

Impact of Integrated Teaching Sessions for Comprehensive Learning and Rational Pharmacotherapeutics for Medical Undergraduates

Abstract

Background: It is postulated that integrated teaching method may enhance retention of the knowledge and clinical applicability of the basic sciences as compared to the didactic method. **Aim:** The present study was undertaken to compare the integrated teaching method with the didactic method for the learning ability and clinical applicability of the basic sciences. **Materials and Methods:** The 2nd year MBBS students were divided into two groups randomly. The study was conducted into two stages. In the first stage, conventional didactic lectures on hypertension (HT) were delivered to one group and multidisciplinary integrated teaching to another group. For the second stage, diabetes mellitus groups were swapped. Retention of the knowledge between the groups were assessed through a multiple choice questions (MCQ) test. Feedback of the students and faculty was obtained on a 5 point Likert scale. For the comparison, student's data were regrouped into four groups, i.e., integrated HT, didactic HT, integrated diabetes and didactic diabetes. **Results:** There was no significant difference of MCQ score between integrated HT, didactic HT, and integrated diabetes group. However, the score obtained in didactic diabetes was significantly more ($P = 0.00$) than other groups. Majority of the students favored integrated teaching for clinical application of basic science and learning of the skill for the future clinical practice. Faculties considered integrated method as a useful method and suggested frequent use of this method. **Conclusion:** There was no clear difference in knowledge acquisition; however, the students and faculties favored integrated teaching method in the feedback questionnaire.

Keywords: Didactic lecture, integrated teaching, multiple choice questions, students feedback

Introduction

Undergraduate medical teaching methods are evolving with time and continuous efforts are being attempted worldwide to reform the medical education. Didactic lectures by the single disciple are the most common mode of teaching in the majority of the medical colleges in India.^[1] This method of teaching is not only time-consuming but also have limited focus on clinical skills and interaction with patients and thus are poorly motivating for the students.^[2] Moreover, students do not achieve a comprehensive understanding and loose clinical relevance of the basic sciences at the time of their clinical training due to a significant diversity of interests, resources, and approaches between different departments while teaching different aspects of a particular topic.^[3] Many innovations and trends in medical education have been undertaken globally in the past few years which include self-directed

learning, problem-based learning, integrated teaching, and community orientation.^[4]

Medical educationists all over the world recognize that integration in medical education is one of the major educational reforms required.^[5,6] Multidisciplinary integrated teaching ensures that the entire teaching material is covered by every faculty member, regardless of areas of personal expertise and/or research.^[7] It not only develops creative thinking but also encourages the student to form their own opinions about issues of importance.^[8]

Treating of patients should always have a holistic approach for better results and can be attained by well-trained doctors. As we know for many diseases, an optimal treatment requires targeting different physiologic pathway and pathologies in a concerted synergistic effort.^[9] Integrated teaching is one of the teaching-learning methods which help in correlating the symptoms, signs, and diagnosis. Hence, it is expected that integrated teaching

**Sneha Ambwani,
Bhavisha Vegada,
Rimple Sidhu¹,
Jaykaran Charan**

*Department of Pharmacology,
All India Institute of Medical
Science, ¹Department of
Pharmacology, SN Medical
College, Jodhpur, Rajasthan,
India*

Received: 22 April, 2017.
Accepted: 12 October, 2017.

Address for correspondence:
*Dr. Sneha Ambwani,
Department of Pharmacology,
All India Institute of Medical
Sciences, Jodhpur, Rajasthan,
India.
E-mail: sr_ambwani@yahoo.
com*

Access this article online

Website:
www.ijabmr.org

DOI:
10.4103/ijabmr.IJABMR_130_17

Quick Response Code:



How to cite this article: Ambwani S, Vegada B, Sidhu R, Charan J. Impact of integrated teaching sessions for comprehensive learning and rational pharmacotherapeutics for medical undergraduates. *Int J App Basic Med Res* 2017;7:S57-61.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

sessions might be an important education strategy in medical education for the students for adequate retention of the knowledge as well as the clinical applicability of the basic sciences. This may improve student's learning abilities for a better understanding of pharmacology and may prove a key factor in the delivery of an effective educational programme in coming times. An integrated curriculum may promote positive working relationship too, as teachers become aware of one another's contributions.^[10] Theoretically, the integrated method of teaching looks superior to the other methods, but we do not have convincing evidence to prove its superiority over the established method like didactic lectures particularly in the teachings related to medicine. It can be worthwhile to compare the integrated teaching with the didactic teaching for knowledge acquisition and skill learning so that evidence can be generated for the future reference.

The present study was thus designed to compare the integrated teaching methods with conventional teaching sessions on medical undergraduates for comprehensive learning and better retention of knowledge as well as the clinical applicability of basic sciences during their clinical postings.

Materials and Methods

The study was carried out in the Department of Pharmacology, on the 2nd year MBBS students. Approval from the institutional ethical committee was taken. Two topics, i.e., hypertension (HT) and diabetes mellitus (DM) were selected for the study. Core group including faculty of different departments was constituted to finalize the teaching schedule for integrated teaching (IT) and conventional lecture. Before study, the faculty, as well as students, were sensitized about the integrated teaching sessions. To ensure the complete coverage of the topic without repetition and in the stipulated time, several meeting with faculty members of different discipline engaged in IT session was conducted. The learning objectives of the topics to be covered by each department were discussed. Powerpoint presentation was prepared by each faculty participating in IT session which was compiled as a final single presentation keeping in mind the content as well as the time allocated to each faculty. Multiple choice questions (MCQs) related to the topic and the feedback questionnaires (both for students and faculty) were prepared.

Written informed consent was taken from the students before each session. To conduct the session, students were divided into two groups. Didactic lectures on HT were delivered to one group. The other group was exposed to multidisciplinary integrated teaching session on HT by faculties of Physiology, Biochemistry, Pathology, Pharmacology and Medicine. For the next integrated session on DM, the groups were swapped; the one which received didactic lectures in earlier session received multidisciplinary integrated teaching session and vice versa. The integrated session on DM was taken by

faculty members of Physiology, Biochemistry, Pathology, Pharmacology, Pediatrics, and Endocrinologist.

To evaluate the performance of students, a posttest was conducted for both groups immediately after the session. Twenty MCQs of single best response type was prepared by the faculty members of the Pharmacology excluding the members participating in the study. This questionnaire was sent to some senior faculties of pharmacology working in other institutions for face and construct validation. MCQs were modified based on the comments sent by these senior faculties. Feedback of the students on a predesigned questionnaire about the various aspects of the learning activity was then obtained on a 5 point Likert scale rating for 12 items and an open-ended question. Feedback from the core group faculty as well as other faculty was also taken on a predesigned questionnaire on a 5 point Likert scale rating for 10 items and an open-ended question.

Calculation of satisfaction index (SI) of each item of students and faculty feedback questionnaire was done by the following formula:

$$SI = \frac{([n1 \times 1] + [n2 \times 2] + [n4 \times 4] + [n5 \times 5]) \times 20}{n1 + n2 + n4 + n5}$$

Statistical analysis

Descriptive statistics were reported in the form of mean, standard deviation (SD), median, range, frequency, and percentages. The analysis of score obtained in the four group of teaching methodologies was done using one-way analysis of variance followed by *post hoc* Bonferroni test. The analysis of score obtained in integrated v/s didactic was performed using unpaired *t*-test. SPSS (Statistics for Windows, version 17.0., SPSS Inc., Chicago, IL, USA) software was used for the analysis.

Results

Comparison of score of integration teaching method with didactic method

In the first session on HT, 86 students participated (42 in IT session and 44 in didactic lecture). In session on DM, 73 students participated (33 in IT session and 40 in didactic lecture). There was no significant difference between test score obtained in integrated HT, didactic HT, and integrated diabetes groups. However, the score obtained in Didactic Diabetes was significantly more ($P = 0.00$) than other three groups [Table 1]. Posttest score obtained in the didactic method significantly more than the integrated method. Graphical representation of the same is shown in Figure 1.

Feedback from students

Eighty-two students gave their feedback. About 84% of the students agreed that clinical application is well-addressed during integrated teaching and 68% of students expressed a positive feeling about the learning through integrated

teaching. About 72% of students believed that knowledge and skills acquired during integrated teaching could help them to perform better in clinical practice. They felt that their doubts were better addressed and cleared in such interactive sessions. A significant proportion of students believed that more topics should be taught with the integrated methodology. The feedback response from the students is summarized in Table 2. Maximum satisfactory index was observed for item number 1 (81.10) and minimum was observed for item number 3 (57.78). The SI for different items is shown in Figure 2.

Feedback from the faculties

The feedback from faculty about the various aspects of the integrated teaching sessions on a 5 point Likert scale is

Table 1: Comparison of score of integration teaching method with didactic method

Teaching method	Mean score (marks)	SD	SE	Range	95% CI	
					Lower bound	Upper bound
Integrated						
Hypertension (n=42)	8.24	2.325	0.359	3-13	7.51	8.96
Diabetes mellitus (n=33)	9.15	1.805	0.314	6-14	8.51	9.79
Didactic						
Hypertension (n=44)	7.84	2.241	0.338	4-13	7.16	8.52
Diabetes mellitus (n=40)	13.48	2.631	0.416	9-18	12.63	14.32

SE: Standard error; SD: Standard deviation; CI: Confidence interval

shown in Table 3. Majority of the faculty members (80%) also believed that integrated teaching is a very useful method of teaching and 86% faculty agreed that all the topics should be taught by multi-disciplinary faculty collaboratively. They opined that it will improve the interpersonal relationship and mutual respect among faculty members. The SI was maximum for item number 6 and 7 (92.72) and was minimum for item number 2 (66.15). Figure 2 shows the SI for different item.

Discussion

This study was conducted to compare the integrated teaching method to didactic teaching method. The posttest score obtained in the didactic method of teaching was significantly more than the integrated method. There was no significant difference between two teaching methods on sessions on HT, but the score obtained in a didactic lecture on diabetes was more than that of integrated teaching. The reason for this unexpected high score in didactic

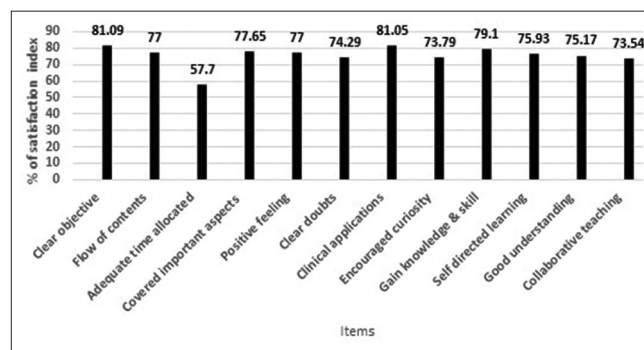


Figure 1: Satisfaction index- students

Table 2: Response of the students on the various aspects of the integrated teaching session on a 5 point Likert scale

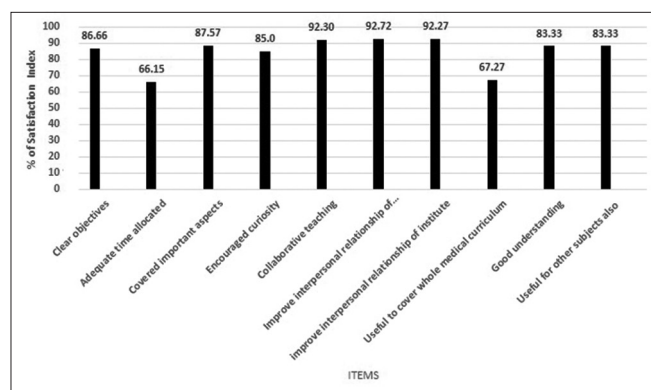
Questions items	1	2	3	4	5
1. The objectives of the session were clear	2.00 (2.44)	3.00 (3.66)	9.00 (10.98)	52.00 (63.41)	16.00 (19.51)
2. The flow of contents during the session was lucid and clear	1.00 (1.23)	6.00 (7.41)	21.00 (25.93)	47.00 (58.02)	6.00 (7.41)
3. Time allocated for the session was not adequate*	19.00 (23.17)	11.00 (13.41)	19.00 (23.17)	24.00 (29.27)	9.00 (10.98)
4. It covered important concepts and were helpful in achieving the objectives of the session	1.00 (1.22)	8.00 (9.76)	14.00 (17.07)	48.00 (58.54)	11.00 (13.41)
5. My overall feelings were positive regarding the learning activities and experiences during this session	3.00 (3.70)	5.00 (6.17)	17.00 (20.99)	45.00 (55.56)	11.00 (13.58)
6. I have not given opportunity to clear my doubts*	1.0 (1.2)	15.0 (18.3)	19.0 (23.2)	32.0 (39.0)	15.0 (18.3)
7. The clinical applications of topic were explained by the teacher(s)	1.0 (1.2)	6.0 (7.3)	6.0 (7.3)	50.0 (61.0)	19.0 (23.2)
8. This teaching technique encouraged my intellectual curiosity	4.0 (4.9)	7.0 (8.5)	24.0 (29.3)	39.0 (47.6)	8.0 (9.8)
9. The knowledge and skills acquired about this topic via this teaching technique will help me in clinical practice	1.0 (1.2)	7.0 (8.5)	15.0 (18.3)	45.0 (54.9)	14.0 (17.1)
10. The teacher/teachers provided guidance for self-learning	1.0 (1.2)	7.0 (8.5)	28.0 (34.1)	40.0 (48.8)	6.0 (7.3)
11. Good understanding is achieved by this teaching technique	1.0 (1.2)	11.0 (13.6)	23.0 (28.4)	35.0 (43.2)	11.0 (13.6)
12. All topics must be taught collaboratively by multiple teachers of different departments	3.0 (3.80)	13.0 (16.3)	15.0 (18.8)	35.0 (43.8)	14.0 (17.5)

Scale of grading 5: Strongly agree; 4: Agree; 3: Neutral/can't say; 2: Disagree; 1: Strongly disagree. For questions *3 and 6 1: Strongly agree; 2: Agree; 3: Neutral/can't say; 4: Disagree; 5: Strongly disagree, Figures in parenthesis are percentage

Table 3: Response of the faculty on the various aspects of the integrated teaching sessions on a 5 point Likert scale

Questions	1	2	3	4	5
1. The objectives of the session were clear	-	-	-	10 (66.67)	5 (33.33)
2. Time allocated for the session was not adequate*	-	5 (33.33)	2 (13.33)	7 (46.67)	1 (6.67)
3. It covered important concepts and were helpful in achieving the objectives of the session	-	-	1 (6.67)	8 (53.33)	6 (40.00)
4. This teaching technique encouraged my intellectual curiosity	-	-	3 (20)	9 (60)	3 (20.00)
5. All topics must be taught collaboratively by multiple teachers of different departments	-	-	2 (13.33)	5 (33.33)	8 (53.33)
6. It will improve the interpersonal relationship among faculty members of the department	-	-	4 (26.67)	4 (26.67)	7 (46.67)
7. It will improve the interpersonal relationship among faculty members of the institute	-	-	4 (26.67)	4 (26.67)	7 (46.67)
8. Such teaching sessions are not very useful to cover whole medical curriculum*	-	4 (26.67)	4 (26.67)	6 (40)	1 (6.67)
9. Good understanding is achieved by this teaching technique	-	-	3 (20)	7 (46.67)	5 (33.33)
10. This form of teaching is useful for other subjects also	-	-	3 (20)	7 (46.67)	5 (33.33)

Scale of grading 5: Strongly agree; 4: Agree; 3: Neutral/can't say; 2: Disagree; 1: Strongly disagree For questions *2 and 8 1: Strongly agree; 2: Agree; 3: Neutral/can't say; 4: Disagree; 5: Strongly disagree Figures in parenthesis are percentage

**Figure 2: Satisfaction index- faculty**

teaching method session on DM cannot be explained, and this result is taking the overall results in favor of didactic teaching method. Due to time constraints, only two topics were compared for this study. This might not be adequate to assess the impact of any teaching style. Since the feedback from students as well as the faculty was in support of integrated teaching thus further evaluation with a comparison of more number of sessions is imperative to reach to some concrete conclusion.

Similar studies are published from different institutions of India and other countries, and it was observed that students and faculty feedback was positive for the integrated teaching as compared to the didactic teaching method, but the improvement of posttest score was not observed in every study.^[11-14] In this study, faculty opined that majority of the teaching should be through the integration between different departments. Similar opinions were observed in other studies, shows the acceptability of medical faculty for this method of teaching. The need for initiation of integrated teaching as policy is a demand from various academicians in India and other part of the world. There is a need of structured module based integrated curriculum based on

body organ or system which is taught by multidisciplinary faculty. The curriculum and process should be reviewed by the faculties periodically to make changes based on previous experience.^[8]

This study has some limitations. The study was conducted in one specialty of the medical science, i.e., pharmacology and two topics from the whole course were selected. For comparison of teaching methodologies, it is always advisable to use the same method for multiple topics of different specialties. This should be kept in mind before generalizing the findings of this study to other specialties.

There is a lot of discussion that the integrated teaching method is superior to the conventional teaching method. Through this study, it is concluded that there is not any significant impact on the learning outcomes of students as reflected by posttest scores, but still, students preferred this method of teaching over conventional method in the feedback provided, thus the positive aspects of this teaching method style cannot be completely neglected. This small intervention revealed that though the learning by integrated teaching has potential to improve the knowledge, skills, and comprehensive learning, the students find it exhaustive. We need to put more efforts to make it more interesting and interactive and hence that students should not lose interest during integrated teaching sessions. If the planning and implication of integrated teaching are done properly, it may lead to better learning outcomes. This might be useful to improve their prescription skills and to be a better-qualified health professional.

Acknowledgment

1. I acknowledge the guidance and help provided by the faculty, senior colleagues and batch mates of CMCL-FAIMER family
2. I would like to thank Prof. Sanjeev Misra, The Director and CEO, AIIMS, Jodhpur (Rajasthan) for allowing me

to carry out the project and extending his support for the same

3. I acknowledge the help of the faculty members and senior residents of the Department of Pharmacology, as well as faculty members of the other departments, who participated in the study AIIMS, Jodhpur (Rajasthan)
4. Last but not the least the second MBBS students, who participated in the study and without whom this project would not be have been possible.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Ahsan M, Mallick AK. Use of prelecture assignment to enhance learning in pharmacology lectures for the 2nd year medical students. *Indian J Pharmacol* 2016;48:S65-S68.
2. Papanna KM, Kulkarni V, Tanvi D, Lakshmi V, Kriti L, Unnikrishnan B, *et al.* Perceptions and preferences of medical students regarding teaching methods in a Medical College, Mangalore India. *Afr Health Sci* 2013;13:808-13.
3. Tsinopoulos IT, Symeonidis C, Tsaousis KT, Mataftsi A, Chalvatzis N, Tzamalís A, *et al.* Contribution of integrated teaching in the improvement of an undergraduate ophthalmology curriculum. *Adv Med Educ Pract* 2014;5:433-7.
4. Kotwal A. Innovations in teaching/learning methods for medical students: Research with mentoring. *Indian J Public Health* 2013;57:144-6.
5. Harden RM. The integration ladder: A tool for curriculum planning and evaluation. *Med Educ* 2000;34:551-7.
6. Woodman OL, Dodds AE, Frauman AG, Mosepele M. Teaching pharmacology to medical students in an integrated problem-based learning curriculum: An Australian perspective. *Acta Pharmacol Sin* 2004;25:1195-203.
7. Rao KH, Rao RH. Perspectives in medical education 5. Implementing a more integrated, interactive and interesting curriculum to improve Japanese medical education. *Keio J Med* 2007;56:75-84.
8. Haranath PS. Integrated teaching in medicine – Indian scene. *Indian J Pharmacol* 2013;45:1-3.
9. Smith SR. Toward an integrated medical curriculum. *Med Health R I* 2005;88:258-61.
10. Muller JH, Jain S, Loeser H, Irby DM. Lessons learned about integrating a medical school curriculum: Perceptions of students, faculty and curriculum leaders. *Med Educ* 2008;42:778-85.
11. Ghosh S, Pandya HV. Implementation of integrated learning program in neurosciences during first year of traditional medical course: Perception of students and faculty. *BMC Med Educ* 2008;8:44.
12. Bhardwaj P, Bhardwaj N, Mahdi F, Srivastava JP, Gupta U. Integrated teaching program using case-based learning. *Int J Appl Basic Med Res* 2015;5:S24-8.
13. Yadav PP, Chaudhary M, Patel J, Shah A, Kantharia ND. Effectiveness of integrated teaching module in pharmacology among medical undergraduates. *Int J Appl Basic Med Res* 2016;6:215-9.
14. Zafar M. Medical students' perceptions of the effectiveness of integrated clinical skills sessions using different simulation adjuncts. *Adv Physiol Educ* 2016;40:514-21.