

# LEVEL OF KNOWLEDGE GAINED BY SELF-DIRECTED LEARNING AND INTERACTIVE LECTURES FOR TEACHING BIOCHEMISTRY AMONG FIRST YEAR MEDICAL STUDENTS IN GOVERNMENT MEDICAL COLLEGE, IDUKKI, KERALA- A COMPARATIVE STUDY

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## ABSTRACT

### BACKGROUND

Interactive lecture seems to be an important and feasible teaching method to increase the effect of learning in medical education. Interactive lectures are teaching learning methods in which students are involved and stimulated by teacher student interaction. Self-directed learning is a process in which individuals take initiative and responsibility for their own learning. Various methods can be used to utilize self-directed learning hours like assignments, problem-based learning or projects.

### MATERIALS AND METHODS

The study was performed from April 2016 to September 2016 among first year medical students in Government Medical College, Idukki. All fifty first year MBBS students of 2015 batch were involved in the study. Three topics of haeme metabolism were taught by interactive lectures and rest of the three topics of haeme metabolism were taught by self-directed learning. Post-test questionnaire with ten multiple questions were given to students after every interactive and self-directed learning. A feedback for assessing perceptions and preferences was obtained from the students after all the sessions. A theory examination having short answer questions were conducted after one month.

### RESULTS

The knowledge gained in the post tests by self-directed learning is more and statistically significant ( $p < 0.038$ ). The knowledge gained by both methods in the theory examinations after one month was not statistically significant.

### CONCLUSION

Self-directed learning can be considered as alternate teaching methods in acquiring knowledge in the medical curriculum.

### KEYWORDS

Interactive Lectures, Self-directed Learning, Brainstorming, Didactic Methods, Curriculum, Jaundice, Thalassemia, Sickle Cell Anaemia, Porphyria and Haeme Metabolism.

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### BACKGROUND

Biochemistry is taught by lectures, seminars, small group discussions and practicals in the medical colleges in India. Lectures in medical education are popular teaching learning methods which can deliver large amount of information to students with support of audio-visual aids. The different types of learning are surface, deep and strategic learning. Two methods that help deep learning are interactive lectures and self-directed learning.<sup>1</sup>

Exchange of ideas occurs between the lecturer and the students in interactive lectures. The learning objectives are emphasized more in the interactive lecture methods than traditional lecture methods. The various interactive

techniques used in lectures are brainstorming, role playing, case-based discussions, quiz programs and asking multiple choice questions to the students.

The concept of self-directedness in learning was first discussed in the educational literature as early as 1926. Self-directed learning describes a process in which individuals take the initiative, with or without the help of faculty, in identifying their learning needs, formulate learning goals, search resources for learning, implement teaching learning methods and evaluate the results. Students take significant responsibility for their own learning and educators assists the students to acquire the skills in self-directed learning.<sup>2</sup> Moreover, self-directed learning is a characteristic feature of adult learning. The main purpose of self-directed learning is to develop the skills of inquiry and acquire new knowledge easily and skillfully.<sup>3</sup> Self-directed learning is more in tune with the natural processes of psychological development. Self-directed learning has been identified as an important learning method to meet the challenges in the career of medical graduates. It is not possible to replace didactic methods of teaching completely with self-directed learning or interactive lectures in the medical education.

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However, an attempt may be done to find the role of self-directed learning in the medical curriculum. The proposed "Regulations on Graduate Medical Education, 2012" by Medical Council of India recommends 20 hours of self-directed learning for Biochemistry. Several health care institutions all over the world have made SDLs a part of their curriculum to update knowledge and continue learning. SDL has been conducted with different methods like assignments, projects or problem-based learning. If the objects are concrete, the learners did not find any difficulty to learn for themselves.<sup>4</sup>

There have been various misbeliefs regarding self-directed learning. Few alleged that the learning in self-directed learning is incomplete, inaccurate and out of date.

They also complained that learners studying slowly and laboriously in self-directed learning. But studies have proved that many of the arguments are imaginary. Various studies concluded controversial results regarding interactive lectures and self-directed learning.<sup>5-14</sup> So this study was planned to find the effectiveness of self-directed learning in teaching biochemistry topics in medical education.

#### *Objectives*

1. To compare the level of knowledge gained by self-directed learning and interactive lectures for teaching biochemistry among first year medical students.
2. To assess the perception and preference for the two methods among first year students.

### **MATERIALS AND METHODS**

*Type of Study-* Comparative study.

*Period of Study-* April 2016 to September 2016.

*Location/Study Setting*

Biochemistry department, Government Medical College, Idukki

*Study Population*

All Fifty first year MBBS students of 2015 regular batch of Government Medical College, Idukki.

*Sampling Methods*

All fifty first year MBBS students were included in the study.

*Statistical Analysis*

Level of knowledge gained from interactive lectures and self-directed learning were obtained by post-test examinations and analysed using paired t test. Comparison between interactive lectures and self-directed learning were analysed using independent t test. Qualitative data on perceptions and preferences were analysed using the Chi square test.

The Institutional Ethical Committee approved the study and informed consent was taken. Six topics of haemoglobin metabolism were selected for study. Three topics (Haeme synthesis, porphyria and haeme catabolism) were taught by interactive lecture methods. The interactive methods used in lectures were brainstorming, asking questions to the students, quiz programs, case-based discussion and summarizing by the students at the end of lectures.

Other three topics of haeme metabolism (Jaundice, Sickle cell anaemia and Thalassemia) were taught by teacher guided self-directed learning. The students used the resources like text books, reference books, mobile phones, lap tops, PowerPoint presentations, internet and videos for gathering information in the self-directed learning. Students brought all the resources and study materials for the self-directed learning. The time allotted for both types of methods was same. Students identified their learning objectives, collected information from the resources and prepared notes. One faculty supervised all the activities in the self-directed learning.

Post-test questionnaire with ten multiple choice questions were given to students after every interactive lectures and self-directed learning to assess the knowledge gained. Each question carried one mark and the time allotted was 10 minutes. A feedback for assessing perceptions and preferences was obtained from the students after all the sessions.

A theory examination having short answer questions were conducted after one month. Fifty percentages of questions were taken from those topics discussed by interactive lectures and self-directed learning. Maximum marks for the theory examination was 20. Marks gained by interactive lectures and self-directed learning were assessed separately and analysed.

*Inclusion Criteria*

All first year medical students of government medical college were included in the study

*Exclusion Criteria*

Those students absent in the classes were excluded from the study.

*Data Analysis*

Statistical analysis was done with SPSS Version 16. Knowledge gained from interactive lectures and self-directed learning were obtained by post-test examinations and were analysed using paired t test. Comparison between lectures and self-directed learning were analysed using independent t test. Qualitative data on perceptions and preferences were analysed using the Chi square test.

### **RESULTS**

Mean scores of post-tests of three interactive lecture methods and three self-directed learning were  $26.5 \pm 2.51$  and  $27.3 \pm 2.50$  respectively. The knowledge gained in the post tests by self-directed learning is more and statistically significant ( $p 0.038$ ).

The knowledge gained in the theory examinations after one month by interactive learning methods and self-directed learning were  $6.58 \pm 2.08$  and  $6.83 \pm 3.35$  respectively. A Statistical analysis by unpaired t test showed that there was no significant difference in knowledge gain between the two methods.

Figures 1-5 shows the feedback from the students about two different lecture methods.

They opined that self-directed learning motivated them more, created interest in the topics and helped them to recollect the topics. Analysis of qualitative data of feedback observed that wider aspect of topics was covered in the

interactive lecture methods. They also opined that self-directed learning was an effective lecture method to learn biochemistry in their feedback.

| Type of Learning Methods | Mean scores of three post-tests (maximum marks=30) Mean± SD | Mean Difference | P value |
|--------------------------|---|-----------------|---------|
| Interactive lectures     | 26.5 ± 2.51   | 0.79            | 0.038   |
| Self-directed learning   | 27.3 ± 2.50   |                 |         |

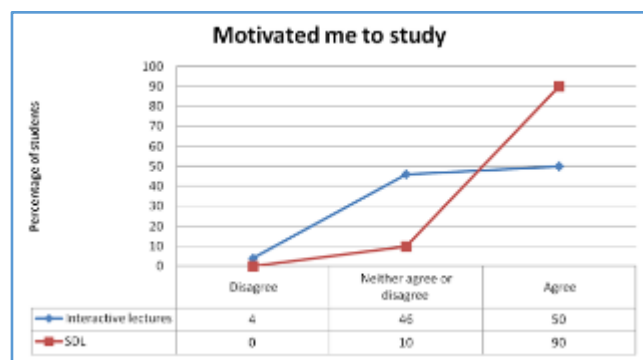
**Table 1. Mean Scores of Three Post Tests of Interactive and Three Self-Directed Learning Methods**

| Type                   | Minimum Mark Mean± SD | Maximum Mark Mean± SD |
|------------------------|-----------------------|-----------------------|
| Interactive lectures   | 15.00                 | 29.00                 |
| Self-directed learning | 17.50                 | 30.00                 |

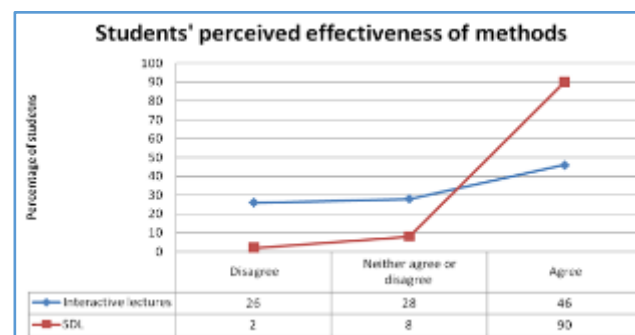
**Table 2. Scores of Short Examinations of Interactive and Self-Directed Learning Methods**

| Type of learning methods | Mean scores (Maximum Marks=10) Mean± SD | Mean Difference | P value |
|--------------------------|---|-----------------|---------|
| Interactive lectures     | 6.58 ± 2.08                             | 0.25            | 0.59    |
| Self-directed learning   | 6.83 ± 3.35                             |                 |         |

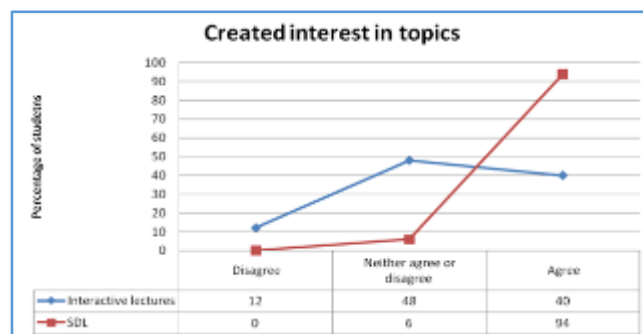
**Table 3. Mean Scores of Short Examinations of Interactive and Self-Directed Learning Methods**



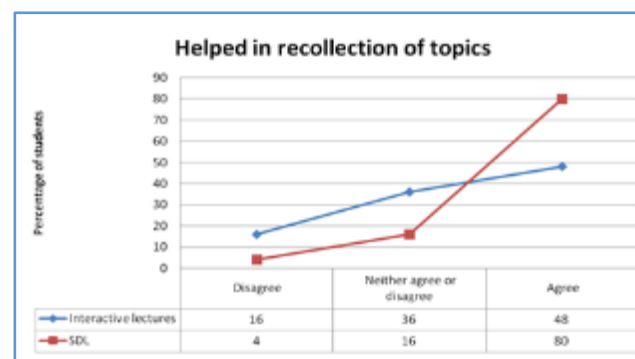
**Figure 1. Students' Feedback on "Motivated me to study"**



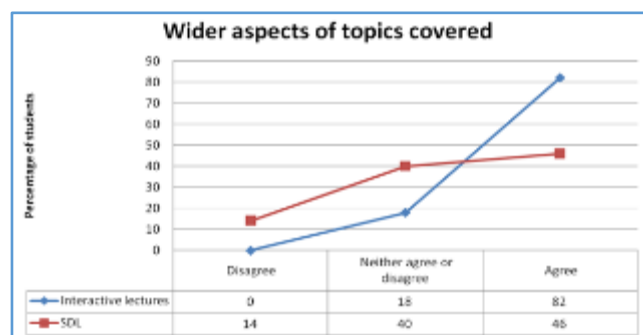
**Figure 4. Students' feedback on "Students' Perceived Effectiveness of Methods"**



**Figure 2. Students' Feedback on "Created Interest in Topics"**



**Figure 5. Students' Feedback on "Helped in Recollection of Topics"**



**Figure 3. Students' feedback on "Wider Aspects of Topics Covered"**

**DISCUSSION**

The knowledge acquired by self-directed learning is sufficient for training first year medical students. It has been proved that self-directed learning is an effective teaching method in increasing learner's knowledge. Kirtana et al in their study observed that self-directed learning is beneficial, especially in increasing knowledge about treating diseases and improving patient care.<sup>15</sup> They also observed that self-directed learning has been benefited more for high scoring groups of medical students.

The knowledge gained by both self-directed learning and interactive lectures were similar.<sup>16</sup> In their study it has

been recommended that self-directed learning can be used as alternative methods to lectures for clinical Biochemistry topics. Students preferred self-directed lectures than interactive lectures.

Murad et al in their study compared self-directed learning with traditional methods to achieve the learning objectives in health professionals. The increase in the knowledge domain was moderate and the increase in the skill domain was trivial and non-significant in self-directed learning. It was associated with a non-significant increase in the attitude domain. They also observed that self-directed learning is more suitable for final semester medical students.<sup>17</sup> They concluded that self-directed learning is more beneficial for adult learners.

### CONCLUSION

Students acquired more knowledge in self-directed learning than interactive lectures. Self-directed learning motivated more, created interest in topic and helped the students to recollect the learning objectives. Wider areas of topics were not covered in the self-directed learning.

We included only one clinical and applied biochemistry topic in the interactive learning (Porphyria). But all the topics were diseases in the self-directed learning in our study. This may be considered as one of our limitation of study. But we got similar scores in the post tests of all the three classes of interactive lectures.

Self-directed learning can be considered as an alternate teaching method in acquiring knowledge in discussing clinically relevant topics in the biochemistry in the medical curriculum.

### Limitations

This study was conducted in limited area of the curriculum of medical education in a single medical college. Multicentric study covering large areas of the curriculum of longer duration is required to study the impact of self-directed learning in the medical education.

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