IJCRR
Vol 06 issue 04
Section: Healthcare
Category: Research
Received on: 27/12/13
Revised on: 19/01/14
Accepted on: 06/02/14

CASE BASED LECTURES VERSUS CONVENTIONAL LECTURES FOR TEACHING MEDICAL MICROBIOLOGY TO UNDERGRADUATE STUDENTS

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ABSTRACT

Background and Objectives: Routinely for teaching large number of students, didactic lecture (DL) is used which is a teacher centered process, promotes passive learning and fails to motivate the students. Case based lecture (CBL) is an interactive student centered approach and promotes active learning. Hence the present study was undertaken to assess whether CBL is an effective teaching tool for the Medical Microbiology and to evaluate students' perception about this new methodology.

Method: 78 students from second year MBBS fifth semester were included in the study. First they had conventional DL and next time they were exposed to CBL. Pretest and post test on DL and CBL topics were taken. Feedback regarding DL and CBL topics and CBL methodology were taken on Likert 5 point scale. Data from pre and post test scores was analyzed by paired t test.

Result: The post test scores and gain in learning in CBL session were significantly higher than that of didactic lecture (p value <0.001). Feedback on DL and CBL topics showed that CBL was more effective than DL in understanding the topic. Students responded that, CBL had improved their learning skills, independent learning abilities, analytical skills indicating that CBL is an effective method in a large classroom setting than didactic lecture.

Conclusion: To improve the outcome of didactic lecture and to promote active learning, CBL can be an effective teaching tool.

Keywords: case based lecture, medical microbiology, active learning

INTRODUCTION

In medical education, there are various methodologies of teaching and learning each having its own advantages and disadvantages. Routinely for teaching large number of students, didactic lecture (DL) is used. It is a teacher centered process, promotes passive learning and fails to motivate the students.[1] Therefore in last few decades; concept of active learning has evolved. Case based learning is an interactive, student centered approach and promotes active learning.[2] It engages students in discussion of clinical case that resembles real life situation and provides information such as history, physical findings and laboratory results.[3] Students interact with each other and work together as a group to solve the case. The instructor's role is that of facilitator. But this is a small group teaching method and requires large number of faculties. Hence the adaptation of this method is difficult where class size is large and number of faculties is small.[4]

In medical microbiology, students learn about various microorganisms and factors that lead to

disease. In reality, patients present with various signs and symptoms which has to be correlated with infectious agents and host's response.[4] In pure didactic lecture, this correlation is not possible. Incorporation of case in didactic lecture can solve this problem. Here the case is used to teach content and connect the situation with real life data .It provides opportunities for the students to interact with each other and with faculty. They generate the knowledge, organize it in meaningful manner and try to solve the problem. This approach fits well with Kolb's experiential learning model.[5] It recommends, opportunities should be provided for reflection and connection with existing knowledge and experimentation, in addition to content presentation. Hence the present study was undertaken to assess whether interactive case-based lecture (CBL) is an effective teaching tool for the Medical Microbiology and to evaluate medical students' perception about this new methodology.

MATERIALS AND METHODS

This interventional study was conducted in Department of Microbiology and School of Health Professional Education and Research (S.H.P.E.R.). Topics chosen for didactic and case based lecture were from must know area and of same difficulty index. Validation of the entire questionnaire was done in advance and the project was approved by Institutional Ethics Committee.

78 students from second year MBBS fifth semester were included in the study. Written consent for participation in the study was taken from the students.

First 78 students had conventional didactic lecture (topic- Candida). Pre test, post test and feedback regarding didactic lecture topic were taken. Next time, these 78 students were exposed to case based lecture (topic-Cryptococcus)

Case based lecture

1) Case – 5minutes
2) Faculty learner interaction – 10 minutes
3) Routine Lecture -40 minutes
4) Faculty learner interaction on resolution of the case – 5 minutes

Pretest and post test on case based lecture topic were taken. Feedback regarding the topic and methodology of case based lecture were taken on Likert 5 point scale. The marks obtained in pretest and post test in the topics covered during DL and CBL session were compared by using paired t test using SPSS 12.0.1version for windows.[6]

RESULTS

In the present study, same students (n=78) participated in both the sessions. The pretest marks of both sessions were compared and the difference between them was found to be insignificant (p value > 0.05) indicating that the knowledge about both the topics was similar before lecture.

The pretest and post test marks of DL and CBL sessions were compared (table1). The post test scores of both the sessions were significantly higher than that of pretest scores (p value < 0.001).

The percentage of students with regards to various marks range in post test of both the sessions were compared (Figure 1).

The percentage of students (67.94%) in higher mark range (7.5-10) in CBL session was more than the percentage of students (38.46%) in DL session. With regards to lowest mark range (0.5-3), it was found that there was not a single student in CBL session. In contrast in DL session, we got 5 (6.41%) students in that range.

The post test marks of DL and CBL sessions were compared (table 3). The post test scores of CBL session were significantly higher than that of didactic lecture (p <0.001).

In the present study, the gain in score / learning (i.e. difference between pre test and post test scores) of students in both DL and CBL session were compared. It was found that the gain in learning in CBL session was significantly higher than that in DL session (p value < 0.001).

(Mean difference- 2.109, S.D.- 2.311, S.E.M.- 0.261, t value -8.059 , p < 0.001)

In the present study, feedback regarding DL and CBL topics on Likert 5 point scale was taken (table 4).

Higher percentage of students had given scores of 4 and 5 in CBL session than in DL session. With regards to score 1, there was not a single student in CBL session while there were 7.68% students in DL session. For score 2 and 3, the percentage of students in CBL session was less than DL session (table 4).This indicates that CBL session was more effective than DL session in understanding the topic and clearing the basic concepts.

The perception of students regarding methodology of case based lecture was taken using Likert 5 point scale (table 5).

A large proportion of students (91.02%) thought that learning objectives were achieved at the end of CBL session. (39.74% strongly agreed, 51.28 % agreed). 87.17% students thought that CBL was an effective learning tool for them (44.87% strongly agreed, 42.30% agreed) and none disagreed. A similar percentage (87.17%) of respondents said that CBL had improved their learning skills (35.89% strongly agreed, 51.28% agreed) and helped them retaining relevant information (32.05% strongly agreed, 55.12% agreed) .85.89% participants felt that CBL had helped them clearing the basic concepts (33.33% strongly agreed, 52.56% agreed). 82.04% students responded that CBL had improved their independent learning abilities (20.51% strongly agreed, 61.53% agreed) . 65.38% students felt that CBL had increased their analytical skills (26.92% strongly agreed, 38.46% agreed) while 50% of them felt that CBL had substantially improved their communication skills.

With regards to questions 1,5,7,8 (improved learning skills, learning objectives achieved, retaining relevant information and CBL as an effective tool) none of the student disagreed. Regarding questions 2, 4, 6 only 1 student (1.28%) disagreed and for question 3, three students (3.84%) disagreed.

Two open ended questions were also given i.e. do you think that CBL is better than conventional didactic lecture? And give the reason. In response to the first question, "YES" answer was given by 76 (97.43%) students and "NO" answer was given by two students.

All these data indicate that case based lecture has significant positive impact and is superior to traditional lecture format with regards to achieving of learning objective, understanding of course content and retention of information. Also there are several positive outcomes like improved learning skills, independent learning abilities, analytical skills etc. indicating that case based lecture is an effective method in a large classroom setting than didactic lecture.

DISCUSSION

In medical education, various teaching methods are adopted to increase student motivation and enhance active learning. The introduction of an interactive student-centered approach has dramatically changed the way students learn. The present study was carried out to determine whether interactive, case-based lecture is an effective teaching tool for the Medical Microbiology and to measure medical students' perception about this new methodology.

By and large, our data demonstrated that the majority of the students warmly welcomed this new methodology. In the present study, the comparison of post test marks of didactic lecture(DL) and case based lecture(CBL) showed that post test scores of CBL were significantly higher than that of didactic lecture($p < 0.001$). The gain in learning in CBL session was significantly higher than that in DL session (p value < 0.001). CBL session was more effective than DL session in understanding the topic and clearing the basic concepts. The findings of our study are comparable with other studies but we cannot directly compare with those studies as they have been done in small group. In a maxillofacial radiology course, Kumar et al [7] reported that the

majority of students felt that case-based instruction helped them learn course content in a more comprehensive manner and increased their knowledge of radiographic interpretation.

In the present study, a large proportion of the participating students (97.43%) thought that interactive case based lecture was effective than conventional didactic lecture and opined that case based lecture should be implemented in medical microbiology. 91.02% students reported that learning objectives were achieved. 87.17% students felt that CBL was an effective learning tool for them and improved their learning skills and helped them retaining relevant information. 82.04% students felt that CBL had improved their independent learning abilities and analytical skills (65.38%). 50% of them felt that CBL had substantially improved their communication skills.

In study by Yasin I. Tayem[8], the majority of students thought that case based learning was an effective learning tool (82%) and improved their learning skills (83%), independent learning skills (74%) and analytical skills (70%). Most students reported that team discussions helped them to achieve lecture objectives (84%) and improved their communication skills (68%).

In study by Ciraj et al [9], 75.30% students thought that case based learning had improved their learning skills and helped them retain the relevant information(77.1%),better understanding of the microbiology learning objectives(77.7%) and promoted independent learning traits(81.9%). Students opined that case based learning had improved their communication skills (57.2%) and analytical skills (69.2%).

Retention of learned material is better if the learning occurs around the realistic problem.[9] In case based lecture, case is used to stimulate the students to think, to frame questions, to utilize their knowledge to answer those questions. The students make interactions with each other and with the faculty to solve the problem. As case is followed by didactic lecture, students gain more scientific knowledge about that particular topic. At the end of CBL, they come up with the more scientific conclusions. This will help the medical students to improve their learning skills, analytical skills, communication skills and their decision making abilities. The findings of this study are consistent with the positive results of other studies.[8,9,10,11] Thus this interactive student centered approach promotes active learning. In microbiology, case based lecture would be helpful to link the knowledge of basic sciences and its clinical application.[4,9,11] The students' responses that we received in this regard were encouraging.

In medical education, it has been observed that small group activities are helpful for student learning. But small group activities require large number of faculties or can be applicable where student class size is small.[4] In situations where student class size is large and the number of faculties is small, case based lecture approach can be used. Advantages of case based lecture are, it can be applied to large class, requires only one faculty and is less susceptible to intra group problems.[12]

There are certain limitations of this study. First, the study utilize to assess the effectiveness of case based lecture over the didactic lecture and to know the students perception, was taken only on a single occasion. As study group chosen was at the end of fifth semester and after one month they had their prelims examination. To measure the students' attitude towards the new methodology, a multistage assessment would have been more reliable. Second limitation of the current study is that it was not possible to evaluate the effect of CBL on academic performance of the students before and after introduction of CBL. Further studies are required to justify the implementation of this technique in microbiology curriculum.

CONCLUSION

Our data showed that, case based lecture was more effective than didactic lecture in understanding the topic, clearing the basic concepts and in retention of knowledge. Also there are several positive

outcomes like improved learning skills, independent learning abilities, analytical skills and communication skills etc. indicating that case based lecture is an effective method in a large classroom setting than conventional didactic lecture. Hence, case based lecture can be used as an adjunct to didactic lecture to promote active learning among the students.

ACKNOWLEDGEMENT

Authors are thankful to DMIMS (DU) and School of Health Professional Education and Research (S.H.P.E.R.) for the help while conducting the study. Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

REFERENCES

1. Sprawls P. Evolving models for medical physics education and training: a global perspective. Biomed Imaging intervention J. 2008;4:e16.
2. Thistlethwaite JE, Davies D, Ekeocha S, Kidd JM, MacDougall C, Matthews P, et al. The effectiveness of case-based learning in health professional education. A BEME systematic review: BEME Guide No. 23. Med Teach. 2012;34: e421–4.
3. Williams B. Case based learning: A review of the literature: Is there scope for this educational paradigm in prehospital education? Emerg Med J 2005;22: 577-81.
4. Neal R. Chamberlain, Melissa K. Stuart, Vineet K. Singh and Neil J. Sargentini. Utilization of case presentations in medical microbiology to enhance relevance of basic science for medical students.Medical Education Online vol.17, 2012.
5. KoIb, D. A. (1984) Experiential learning. Englewood Cliffs, NJ: Prentice-Hall
6. SPSS for windows, version 12.0.1.2001 Chicago: SPSS Inc.
7. Kumar V, Gadbury-Amyot CC. A case-based and team-based learning model in oral and maxillofacial radiology. J Dental Educ. 2012;76:330–7.
8. Yasin I. Tayem. The Impact of Small Group Case-based Learning on Traditional Pharmacology Teaching. Sultan Qaboos Univ Med J. 2013 February; 13(1): 115–120.
9. Ciraj AM, Vinod P, Ramnarayan K. Enhancing active learning in microbiology through case-based learning: Experiences from an Indian medical school. Indian J Pathol Microbiol. 2010;53:729–33.
10. Ochsendorf FR, Boehncke WH, Sommerlad M, Kaufmann R. Interactive large-group teaching in a dermatology course. Med Teach. 2006;28:697-701.
11. Blewett EL, Kisamore JL. Evaluation of an interactive, case-based review session in teaching medical microbiology. BMC Med Educ. 2009;9:56.
12. Tarnvik A. Revival of the case method: a way to retain student-centered learning in a post-PBL era. Med Teach. 2007;29:e32–36.

Table 1: Comparison between Pretest and Post test marks of DL and CBL

	DL	CBL
Mean of difference between pre and post test	4.76	6.87
S.D.	1.89	2.08
S.E.M.	0.21	0.22
t value	22.15	30.06
p value	<0.001	<0.001

Table 2: Comparison of post test marks of DL and CBL session

	DL	CBL
Mean post test score	6.34	7.90
S.D.	1.80	1.58
S.E.M.	0.20	0.17

t value -7.07, **p value** <0.001 (significant)

Table 3: Evaluation of feedback on content of didactic and case based lecture topics on Likert 5 point scale (n=78)

Question	Session	1[a]	2	3	4	5
1	DL	-	2.56%[b]	12.82%	58.97%	25.64%
	CBL	-	-	2.56%	66.66%	30.76%
2	DL	-	2.56%	24.35%	42.30%	30.76%
	CBL	-	-	11.53%	38.46%	50%
3	DL	-	3.84%	8.97%	55.12%	32.05%
	CBL	-	1.28%	11.53%	42.30%	44.87%
4	DL	2.56%	2.56%	32.05%	44.875	17.94%
	CBL	-	1.28%	12.82%	47.43%	38.46%
5	DL	5.125	1.28%	24.35%	43.58	25.64%
	CBL	-	-	15.38%	46.15%	38.46%

a-Five point Likert scale :1=Poor; 2= Weak; 3= Average ;4= Good 5= Excellent
b-Percentage of students giving this score in response to the survey question.

Didactic Lecture (DL) topic- Candida
Case based Lecture (CBL) topic-Cryptococcus

Table 4: Case based lecture- Assessment of teaching method by students (n=78)

Sr. No.	Items	5[a]	4	3	2	1
1	CBL has improved my learning skills	35.89%[b]	51.28%	12.82%	-	-
2	CBL has facilitated my independent learning abilities	20.51%	61.53%	16.66%	1.28%	-
3	CBL has enhanced my communication skills	11.53%	38.46%	46.15%	3.84%	-
4	CBL has increased my analytical skills	26.92%	38.46%	32.05%	1.28%	1.28%
5	Learning objectives were achieved at the end of session	39.74%	51.28%	8.97%	-	-
6	CBL has helped me clearing the basic concepts	33.33%	52.56%	12.82%	1.28%	-
7	CBL has helped me retaining relevant information	32.05%	55.12%	12.82%	-	-
8	CBL has worked as an effective learning tool for me	44.87%	42.30%	12.82%	-	-

a-Five point Likert scale:5=Strongly agree;4=Agree;3=neutral; 2=Disagree;1=Strongly disagree b-Percentage of students giving this score in response to the survey question

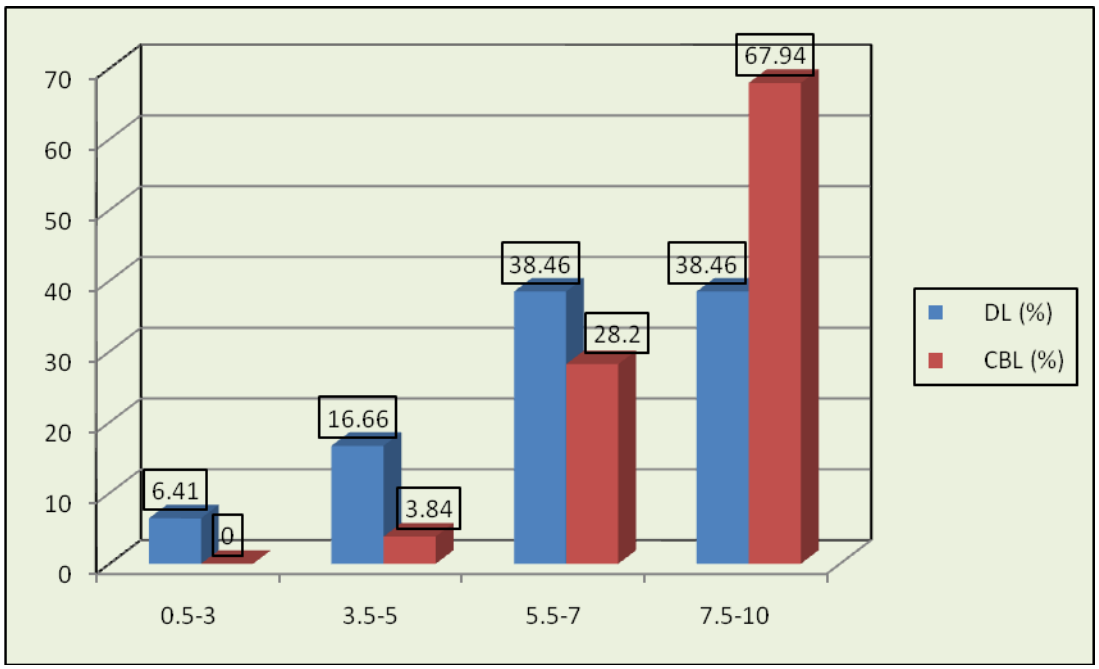

Figure 1: Percentage of students with regards to various marks range in post test of didactic lecture and case based lecture