

## Original Article

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## Teaching Approach to Tachycardia and Bradycardia in Medical Students: A Quasi-Experimental Study to Compare Team-Based Learning and Lecture Method

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### Abstract

**Introduction:** It is crucial to find ways to improve the durability of learning in clinical units. One of these methods is team-based learning (TBL). This learning method is active and students must study the subject before the session.

**Objective:** This study examined TBL and compared it with conventional lecture method (LM) in an educational approach to tachycardia and bradycardia in adult patients.

**Method:** In this quasi-experimental study, medical students (interns) were randomly divided into two groups of TBL and LM. Two faculty members of emergency medicine were responsible for teaching in both LM and TBL groups. Data collection tool was a checklist including demographic information and a researcher-made questionnaire for assessing knowledge about tachycardia and bradycardia in adult patients. Two sets of questions with the same difficulty were designed to be used for pre-test and post-test. Both groups completed pre-test and post-test, which were finally compared.

**Results:** Totally 65 medical interns with the mean age of  $28.75 \pm 2.26$  years were participated of whom 37 persons (56.9%) were female. There was no significant difference in terms of the mean age of the participants in the two groups ( $p=0.914$ ). The two groups were also matched in terms of male/female ratio ( $p=0.416$ ). There was no significant difference between TBL and LM groups regarding pre-test score ( $p=0.935$ ). However, they were significantly different in post-test ( $p=0.001$ ) when TBL group scored higher than the LM group.

**Conclusion:** Based on the research findings, it seems that TBL was more effective than LM on students' understanding of approach to tachycardia and bradycardia in adult patients.

**Key words:** Bradycardia; Group Processes; Learning; Lecture; Tachycardia

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### INTRODUCTION

Currently, medical education is a challenging field in scientific research. New training methods such as Team-Based Learning (TBL) are replacing conventional lecture methods in several medical universities in the world (1). TBL is a kind of structured team learning used since 1970 in various fields of learning in organizations, industries, and recently in medicine. Students can learn how to interact with others, how to cooperate as a team member, and how to finish a task in the best way suitable for any person in any environment through this method (2). TBL is based on cooperation, is student-centered, and is an active learning process in small student groups that

focus on a specific topic (3, 4). The principle of the TBL is that students with different skills are randomly categorized in teams of 5-7 learners. Before the class starts, students do an out-of-class activity, such as a reading assignment or homework. Then they enter the training group with aforementioned preparation to discuss a specific topic. In the second step, students are assessed with individual Readiness Assurance Process (iRAT) to ensure their preparation. In the third stage, group discussions are held in the class and students interact with one another and with their professor. The following measures furnish students with sufficient information about the

subject: reviewing the subjects in the class, asking several questions to motivate the students (not just giving an answer or solving a problem), strengthening the problem-solving skills, understanding and hearing the opinions of others, active listening, enhancing interpersonal and social communication skills and getting feedback and support from colleagues under the supervision of the professor. TBL is suggested for students who are not interested in a particular field of activity, who do not carry out their homework assignments, and who have difficulty learning a particular subject (5). TBL has been reported to improve learning and to provide better performance in the written exams as well as in Objective Structured Clinical Examination (OSCE) (6-8). According to recent studies, TBL can be considered an alternative approach to conventional lecture methods in improving test performance and durability of learning. Ultimately, the improved quality of educating students can augment the quality of the service they provide in the clinic (9). Tachycardia and bradycardia are among the important topics that clinical students (interns) should learn during their emergency medicine course. Given that medical interns may be exposed to various patients with cardiac complaints, they need sufficient knowledge to interpret cardiac pathologies, which mandates an effective teaching method. As few studies have investigated the impact of new teaching methods on this issue and that medical interns have limited time for learning, new teaching methods with higher quality should be investigated and implemented. Therefore, this study examined TBL and compared it with conventional lecture method (LM) in an educational approach to tachycardia and bradycardia in adult patients.

## METHODS

### **Study design**

This quasi-experimental study was conducted in 2018 in Kerman, Iran. Initially, the students were briefed about the project, and completed informed consent forms. We emphasized that the training materials were the same for both groups. All the information was confidential and that the tests were solely used for evaluating the effectiveness of the training methods. This study was approved by the ethics committee of Kerman University of Medical Sciences (IR.KMU.REC.1396.1257).

### **Study population**

Medical interns who were introduced to the emergency department for their emergency medicine course were eligible. Exclusion criteria

included irregular attendance, non-compliance with teamwork, failure to cooperate or not willing to complete the questionnaire. By the random selection in each period, the first ten interns sent to the emergency department (the first 10 students in list) received conventional training through lecture, and the second group (the second 10 students in list) were trained by TBL.

### **Intervention**

Two faculty members of emergency medicine were responsible for teaching in both conventional and TBL groups.

Each session of TBL included the following steps: 1) Designing 30 multiple choice questions (MCQ) and ensuring their clarity. The questions were sorted from simple to difficult. The same method was used for designing MCQs in both lecture and TBL methods. 2) Answering MCQs by individuals in 30 minutes. 3) Group discussion and answering MCQs in small groups of 5 students. 4) Answering MCQs by the professor at the end of group discussion.

An extra form which did not include any specific contents in which the students of each group should refer to the extent they had previously studied, and where they should explain for each wrong answer. This form was filled by each group not individuals. Then, the professor participated in their discussions. Also, a challenging subject or topic on dysrhythmias was arranged and discussed for all groups.

The other group received conventional lecture training, where the professor played the main role and lectured for two hours regarding the subject.

### **Data gathering**

Data collection tool was a checklist including demographic information (age, sex) and a researcher-made questionnaire for assessing knowledge about tachycardia and bradycardia in adult patients. The content validity of this questionnaire was confirmed by emergency medicine specialists (2 professors), and cardiologists (2 professors), and the reliability was assessed by piloting the questionnaire in 10 students who completed the questionnaire (Cronbach's alpha = 90%). Two sets of questions with the same difficulty were designed to be used for pre-test and post-test. Both groups completed pre-test and post-test, which were finally compared.

### **Data analysis**

Mean and standard deviation were used to compare quantitative variables in the two groups. We analyzed the data by SPSS version 20 using Mann-Whitney, chi-square and t-test.

**Table 1:** Comparison between pre-test and post-test score in both team-based learning and lecture method groups

Variables	Group						P
	Lecture method			Team-based learning			
	Average score/total score	Standard deviation	Number of students	Average score/total score	Standard deviation	Number of students	
<b>Overall</b>							
Pre-test score	125.63/150	11.14	32	125.39/150	11.54	33	0.935
Post-test score	20.0/30	3.96	32	24.55/30	4.16	33	0.001
<b>Male students</b>							
Pre-test score	123.64/150	12.88	14	126.86/150	12.68	14	0.512
Post-test score	19.93/30	4.55	14	25.64/30	3.91	14	0.405
<b>Female students</b>							
Pre-test score	127.17/150	9.68	18	124.32/150	10.84	19	0.001
Post-test score	20.06/30	3.57	18	23.74/30	4.25	19	0.007

## RESULTS

Totally 65 medical interns with the mean age of  $28.75 \pm 2.26$  years were participated of whom 37 persons (56.9%) were female. From the final participants, 32 persons were assigned to LM group and the other 33 persons were assigned to TBL group. Analysis revealed no significant difference in terms of the mean age of the participants in the two groups (LM:  $28.59 \pm 2.39$  years vs. TBL:  $28.91 \pm 2.13$  years;  $p=0.914$ ). The two groups were also matched in terms of male/female ratio (LM: 14/18 vs. TBL: 14/19;  $p=0.416$ ).

Results of pre-test and post-test scores in both groups are reported in table 1. The results of t-test showed no significant difference between TBL group and LM group regarding pre-test score ( $p=0.935$ ). However, they were significantly different in post-test ( $p=0.001$ ) when TBL group scored higher than the LM group. The same results were seen in each sex sub-categories.

## DISCUSSION

Following conduction of current study, we assumed that students' perception of tachycardia and bradycardia in adult patients was better in TBL group as compared with lecture method group. Several studies have shown the effectiveness of TBL in learning and motivating students, most of which reflect the fact that TBL enhances students' motivation, improves their attitudes, and improves learning (10). Jafari et al. compared TBL and lecture during a neurology course. They concluded that TBL resulted in more success and satisfaction for students (11). Zeheib examined pharmacy students, and reported that TBL was more effective than lecture (12). Bahadur et al. evaluated and compared the perceptions of midwifery students about the effectiveness of TBL and lecture teaching methods on child care, and reported that trainees in TBL group had a better opinion of TBL compared

to the lecture method (10). Vaezi et al. compared TBL and lecture for learning and memorizing processes in nursing students of internal surgery department. Their results showed that TBL increased communication skills and facilitated learning in most students (13). Hasanzadeh et al. concluded that TBL was helpful in communicating, understanding the concepts and facilitating and deepening the students' learning (14). Wiener et al. also stated that TBL had a special interest in medical education processes and even enhance students' success in key examinations (15). Cheng et al. showed that TBL is an active method in the learning process of 103 Taiwanese students (16). These studies are consistent with the results of the present study. As we did not observe a significant difference between interns' score in TBL and LM. However, some studies reported no significant changes and improvement in the scores of TBL group compared to other educational methods (9, 17, 18). Some students still believe that TBL has a positive impact on learning and the quality of learning (18, 19). TBL is effective, efficient and active in transferring the concepts, and students feel relaxed in this way. Unfortunately, most universities employ lecture-based training which is boring for students. In other words, an educational system which relies just on memorizing, passing the exam and giving a score, is boring (20). It is recommended that TBL be used from the very beginning of university training. This method is recommended even if it does not yield better results in exams in comparison with conventional methods because it encourages more students to participate in the learning process and more interaction between students and professors (21). The results of the t-test showed that test scores in male students in the conventional method was higher than those in TBL group.

Nonetheless, female students' scores were higher

in TBL group as compared with the lecture group. Vasan et al. concluded that students performed better in the Board of Medical exams following TBL method compared to conventional lecture-based teaching. They compared TBL and lecture, and found that students in TBL group were more active than those in lecture group because they participated in group discussions and interactions, and studied before the class (22). TBL experiences are designed to provide students with the opportunity to assess their learning and practice concepts through the application and problem-solving skills which help the students to be more confident. Facilitation of learning is one of the conditions necessary for new learning methods, including TBL (3).

The results of the present study show that TBL increased interpersonal skills in female students. The reason is that the most important feature of the TBL is teamwork which leads to the collaboration and interaction of team members, mutual respect for others and leadership development (23).

#### **Limitations**

Although Team-based learning seems to be better learning method, it needs cooperation of students and studying the subject before class. For this reason, student selection is very important and larger sample size may help to take more accurate conclusion.

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#### **CONCLUSIONS**

According to the findings of this study, it appears that students' perception of tachycardia and bradycardia in adult patients was better in TBL group as compared with lecture method group.

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#### **AUTHORS' CONTRIBUTION**

All authors have, fully or partly, been involved in the concepts and design of the study, collecting the data or preparing the manuscript. In addition, all have reviewed the manuscript.

#### **CONFLICT OF INTEREST**

None declared.

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