

Near Peer Teaching in Pathology Practical Training- An Experimental Pilot Study

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ABSTRACT

Introduction: Medical education requires teaching methods with student centric approach to train our Indian Medical Graduates (IMG) enabling them to perform the roles of a clinician, communicator, leader, lifelong learner and a professional. Near Peer Teaching (NPT) or Peer Assisted Learning (PAL) is one such method where peers who are not professional teachers belonging to similar social grouping and academic training helps each other to learn and also learn by teaching.

Aim: To use the concept of NPT as an alternative teaching method in undergraduate pathology practical training and evaluate its effectiveness on the learners in comparison with the traditional teaching by Objective Structured Practical Examination (OSPE) and its acceptance among the participating students through feedback.

Materials and Methods: In this experimental pilot study was conducted at ESIC Medical College and PGIMSR, Chennai, Tamil Nadu, India, for a period of three months (June-August 2019) 22 students who were allotted to the faculty for pathology practical sessions were divided into two groups- the regular (group A) and interventional (group B). The regular group was taught by faculty while in the other group the students were taught about the peer teaching principles and were made as tutors and tutees alternatively, until the intended spotters were completed in the 10 intended

sessions over a period of three months. At the end of the study, all the students' assessment was done by OSPE and their feedback regarding the new method was obtained. Descriptive statistics and independent t-test (95% confidence interval) were used. The statistical significance was considered at the level $p < 0.05$. The students' feedback was charted as percentage of responses.

Results: Students' OSPE test scores of all the stations were better among the NPT group than the traditional method group with statistically significant difference observed in the slide identification spotter station (group A, 21.7 ± 7.1 vs group B, 15.3 ± 5.5 , $p < 0.05$). Majority of the students' response about NPT as a teaching method in pathology practical training sessions was positive especially with regard to providing a cordial learning environment (100% agreed), improved understanding (91.7% agreed) and retention of the topic (100% agreed). They also felt that the method will help to improve their communication skills, teaching skills and motivate towards self-directed learning. NPT can be used as an interactive Teaching Learning Method (TLM) in faculty resource poor settings.

Conclusion: The NPT in pathology practical session is a simple, potent and a practical teaching method, with better results than the traditional teaching method. The method has been preferred and well accepted by undergraduate medical students in the present study.

Keywords: Assessment, Medical education, Peer assisted learning, Undergraduate

INTRODUCTION

The National Medical Commission (NMC), India envisages an IMG to be able to effectively play the different roles of a clinician, communicator, leader, lifelong learner and a professional [1]. The student would require an adequate input of knowledge, skills and attitude to play the above mentioned roles successfully and also get equipped to take care of the prevailing medical needs of the society [2,3]. The new Competency Based Medical Education (CBME, 2019) will try to help the medical students in this direction by providing a comprehensive learning experience using student centric interactive Teaching Learning Methods (TLM) [4,5]. NPT or PAL is an interactive TLM where peers who are not professional teachers belonging to similar social grouping and academic training help each other to learn and also learn by teaching their peers [6]. NPT is an effective TLM primarily based on the principles of social constructivism and cognitive congruence between the peer tutors and peer learners [7].

Cognitive congruence takes advantage of the prevailing knowledge gap between peers and provides scope for better communication of facts, improved learning and sharing of knowledge [7,8]. Social constructivism is a model of sharing and learning among peers (medical students) of a common cultural and social context, using collaborative and communicative methods through a familiar language [7,8]. Studies about NPT have brought out its effectiveness in improving the students' interest, engagement, commitment levels, coordination and better understanding of the topic [9].

Peer teaching of basic histopathology has met with success in comparison with the faculty teaching, but there is a dearth of literature regarding evidence-based approaches of NPT usage in pathology practical training among medical undergraduates [6,9,10]. Students often develop a tendency to treat pathology as a subject that just needs to be passed and the pathology teaching sessions too offers relatively less scope for excitement to the students [10]. They also often find it difficult to examine the pathology microscopic slides [10]. The present study attempted to analyse the effectiveness of NPT in pathology practical training sessions as an alternative teaching method for traditional lecture teaching that is followed in the study institution, and to understand its acceptability among the students taught through NPT using a feedback questionnaire.

MATERIALS AND METHODS

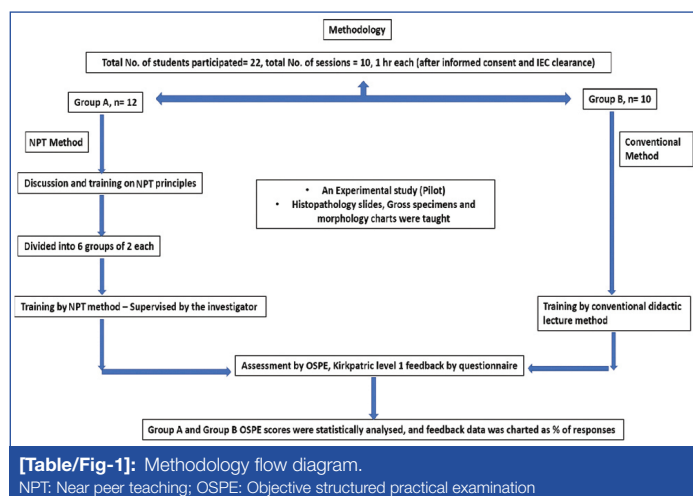
An experimental pilot study was conducted at ESIC Medical College and PGIMSR, Chennai, Tamil Nadu, India, for a period of three months (June to August 2019), among the second-year undergraduate students. The Institutional Ethics Committee (IEC) clearance was obtained before the commencement of the study (IEC No. IEC/2019/1/40).

Inclusion criteria: This study included 22 students (out of the total 97 second-year undergraduates) who were allotted to the investigator during the three months study period as per the departmental student rotation policy. They were included after obtaining informed consent, and were free to stop participating in the study whenever they wanted.

Exclusion criteria: Students not willing to participate in the study were excluded.

Study Procedure

The study included 22 students who were divided into two groups group A (n=12), and group B (n=10) as per the departmental practical timetable scheduling, to be taught on two separate days in a week for one hour duration. A 14 histopathology slide spotters, nine gross specimen spotters and seven morphology charts were identified by the faculty members which could be handled by the peer tutors during the NPT sessions, were included in the study. Group A students were taught using NPT method on day one which was followed by group B, who were taught the same spotter by the traditional didactic method on day two of the week (each pathology practical training session lasted one hour). All the group A students were taught by the investigator, about the principles of NPT and were introduced to the basics of how to prepare for a pathology practical teaching session before the commencement of the study. They were divided into six groups of two each with each student being able to get an equal chance of being a tutor and tutee over the 10 intended teaching sessions, in the three months period. They took the role of tutor and tutee alternatively in each session and the first 30 minutes of a session had NPT section where the peer tutors would discuss with their peer learners about the selected spotter followed by its demonstration. In group B, the same spotters were taught by the faculty through didactic lecture method in the first 30 minutes followed by its demonstration. By the end of the third month both the groups were assessed through OSPE which was conducted, supervised and assessed by a senior department faculty. The methodology flow diagram, explains about the grouping of selected students, usage of NPT and traditional teaching method among the two groups, and their assessment [Table/Fig-1]. The group activity schedule highlights the conduct



of the weekly pathology practical sessions among the two groups, and NPT feedback evaluation of group A students [Table/Fig-2]. Each station was given a score of 2 marks and the total score was 60 marks (14 histopathology slide station +9 gross specimen +7 morphology charts=30 stations). As the Group A students were taught by NPT method, Level 1 Kirkpatrick feedback evaluation responses was received from them. The questionnaire included questions to assess their experience, perception and satisfaction level related to NPT module usage. The responses received were expressed on a five-point Likert scale, (strongly agree, agree, neutral, disagree, strongly disagree) and was charted as percentage of responses [11]. The principles and methodology of NPT was then introduced to Group B (n=10), and the rest of the 75 second-year undergraduate students.

S. No.	Group	Period (10 classes of one hour each)	
		First 30 minutes	Second 30 minutes
1	A	PPT session	Spotter/s demonstration
2	B	Conventional lecture session	Spotter/s demonstration
3	A and B	OSPE test (after the completion of all the spotters)	
4	A	Level 1 Kirkpatrick feedback questionnaire evaluation (as Group A students were involved in using the NPT method during the study period)	

[Table/Fig-2]: Group activity schedule.

STATISTICAL ANALYSIS

Descriptive statistics of continuous variables was presented and independent t-test (95% confidence interval) was used to compare the final OSPE scores between group A and group B. The statistical analysis was carried out using software International Business Machines (IBM) Statistical Package for the Social Sciences (SPSS) (v 21.0) and the statistical significance was considered at the level $p < 0.05$. The students' feedback of NPT was charted as percentage of responses.

RESULTS

The mean OSPE test scores of Group A [Table/Fig-3] in all the stations (slides, gross specimens and morphology charts) were higher than that of the Group B [Table/Fig-4]. The difference was statistically significant in the histopathology slide spotter section (Group A, 21.7 ± 7.1 vs. Group B, 15.3 ± 5.5 , $p < 0.05$) [Table/Fig-5]. Kirkpatrick level 1 feedback evaluation of the NPT method from the students showed that 75% of them strongly agreed for further usage of PPT in practical training sessions. Students had a strong agreement that the NPT method improved their confidence level and positive attitude towards the subject (83.3%), provided a cordial environment to study (75%), motivated for active participation as a tutor (50%) and increases the topic retention period (66.7%) [Table/Fig-6].

Group A students (n=12), NPT group													
S. No.	Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	Slide	2	2	2	2	0	2	2	0	1	2	0	2
2	Slide	2	2	2	2	2	2	0	2	1.5	2	1	2
3	Slide	0.25	2	2	2	1.5	2	0	2	2	2	2	2
4	Slide	2	2	2	2	2	2	0	1	2	2	0	2
5	Slide	2	2	1.5	2	2	2	0	2	2	2	0	2
6	Slide	2	2	1.75	2	2	2	0	2	2	2	0	1.5
7	Slide	2	2	0	2	0	0	0	2	0	2	1	0
8	Slide	1.5	2	1.5	2	1.5	2	0	2	2	2	0.25	2
9	Slide	2	1.5	1.5	2	1.75	2	0.75	1.5	1.5	2	0	2
10	Slide	2	1.5	2	2	2	2	2	2	2	2	0	2
11	Slide	2	2	2	2	2	2	0	2	2	2	0	2
12	Slide	2	2	2	2	1.5	2	0	2	2	2	1.5	2

13	Slide	2	0	2	2	2	0.25	2	2	0.25	2	0	2
14	Slide	2	2	2	2	0	2	0	2	2	2	2	0
15	Specimen	2	2	2	2	0.5	2	2	1	0.25	2	2	2
16	Specimen	2	0	1.75	2	0	2	0.5	2	0.25	2	1	0.25
17	Specimen	2	2	1.75	2	1	0.25	0	1	0	2	1	0
18	Specimen	2	2	2	2	1	1.5	2	1	0.25	2	0	2
19	Specimen	2	2	2	2	0	0	0.5	0.25	0	2	0.25	2
20	Specimen	2	2	2	2	0	2	1.25	2	0	2	0	2
21	Specimen	2	2	2	2	1.5	1	2	2	0	0.25	2	2
22	Specimen	2	2	2	2	1.5	1.75	2	2	0	2	1	2
23	Specimen	2	2	2	2	2	2	2	2	2	2	2	2
24	Chart	2	2	1.75	2	2	2	1	1.25	2	2	2	2
25	Chart	2	1.5	1.5	2	2	2	1.5	1	1	2	0	2
26	Chart	2	2	2	2	1.75	2	2	2	1.5	2	1	2
27	Chart	2	2	2	2	2	2	1.5	2	1.75	2	1	2
28	Chart	2	2	2	2	2	2	0	2	0.25	2	2	2
29	Chart	2	2	2	2	2	2	1.5	1.25	2	2	1.75	2
30	Chart	2	2	1.75	2	2	2	1.5	2	2	2	2	2
	Total	57.75	54.5	54.75	60	41.5	50.75	28	49.25	35.5	58.25	26.75	51.75
	Percentage	96.25	90.83	91.25	100	69.17	84.58	46.67	82.08	59.17	97.08	44.58	86.25

[Table/Fig-3]: Group A OSPE scores.

Group B students (n=10), Traditional group												
S. No.	Station	I	II	III	IV	V	VI	VII	VIII	IX	X	
1	Slide	1	0	0	2	1	1.5	1.5	1	0	0	
2	Slide	1	0	0	1	2	0	0	0	1.75	1	
3	Slide	2	2	2	2	1	0	2	0	1.5	0	
4	Slide	2	2	1.5	2	2	1.5	2	0	1.5	1	
5	Slide	1	0	2	0	2	2	2	0	0	0	
6	Slide	2	1.5	0	2	1.5	2	0	0	0	0	
7	Slide	0	0	0	0	1	0	2	0	0	0	
8	Slide	2	0	2	2	2	2	2	2	2	2	
9	Slide	2	2	1	1.5	1.5	0.5	2	1	1.5	1	
10	Slide	1.5	1.5	1.5	1	1.5	1.5	1.5	0	1.5	2	
11	Slide	2	0.5	2	0	2	0	2	0	2	0	
12	Slide	2	0	1.5	2	2	0	2	1.5	2	2	
13	Slide	0	0	2	0	2	0	2	0	0	0	
14	Slide	1.5	0	1.5	2	0	0.5	2	1	2	2	
15	Specimen	2	1.5	0	2	1.5	1.5	2	1.5	1.75	1	
16	Specimen	1	1.5	1	1.5	2	2	2	0	0	0	
17	Specimen	0	0	2	2	0.5	0.5	2	0.25	2	2	
18	Specimen	2	1.5	2	2	2	2	2	0.5	0	2	
19	Specimen	2	2	2	2	2	2	2	2	2	2	
20	Specimen	1	2	1.5	0.5	2	2	2	0	2	0	
21	Specimen	1	0	0.5	2	2	0.5	2	0.5	2	1	
22	Specimen	2	2	1.5	2	2	2	1.5	0.75	2	0	
23	Specimen	0	0	1.5	2	1.5	2	2	0.25	0	0	
24	Chart	2	2	1.5	2	2	2	2	1	1.5	0	
25	Chart	2	0	1.25	1.5	1.5	2	2	1.5	1.75	1.5	
26	Chart	2	2	2	2	2	2	2	0.75	1.75	0	
27	Chart	2	2	1.5	2	2	2	2	1	2	1.75	
28	Chart	2	1.75	2	2	2	2	2	1	1.75	1.25	
29	Chart	2	1.5	2	2	2	2	2	1	2	1.75	
30	Chart	2	2	2	2	2	2	2	1.75	2	2	
	Total	45	31.25	41.25	47	50.5	40	54.5	20.25	40.25	27.25	
	Percentage	75	50.08	68.75	78.33	84.17	66.67	90.83	33.75	67.08	45.42	

[Table/Fig-4]: Group B OSPE scores.

OSPE stations	Groups		Mean±SD (score)	Std. Error	p-value
	Group A (n=12)	Group B (n=10)			
HP slides (14)	Group A		21.7±7.1	2.0	0.03
	Group B		15.3±5.5	1.7	
Gross specimens (9)	Group A		13.1±4.7	1.4	0.64
	Group B		12.3±3.7	1.2	
Morphology charts (7)	Group A		12.6±1.9	0.5	0.59
	Group B		12.1±2.3	0.7	
Overall scores comparison	Group A		48.1±1.4	3.3	0.09
	Group B		40.0±9.2	2.9	

[Table/Fig-5]: Mean OSPE test scores of group A and group B comparison (Data are explained as mean scores, standard deviation and standard error. p-value was determined using Student's independent t-test) HP: Histopathology; SD: Standard deviation; p<0.05 considered significant

Feedback questions		Strongly agree N (%)	Agree N (%)	Neutral N (%)	Disagree N (%)	Strongly disagree N (%)
1.	NPT helped to increase my retention period of the topic	8 (66.7)	4 (33.3)	-	-	-
2.	NPT helped to understand the topic better	5 (41.7)	6 (50)	-	1 (8.3)	-
3.	NPT motivated and created interest in learning	6 (50)	5 (41.7)	1 (8.3)	-	-
4.	NPT helped to develop self-directed learning	3 (25)	5 (41.7)	3 (25)	1 (8.3)	-
5.	NPT helped in better communication and bonding between tutor and tutee	5 (41.7)	5 (41.7)	2 (16.6)	-	-
6.	NPT provided a cordial environment to enhance my learning opportunities	9 (75)	3 (25)	-	-	-
7.	NPT helped in my active participation as a tutor	6 (50)	2 (16.7)	4 (33.3)	-	-
8.	NPT improved my confidence and positive attitude towards the subject	10 (83.3)	2 (16.7)	-	-	-
9.	NPT methodology is a better teaching-learning method	3 (25)	9 (75)	-	-	-
10.	I encourage NPT for further pathology teaching	9 (75)	3 (25)	-	-	-

[Table/Fig-6]: Feedback of students regarding their learning experience with PPT methodology.

DISCUSSION

The second year medical students are expected to understand the a etiopathogenesis, gross and microscopic morphology of various pathological entities, which will help them to approach the disease management modalities in clinical medicine [12]. As has been suggested in educational research, interactive learning helps to improve the topic retention, understanding, facilitates problem solving skills, better decision making and improves communication skills

[13,14]. NPT is a novel TLM which is used in slide sessions, grossing instruction in pathology has been advocated under the guidance of the facilitator when the appropriate subject areas are identified [10].

In this study, 30 such OSPE spotters were identified from the curriculum. The results showed that the group A students (taught by NPT method) had scored better than the group B (taught by traditional didactic method) in all the three OSPE stations [Table/Fig-5]. The scores especially in the histopathology slides station were statistically significant ($p < 0.05$, [Table/Fig-5]). These findings suggests that NPT has helped in the increased retention period (66.7%- strongly agreed by students, [Table/Fig-6]), and better understanding of the topics (91.7%-agreed by students, [Table/Fig-6]). Beck A et al., found that students who were taught basic histopathology by the peers did better than those who were taught through faculty instructions [6]. Studies on NPT in pathology have also discussed about the better ability of the students to recall the topics when the learning happens with peers, which can be attributed to fun filled healthy interactions during their learning sessions [9,15]. These learnings in their respective subjects will help the undergraduate students to develop as a professional with better knowledge which they have to disseminate among the patients and relatives [16]. Divya R et al., found an improved performance in the scores at the end of the NPT teaching sessions among the 1st year medical students by using the NPT method when compared with traditional teaching method [17]. In the present study, 8.3% of the students [Table/Fig-6] disagreed with the point that NPT helped in their understanding of the topic discussed. A similar observation was discussed in a study by Yvonne H et al., where 81% of the students preferred to learn pathology from their senior faculty than their peers [18].

In the present study, the point that NPT atmosphere creates interest and motivation in the learning process was agreed by 91.7% [Table/Fig-6] of the students. This allowed them to be engaged in active learning, be at ease with their peer tutors while clearing their doubts and also learn by actively involved in teaching their peers [9,10]. The student's responses also revealed that 25% (strongly agreed), and 41.7% (agreed, [Table/Fig-6]), felt that their self-directed learning showed an improvement due to the topic preparation especially during their role as peer tutors. Loda T et al. had discussed about the less stressful and relaxed environment that prevails in NPT as the important factor for easy understanding and knowledge transfer [7]. Grover S et al., and Buch AC et al., had similar findings of improved self-directed learning of the topics identified by using interactive learning methods in pathology [9,14].

The NMC, India, have outlined the importance of communication as a skill that has to be imparted to the undergraduate students [13]. The General Medical Council, United Kingdom (UK) advocates to instill the characteristics of a teacher to the medical students as they have to play the role of a teacher and a trainer when they become a medical professional [19]. In this study, 83.4% of group A students [Table/Fig-6] agreed that the tutor role in the NPT method helped in the improvement of their communication skills and bonding due to the prevailing cordial environment (75%, strongly agreed [Table/Fig-6]) during the teaching sessions. Grover S et al., and Koch LK et al., had discussed the benefits of NPT where the students feel more comfortable in the presence of peer tutors [9,10]. The active participation as a tutor helps the students to develop academically, professionally and also to improve their critical lifelong learning and teaching skills [7,10,20]. This also enables collaboration, socialisation, and provides worthwhile learning experience, rises their morale and positions them to face the future challenging teaching roles [10]. A good communication skill for a medical student is very crucial for a meaningful physician-patient interaction and also to perform well in the various teaching roles in the hospital environment [21].

The students (83.3%) strongly agreed that their confidence and positive attitude for the teaching sessions and the subject got better over the three months of NPT sessions which was also discussed by Yu TC et al., in a systematic review on PAL [22]. All the students agreed that NPT was comparatively a better TLM than the

conventional lecture-based method for pathology practical training sessions and they also encouraged the use of such sessions in the near future [Table/Fig-6]. In a study by Nicholas T et al., it was found that the peer tutors were more approachable, receptive for student's inputs, and more aware of the learning outcomes [23]. This was one of the important reasons for the better acceptance of NPT method by the students in the present study [23].

An optimal distance of 2-3 years between the peer tutors and peer learners was suggested by Nicholas T et al., but we suggest that the better social and cognitive congruence in the present study is because both the peer tutors and peer learners belonged to the same year [23]. However, Hall S et al., found no difference in approachability between senior medical student teachers with junior doctors in their study done among the first-year medical graduates [24]. The resource of peer tutors, with proper guidance and training by the subject faculty and by the selection of appropriate of topics for the NPT sessions, can greatly add to the success of NPT method in faculty resource limited settings [10,22,23]. Border S et al., have discussed about the various practical considerations necessary for the successful implementation of NPT programs in any undergraduate subjects [25]. The authors have highlighted that relevant topics which the student tutors can handle and deliver to the expected level of understanding has to be identified and tutor training in NPT principles is needed for its successful implementation [10,25].

Limitation(s)

This was a pilot study with shorter duration and limited number of students who participated. The findings may not give the generalisability to apply for the larger group of participants. Adequate time is imperative for planning and to address the general apprehension among the faculty and students for the successful implementation of PPT as a teaching method.

CONCLUSION(S)

The present study has pointed out that NPT can be a better TLM when compared with the conventional lecture method for pathology practical training sessions especially in the microscopic slide spotter identification. A careful understanding of the NPT principles and appropriate subject topics has to be chosen for its success. The method can help to foster better understanding of the subject in the minds of the eager students. NPT can also become handy in faculty resource limited setting and such sessions during the initial undergraduate stage will guide the student to tread the path of becoming a competent IMG.

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