study concludes that SDL is more suitable for adult learners who already have background knowledge and can apply their learning immediately to their practices.

A study conducted by Parineetha P Bhat et al. in the Melaka Manipal Medical College, Karnataka on a group of one twenty-five students of biochemistry compared the knowledge increment in the high scoring and the low scoring students. The study suggests that SDL may help good students to understand concepts and score highly, but weak students may suffer as they may lack the requisite cognitive skills like information gathering, information-processing, correlation and a good working memory.13 In our study, we haven't analysed the effectiveness of SDL in students with different learning abilities.

According to Marcos et al., a study of self-directed learning in gross anatomy shows the same results. Most of the students appreciate the benefits of active, self-directed learning and feel an increasing motivation to learn.14 Numerous studies have proved SDL valuable regarding knowledge acquisition for learning anatomy and physiology.15,16

All of the above findings are in accordance with our study where the results show equal effectiveness of self-study and interactive lecture. Further, previous studies also proved self-learning to be helpful in increasing knowledge about clinical management and in improving quality care of patients.

CONCLUSIONS

The present study shows that the gain in knowledge was significant in both the groups. Thus, faculty-guided self-directed learning is as effective as interactive lecture classes. The Medical Council of India is aiming for a curriculum focusing on competency based medical education which also encourages self directed learning. So, for first-year medical students, SDL can be used as an alternative to lectures. Topics in Basic biochemistry with a clinical application can be selected for self-directed learning. From the student's feedback, it can be inferred that self-directed learning is preferred over interactive lecture.

LIMITATIONS

In this study, only a few topics could be covered from the total content of first year MBBS curriculum. A study of longer duration covering a wider range of topics can be done to confirm the findings in the present study.

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