

Peer-Assisted Learning in Physiology

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Abstract

This before-and-after type of educational intervention study was conducted in a municipal medical college in Maharashtra, India. The participants (60 first-year MBBS students, aged 18 years and above, of either gender) were briefed about peer-assisted learning. After a faculty-delivered conventional lecture, a pre-test was administered. The same topic was taught to the same batch by a trained peer teacher in the presence of faculty members. Subsequently, a post-test was administered. The questions in the post-test were identical to that in the pre-test. The mean marks (out of 60) of students increased from 42.9 +/- 5.98 to 47.16 +/- 5.60, exhibiting significant difference ($p < 0.00001$) in the overall pre-and post-test scores. The mean marks of female students ($n=30$) were 43.87 +/- 6.46 and 48.07 +/- 5.13, in the pre-and post-tests, respectively, exhibiting a significant difference ($p=0.0053$). The mean marks of male students ($n=30$) also showed significant difference ($p=0.0070$) in the pre-test (42.50 +/- 5.84) and post-test (46.57 +/- 5.86). The gender differences in the mean scores were not statistically significant in the pre-test ($p=0.3886$) and the post-test ($p=0.2914$). Formal use of peer-assisted learning in institutions would ensure collaborative learning that can be juxtaposed with conventional learning.

Keywords: Peer, Peer-assisted Learning, Physiology.

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INTRODUCTION

In peer-assisted learning (PAL), students from similar backgrounds, or status-equals (“peers”) [1, 2], who are not approved teachers, help each other to learn by teaching [3] in a reciprocal learning activity [4]. The term PAL embraces a range of teaching-learning activities, such as, peer teaching, peer assessment and feedback, peer mentoring and peer leadership, monitoring and team work on tasks [5, 6]. Various peer-teaching methods have been described [7]. In “same-year peer teaching”, the peer teacher (PT) is at the same educational level as the taught, while in “cross-year peer teaching”, the PT teaches students who are at a lower educational level [4]. Peer teaching has existed since thousands of years. The ancient Roman philosopher, Lucius Annaeus Seneca had declared, “*Those who teach learn*”. Thus, the concept of peer teaching is buttressed by the fact that the very act of teaching others also reinforces one’s own learning [8]. Although PAL is now being increasingly used in medical education [9, 10], the potential of this teaching-learning method has not yet been fully harnessed in academia [11]. Studies [5, 12] suggest that in certain circumstances, learning outcomes achieved after PAL

may be comparable to that obtained after faculty teaching.

PTs understand their fellow students and have “social congruence” [13, 14] due to their similar social roles. They share learning experiences and explain concepts at the required level, which is termed “cognitive congruence” [14]. Consequently, students feel more comfortable with their PTs, as compared to a faculty member, because they comprehend each other’s vocabulary [15, 16]. PAL helps students provide support to each other with less reticence, compared to that felt in the presence of faculty [17-19] because of the communication barriers due to rank and hierarchy [20]. The other benefits of PAL include enhanced self-confidence and oral presentation skills [21], supplementation of experiential learning [9] where students learn by participation, improved psychomotor and cognitive learning skills [22], augmented academic performance [2], better teamwork [23] and critical thinking skills [24]. In professional education, self-directed learning [15], collaborative learning [25] and team work [26] helps prepare students for their professional life. This interactive teaching-learning method has been shown to enhance cognitive and

psychomotor domain scores of medical students, which is comparable to that achieved by other teaching-learning methods [17]. PAL helps students to acquire knowledge and skills when they share viewpoints that initiate useful comprehension and due to cooperative learning, students work together to achieve a mutually shared objective [27].

As a consequence of the large number of students in the MBBS course, there is a need for innovations in teaching-learning methods. PAL has existed informally in medical colleges. It is necessary to investigate the effectiveness of PAL so that positive results may facilitate inclusion of PAL in the curriculum. PAL is expedient for both faculty and the institution because it reduces faculty teaching load, assists in suitable deployment of expert teachers [9], and allows clinical faculty to prioritise and reschedule their workload across patient care, teaching and administration [28]. From the student's perspective, PAL helps in adding subject matter that is essential for scoring in examinations [15, 17] and helps prepare students for their future role as educators [29], facilitates development of communication and professional skills. It has been reported that students consider PTs to be more important as conduits to success in examinations, as compared to faculty [30]. The objective of the present study was to determine the effectiveness of PAL in improving cognitive domain scores.

MATERIALS AND METHODS

This before-and-after type of educational intervention study was conducted in a municipal medical college in Maharashtra, India where sixty students are admitted to the MBBS course each year. After obtaining written informed consent, the participants (first-year MBBS students, aged 18 years and above, of either gender) were briefed about PAL and the students were asked to volunteer as a peer-teacher (PT). This PT was trained in teaching. After a faculty-delivered conventional lecture as per University

syllabus, a pre-test was administered, which contained 50 multiple choice questions (MCQs) and 10 short-answer questions (SAQs), each carrying one mark (total 60 marks). Subsequently, the same topic was taught to the same batch by the PT in the presence of faculty members and a post-test was administered. The questions in the post-test were identical to that in the pre-test.

The pre- and post-test scores were tabulated in Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) and statistically analysed using EpiInfo Version 7.0 (public domain software package from the Centers for Disease Control and Prevention, Atlanta, GA, USA). Continuous data were presented as Mean and Standard Deviation (SD). 95% Confidence interval (CI) was stated as: [Mean-(1.96)*Standard Error] - [Mean+(1.96)*Standard Error]. The standard error of difference between two means was calculated. A "p" value of <0.05 was considered as statistically significant.

RESULTS AND DISCUSSION

A total of 60 first-year MBBS students (30 females and 30 males) participated in this study.

Overall Scores

The overall mean marks (out of 60) of students (n=60) increased from 42.9 +/- 5.98 (95% CI: 41.39 - 44.41) to 47.16 +/- 5.60 (95% CI: 45.74-48.58). The difference in the overall pre-and post-test scores was significant (Z=4.027; p<0.00001). The mean marks of female students (n=30) were 43.87 +/- 6.46 (95% CI: 41.56-46.18) and 48.07 +/- 5.13 (95% CI: 46.23-49.90), in the pre- and post-tests, respectively, exhibiting a significant difference (Z= 2.788; p=0.0053). The mean marks of male students (n=30) increased from 42.50 +/- 5.84 (95% CI: 40.41-44.59) to 46.57 +/- 5.86 (95% CI: 44.47-48.66), revealing a significant difference (Z= 2.694; p= 0.0070) in the pre- and post-test scores (Table-1).

Table-1: Comparison of mean scores in pre- and post-tests

	Pre-test (n=60) Mean (SD)	Pre-test (n=60) Mean (SD)	Z value #	p value
Overall (n=60)	42.90 (5.98)	47.16 (5.60)	4.027	<0.00001 *
Females (n=30)	43.87 (6.46)	48.07 (5.13)	2.788	0.0053 *
Males (n=30)	42.50 (5.84)	46.57 (5.86)	2.694	0.0076 *

Standard error of difference between two means; SD = Standard deviation; * Significant

In the present study, the difference in pre- and post-test scores was statistically significant for the entire batch, as well as for female and male students. Similar results have been reported by other researchers [31, 32]. Proximity to the PTs enables the students to freely express their difficulties [2]. This helps students in obtaining higher scores, even though the PTs are not experts in the subject or in teaching [33]. Social and

cognitive congruence between the PTs and students permits free discussion since the students less hesitant in asking questions [2, 14]. The fact that the PTs were their own batch mates could have made the learning more interesting. Since PTs tend to know the students at a personal level, they comprehend the students' learning problems and are inclined to be less demanding [34]. Since medical students act as

repositories of health-related information for their friends, family members, as well as patients, it can be deduced that they are engaged in teaching even during their undergraduate clinical placements. Medical students tend to demonstrate better comprehension of complex concepts [35] when they attempt to impart health-related information in a language that lay persons can understand. Studies [36, 37] have reported that health science students do not receive sufficient feedback on their learning and performance in clinical placements. PAL has the potential to provide students with feedback on their performance and conversely, to receive feedback.

Gender-Wise Scores

In the pre-test, the maximum, median, first quartile and minimum scores were nearly identical for both female and male students. In the post-test, the median score obtained by female students (49) was marginally higher than that for males (47) while the first quartile post-test scores was much higher for female students (47.25) as compared to that obtained by their male counterparts (42.50). However, the minimum score for male students (34) was slightly higher than that for female students (31) (Figure-1).

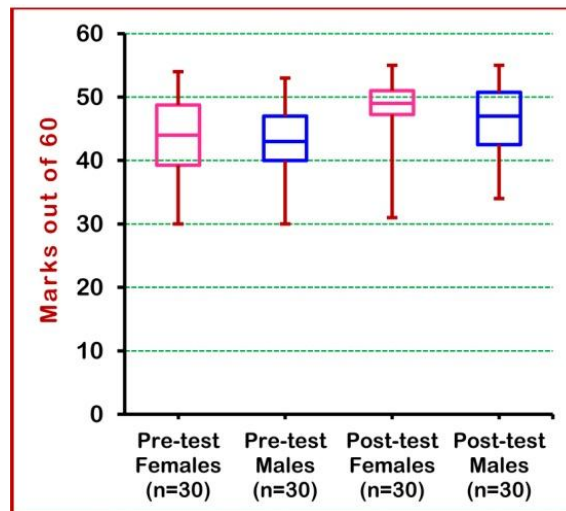


Fig-1: Boxplot depicting gender differences in scores

The gender differences in the mean scores were not statistically significant in the pre-test

($Z=0.862$; $p=0.3886$) as well as in the post-test ($Z=1.055$; $p=0.2914$) (Table-2).

Table-2: Gender differences in mean scores in the pre- and post-tests

	Females (n=30)	Males (n=30)	Z value	p value
Pre-test: Mean (SD)	43.87 (6.46)	42.50 (5.84)	0.862	0.3886
Post-test: Mean (SD)	48.07 (5.13)	46.57 (5.86)	1.055	0.2914

Standard error of difference between two means; SD = Standard deviation

Feedback

57 out of 60 students (95%) gave their feedback. Their responses were that peer teaching led to improved study skills (91.23%), better clarification of concepts (85.96%), enhanced communication (71.93%), increased comprehension (71.93%) and amplified level of reinforcement (75.44%). A majority (85.96%) felt that peer teaching was beneficial for examinations. 84.21% expressed their willingness to be a PT in future.

Teaching methods ought to be suitably innovated to compensate the faculty deficiency in medical colleges and to encourage student participation. The PAL approach makes students more inquisitive, increases their attention span and facilitates students to freely ask questions and accept their faults without fear of reprimand [17]. The usefulness of PAL may ensure effective use of available resources. Contrasting results

were obtained by a Karnataka-based study [38], which reported that faculty teaching was superior to PAL because of lack of seriousness among the PTs and the students, unreliable quality of peer teaching and lack of confidence in performing a PT's role.

CONCLUSION

Since medical students use PAL in informal settings, educational interventions using PAL ought to focus on the quality and perceived utility of PAL. Formal use of PAL in institutions would lead to collaborative learning and will also authenticate PAL as a supplementary source of information that can be juxtaposed with conventional teaching. The teaching skills of both PTs and faculty can be boosted in ensuing sessions by providing for immediate feedback. PAL infuses teaching skills and can kindle further learning by PTs and faculty.

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