

## **Team-based learning (TBL) as a teaching modality in Pharmacology**

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**Abstract:** Team-based learning (TBL) is a student-centered teaching approach that requires both individual and group accountability to ensure a fruitful teaching/learning experience. We adopted TBL in teaching second year Pharmacy students Pharmacology course in Dubai Pharmacy College (DPC), Dubai, UAE. The present study assessed students' perception to TBL as a teaching/learning method. Second year students were divided into 10 groups 7-8 students each. The three phases of the TBL technique were implemented. Students were requested to respond to a questionnaire to assess their perception to the TBL experience. A significant proportion of the students felt that TBL provides an enjoyable teaching/learning experience that enhances their active learning, self-directed learning (SDL), critical thinking and ability to solve clinical problems.

**Keywords:** Team-based learning, TBL, active learning, Medical Education, Pharmacology student-centered.

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### **I. Introduction**

Team based learning (TBL) is a student-centered teaching modality that requires individual and group accountability to solve the problem and ensure a successful and enjoyable teaching/learning experience. It incorporates the independent individual pre-session preparation with the in-class small group (team) discussion. It is a teaching/learning strategy that promotes self-directed learning (SDL) and teamwork. Accordingly, it requires attendance and a lot of preparation. It also helps the students to use their knowledge, master the course content, develop a critical thinking and apply their learning concepts in solving the clinical problems. There is growing evidence that TBL is an effective way of teaching /learning in both under and post-graduate medical curriculum. It has been adopted in many integrated as well as traditional/ interdisciplinary curriculum<sup>1-6</sup>.

Dubai Pharmacy College (DPC) offers a four year Bachelor degree in Pharmacy, with this upward trend in adopting team-based learning as a teaching/learning modality in medical curriculum. The aim of the present study was to investigate students' perception toward this modality in teaching Pharmacology course to second year DPC students.

### **II. Methodology**

This study was conducted in DPC during the academic year 2013-2014 after approval of the research and ethical committee and taken consent from the students. The second year DPC students (n=74) were divided during their Pharmacology course into 10 groups each of 7-8 students. Due to the diversity of the academic performance of the students and to ensure a fruitful teaching/learning experience for the students during the TBL session, the authors assured the presence of higher, medium, lower-achievers students in each group. This was achieved by random distribution of students from each academic category to all the 10 groups. Categories were classified based on the students' academic performance in Pharmacology mid-semester exam<sup>7</sup>.

The TBL experience consisted of three Phases. Phase I: The selected topic for discussion "oral contraceptives" was assigned to be read from the Pharmacology textbook; Basic and Clinical Pharmacology 12th ed.,<sup>8</sup> Pharmacology course booklet, and the aided online teaching material uploaded on DPC online platform. Intended Learning Outcomes (ILOs) have been created based on the assigned teaching resources and focused on the clinical application of the course content and the critical thinking in solving the clinical problems. A period of one week was given for individual reading before the TBL session and team discussion. Phase II: During the TBL session, each individual student independently answered ten MCQs as individual Readiness Assurance Test (iRAT). The MCQs were created in a way to assess the ILOs previously set with emphasis on assessing the ability of students to solve medical problems. Immediately afterwards, the team Readiness Assurance Test (tRAT) was performed in which students answered the same ten MCQs as team after the team agreed on a single answer for each question. Phase III: The instructor provided an immediate feedback with the key answer for the ten MCQs and each team checked its response with the key answer. If the answer was correct one credit point for the question is recorded, if the answer was wrong the team discusses the question again to agree on the right answer. Any doubt raised by the teams were further discussed and explained by the faculty to clarify any misconception and justify the correct answer. Following that, the students were asked to do a peer evaluation for their team-mates and to respond to a well-designed and validated (20

questions) questionnaire assessing their perception to TBL as a teaching/learning modality in the Pharmacology course.

### III. Results

The perception of the second year DPC students to TBL as a teaching/learning modality in Pharmacology is assessed by a well-designed validated questionnaire with responses shown in table (1). Percentage of students agreeing for the statement of each question was calculated and presented in the table. An asterisk was given to questions with results less than 60% agreement rate among students.

**Table (1):** students' perception to TBL as a teaching/learning modality in Pharmacology course

No.	Items	Percentage (%)
1.	TBL helped me to increase my knowledge of oral contraceptive Pharmacology	81.60
2.	I found it an easy way to complete reading the assigned portion/I have completed 100% of the required reading	30.20*
3.	I generally felt prepared for the discussion	35.21*
4.	The group discussion was a useful activity for learning	74.60
5.	The group discussions allowed me to improve my understanding of concepts	70.40
6.	The group discussions allowed me to clear my doubts	63.30
7.	I learn better from TBL than from lectures	46.48*
8.	I learn better from TBL than from individual self-study	54.93*
9.	Solving problems in a group is an effective and motivating way to learn Pharmacology of oral contraceptives	78.87
10.	It has improved my ability to think of the possible answers.	71.80
11.	I think TBL helped me to prepare better for my examination in the given portion.	56.34*
12.	The TBL technique was helpful in developing my information gathering skills	60.00
13.	TBL reduces the amount of time needed for self-study	32.39*
14.	I will recommend TBL to other students	42.25*
15.	TBL should be offered more frequently in the curriculum	42.25*
16.	My team worked well together	85.90
17.	There was mutual respect for other teammates' viewpoints during TBL	83.10
18.	I contributed meaningfully to the TBL discussions	73.20
19.	I contributed with full enthusiasm and interest to the TBL experience	67.60
20.	The ability to work in a team is necessary if I am to be a successful pharmacist	80.20

\* Students' response < 60%

### IV. Discussion

TBL is completely different from the traditional didactic lecture. Didactic lecture is an economic method that is teacher-centered providing an up-to-date summary of the topic and a spoon feeding of the knowledge and concepts yet has a limited chance -if any- to give immediate feedback to the student. The feedback is mandatory to correct any misunderstanding and misconception that may arise during the lecture. On the other hand, TBL is an upward trend used nowadays by many medical universities to overcome the drawbacks of the lecture. TBL is a student-centered technique that allows active learning, SDL, teamwork, immediate feedback and peer evaluation thus enhancing students' critical thinking and abilities to solve clinical problems and help them to become a lifelong active learners<sup>9-11</sup>.

In this study, applying TBL technique during the Pharmacology course of the second year DPC students had a positive impact on the students' teaching/learning experience. More than 70% of the students stated that TBL helped them to increase their knowledge about the assigned topic and that the group discussion cleared their doubt and improved their understanding of the assigned topic. This in accordance with other studies who found positive perception of the students to the TBL experience as a teaching modality, they reported that TBL increased their gained knowledge and allowed them to be more actively involved in their learning process as individual and in groups<sup>11</sup>.

Also more than 70% of the students feel that TBL is an effective way to enhance their SDL, critical thinking and give them a better chance to solve clinical problems in groups. Moreover, 78-85% of the students enjoyed the teamwork experience, felt that working in team made them more motivated and enthusiastic to learn, were able to contribute meaningfully in the discussion, and showed mutual respect between all the teammates. 80% of the students considered successful team work as a crucial aspect in their profession as a pharmacist. This is in coherence with other researchers who found that students find TBL an interesting and enjoyable method as they were able to actively participate in the learning process and the discussion. Studies also showed that students preferred TBL as it provided them with an opportunity for SDL prior to the session and to spend more time with the instructor for discussion and feedback and they would recommend using TBL more in the curriculum<sup>12-15</sup>.

On the other hand, 30% to 46% of students felt that TBL requires a lot of time for the SDL and preparation and they would still prefer to have didactic lectures and would not recommend TBL to other

students or to be offered more in the curriculum. Being minority would suggest that they may be the lower achiever students. This runs in accordance with other studies which found that students preferred didactic lecture more than the peer-teaching and considered group learning less effective. Authors of the mentioned studies reported that these students were either the lower achiever students or students who encountered difficulties in SDL and preparing for the TBL session<sup>11,16-18</sup>.

#### **Recommendation of the study:**

Prior to generalizing the findings of the study we would recommend further studies with large sample size, multidisciplinary approach and stratification analysis of the results according to the academic performance of the students.

### **V. Conclusion**

Our experience in using TBL technique is positive. It creates an enjoyable teaching/learning session that enhances students' active learning, SDL, critical thinking and ability to solve clinical problems. Majority of the students expressed their positive perception about the effectiveness of TBL as a teaching modality.

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