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Original Article

A comparative study of the efficacy of "Think-Pair-Share" method over tutorials in Pharmacology for undergraduates

Megaravalli R Manasa [1*], Chaitanya Karant [1], Shilpa Bhimalli [2]

1. Department of Pharmacology, Karwar Institute of medical sciences, Rajiv Gandhi University of Health Sciences, Karwar, Karnataka, India
2. Department of Anatomy, KAHER Jawaharlal Nehru Medical College, Belagavi, Karnataka, India

ABSTRACT

Introduction: "Think–Pair–Share" (TPS) is an active cooperative teaching-learning method that encourages as well as allows for individual thinking, collaboration, and presentation. It offers the benefits of small group learning and the development of higher-order thinking skills. It provides immediate feedback to students on their understanding and teachers on the extent of pupil understanding. Thus it helps in modifying both teaching and learning. Hence the current study aimed at comparing the efficacy of TPS with tutorials and assessing the perception of students towards TPS.

Methods: 42 students who met the eligibility criteria and consented to participate in the study were included after obtaining Institutional ethics committee clearance and written informed consent. There were 2 test groups. TPS was employed to teach Group 1 while Group 2 was taught by Tutorials simultaneously for 6 sessions. A pre-test and post-test were conducted for each session. A final Multiple choice question test was conducted at the end of the study. The perception of the participants towards TPS was also obtained.

Results: Our study did not show a significant difference between the post-test, change in mean post-test over pre-test scores, and final test scores. The participants had a good perception regarding TPS and agreed that it was engaging and improved communication with the teacher. They felt that it also should be used in the future.

Conclusion: Although TPS failed to exhibit an improved efficacy, it can be used in the future because it promotes active learner participation, individual thinking, and communication skills as well as provides immediate feedback.

Keywords:
Think-Pair-Share
Pharmacology
Undergraduates

Introduction

Conventional teaching encompassing a course curriculum, textbooks, and predefined practical manuals is teacher-centered (McDermott et al, 1991). This approach does not provide the students with opportunities to think about the fundamental concepts as teachers provide everything essential for them. Thus they begin to memorize the concepts without trying to understand

* Corresponding author: Megaravalli R Manasa, dr.manasamr@gmail.com
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them (Gok, 2013). There is a lack of active learner involvement in this approach. Various studies have confirmed that learners' performance can be improved by active learning approaches (Freeman et al., 2014). Active learner engagement also results in better long-term retention than passive receipt of information (MacDougall, 2017). Hence, it is essential to change to learner-centric teaching.

Think–Pair–Share (TPS) method is an active cooperative teaching-learning method which allows individual thinking, collaboration, and presentation (Hamdan, 2017). This learning strategy provides sufficient time to think on a particular subject, which enables the pupils to frame individual concepts and discuss these concepts with a peer. In contrast to conventional methods where the teacher poses a question and an individual student responds, it encourages a high degree of active participation and response from students. In this method, all students are allowed to share their thoughts with their peers, thereby, enhancing their active involvement and communication (Kumar et al., 2016). This method increases the wait time of teachers, which in turn increases the student's think time. Wait/think time is a dominant factor which increases the responses of learners. Thus, the classroom discussions, become more productive (Sapsuha et al, 2013). It offers the benefits of small group co-operative learning. It enables learners to develop advanced thinking skills thereby encouraging them to frame individual reasoning which can then be shared with peers (Bonwell et al, 1991). This method also incorporates feedback. Students can get immediate and detailed feedback from teachers as well as co-learners. Teachers also get prompt feedback on the extent of understanding of pupils. Thus, there is an opportunity to improve both teaching and learning (Black et al., 1998).

The new Competency-based medical education (CBME) emphasizes small group teaching and the use of feedback to improve learning (Medical council of India , 2017). It also recommends a shift from traditional teacher-centered teaching to learner-centered teaching. TPS method provides these benefits in a single activity. Currently, this strategy has been tried in elementary education, nursing, and pharmacy education but there is no published studies of the TPS method in medical education and particularly in Pharmacology. Hence, the present study was conducted to compare the efficacy of TPS with tutorials and obtain the perception of students about TPS.

Materials and methods

A prospective study was carried out for 2 months from June-July 2021. The study was conducted according to the National Ethical Guidelines for biomedical and health research involving human participants (Indian council of medical research guidelines, 2017). It was approved by Institutional Ethics committee (IEC/KRIMS/O/01/2021-22). Study participants were identified based on their performances in the first internal assessment. This study was planned as a pilot study for students who did not perform well in internal assessment. Based on the effectiveness of TPS in the study participants, this method can then be used in the remaining students. Out of 150 students, 42 students met the eligibility criteria and were included after obtaining written informed consent. The participants were grouped into 2 test groups. TPS was employed to teach Group 1 (n= 21) while Group 2 (n= 21) was taught by Tutorials. The same topics were discussed simultaneously for both groups for 6 sessions.

Preparation of learning material

The topics selected for discussion for the present study were from the Central nervous system. The following topics were discussed during the study:

General anesthetics

Antiepileptics

Antipsychotics

The content and objectives were the same for both TPS and Tutorials. Each of the selected topics was discussed in two sessions.

Session planning

Think Pair Share (TPS)

The topic for discussion was given to the participants in advance and they were provided sufficient time for preparation. Recommended textbooks were suggested. The sessions were held weekly once in the afternoon hours for 6 weeks.

Group 1 participants (n = 21) were further divided into 7 sub-groups of 3 participants each. TPS was conducted in the following steps.

Step 1 - Preliminary stage

The facilitator opened the discussion by explaining

the purpose of the session and sharing the session objectives. The facilitator then posed a question.

Step 2 - Think stage

The facilitator encouraged the participants to think individually about the question.

Step 3 - Pair stage

The facilitator encouraged the sub-groups to discuss among themselves. This allows them to consider each other's answers, obtain feedback and decide on the best response.

Step 4 – Share stage

One representative from the sub-groups shared the answer with the rest of the participants. Feedback was given to the participant from both peers and the facilitator.

Step 5 – Closing

The facilitator and learners reflect on the learning process and outcomes. The session is concluded by providing the topic and learning materials for the next session.

b. Tutorials

Tutorials were conducted conventionally. Group 2 participants (n = 21) were given the topic for discussion in advance. Tutorials were conducted weekly once in the afternoon hours for 6 sessions. The facilitator briefly introduced the topic, then posed questions and asked one of the participants to answer them. At the end of the session, the topic was summarized.

Assessment

Pre-test and post-test were conducted for each teaching session for both TPS and tutorials consisting of 10 MCQs. A final MCQ test was conducted at the end of the study consisting of 30 MCQs covering all 3 topics.

Examples of assessment questions

1. Use of glycopyrrolate in pre-anesthetic medication serves the following purposes except:

A. Prevents respiratory secretions during anesthesia

B. Guards against reflex vagal bradycardia during surgery

C. Produces amnesia for perioperative events

D. Reduces the probability of occurrence of laryngospasm

2. Select the incorrect statement about antipsychotic drugs.

A. Bioavailability is low

B. Volume of distribution is large

C. Tissue protein binding is low

D. Cumulate on repeated administration

Perception of participants: The perception of participants towards the TPS method was assessed using a structured pre-validated questionnaire anonymously.

Statistical analysis

Independent sample t-test was employed to analyze the data obtained from the pre-test, post-test, and final MCQ test. Data were analyzed using SPSS v 24.0. Tables and graphs were used to present the data. A *p*-value of <0.05 was taken as significant.

Results

The post-test scores, change in mean post-test over pre-test scores and final MCQ test scores were compared between the Tutorial and TPS groups. Our study did not show a significant difference between post-test, change in mean post-test over pre-test scores, and final test scores of the two groups. (Table 1 and 2, Figures 1 and 2).

The participants had a good perception of the TPS method. 60% of them strongly agreed that it was engaging and more informative. Also, it improved learning

TABLE 1: Independent Samples t-test for Comparison between Tutorial & Think- Pair-Share groups (TPS) (n=21). SD=Standard Deviation

	Test groups	Mean-value	SD	t-value	*p*-value
Pre -Test	Tutorial	5.48	1.96	1.029	0.31
	TPS	5.87	1.45		
Post-Test	Tutorial	5.98	2.22	0.199	0.84
	TPS	4.94	1.39		
Final Test	Tutorial	16.20	4.35	1.15	0.26
	TPS	14.70	3.88		

TABLE 2: Change in mean post-test over pre-test scores of Tutorials and Think-Pair-Share (TPS) groups (n=21).

Groups	Mean difference between post-test & pre-test scores	t-value (95% CI of the difference)	*p*-value
Tutorials	0.50	-0.51 (-0.76 to 0.45)	0.614
TPS	0.65		

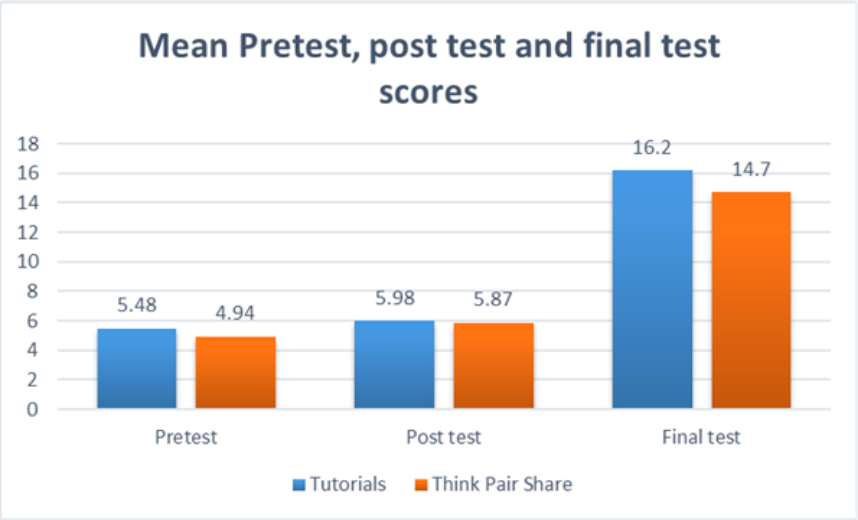

FIGURE 1. Mean pretest, Post-test and final test scores of Tutorials & Think Pair Share groups. Mean pretest, post-test and final test scores of Tutorials & Think Pair Share groups.

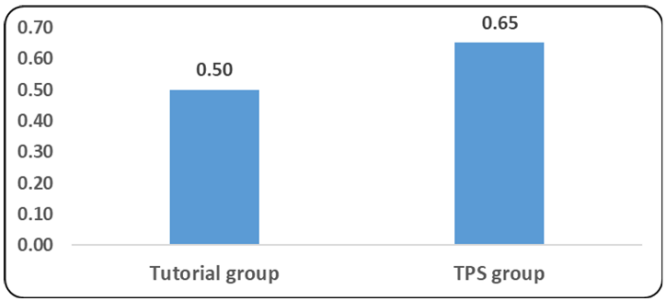

FIGURE 2. Changes in mean Post-test over Pre-test scores of Tutorials and Think Pair Share groups. Change in mean Post-test over Pre-test scores of Tutorials and Think Pair Share groups.

motivation and facilitated the development of self-assessment and peer assessment skills. 80% of the participants strongly agreed that it improved communication with the teacher. 65% of the participants strongly agreed that it helped in gaining a better understanding of the topics (Table 3).

Discussion

The new Competency based undergraduate medical curriculum (CBME) introduced in 2019 laid greater emphasis on learner-centric methods of teaching. According to the Graduate Medical Regulations (GMR) 2019, two-thirds of the total teaching schedule should include small group interactive sessions and collaborative team-based teaching methods while the time allotted for traditional didactic lectures has been reduced to less than one-third of the total teaching hours (Medical council of India , 2017). These regulations have paved the way for the transition from traditional teacher-centered teaching to learner-centered teaching. To achieve this, the new curriculum requires the incorporation of newer teaching methods to encourage active learner engagement and participation. It also emphasizes the incorporation of feedback to learners to improve their learning. Among the newer teaching strategies, TPS offers the advantages of small group discussion, and feedback, as well as improves communication.

TPS has been shown to promote active student learn-

TABLE 3: Perception of students regarding the Think-Pair-Share (TPS) method

Item No.	Items	Students' perception				
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	TPS method was engaging and improved my learning motivation.	60%	40%	0%	0%	0%
2	This teaching method was more informative.	60%	40%	0%	0%	0%
3	This method helped in gaining a better understanding of the topics.	65%	35%	0%	0%	0%
4	This method resulted in better retention of topics than traditional teaching methods.	55%	40%	5%	0%	0%
5	This method provided an opportunity to communicate with other students.	50%	45%	5%	0%	0%
6	This method improved communication with the teacher.	80%	20%	0%	0%	0%
7	This method was thought-provoking.	45%	30%	10%	15%	0%
8	This method allowed me to keep pace with the teacher.	55%	40%	5%	0%	0%
9	The course content covered by this method was satisfactory.	65%	35%	0%	0%	0%
10	This method helped to consolidate the concepts of vast topics.	50%	40%	10%	0%	0%
11	This method was time-consuming.	10%	25%	10%	50%	5%
12	This method facilitated the development of self-assessment and peer assessment skills.	60%	40%	0%	0%	0%
13	This method gave me too much burden and pressure.	15%	10%	5%	20%	50%
14	This method should be used for future classes.	45%	40%	15%	0%	0%

ing and increase learner engagement in discussions (Ledlow, 2001; Karge et al, 2011). Medical students are expected to apply their knowledge and develop critical thinking skills so that they will be better equipped to deliver efficient patient care. TPS has been reported to enhance critical thinking ability (Kaddoura, 2013). It has been reported that TPS permits learners to acquire additional knowledge and understand concepts by discussing in pairs and then sharing it in larger groups (Lujan et al, 2005). Several studies have reported that TPS improves decision-making, problem-solving, social skills, and academic performance (Giancarlo et al, 2007; Nagel, 2008; Nwaubani et al 2016).

The current study did not find a significant change in efficacy between the TPS and tutorial groups. This could be because of the short duration of the study. However, the participants had a positive perception of TPS. The majority of the participants of our study agreed that TPS was engaging and improved their learning motivation. Studies by Ariana S and Zaini RG also reported similar findings (Ariana, 2013; Zaini, 2020). Most of the participants opined that this method helped in better retention of the topic. MacDougall C reported that active learning resulted in better long-term retention of the subject (MacDougall, 2017). The majority of the TPS participants agreed that there was improved communication between them and teachers, which is similar to the findings of the study by Sumekto DR. (Sumekto, 2018)

The study participants agreed that this method helped in consolidating the concepts of vast topics and enabled them to understand the topic. This method also facilitated the development of self-assessment and peer assessment skills by providing immediate and prompt feedback. This feedback from peers and facilitators can help in improving learning outcomes. Hence TPS can be incorporated as a teaching tool for small group discussion as per the new CBME curriculum as it provides several benefits such as enhanced student-teacher in-

teraction, learner engagement, and active participation. Also, it improved communication skills and feedback for learning.

Conclusion

Although TPS has not shown any significant improvement in efficacy, it can be used in the future because it promotes active learner participation, individual thinking, and communication skills as well as provides immediate feedback.

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Conflict of interest

Authors declare no conflict of interest

Ethical approval

The study was approved by Institutional Ethics Committee, Karwar Institute of Medical Sciences, Karwar, Karnataka, India

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