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Original Article

Effectiveness of Traditional Lecture-Based Learning and Team-Based Learning in Teaching Dermatology among Undergraduate Medical Students of Bangladesh

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Abstract

Background: In recent years, transition towards competency-based education, has been one of the most major shifts in medical education. From traditional lecture-based teaching-learning to problem-based teaching-learning (PBL) and team-based teaching-learning (TBL) are the methods increasingly being employed in medical education. For promoting active learning by improving teaching efficiency is the most valuable and effective approach, which requires students to actively participate in the class, engage with learning materials and collaborate with the peers This study aimed to evaluating the effectiveness and acceptability of Traditional Lecture-Based Learning (TLBL) and Team-Based Learning (TBL) in dermatology among undergraduate medical students of Bangladesh.

Methods: This quasi experimental study was performed among 118 undergraduate medical final year students from three non-government medical colleges in Cumilla district of Bangladesh, who were selected using convenience sampling method. The study was conducted from July 2023 to June 2024. To assess effectiveness three topics Acne, Psoriasis and Alopecia were chosen and two teaching methods Traditional Lecture-Based Learning (TLBL) and Team-Based Learning (TBL) were adopted. Pre-test and Post-test of each session were conducted and self-administered structured questionnaire were used to get level of performance and satisfaction respectively.

Results: Study revealed that the overall satisfactions about the attainment of 'learning objectives', 'learning ability and interest', 'team/group work ability', 'clinical ability' and on the 'teaching method' by TLBL were 43.2%, 37.4%, 25.6%, 37.4% and 44.2 % respectively. These satisfactions were increased as 94.2%, 93.8%, 95.8%, 94.8% and 95% respectively by TBL. The gross satisfaction in percentage with TLBL was only 37.6%, increased to 94.7% with TBL. All these differences were statistically significant between the two groups as a whole (Independent t test, P=0.000). The mean post-class test scores compared to the mean pre-class test scores showed that students' learning increased 101% by TBL (P=0.000) and decreased -4.22% by TLBL (P=0.698).

Conclusion: The null hypothesis of the of the present quasi experimental design was, 'Traditional lecture-based leaning (TLBL) and Team-based learning (TBL) are equally effective in teaching dermatology to undergraduate medical students of Bangladesh'. Based on the findings of the present study we can reject the null hypothesis and accept the alternate hypothesis 'Team-based learning and Traditional lecture-based leaning are not equally effective; Team-based learning is better than Traditional lecture-based learning in teaching dermatology to undergraduate medical students of Bangladesh.'. TBL can be complementary with TLBL if these are judiciously used and included with wider research in the teaching methods of medical education of Bangladesh.

Keywords: Traditional-Lecture Based Learning (TLBL), Team-Based learning (TBL), Medical Education, Dermatology.

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Introduction

Rapidly changing healthcare needs of populations worldwide challenges medical education in keeping pace. Traditional curricula, inadequate resources, poor quality assurance and accreditation practices results in the production of under equipped graduates. To effectively address and mitigate the health problems of the twenty-first century, more efficient, and effective paradigms in public health and medical education are necessary.[1,2] Health professional institutes have to play pivotal role in developing evidence-based curricula, implementing new technology, and promoting new programs. Principal stakeholders must take an active role to bring about the necessary changes in medical education and public health. Now a days, shift towards competency-based curriculum, the use of newer technology, the raising demand on interprofessional education and addressing social determinants of public health related issues in medical education are major challenges.[3]

In recent years, transition towards competency-based education, has been one of the most major shifts in medical education. An extensive evolutionary process has been occurred in medical education for so many years. From traditional lecture-based teaching-learning to problem-based teaching-learning (PBL), case-based learning, and team-based teaching-learning (TBL) are the methods increasingly being employed in medical education. For promoting active learning by improving teaching efficiency is the most valuable and effective approach, which requires students to actively participate in the class, engage with learning materials and collaborate with the peers.[4] Active learning has been shown to be effective as it engages the students in the learning process. It facilitates more interaction between students and teachers and frequent useful feedback from the faculties. It also leads to more collaboration and interaction between the students and may gain extraordinary learning experience.[4,5] Another research reported that team-based learning is more effective in teaching undergraduate medical students.[6] In Team-Based Learning (TBL), a three-steps sequence is applied; i) students prepare the selected topics in advance, ii) an assurance of readiness through individual and group activity of learning, which can be demonstrated via readiness assurance tests (RATs), and iii) application of problem-solving exercises.[7]

The development of socioeconomic status and improvements in the standard of living in Bangladesh has resulted in increased demand of higher level and efficient dermatologists. Providing dermatology education and learning has been difficult owing to diverse and complex types of dermatology. Therefore, it is necessary to implement a standardized teaching and learning system for medical students to cultivate clinical physician with appropriate medical theoretical knowledge and clinical practice skills as well as ability to engage in autonomous learning, critical thinking and real-life application; so, that they would be well equipped independently engage in clinical management.

Failure in the academic domain as well as increasing the costs of medical education due to lack of proper learning method and attention on the academic side. The ability of the teacher to investigate or assess the details of preferred teaching methods and learning styles by students can help the students to become more attentive and active in academic sessions can also help to standardize their academic status. Due to this importance, education should be provided in a better way with special emphasis on the teaching methods and learning styles of the students. The most common method of teaching is lecture-based instruction. In this method, primary transmitters of knowledge are teachers whereas students are the receivers. Lecture-based learning is more or less efficient but it involves less engagement of the students. Medical students need to acquire a large extent of knowledge and that knowledge must be retained by students for long-term use. This long-term retention of knowledge can be facilitated by employing methods of active learning that ensure extensive involvement by the students; team-based and flipped classroom learning strategies fall in the category of active and effective learning.[8]

Team-based learning (TBL) is the type of active learning strategy in which instructor divides the large number of students into smaller groups. Each group is assigned a topic and they discuss and solve the given problem altogether. It gives the students better involvement and understanding in learning and development of the sense

of responsibility towards team members. However, TBL includes limited time to complete problem solving activities and less emphasis on the individual student-centered approach among the group of students.[9] Therefore, it is very much important to evaluate the effectiveness of the team-based learning that is applied to a new setting. Thus, this study was conducted with the objective of evaluating the effectiveness and acceptability of the team-based learning in teaching dermatology among undergraduate medical students in Bangladesh.

Team-based learning is emerging rapidly and need to be tested so that the effectiveness of this learning strategy could be determined and implemented to improve the quality of education. In this light of the above-mentioned facts, the researcher in this study assessed the effectiveness of traditional lecture-based learning and team-based learning in teaching dermatology among undergraduate medical students in Bangladesh. Exactly, this type of study was not conducted before in Bangladesh. Findings of the study may suggest necessary modification in the existing course, teaching methods for further improvement in medical education.

Methods

This quasi experimental study was conducted from 1st July 2023 to 30th June 2024 among undergraduate final year medical students of dermatology course from three non-government medical colleges at Cumilla district of Bangladesh. The null hypothesis of the quasi experimental design was, 'Traditional lecture-based leaning (TLBL) and Team based learning (TBL) are equally effective in teaching dermatology to undergraduate medical students of Bangladesh' and alternate hypothesis was 'Team based learning and Traditional lecture-based leaning are not equally effective; Team based learning is better than Traditional lecture-based learning in teaching dermatology to undergraduate medical students of Bangladesh.' Convenience sampling technique was adopted to collect data with the reason for students with similar academic background could be included by random sampling in the study. Inclusion criteria were undergraduate final year M.B.B.S. students who participated in the dermatology classes and were willing to participate in the study. Exclusion criteria were those students who did not answer perception and satisfaction questionnaire and pre-class and post-class MCQ test questions. Calculated sample size was 16 in each group. Attempted to collect data from not less than 30 students in each group of selected medical colleges during intervention to ensure normality assumption of data. The total sample size was 118. Three different categories of instruments were used in this study. A self-administered structured questionnaire was used to collect data regarding the perception and satisfaction of traditional classroom learning and team-based learning for final year students, constructed under 5 points Likert`s scale was used for data collection. The appropriate values for the Likert`s scale were: strongly disagree = 1, disagree = 2, neither disagree nor agree = 3, agree = 4 and strongly agree = 5. A pre-class MCQ test questions with 10 items with total 10 marks was used for assessing the students' preliminary knowledge before conducting the teaching methods-based learning. Out of 10 items, all were recall type questions. A post-class MCQ test questions with 10 items with total 10 marks was used for assessing the students' knowledge after conducting the teaching methods-based learning. Out of 10 items, 4 items were problem oriented and 6 items were recall type questions. The questions of pre-class test were not repeated in the post class test. The instrument was pretested in medical colleges other than the study area. Selected medical colleges were approached through a request letter issued by Director, Centre for Medical Education describing the purpose of the study and seeking co-operation to conduct the study. This study was conducted at dermatology department, in the three selected non-government medical colleges. The researcher visited the medical colleges, introduced himself and explained the title and objectives of the study and finalized date and time for data collection. Initially the students of the dermatology department of the selected medical colleges were briefed about team-based learning (TBL) in one session. The students gave their prior permission before the study was conducted. Traditional Lecture-Based Learning (TLBL) on the topic was conducted through PowerPoint presentation. For Team-Based Learning (TBL), during day-1 instructor stated the learning objectives of the selected topic to put down by the students and recommended the source of the topic for student`s individual study. Teams were created, the number of ideal

students in a team was 6 to 7 with combination of diversity of the students. Researcher previewed the next day's session how it would be conducted by assurance of readiness to apply learning concepts and application of content through group solving activities. Finally, students were asked to study the topic thoroughly according to the learning objectives and mentioned source of the topic at home. During day-2 an individual readiness test was applied, which was completed within 30 minutes, where the main concepts in the learning objectives were tested by written questions; students wrote down the answers individually from their knowledge of previous day self-study. Following the individual readiness exam, students came together with their predetermined team and discussed the same questions as a team and made the correct answer. After team readiness exam, the researcher provided positive feedback and information about the performances of the team. Then, discussion session was carried out with the problem-solving exercises or task/case study. The teams worked in the same hall, where they could see and hear each other and together during discussion. Intra-team and inter-team discussion were carried out to solve the problems and made possible correct answer. Finally, the instructor provided feedback on their performance and any missing points regarding correct answer.

Before conducting all the preselected session, students were assessed through pre-class MCQ test questions of respective topics.

Researcher himself conducted the sessions with preselected teaching technique and students participated in the preselected categories of session and teachers of dermatology department also participated in the sessions as observer. During data collection from students the researcher provided some introduction to the students related to the study. The students were briefed all about the questionnaire. Any question raised during data collection was clarified by the researcher. After the session the student performances were assessed using the post-class MCQ test questions along with the questionnaire regarding their perception and satisfaction of the respective session. Topics for the session were acne, psoriasis and alopecia. In each medical college, first teaching method was traditional lecture based, then team-based teaching methods with selected topics respectively.

The data obtained by the questionnaire were checked and edited immediately after data collection manually. Then this was entered into computer Software Program SPSS version 27.0.1. The computerized data was again checked and edited. Data was analyzed as per the specific objectives of the study. The statistical tool commonly was used to analyze survey data and compare multiple groups' perceptions and performance scores was Independent t tests. In order to get a comprehensive insight from students' perception on different teaching methods researcher developed following matrix of students' satisfaction level:

Highly Unsatisfactory	Unsatisfactory	Moderately Unsatisfactory	Moderately Satisfactory	Satisfactory	Highly Satisfactory
Below 40%	41%-50%	51% to 60%	61%-70%	71%-80%	81% and above

Result

Table 1: Comparison of mean level students' satisfaction on different issues related to their attainment of leaning objectives by TLBL and TBL

Question	Method of teaching (n)	Percentage of level of agreement with corresponding score					Score Mean (SD)	t, (df), P-value
		SD=1	D=2	NDNA=3	A=4	SA=5		
Meets my learning requirement of the syllabus	TLBL (n=110)	8 (7.27%)	25 (22.73%)	44 (40%)	33 (30%)	0 (0%)	2.93 (0.91)	-18.146 (175.71) 0.000*
	TBL (n=112)	0 (0%)	1 (0.89%)	2 (1.79%)	22 (19.64%)	87 77.68%)	4.74 (0.53)	
I grasped the key points and difficulties	TLBL (n=110)	7 (6.36%)	37 (33.64%)	58 (52.73%)	8 (7.2%)	0 (0%)	2.61 (0.72)	-23.765 (201.81) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	3 (2.68%)	35 (31.25%)	74 (66.07%)	4.63 (0.54)	
This method covered wide content areas	TLBL (n=110)	9 (8.18%)	32 (29.09%)	25 (22.73%)	43 (39.09%)	1 (0.91%)	2.95 (1.03)	-12.664 (186.72) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	11 (9.82%)	42 (37.5%)	59 (52.68%)	4.43 (0.67)	
Makes me more efficient in achieving my goals and knowledge	TLBL (n=110)	9 (8.18%)	45 (40.91%)	44 (40%)	12 (10.91%)	0 (0%)	2.54 (0.8)	-23.813 (186.72) 0.000*
	TBL (n=111)	0 (0%)	0 (0%)	3 (2.7%)	28 (25.23%)	80 (72.07%)	4.96 (0.52)	
My knowledge related to the topics has been strengthened by discussion	TLBL (n=109)	36 (33.03%)	59 (54.13%)	11 (10.09%)	3 (2.75%)	0 (0%)	1.83 (0.72)	-35.834 (185.40) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	2 (1.79%)	23 (20.54%)	87 (77.68%)	4.76 (0.47)	
I got maximum scope of clinical problem solving and the application of knowledge	TLBL (n=109)	57 (52.29%)	51 (46.79%)	1 (0.92%)	0 (0%)	0 (0%)	1.49 (0.52)	-52.025 (207.53) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	1 (0.89%)	20 (17.86%)	91 (81.25%)	4.8 (0.42)	
I got scope of team discussion and the understanding of knowledge	TLBL (n=110)	76 (69.09%)	29 (26.36%)	4 (3.64%)	1 (0.91%)	0 (0%)	1.36 (0.6)	-53.192 (172.17) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	0 (0%)	15 (13.39%)	97 (86.61%)	4.87 (0.34)	
I spent more time on pre-class preparation	TLBL (n=110)	60 (54.55%)	43 (39.09%)	5 (4.55%)	1 (0.91%)	1 (0.91%)	1.55 (0.71)	-39.615 (188.30) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	2 (1.79%)	23 (20.54%)	87 (77.68%)	4.76 (0.47)	
Overall	TLBL (n=878)	262 (29.84%)	321 (36.56%)	192 (21.87%)	101 (11.5%)	2 (0.23%)	2.16 (0.47)	-52.023 (153.75) 0.000*
	TBL (n=895)	0 (0%)	1 (0.11%)	24 (2.68%)	208 (23.24%)	662 (73.97%)	4.71 (0.22)	

TLBL= Traditional Lecture-Based Learning, TBL= Team-Based Learning, SD= Strongly Disagree, D= Disagree, NDNA=Neither Disagree nor Agree, A=Agree & SA= Strongly Agree. *Independent sample t test showed two groups (TLBL vs. TBL) were statistically differ from each other and the difference for the TBL was highly significant (P-value=0.000).

Table 1 presents the students' level of satisfaction with the attainment of learning objectives, as measured on a 5-point Likert scale. The mean scores for satisfaction with Traditional Lecture-Based Learning (TLBL) ranged from 1.55 to 2.95,

translating to a satisfaction rate of 31% to 59%. In contrast, satisfaction with Team-Based Learning (TBL) ranged from 4.43 to 4.96, corresponding to a satisfaction rate of 88.6% to 99.2%. The overall mean scores were 2.16 for TLBL and 4.71 for TBL, indicating an overall satisfaction level on different issues related to their attainment of leaning objectives 43.2% by TLBL and 94.2% by TBL providing highly significant differences (p-value <0.001).

Table 2: Comparison of mean level students' satisfaction on different issues related to their learning ability and interest by TLBL and TBL

Question	Method of teaching (n)	Percentage of level of agreement with corresponding score					Score Mean (SD)	t, (df), P-value
		SD=1	D=2	NDNA=3	A=4	SA=5		
Helps to improve my ability to expression	TLBL (n=110)	66 (60%)	40 (36.36%)	2 (1.82%)	2 (1.82%)	0 (0%)	1.45 (0.63)	-34.434 (115,22) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	3 (2.648%)	28 (25%)	81 (72.32%)	4.64 (0.75)	
Improves my thinking ability	TLBL (n=110)	25 (22.73%)	71 (64.55%)	12 (10.91%)	2 (1.82%)	0 (0%)	1.94 (0.71)	-30.157 (214.91) 0.000*
	TBL (n=112)	1 (0.89%)	0 (0%)	2 (1.79%)	34 (30.36%)	75 (66.96%)	4.63 (0.62)	
More effective utilization and controllable of time to learning	TLBL (n=110)	55 (50%)	44 (40%)	10 (9.09%)	1 (0.91%)	0 (0%)	1.61 (0.69)	-35.576 (204.81) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	2 (1.79%)	45 (40.18%)	65 (58.04%)	4.56 (0.53)	
Improves my ability to self-learning	TLBL (n=109)	48 (44.04%)	48 (44.04%)	12 (11.01%)	1 (0.92%)	0 (0%)	1.69 (0.7)	-35.341 (198.74) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	2 (1.79%)	37 (33.04%)	73 (65.18%)	4.63 (0.52)	
Stimulates my interest in dermatology	TLBL (n=110)	25 (22.73%)	37 (33.64%)	40 (36.36%)	6 (5.45%)	2 (1.82%)	2.30 (0.94)	-25.291 (151.3) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	1 (0.89%)	21 (18.75%)	90 (80.36%)	4.79 (0.43)	
Makes me more willing to spend time on dermatology learning	TLBL (n=110)	27 (24.55%)	37 (33.64%)	39 (35.45%)	7 (6.36%)	0 (0%)	2.24 (0.9)	-28.74 (139.52) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	0 (0%)	15 (13.39%)	97 (86.61%)	4.87 (0.34)	
Overall	TLBL (n=659)	246 (37.33%)	277 (42.03%)	115 (17.45%)	19 (2.88%)	2 (0.3%)	1.87 (0.52)	-51.079 (162.15) 0.000*
	TBL (n=672)	1 (0.15%)	0 (0%)	10 (1.49%)	180 (26.79%)	481 (71.58%)	4.69 (0.26)	

TLBL= Traditional Lecture-Based learning, TBL= Team-Based Learning, SD= Strongly Disagree, D= Disagree, NDNA=Neither Disagree nor Agree, A=Agree & SA= Strongly Agree. *Independent sample t test showed two groups (TLBL vs. TBL) were statistically differ from each other and the difference for the TBL was highly significant (P-value=0.000).

Table 2 illustrates the students' level of satisfaction with the attainment of learning ability and interest, based on a 5-point Likert scale. The mean satisfaction scores for Traditional Lecture-Based Learning (TLBL) ranged from 1.45 to 2.30, indicating a satisfaction rate of 29% to 46%. For Team-Based Learning (TBL), the mean scores ranged from 4.56 to 4.87, corresponding to a satisfaction rate of 91.2% to 97.4%. The overall mean scores were 1.87 for TLBL and 4.69 for TBL, reflecting an overall satisfaction level on different issues related to their learning ability and interest 37.4% by TLBL and 93.8% by TBL providing highly significant differences (p-value <0.001).

Table 3: Comparison of mean level students' satisfaction on different issues related to their team/group work ability by TLBL and TBL

Question	Method of teaching (n)	Percentage of level of agreement with corresponding score					Score Mean (SD)	t, (df), P-value
		SD=1	D=2	NDNA=3	A=4	SA=5		
Improves our group/team collaboration ability	TLBL (n=110)	70 (63.64%)	40 (36.36%)	0 (0%)	0 (0%)	0 (0%)	1.36 (0.48)	-52.518 (219.94) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	1 (0.89%)	15 (13.39%)	96 (85.71%)	4.83 (0.5)	
Provides scope of discussion among most of the members of our class	TLBL (n=110)	69 (62.73%)	40 (36.36%)	1 (0.91%)	0 (0%)	0 (0%)	1.38 (0.51)	-47.079 (218.93) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	1 (0.89%)	26 (23.21%)	85 (75.89%)	4.73 (0.55)	
Provides scope of emerging many different opinions	TLBL (n=110)	78 (70.91%)	29 (26.36%)	3 (2.73%)	0 (0%)	0 (0%)	1.32 (0.52)	-54.609 (208.77) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	1 (0.89%)	20 (17.86%)	91 (81.25%)	4.8 (0.42)	
Provides scope of accepting different views by others	TLBL (n=110)	83 (75.45%)	26 (23.64%)	1 (0.91%)	0 (0%)	0 (0%)	1.25 (0.46)	-56.731 (220.00) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	2 (1.79%)	22 (19.64%)	88 (78.57%)	4.77 (0.46)	
Every member has an opportunity to express opinions	TLBL (n=109)	86 (78.9%)	21 (19.27%)	2 (1.83%)	0 (0%)	0 (0%)	1.23 (0.46)	-57.253 (217.94) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	0 (0%)	30 (26.79%)	82 (73.21%)	4.73 (0.44)	
Everyone is focusing on the discussion as team/group work	TLBL (n=110)	97 (88.18%)	13 (11.82%)	0 (0%)	0 (0%)	0 (0%)	1.12 (0.32)	-80.605 (217.54) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	1 (0.89%)	13 (11.61%)	98 (87.5%)	4.87 (0.37)	
Overall	TLBL (n=659)	483 (73.29%)	169 (25.64%)	7 (1.06%)	0 (0%)	0 (0%)	1.28 (0.31)	-98.212 (196.60) 0.000*
	TBL (n=672)	0 (0%)	0 (0%)	6 (0.89%)	126 (18.75%)	540 (80.36%)	4.79 (0.22)	

TLBL= Traditional Lecture-Based Learning, TBL= Team Based Learning, SD= Strongly Disagree, D= Disagree, NDNA= Neither Disagree nor Agree, A=Agree & SA= Strongly Agree. *Independent sample t test showed two groups (TLBL vs. TBL) were statistically differ from each other and the difference for the TBL was highly significant (P-value=0.000).

Table 3 presents the students' level of satisfaction with their attainment of team/group work abilities, as measured by a 5-point Likert scale. The mean satisfaction scores for Traditional Lecture-Based Learning (TLBL) ranged from 1.12 to 1.38, corresponding to a satisfaction rate of 22.4% to 27.6%. For Team-Based Learning (TBL), the mean scores ranged from 4.73 to 4.87, indicating a satisfaction rate of 94.4% to 97.4%. The overall mean scores were 1.28 for TLBL and 4.79 for TBL, reflecting an overall satisfaction level on different issues related to their team/group work ability 25.6% by TLBL and 95.8% by TBL.

Table 4: Comparison of mean level students' satisfaction on different issues related to their clinical ability by TLBL and TBL

Question	Method of teaching (n)	Percentage of level of agreement with corresponding score					Score Mean (SD)	t, (df), P-value
		SD=1	D=2	NDNA=3	A=4	SA=5		
Improves my clinical reasoning thinking	TLBL (n=110)	51 (46.36%)	45 (40.91%)	9 (8.18%)	5 (4.55%)	0 (0%)	1.71 (0.81)	-30.914 (198.82) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	1 (0.89%)	37 (33.04%)	74 (66.07%)	4.63 (0.59)	
Makes me know more of the topic	TLBL (n=109)	26 (23.85%)	60 (55.05%)	17 (15.6%)	6 (5.5%)	0 (0%)	2.03 (0.79)	-30.651 (176.14) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	1 (0.89%)	30 (26.79%)	81 (72.32%)	4.71 (0.47)	
Makes me more impressed with the topic	TLBL (n=110)	24 (21.82%)	58 (52.73%)	25 (22.73%)	3 (2.73%)	0 (0%)	2.06 (0.75)	-31.037 (186.69) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	1 (0.89%)	33 (29.46%)	78 (69.64%)	4.69 (0.48)	
Improves my ability on how to treat patients	TLBL (n=110)	56 (50.91%)	40 (36.36%)	10 (9.09%)	2 (1.82%)	2 (1.82%)	1.67 (0.86)	-37.857 (130.50) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	0 (0%)	9 (8.04%)	103 (91.96%)	4.92 (0.27)	
Overall	TLBL (n=439)	157 (35.76%)	203 (46.24%)	61 (13.9%)	16 (3.64%)	2 (0.46%)	1.87 (0.61)	-45.586 (143.88) 0.000*
	TBL (n=448)	0 (0%)	0 (0%)	3 (0.67%)	109 (24.33%)	33 (6.75%)	4.74 (0.25)	

TLBL= Traditional Lecture-Based Learning, TBL= Team-Based Learning, SD= Strongly Disagree, D= Disagree, NDNA=Neither Disagree nor Agree, A=Agree & SA= Strongly Agree. *Independent sample t test showed two groups (TLBL vs. TBL) were statistically differ from each other and the difference for the TBL was highly significant (P-value=0.000).

Table 4 illustrates the students' satisfaction with the attainment of their clinical abilities, measured on a 5-point Likert scale. The mean satisfaction scores for Traditional Lecture-Based Learning (TLBL) ranged from 1.67 to 2.06, corresponding to a satisfaction rate of 33.4% to 41.2%. In contrast, the Team-Based Learning (TBL) method had mean scores ranging from 4.63 to 4.92, reflecting a satisfaction rate of 92.6% to 98.4%. The overall mean scores were 1.87 for TLBL and 4.74 for TBL, indicating overall satisfaction levels on different issues related to their clinical ability 37.4% by TLBL and 94.8% by TBL providing highly significant differences (p-value <0.001).

Table 5: Comparison of mean level students' satisfaction on different issues related to teaching methods by TLBL and TBL

Question	Method of teaching (n)	Percentage of level of agreement with corresponding score					Score Mean (SD)	t, (df), P-value
		SD=1	D=2	NDNA=3	A=4	SA=5		
I have no resistance to this teaching method	TLBL (n=110)	9 (8.18%)	60 (54.55%)	34 (30.91%)	7 (6.36%)	0 (0%)	2.35 (0.72)	-27.059 (194.31) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	1 (0.89%)	40 (35.71%)	71 (63.39%)	4.63 (0.5)	

This teaching method is expected to be carried out in more topics	TLBL (n=110)	13 (11.82%)	61 (55.45%)	31 (28.18%)	5 (4.55%)	0 (0%)	2.25 (0.72)	-29.425 (192.68) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	2 (1.79%)	29 (25.89%)	81 (72.32%)	4.71 (0.5)	
This teaching method is an effective teaching method	TLBL (n=110)	31 (28.18%)	54 (49.09%)	18 (16.36%)	7 (6.36%)	0 (0%)	2.01 (0.84)	-34.574 (131.39) 0.000*
	TBL (n=112)	0 (0%)	0 (0%)	0 (0%)	9 (8.04%)	103 (91.96%)	4.92 (0.27)	
Overall	TLBL n=330)	53 (16.06%)	175 (53.03%)	83 (25.15%)	19 (5.76%)	0 (0%)	2.21 (0.61)	-40.461
	TBL (n=336)	0 (0%)	0 (0%)	3 (0.89%)	78 (23.21%)	255 (75.89%)	4.75 (0.26)	(146.80) 0.000*

TLBL= Traditional Lecture-Based Learning, TBL= Team-Based Learning, SD= Strongly Disagree, D= Disagree, NDNA= Neither Disagree nor Agree, A=Agree & SA= Strongly Agree. *Independent sample t test showed two groups (TLBL vs. TBL) were statistically differ from each other and the difference for the TBL was highly significant (P-value=0.000).

Table 5 presents the students' satisfaction with the teaching method, as measured on a 5-point Likert scale. The mean satisfaction scores for Traditional Lecture-Based Learning (TLBL) ranged from 2.01 to 2.35, equating to a satisfaction rate of 40.2% to 47%. For the Team-Based Learning (TBL) method, the mean scores ranged from 4.63 to 4.92, corresponding to a satisfaction rate of 92.6% to 98.4%. The overall mean scores were 2.21 for TLBL and 4.75 for TBL, indicating overall satisfaction levels on different issues related to teaching methods 44.2% by TLBL and 95% by TBL providing highly significant differences (p-value <0.001).

Table no 6: Distribution students attended in pre-class test and post-class test, and comparison of mean score by TLBL and TBL using Independent T test

Teaching method	Type of test	Descriptive statistics			Inferential statistics				
		n	Mean	Std. Dev.	F	Sig.	T	df	Sig. (2-tailed)
TLBL	Pre-class test	112	3.79	3.340	8.487	0.004	0.388**	218.25	0.698
	Post-class test	111	3.63	2.957					
TBL	Pre-class test	112	2.93	3.340	0.546	0.461	-5.938**	222	0.000*
	Post-class test	112	5.89	2.957					

TLBL= Traditional Lecture-Based Learning & TBL= Team-based learning. **Independent sample t test showed two groups (TLBL vs. TBL) were statistically differ from each other and * the difference for the TBL was highly significant (P-value = 0.000).

Table 6 displays the mean student scores before and after the implementation of two different teaching methods. The data indicates that the pre-class test scores for TLBL and TBL were not identical, exhibited difference of 0.86. However, post-class test scores show a significant improvement with TBL compared to TLBL. The increase in scores after applying TBL was

markedly higher (from 2.93 to 5.89, an increase of 2.96 points or 101.02%) compared to the decrease observed with TLBL (from 3.79 to 3.63, a decrease of -0.16 points or -4.22%). An independent t-test confirmed that the difference was statistically significant for TBL, with p-values of 0.000.

Discussion

In this quasi experimental study, researcher amass the perception of students participated in the teaching learning sessions from different point of view including fulfilling learning objectives, attainment of learning ability and interest, enhancing team work ability, improving clinical ability, and their acceptance of these methods on 5-point Likert scales. This research was conducted among 118 students of three non-government medical colleges located in Cumilla district of Bangladesh. Among participants, number of female (58.90%) participants were more than the male (41.10%); this is due to large number of female students are getting admission compared to the male students in the medical colleges of Bangladesh.

It was observed that students' level of satisfaction about the attainment of learning objectives (table-1) by TLBL were ranged from 31 to 59% and TBL were ranged from 86.6 to 99.2%, which indicates the satisfaction about the issues related to the attainment of learning objectives were highly unsatisfactory to moderately unsatisfactory for TLBL and highly satisfactory for TBL respectively and the overall mean scores were 2.16 for TLBL and 4.71 for TBL providing highly significant differences (p-value <0.001). A study was conducted on 150 MBBS Phase-I medical students in Chirayu Medical College and Hospital, Bhopal, Madhya Pradesh, India by Jaiswal et al reported the similar finding that 78.68% of students responded against that traditional lecture was not interactive and couldn`t fulfil their learning objectives.[10] As Wu et al observed in their research conducted among 275 third students of clinical medicine from the Central South University, roughly two-thirds of participants (66.66%) were convinced of TBL's ability to align with the teaching syllabus. Besides, this confidence of the students grew further when apprising effectiveness of this method for making out core concepts, with approximately 74.07% affirming their understanding of the core concepts and challenges presented in the TBL approach.[11]

Students' level of satisfaction about the attainment of learning ability and interest (table-2) by TLBL were ranged from 29 to 46% and TBL were ranged from 91.2 to 97.4% which indicates the satisfaction about the issues related to the attainment of learning ability and interest were highly unsatisfactory to unsatisfactory for TLBL and highly satisfactory for TBL respectively and the overall mean scores were 1.87 for TLBL and 4.69 for TBL providing highly significant differences (p-value <0.001). Jaiswal et al also found that 88.52% students perceived TLBL classroom did not develop their interest about the topic and 72.13% of those believed it was not helpful for improving their communication skills.[10] A cross-sectional study conducted by Jain et al among 120 third year MBBS students in a tertiary care teaching hospital of Uttar Pradesh, India, from December 2019 to February 2020, found that more than 85%, among the participants comprised of 120 Bachelor of Medicine and Bachelor of Surgery (MBBS) students of 3rd year student, felt that TBL could attract students' attention all through the session, when 71% of them expressed their predisposition towards TBL sessions in the future to cover wider range of topics.[12] Jaiswal et al reported 93.54% students actively participated in the classroom and 98.38% of them developed interest about lesson due to Small Group Discussion, alternative to TLBL.[10] A Cross-sectional descriptive study among 147 dentistry students at Qassim University, Saudi Arabia by Nawabi et al who reported that the item regarding the enjoyment and engagement level of TBL activities received the highest mean score (M=3.67 with SD=1.19, on a 5-point Likert scale) similar to current study showed satisfaction of students about fun and enjoyment of Team Based learning activities was 73.40%. These findings may be applicable for other discipline of MBBS course.[13]

It was observed that students' level of satisfaction about the attainment of their team/group work ability (table-3) by TLBL were ranged from 22.4 to 27.6% and TBL were ranged from 94.4 to 97.4%, which indicates the satisfaction about the issues related to the attainment of their team/group work ability were highly unsatisfactory for TLBL and highly satisfactory for TBL respectively and the overall mean scores were 1.28 for TLBL and 4.79 for TBL providing highly significant differences (p-value

<0.001). Likewise, the event was more negative in Jaiswal et al study where only 8.18% participants of the study believe that TLBL increase their active involvement in the class[10]. Likewise, a quasi-experimental nonrandomized study, involved an intervention group of 157 students and a control group of 76 students of Neuroanatomy, facilitated by Rezende et al. (2019) found TBL as an effective method for facilitating group discussion and increasing satisfaction and perception of students about the subject being taught.[14] Nichat A, Gajbe U, Bankar N J, et al's systematic review and meta-analysis concluded with emphasizing TBL method, which provides opportunity for the students in learning through an active and structured group learning facility which allows them to unravel a problem by themselves.[15]

Students' level of satisfaction about the attainment of their clinical ability (table-4) by TLBL were ranged from 33.4 to 41.2% and TBL were ranged from 92.6 to 98.4%, which indicates the satisfaction about the issues related to the attainment of their clinical ability were highly unsatisfactory to unsatisfactory for TLBL and highly satisfactory for TBL and the overall mean scores were 1.87 for TLBL and 4.74 for TBL providing highly significant differences (p-value <0.001). Among 268 students participated in a cross-sectional study by Ali et al only one-fourth of the students believed that traditional classroom boosted their analytical and problem-solving skills.[16] Jain et al revealed that TBL as an active teaching and learning methodology, enhances students' critical thinking, analytical skills, problem-solving abilities, and clinical reasoning by emphasizing applied clinical knowledge and fostering the skills necessary to tackle complex clinical case scenarios.[12] Similarly, Appaji et al found that 87% students acknowledged the significance of team-based learning for enhancing critical thinking and analysis (median = 4, mode = 4, in a 5-point Likert scale similar to current study) and for applying knowledge to solve clinical problems.[17] However, Wu et al. in a study observed 55.56% students partially agreed and 24.07% strongly agreed the statement that TBL improves their ability on how to take in and treat patients.[11]

Students' level of satisfaction about the teaching method (table-5) by TLBL were ranged from 40.2 to 47% and by TBL were ranged from 92.6 to 98.4%, which indicates the satisfaction about the issues related to the teaching method were unsatisfactory for TLBL and highly satisfactory for TBL and the overall mean scores were 2.21 for TLBL and 4.75 for TBL providing highly significant differences (p-value <0.001). Only 3.27% participants of Jaiswal et al study wanted to attend TLBL class in future while comparing with the class based on small group discussion.[10] Rezende et al found that 81% students favored a blend of traditional lectures and TBL. Thus, TBL method is widely accepted by the student, as it provides higher motivation while integrating clinical and basic science.[14] As an active learning methodology, TBL has garnered a high degree of student acceptance.[9] Overall, most high achievers (75%) preferred Small Group Discussions (SGDs) to traditional lectures.[16] A randomized crossover study for TBL was conducted at SMS Medical College in the department of pathology on 224 third semester (MBBS) students by Bhargava et al who noted a favorable shift in student perception towards TBL, with a significant majority (70.98%) expressing preference for TBL over traditional lectures as a superior learning approach.[18] A cross-sectional study conducted in RAK Medical and Health Sciences University on the 1st year medical students by Bhojaraja et al showed that around two-third (66%) students coming from conventional curriculum opined in favors of TBL as teaching-learning method over didactic method of delivering lesson.[19] Drawing from the research by Nawabi et al, the analysis indicates that students view about team-based learning as a more effective learning approach than traditional lectures.[13] Students in the intervention group, participated in discussion base learning, of Zhao and Potter et al study felt more confident handling gastroschisis and placing a silo right away. They also found the educational experience more worthwhile compared to the control group of the same study.[20] Therefore, we can assume that TBL will be comparatively beneficial option for the students of dermatology as well as other disciplines of MBBS course. Above statistical information summarizes that TBL, according to the perception of student who experienced the two teaching methods, is the most helpful instruction method provided them with enough opportunity to be equipped with required knowledge and skill for profound understating about dermatology. Similar, reaction was

documented through a cross-sectional study conducted by Jain et al perceived that TBL helped them to get better cognizance about glaucoma and also this teaching-learning method improved their relationship with faculties.[12] Therefore, we can assume that TBL will be comparatively beneficial option for the students of dermatology as well as other disciplines of MBBS course. It is evident from the table 6 that students' baseline test scores were nearly identical for TLBL and TBL, ranging only around 8% of total score, indicating consistent initial proficiency. The increase of scores in the post-class tests compared to the pre-class tests was higher with TBL (5.89-2.93=2.96, 101%) but it was negative with TLBL (3.63-3.79= -0.16, -4.2%). Since, questions for the post-class test included few questions that require problem-solving skills to answer correctly, students participated in TLBL class failed to secure desired scores in the post-class test, implying low or absent of problem-solving skills attained by the students participated in TLBL classes. The independent sample t-test shows these differences were statistically significant in case of TBL (P=0.000), but in case of TLBL it was insignificant. This suggests that TBL was notably more effective in enhancing problem-solving skills, as TLBL students struggled with problem-oriented questions in the post-test. Punja et al facilitated research, involved 241 1st year MBBS students split into intervention (n=128) group and control (n=113) group, the study substantiated that the students participated in the TBL group performed significantly better than those who did not participate in. Median score of MCQ test, in this connection, for the group supplemented with TBL was 7.00 (2.00) against the median of 6.00 (3.00) for the other group, with P<0.001, exhibiting statistical significance.[21] By the same token, Bhargava et al observed that there was a notable difference in the learning outcomes of students who participated in TBL (mean assessment score 7.21) as compared to those joined in conventional class (mean assessment score 6.09), with P < 0.001.[18] The similar outcome, statistically significant difference (P<0.001) between overall mean score of TBL group (70.50) and of TLBL group (65.40) by Salih et al.[22] Furthermore, students participated in the TBL session scored 67.00 (10.40) comparatively better than 48.30 (8.40) mean score of the students participated in FCL by Zaman et al.[6] Therefore, it gives a clear indication that TBL method compared to other methods improves students' performance. In contrast, TLBL often shows limitations in fostering deep problem-solving skills, as evidenced by lower gains in similar studies.[23] Hashmi et al study, analogous to this construction, found that seventy-two, fourth year MBBS students at Lahore Medical and Dental College, Lahore, made an increase in the score after the TBL session. Also, these students viewed that TBL has been shown to reinforce their concept and aided them to be part of active learning.[24] Supporting this proposition, a remarkable finding favoring TBL effectiveness has been brought out by Anas et al, among final year undergraduate students of Biomedical Sciences at Brunel University London. Study found that the students who participated in TBL sessions achieved an impressive overall performance rate of 63% with no failures in their final year examination. Conversely, those who chose not to attend these sessions scored 50.4%.[25]

Therefore, as far the studies revealed, team-based learning (TBL) consistently outperformed traditional lecture-based learning (TLBL) in student performance regardless of geography and discipline they belong to, as there was significant difference in performance between in either way.

Limitations of the study

Selection of the medical colleges were convenient. So, generalization of the result is difficult. This study included only dermatology discipline; other disciplines were not included. Study was conducted by only three topics of dermatology; system or card of dermatology course was not included.

Conclusion

The null hypothesis of the quantitative section of the present quasi experimental design was, 'Traditional lecture-based leaning (TLBL) and Team-based learning (TBL) are equally effective in teaching dermatology to undergraduate medical students of Bangladesh'. This quantitative data revealed that gross satisfaction in percentage on the different teaching methods was lower with TLBL (37.6%) and higher with TBL (94.7%) and the differences were always statistically highly significant (P=0.000). Comparing the pre-class test scores

with the post-class test scores it was found that better advancement of students' performance occurs with TBL (101%) but students' performance decrease with TLBL (-4.2%); these changes were statistically significant for TBL (P=0.000); but was insignificant for TLBL (P=0.698). Hence, we can reject the null hypothesis and accept the alternate hypothesis 'Team-based learning and Traditional lecture-based leaning are not equally effective; Team-based learning is better than Traditional lecture-based learning in teaching dermatology to undergraduate medical students of Bangladesh.' TBL can be complementary with TLBL if these are included with wider research in the teaching methods of medical education of Bangladesh. Hence it can be concluded that the TBL and TLBL can be complementary to each other if they are judiciously used.

Recommendations

On the basis of findings, the following recommendations have been proposed: To create a supportive and interactive learning environment that prepares students for the challenges of clinical practice, Team-Based Learning (TBL) can be incorporated in some extent along with Traditional Lecture-Based Learning (TLBL) in undergraduate M.B.B.S curriculum. Clinical teaching in any topics will be more effective by adopting Team-Based Learning (TBL). A further study covering a larger sample size along with more disciplines may be conducted in future for generalizations of the findings of the study.

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Ethical clearance

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No conflict of interest

Plagiarism

Plagiarism (7%) was checked by central library of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh and the study was accepted.

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