Comparison of Peer-Assisted Learning with Traditional Faculty-led Teaching in Family Medicine Clerkship: An Experimental Study

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ABSTRACT

Objective: To compare the effects of reciprocal peer-assisted learning (PAL) with traditional faculty-led teaching on the academic performance of fourth-year medical students in Family Medicine clerkship.
Study Design: An experimental study.
Place and Duration of Study: Department of Health Professions Education and Department of Family Medicine, Shifa College of Medicine, Islamabad, Pakistan, from 22nd February 2019 to 25th February 2020.
Methodology: The study was conducted longitudinally in three clerkship rounds of Family Medicine with 77 fourth-year students separated into a control group and an intervention group taught by faculty and peers respectively. All peer tutors were trained prior to their sessions and there were parallel peer-led and faculty-led sessions. Both groups were given a pre-test prior to the intervention and a post-test after the intervention. The data were entered in SPSS version 24 and analysed using chi-square, independent and paired sample t-tests.
Results: Participants of both intervention (PAL) and control (non-PAL) groups demonstrated a significant difference in post and pre-test scores with a p-value <0.05. However, the mean difference in the post-and pre-test scores between the two groups was not significant with a p-value >0.05.
Conclusion: Students taught by peers performed as well as students taught by the faculty in this study, as depicted by their academic scores. Henceforth PAL is comparable to faculty-led teaching in acquisition of knowledge in Family Medicine clerkship.

Key Words: Peer-assisted learning, Reciprocal peer-assisted learning, Traditional teaching, Family medicine.

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INTRODUCTION

Regulatory bodies all over the world have recognised a deficiency in the teaching skills of doctors and have included teaching as a competency for their medical graduates.[1] Given its importance in all tiers of a medical career, some curricula have made demonstrating effective teaching skills compulsory; notable among these are, the Can Meds, Australian Medical Council, and General Medical Council.[1,2]

Peer-assisted learning (PAL) is an innovative teaching strategy where students assume the role of teachers and mentors to their peers.[3] It provides a means to fulfil the demands of the accrediting agencies and the latest trends in medical education, requiring medical students to be trained as teachers.[2]

The concept of peer-assisted learning is based on the theories of social and cognitive congruence.[4-6] Social congruence implies that peer tutors, coming from similar backgrounds and age groups as their tutees, so that they can relate to their problems in a way teachers will be unable to. Similarly, cognitive congruence implies the existence of a shared foundation of knowledge between peer tutors and tutees, which extends to the language used to dispense information, leading to a better understanding by students.[7,8]

PAL also provides the students with a platform where they can learn from each other and improve their teaching, communication, teamwork and leadership skills and become responsible learners.[3,9-11] Studies show that PAL helps develop an encour-

aging environment that is less conducive to stress and allows for the reception of better feedback, leading to greater contentment amongst students.[9,12] PAL is also known to reduce faculty burden by allowing efficient use of faculty time.[11,13] Additionally, by giving students the autonomy to be responsible for their own learning, it could be viewed as a step towards student empowerment.

A study by Daud *et al*. comparing faculty-led lectures with same-level PAL in small groups of 4th-year community medicine students found PAL to be just as effective as teaching by the faculty.[14] Taking into consideration its potential benefits in areas not directly reflected in academic performance, it makes a case for the supplementation of traditional teaching methods with PAL.[14]

Peer-assisted learning has been incorporated in the curriculum globally, in higher education and to some extent in health professions education as well.[2,3] In near-peer or cross-level PAL, peer tutors are senior than peer tutees by a year or more,[15] as opposed to same-level reciprocal PAL where peer-tutors and tutees belong to the same academic year in the same discipline and take turns to teach each other and individual students are tutors and tutees at varying times.[7] The latter gives all the students the opportunity to teach and reap benefits as tutors rather than a few students who are selected as tutors in other models of PAL either randomly or on the basis of their academic performance. However, in spite of the fact that same-level PAL is more workable than cross-level PAL due to similar timetables of peer tutors and tutees, there are very few international studies on same-level reciprocal PAL and even fewer Pakistani studies.[3,16,17] Previous studies that were even done in Pakistan did not use a robust design. Additionally, the majority of those studies were done in the basic sciences and not in a clinical context. Henceforth, this study was conducted to assess the effects of PAL on academic performance with regard to acquisition of knowledge using same level of peers, to judge its feasibility in a clinical setting.

METHODOLOGY

The research was carried out at Shifa College of Medicine, Islamabad, Pakistan from 22nd February 2019 to 25th February 2020 with three successive clerkship rounds of fourth-year students during their Family Medicine rotation. There were 77 students in the three clinical groups. Group # 1 had 21, group # 2 had 27, and group # 3 had 29 students.

It was an experimental study conducted longitudinally with a pre-test and a post-test design and peer-assisted learning as the intervention. The students were assigned into control and experimental groups through computer-generated roll numbers. They were selected through universal sampling technique and included all the fourth-year medical students who were doing the clerkship at that time. Any student who wanted to be excluded from their group was given the option to switch their groups if they did not want to stay in the group allotted to them. There were 4 students in round 1 and 2 students in round 2, who mutually

switched their groups, while no student in round 3 changed their assigned groups. Written consent was taken from all the students. The control groups were exposed to traditional teaching and the experimental groups were exposed to peer teaching.

The intervention *i.e.* peer assisted learning or traditional teaching by faculty was the independent variable while the academic performance of the students as shown in the test scores was the dependent variable.

Three sessions were held with each round of students during their rotation in Family Medicine. First was an introductory session where they were briefed about the project, its objectives and their respective roles followed by a training session for peer tutors conducted by the principal investigator, a medical educationist. Second was a training session where the students were trained on how to conduct small group discussions. Third was a guidance session for peer-tutors from the faculty of the Department of Family Medicine in which they were informed about the recommended resources and books for their individual sessions. To avoid contamination, the students were requested not to discuss the topics with the students of the other group (control group students with intervention group students and *vice versa*). All the students were asked to maintain a log of the sessions mentioning the date and names of the topic and the person/s they had the discussion with. These forms were collected from them at the end of the clerkship. The response rate was 50% overall and did not show contamination.

The learning objectives of each session were communicated to the peer-tutors through e-mail and they were called in person for further clarification. Since it was reciprocal PAL, all students belonging to the PAL group acted as peer tutees and tutors in the same round and took turns to teach. Furthermore, the authors standardised the PAL teaching sessions by exposing all the peer tutors to similar training sessions. There were 12 parallel peer-led and faculty-led sessions that took place simultaneously in each clerkship round. One faculty member taught the control group and the other faculty member observed peer-led session.

To assess the baseline knowledge of the students, a pre-test was given both to control and intervention groups at the beginning of the clerkship, which comprised single best answer multiple choice questions (MCQs) and short answer questions (SAQs). After the intervention, a post-test was also given to both groups whose format was similar to the pre-test. The bias was minimised by having the questions reviewed by a subject specialist who ensured that they all had questions with similar difficulty levels. The MCQs and SAQs were developed according to the table of specifications, by the subject specialist and vetted by medical educationists.

Data were entered in SPSS-24. Quantitative variables like age and test scores were presented as mean ± SD and independent sample t-test was used for comparison of difference in post-test and pre-test scores while qualitative variables like gender were presented as frequency and percentages and chi-square test was used for comparison. To compare the effects of before and

after intervention, paired sample t-test was used as adjusted analyses. A p-value of less than 0.05 was considered to be significant. There were no confounding variables.

Ethical approval to conduct the study was obtained by the institutional review board of Shifa International Hospital, Shifa Tameer-e-Millat University.

RESULTS

All PAL students were assigned sub-group 'a' and non-PAL students were assigned sub-group 'b". Each sub-group was given a numerical number indicating the round number and an alphabet, 'a' or 'b' for PAL and non-PAL groups respectively. Round number is the sequence of the 8-week long clerkship in Family Medicine.

There were 77 students in three rounds of clerkships that were included in the study. The average age of the students was 22.25 (± .951). The total number of students in all three PAL groups was 40 and that in all non-PAL groups was 37. There were 44 females and 33 males in all, thus female to male ratio was 4:3 in this cohort. There were 21 males (52.5%) and 19 females (47.5%) in the 3 PAL groups whereas in the 3 non-PAL groups there were 12 males (32.4%) and 25 females (67.5%). Chi-square test was applied to examine the relationship between gender distribution between the groups and independent sample t-test was performed to compare the mean age of students of the two groups. The non-significant results represented by p-value 0.075 for gender distribution and p-value 0.076 for average age of students in the two groups show that the group composition was similar at the start of the experiment, in terms of age and gender.

As shown in Table I. the difference in the pre- and post-test scores of students in both PAL and non-PAL groups was statistically significant (p<0.05). Independent sample t-test was applied to compare the difference in mean post and pre-test scores between PAL subgroups 'a' and non-PAL subgroups 'b' of each of the three rounds.

Table II depicts no statistically significant difference between the pre-test scores of PAL and non-PAL groups (p>0.05).

Table I: Paired t-test for comparison of the difference in post-test and pre-test scores within all PAL groups and all non-PAL groups combined.

Variables	PAL groups (1a,2a,3a) mean ± sd n=40		p-value
	Pretest	Post-test	
MCQs	13.10 ± 2.86	14.35 ± 3.07	<0.016*
SAQs	3.00 ± 1.28	3.97 ± 1.25	<0.001*
Total	16.10 ± 2.57	18.32 ± 3.67	<0.0001**
Total percentage	51.83 ± 8.37	59.15 ± 11.89	<0.0001**
Variables	Non-PAL groups (1b,2b,3b) mean ± sd n=37		p-value
	Pretest	Post-test	
MCQs	11.67 ± 2.66	13.62 ± 4.00	.001*
SAQs	3.00 ± 1.77	3.72 ± 1.49	.048*
Total	14.67 ± 3.50	17.35 ± 4.89	<0.0001*
Total percentage	47.30 ± 11.38	56.00 ± 15.78	<0.0001*

*= Significant   **= Highly significant.

Independent sample t-test was also performed to assess the mean difference in the post- and pre-test scores of PAL and non-PAL groups combined. The mean difference in MCQ post and pre-test scores between the PAL and the non-PAL group was not significant (p-value 0.354). The mean post- and pre-test difference in SAQs between the two groups was also insignificant (p-value 0.579). The mean difference in the total for post and pretest between PAL and non-PAL was also not significant (p-value 0.615) implying that there was no difference in learning between PAL and non-PAL groups (Table III).

DISCUSSION

To the authors' knowledge, this is the first study on reciprocal PAL carried out in a clinical context in Pakistan. It was an experimental study with a pre-test and post-test design where the experimental groups were taught by their peers and the control groups were taught traditionally by the faculty.

These results show that the academic performance of the experimental and control groups was alike since their mean test scores were similar. The results are in alignment with the findings of other studies that have compared the acquisition of knowledge through PAL with faculty-led groups.[17] They followed a cross-over design in Community Medicine in the fourth-year and selected peer-tutors with best academic record. The current study gave all the students a chance to tutor their peers irrespective of their academic achievements as it motivates weaker students to study more and gives them an opportunity to empathise with fellow weak students.[7]

Another study on gain in knowledge of fourth-year medical students in community health and nutrition courses had a similar conclusion when they compared peer-assisted learning with conventional teaching.[18] They recommended PAL as supplemental teaching strategy which aids in increasing the motivation and confidence of the learners as well.

Though this study focused on comparison of acquisition of knowledge between peer-led and faculty-led groups, similar results have been demonstrated between the two groups regarding acquisition of skills as well.[19] Nomura *et al.* found cross-year peer tutoring as successful as faculty tutoring for teaching of communication skills using convergent mixed-methods study design where final year students taught fourth-year students.[19] However in the study setting, conducting a cross-year peer teaching was a challenge due to conflicting timings of students belonging to different years.

There are some studies that have even advocated the replacement of expert-led teaching by peer-teaching in courses involving the gain of psychomotor skills.[20] They concluded that effects of same-year peer teaching were superior than regular teaching of examination of physical skills by the experts in Surgery in the final year.

An Iranian study on PAL in a nursing school showed better performance of the PAL group in the posttest but no difference with the control group taught by the faculty in the final exam.[21] In the present study, the PAL groups and control groups demonstrated similar performance in all the three rounds.

Table II: Independent sample t-test for mean comparison of difference between post-test and pre-test scores of PAL and non-PAL groups of rounds 1, 2, and 3.

Round 1		PAL 1a (n=11) - mean ± sd			Non -PAL 1b (n=10) - mean ± SD			p-value
		Pre-test	Post-test	Difference	Pre-test	Post-test	Difference	
	MCQs	14.90 ±2.73	14.0 ± 1.94	-0.9091 ± 2.54	12.50 ± 2.06	12.50 ±2.01	.00 ± 2.74	0.441
	SAQs	2.4 ± 0.917	3.0 ±1.54	0.5909 ±1.393	2.10 ± 1.71	3.05 ± 0.89	.95 ± 2.06	0.642
	Total	17.3 ± 2.96	17.0 ± 3.34	0.3182 ± 3.10	14.60 ± 3.16	15.55 ±1.77	.95 ± 3.71	0.0405
	Total %	55.7 ± 9.68	54.9 ± 11.05	0.8182 ±10.13	47.10 ±10.21	50.30 ±5.67	3.2 ±11.91	0.419
Round 2		PAL 2a (15) - Mean ± SD			Non-PAL 2b (14) - Mean ± SD			p-value
		Pre-test	Post-test	Difference	Pre-test	Post-test	Difference	
	MCQs	10.46 ±1.35	12.53 ± 1.84	2.06 ± 1.86	9.85 ± 2.03	11.28 ± 4.04	1.42 ± 3.08	0.503
	SAQs	4.16 ±1.02	4.06 ± 0.798	-.100 ± 1.28	3.67 ± 1.68	2.89 ± 1.38	-0.785 ± 1.76	0.239
	Total	14.63 ±1.81	16.60 ± 2.16	1.96 ± 2.19	13.53 ± 3.14	14.17 ± 4.45	0.642 ± 2.72	0.159
	Total %	47 ± 5.78	53.6 ± 7.039	6.60 ± 7.10	43.57 ± 10.21	45.64 ± 14.44	2.07 ± 9.00	0.143
Round 3		PAL 3a (14) - Mean ± SD			Non-PAL 3b (13) - Mean ± SD			p-value
		Pre-test	Post-test	Difference	Pre-test	Post-test	Difference	
	MCQs	14.50 ± 1.99	16.57 ± 3.54	2.07 ± 3.91	13.00 ± 2.70	17.00 ±2.76	4.00 ± 3.29	0.180
	SAQs	2.21 ± .801	4.64 ± 0.928	2.42 ± 0.977	2.96 ± 1.73	5.15 ± .80	2.19 ± 1.60	0.645
	Total	16.71 ± 2.31	21.21 ± 3.59	4.50 ± 3.95	15.96 ± 3.90	22.15 ± 2.91	6.19 ± 3.71	0.264
	Total %	53.93 ± 7.61	68.43 ±11.54	14.50 ± 12.73	51.46 ±12.75	71.54 ± 9.16	20.07 ± 11.99	0.253

Table III: Independent sample t-test for comparison of difference between post-test and pre-test of all PAL and non-PAL groups combined.

	PAL (40) mean ± SD			NONPAL (37) mean ± SD			p-value
	Pre-test	Post-test	Difference	Pretest	Post-test	Difference	
MCQs	13.10 ± 2.86	14.35 ± 3.07	1.25 ± 3.13	11.67 ± 2.66	13.62 ± 4.00	1.94 ±3.40	0.354
SAQs	3.00 ± 1.28	3.97 ± 1.25	0.975 ±1.628	3.00 ± 1.77	3.72 ± 1.49	.729 ± 2.17	0.579
Total	16.10 ± 2.57	18.32 ± 3.67	2.22 ± 3.62	14.67 ± 3.50	17.35 ±4.89	2.67 ±4.19	0.615
Total %	51.83 ± 8.37	59.1 ± 11.89	7.32 ±11.66	47.30 ±11.38	56.00 ±15.78	8.70 ±13.60	0.634

PAL has manifested benefits for peer tutees improving their medical understanding and credence.[22] The results of this study also reaffirm that knowledge gained by peer tutees is not inferior to knowledge gained by students who are taught by the faculty.

The present results however, differ from the results of Al Shareef, where students taught through reciprocal PAL performed worse than the students taught by the faculty. Unlike this study, there were no training sessions for the peer tutors.[16] Moreover, he conducted and compared different formats of teaching which included lectures, case scenarios, tutorials and seminars in varying numbers, which could be similar to comparing apples with oranges. Whereas in the present study, there were equal number of peer-led and faculty-led sessions which were conducted in small groups. The present researchers also placed special emphasis on peer tutor training and conducted three orientation/training sessions to ensure standardisation in teaching among peer tutors.

The experimental study design conducted longitudinally with a pre-test and post-test in control and intervention groups was one of the main strengths of this study. It allowed the authors to compare the effects of traditional faculty-led teaching and peer teaching based on the academic performance of the students. Moreover, since it was reciprocal same-level PAL, all the participants of the intervention group were given an opportunity to teach their peers and gain experience as peer tutors.

The students could not be blinded in the study as this was an educational intervention. This may have had an impact on the efforts put in by the students for their exams and ultimately on the test scores as well. Moreover, this study focused only on knowledge acquisition of the learners. More research is needed to study the impact of peer-teaching on performance-related skills.

CONCLUSION

Gain in knowledge by students taught by their peers was similar to the students taught by the faculty, as depicted by

their test scores. Peer-assisted learning is doable and feasible. It can be formalised in the curriculum in order to train students as future teachers and communicators and to reduce faculty load simultaneously, thus proving beneficial for all the stakeholders.

AUTHORS' CONTRIBUTION:
MAS: Conceived the idea of the study, conducted the intervention, managed the whole project, carried out statistical analysis, and wrote the manuscript.
LAB: Contributed in the study design, data analysis and writing of the manuscript.
SPI: Participated in the study design, conduction of the intervention and writing of the manuscript.
UKK, FG: Participated equally in the study design and the intervention.
All the authors have approved the final version of the manuscript to be published.

REFERENCES

1. Burgess A, van Diggele C, Mellis C. Teacher training program for medical students: Improvements needed. *Adv Med Educ Pract* 2015; **6**:265-70. doi: 10.2147/AMEP.S79 671.

2. Herrmann-Werner A, Gramer R, Erschens R, Nikendei C, Wosnik A, Griewatz J, *et al*. Peer-assisted learning (PAL) in undergraduate medical education: An overview. *Z Evid Fortbild Qual Gesundhwes* 2017; **121**:74-81. doi: 10. 1016/j.zefq.2017.01.001.

3. Tai J, Molloy E, Haines T, Canny B. Same-level peer-assisted learning in medical clinical placements: A narrative systematic review. *Med Educ* 2016; **50(4)**:469-84. doi: 10.1111/medu.12898.

4. Williams JC, Alwis WAM, Rotgans JI. Are tutor behaviors in problem-based learning stable? A generalisability study of social congruence, expertise and cognitive congruence. *Adv Heal Sci Educ* 2011; **16(4)**:505-15. doi: 10.1007/s10459-011-9295-2.

5. Moust JHC, Schmidt HG. Facilitating small-group learning: A comparison of student and staff tutors' behavior. *Instr Sci* 1994; **22(4)**:287-301.

6. Lockspeiser TM, O'Sullivan P, Teherani A, Muller J. Understanding the experience of being taught by peers: The value of social and cognitive congruence. *Adv Heal Sci Educ* 2008; **13(3)**:361-72. doi: 10.1007/s10459-006- 9049-8.

7. Ross MT, Cameron HS. Peer assisted learning: A planning and implementation framework: AMEE guide no. 30. *Med Teach* 2007; **29(6)**:527-45. doi: 10.1080/01421590701 665886.

8. Ten Cate O, Durning S. Dimensions and psychology of peer teaching in medical education. *Med Teach* 2007; **29(6)**: 546-52. doi: 10.1080/01421590701583816.

9. Rehman R, Siddiqi HS, Alam F. Peer leader selection: A step forward for assisted peer learning at Aga Khan University. *J Pak Med Assoc* 2018; **68(6)**:936-8.

10. Moore F. Peer-led small groups: Are we on the right track? *Perspect Med Educ* 2017; **6(5)**:325-30. doi: 10.1007/s40037-017-0370-0.

11. Benè KL, Bergus G. When learners become teachers: A review of peer teaching in medical student education. *Fam Med* 2014; **46(10)**:783-7.

12. Loda T, Erschens R, Loenneker H, Keifenheim KE, Nikendei C, Junne F, *et al*. Cognitive and social congruence in peer-assisted learning – A scoping review. *PLOS One* 2019; **14(9)**:1-15. doi: 10.1371/journal.pone.0222224.

13. Jauregui J, Bright S, Strote J, Shandro J. A novel approach to medical student peer-assisted learning through case-based simulations. *West J Emerg Med* 2018; **19(1)**:193-7. doi: 10.5811/westjem.2017.10.35319.

14. Daud S, Chaudhry AM, Ali SK. Lecture based versus peer assisted learning: Quasi-experimental study to compare knowledge gain of forth year medical students in community health and nutrition course. *Res Dev Med Educ* 2016; **5(2)**:62-8. doi.org/10.15171/rdme.2016.013.

15. Olaussen A, Reddy P, Irvine S, Williams B. Peer-assisted learning: Time for nomenclature clarification. *Med Educ Online* 2016; **21(1)**:1-8. doi: 10.3402/meo.v21.30974.

16. AlShareef SM. Comparing the impacts of reciprocal peer teaching with faculty teaching: A single-centre experience from KSA. *J Taibah Univ Med Sci* 2020. doi.org/10.1016/j.jtumed.2020.05.006.

17. Manzoor I. Peer assisted *versus* expert assisted learning: A comparison of effectiveness in terms of academic scores. *J Coll Physicians Surg Pakistan* 2014; **24(11)**:825-9.

18. Daud S, Ali SK. Perception of learners about peer-assisted learning and lectures. *Int J Sci Res* 2014; **3(11)**:1449-55.

19. Nomura O, Onishi H, Kato H. Medical students can teach communication skills - A mixed methods study of cross-year

Muneeza Aamir Sami, Lubna Ansari Baig, Saima Perwaiz Iqbal, Umme Kulsoom Khattak and Farah Gul

peer tutoring. *BMC Med Educ* 2017; **17(1)**. doi: 10.1186/s12909-017-0939-7.

20. Shah I, Mahboob U, Shah S. Effectiveness of horizontal peer-assisted learning in physical examination performance. *J Ayub Med Coll Abbottabad* 2017; **29(4)**: 559-65.

21. Zarifnejad G, Mirhaghi A, Rajabpoor M. Does peer education increase academic achievement in first year students? A Mixed-method study. *J Peer Learn* 2018; **11(1)**:89.

22. Siddiqui S, Siddiqui S, Mustafa Q, Rizvi AF, Hossain IT. The benefits of a peer-assisted mock PACES. *Clin Teach* 2018; **15(3)**:221-5. doi: 10.1111/tct.12658.

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