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Peers Empowering Peers: Boosting Medical Student Learning

Dr. Arijit Mazumdar

Assistant Professor, Department of Physiology.P A Sangma International Medical College, USTM Campus.Meghalaya, India

Corresponding Author:

Dr. Arijit Mazumdar

Email: ID: mazumdararijit17@gmail.com

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ABSTRACT

Background: Peer-assisted learning (PAL) involves students from the same program, often at similar levels, mutually supporting each other's education. This method eases the transition into medical training for novices by engaging near-peers who recently navigated similar challenges, fostering deeper content mastery and richer learning experiences.

Aim and Objectives: i. Enhance comprehension of course material, confidence, and effective learning habits.ii. Cultivate skills in organization, planning, and collaborative teamwork.iii. Produce competent medical graduates equipped for practice.

Methodology: Conducted in the Department of Physiology at Gauhati Medical College, Guwahati, amongst Phase I MBBS students, the project began with faculty sensitization followed by institutional ethical clearance. Students received project orientation and structured, faculty-validated questionnaires were developed for participants and observers. Informed consent was secured. Peer tutors and listeners were paired from Phase I cohorts. Sessions integrated into Physiology practicals, delivering identical competencies (e.g., PY 10.11: Examination of IIIrd–VIth cranial nerves) to all groups. Pre- and post-intervention assessments used MCQs and OSPE for quantitative metrics, supplemented by qualitative feedback questionnaires.

Findings: Out of 200 students, 198 engaged fully. Both peer tutors and listeners showed marked post-test gains, with mean assessment scores reflecting significant academic uplift post-PAL ($p<0.05$). Most students (85%+) reported satisfaction and eagerness for future sessions. Faculty echoed this, deeming PAL feasible, effective, and worthy of expansion across Physiology and other departments.

Conclusions: PAL boosts learning outcomes, academic performance, and communication—key for Indian Medical Graduates (IMGs). Students and faculty endorse it as a valuable teaching-learning method (TLM)..

Keywords: PAL, TLM, MCQ, Phase I MBBS, Questionnaire

INTRODUCTION

Medical students confront an immense volume of knowledge and skills that they must comprehend, retain and apply within the constrained timelines of their undergraduate training. This demanding curriculum requires innovative pedagogical approaches to foster deep learning and competency. The National Medical Commission (formerly Medical Council of India) mandates student-centered teaching-learning methods (TLM),[1] emphasizing the cultivation of lifelong learners dedicated to perpetual enhancement of their knowledge and abilities.

Peer-assisted learning (PAL) emerges as a compelling strategy in this context. It is defined as a collaborative educational model where students within the same program—often from adjacent years—teach and learn from one another. PAL leverages near-peer interactions to bridge learning gaps.[2] Typically, senior students (e.g., second-year) facilitate interactive sessions for juniors (e.g., first-year), drawing on their recent familiarity with the material and transition challenges. This bidirectional exchange not only clears complex concepts but also help in subject mastery, academic proficiency and interpersonal skills.

PAL holds particular promise for new entrants in this field in showing them the path to higher education. By involving tutors

who have freshly read similar topics, it eases acculturation, reduces anxiety and enriches cognitive engagement. Evidence suggests PAL excels in promoting self-directed learning, cooperative dynamics and active participation in group settings, effectively mitigating faculty shortages amid surging student enrolments—a global trend in medical education

The appeal of PAL resonates worldwide, driven by resource constraints, cost-efficiency imperatives and expanding class sizes. It alleviates the traditional teacher-student ratio burden, allowing educators to focus on higher-order facilitation while empowering students as co-creators of knowledge. Systematic reviews affirm PAL's efficacy across preclinical and clinical phases, with meta-analyses reporting superior knowledge retention and skill acquisition compared to didactic lectures alone. When embedded as a curricular cornerstone—rather than an adjunct—PAL yields optimal outcomes, fostering an inclusive departmental ecosystem. [3]

For medical trainees, PAL modifies memorization, targeting cognitive, psychomotor, and affective domains. Student tutors refine their expertise through articulation and leadership, experiencing the "protégé effect" where teaching reinforces personal understanding. Meanwhile, learners gain confidence via relatable guidance, which does not fall into any hierarchy of teaching which maybe there in cases of faculty instructions. Peer discussions activate mirror neuron systems, enhancing empathy, rapport and retention via social constructivism—Vygotsky's zone of proximal development in action.[4]

Practical implementations, such as physiology practicals on cranial nerve examinations, exemplify PAL's versatility. Sessions like this would give rise to dynamic dialogues, dispelling misconceptions in real-time and simulating clinical teamwork essential for future practice. This is especially vital for first-year undergraduates, who find it difficult with medical education's demands, information overload, self-regulation deficits and imposter syndrome.[5] PAL cultivates resilience, communication fluency, and collaborative problem-solving—core competencies for Indian Medical Graduates (IMGs) as per competency-based curricula.

Key aims of PAL include: i) Deepening course material comprehension while instilling learner confidence and autonomy. ii) Honing organizational, planning and teamwork skills through structured peer interactions. iii) Moulding proficient, patient-centered physicians ready for lifelong professional evolution.

Randomized trials demonstrate PAL's edge in OSCE performance and MCQ scores, with effect sizes indicating moderate-to-large gains. Qualitative insights reveal heightened motivation and satisfaction, as peers demystify jargon and contextualize theory. Faculty report reduced workload without compromising outcomes, endorsing scalability across disciplines like anatomy, physiology, biochemistry and beyond. Critically, PAL's success depends on scaffolding: faculty oversight ensures fidelity, while tutor training mitigates knowledge gaps. Challenges like scheduling conflicts or uneven tutor proficiency are surmountable via incentives (e.g., certification credits) and digital platforms for hybrid delivery. In resource-limited settings like India, PAL democratizes education, aligning with equity goals. Ultimately, PAL reimagines medical training as a communal journey, not a solitary ascent. By humanizing learning—peers as empathetic guides—it equips students not just with facts, but with the adaptive mindset for tomorrow's healthcare demands. As enrolments swell and faculties strain, PAL stands as a strong, evidence-based alternative, promising competent graduates who thrive in complexity.

METHODOLOGY

This prospective interventional study evaluating peer-assisted learning (PAL) was conducted in the Department of Physiology at Gauhati Medical College, Guwahati. Prior to implementation, comprehensive sensitization sessions were organized for both faculty members and students to elucidate the rationale, structure, and anticipated benefits of PAL, ensuring appropriateness and alignment with competency-based medical education (CBME) principles. Institutional Ethical Committee approval was obtained. Written informed consent obtained from all participants to safeguard autonomy and confidentiality. To minimize selection bias and enhance generalizability, a randomized controlled design was employed. From the 200 Phase I MBBS students, 20 peer tutors were selected via computer-generated random numbers corresponding to their roll numbers, yielding a representative sample (allocation ratio 1:9 as regards peer tutors: peer listeners). Willingness to serve as peer tutors was confirmed through voluntary consent, excluding any coercion. These tutors underwent a structured orientation by faculty, reinforcing core competencies post-initial didactic lecture and demonstrative sessions to ensure pedagogical genuineness.

The intervention unfolded during routine Physiology practical classes, optimizing integration without disrupting the curriculum. The group of 180 peer listeners was classified into 9 homogeneous groups of 20 students each, with each group assigned 2 peer tutors (tutor: listener ratio 1:10)—a ratio informed by educational literature to balance facilitation and interaction. Identical competencies were delivered across all groups, exemplifying CBME modules such as PY 10.20: "Examination of IIIrd, IVth, Vth, and VIth Cranial Nerves." Faculty-led baseline teaching preceded PAL sessions, standardizing prior knowledge exposure. Peer tutors then facilitated interactive, student-centered sessions emphasizing hands-on demonstration and problem-based discussions, fostering active recall and collaborative learning.

Quantitative outcomes were rigorously assessed via pre- and post-intervention tests administered on the teaching day to capture immediate knowledge and skill gains which included multiple-choice questions (MCQs; 20 items, targeting cognitive

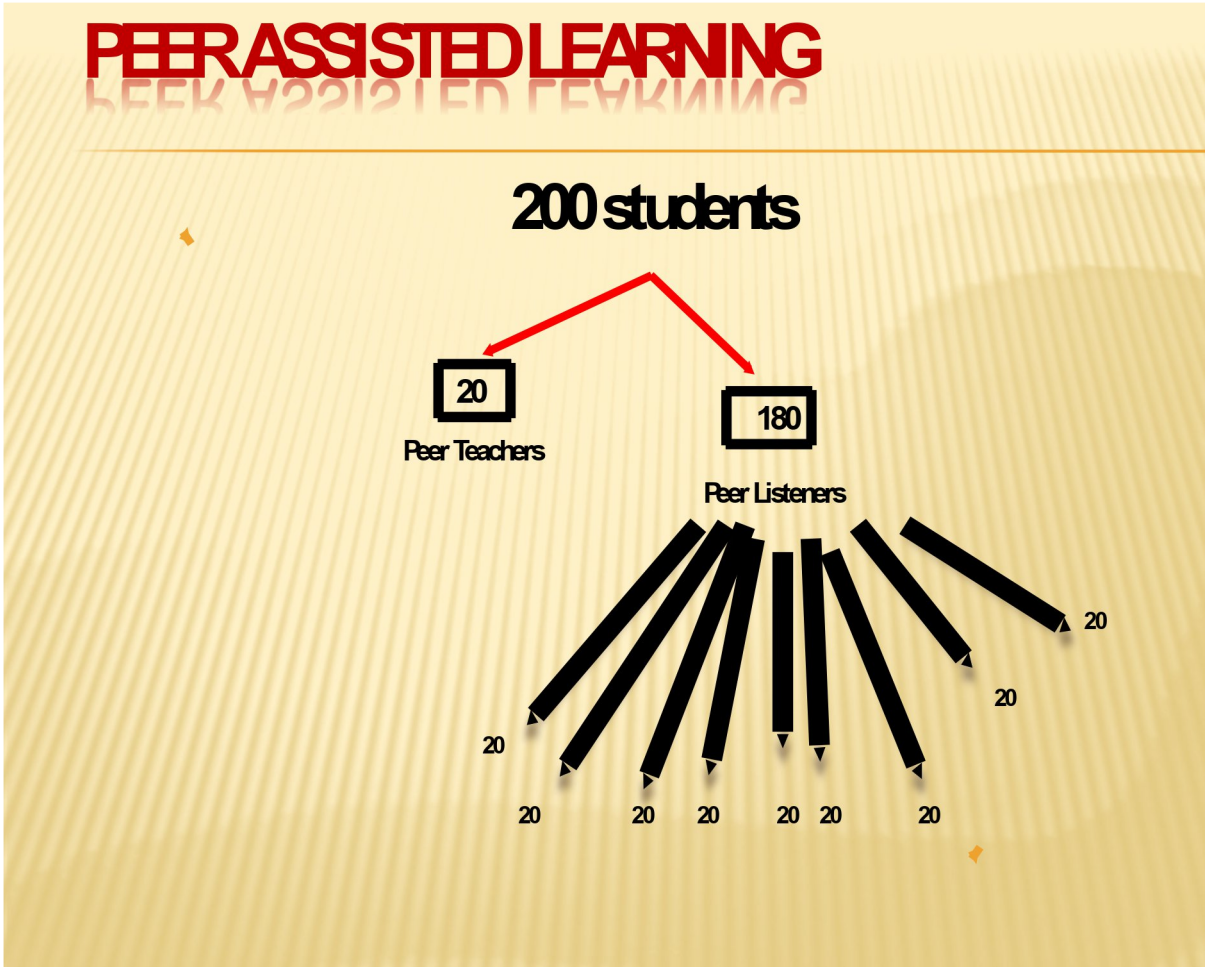
domains (understanding/application) and Objective Structured Practical Examinations (OSCE; 10-station circuit evaluating psychomotor proficiency). Scores were kept secret, entered into MS-Excel and analyzed using paired t-tests (pre-post within groups) and unpaired t-tests (inter-group comparisons), with $p<0.05$ denoting significance.

Qualitative insights complemented this through validated. Likert-scale feedback questionnaires (5-point scale: strongly disagree to strongly agree) administered immediately post-session to peer tutors, listeners and overseeing faculty.

Open-ended items probed perceptions on session efficacy, communication dynamics, confidence augmentation and feasibility. On analysis some important notable points (e.g., "enhanced peer rapport," "reduced faculty load"), triangulating with quantitative data for methodological robustness were found. Faculty perceptions were captured separately via a dedicated form, appraising PAL's alignment with departmental goals, tutor preparedness and scalability.

Sample size justification drew from prior PAL meta-analyses reporting 10-15% score improvements (SD 12%), powering detection at 80% ($\alpha=0.05$, $n=20$ tutors sufficient for pilot). Exclusion criteria encompassed absenteeism or incomplete data (<90% response rate mitigated attrition). Blinding of assessors to group allocation preserved objectivity, while session audio-recordings (with consent) enabled fidelity checks.

This multifaceted evaluation—merging randomized allocation, mixed-methods assessment, and student feedback—positions the study as a robust exploration of PAL's efficacy in resource-constrained Indian Medical Colleges. By embedding PAL within practicals, it mirrors real-world applicability, potentially informing NMC-mandated innovations for IMG competency.



DATA COLLECTION

The data was collected via questionnaire and feedback - The questionnaire was prepared and was validated by senior faculty members to ensure ease of understanding and clarification of all questions. Questionnaires on the topic before and after the session were shared to both the peer tutors and peer listeners. Feedback forms regarding the session were shared to both the student groups and faculties.

RESULTS

A total of 198 students participated in the study. 20 students acted as Peer tutors and rest 178 students were peer listeners. Both the participant groups during the session had to answer Pretest and Post test & scores were compared.

	Pre Test Score (Average)	Post test Score (Average)	Remarks
Peer Tutors	5.7	9.23	Improved Score by 62%
Peer Listeners	4.57	7.72	Improved score by 69%

Table 1: Comparison of scores of Peer learners and Peer Listeners pre and post test

Both peer tutors and peer listeners exhibited statistically significant improvements in post-test scores compared to pre-test baselines ($p < 0.05$, paired t-test). Correlation analysis between pre- and post-test performance revealed a perfect positive linear relationship (Pearson's $r = 1.0$, $p < 0.001$) across both groups, suggesting peer-assisted learning (PAL) as an effective teaching-learning method (TLM) that drives consistent academic gains.

A semi-structured questionnaire was developed for peer tutors and peer listeners, with validation by senior faculty. Feedback from both groups and faculty was captured using a Likert scale.

Studied variables	Strongly agree		Agree		Neutral		Disagree		Strongly disagree		Percentage of agreement
	No	(%)	No	(%)	No	(%)	No	(%)	No	(%)	
I had the opportunity to consolidate my knowledge	**13 (65)**		**6**		**1 (5)**		**0**		**0**		**95**
Being a tutor has increased my confidence in my tutoring and presentation skills	**13 (65)**		**5(25)**		**2(10)**		**0**		**0**		**90**
I have a better understanding of teamwork and the roles within the team	**10 (50)**		**8(40)**		**2(10)**		**0**		**0**		**90**
I am a better role model to my peers	**12 (60)**		**6(30)**		**2(10)**		**0**		**0**		**90**

I have developed both personally and professionally	**9(45)**	**8(40)**	**3(15)**	**0**	**0**	**85**
Being a tutor has made me consider an academic career in the future	**9(45)**	**9(45)**	**2(10)**	**0**	**0**	**90**
I think the students benefitted from my teaching and mentoring experience	**12(60)**	**7(35)**	**1(5)**	**0**	**0**	**95**
I had support from faculty or other peers	**13(65)**	**6 (30)**	**1(5)**	**0**	**0**	**95**
Overall, I feel I was adequately prepared for this role	**12(60)**	**6(30)**	**2(10)**	**0**	**0**	**90**
Peer teaching is more beneficial for the student than the tutor	**10(50)**	**7(35)**	**3(15)**	**0**	**0**	**85**
Every medical student should learn how to teach	**13(65)**	**6 (30)**	**1(5)**	**0**	**0**	**95**

TABLE-2: Peer Tutor Perceptions of Peer Assisted Learning. (20)

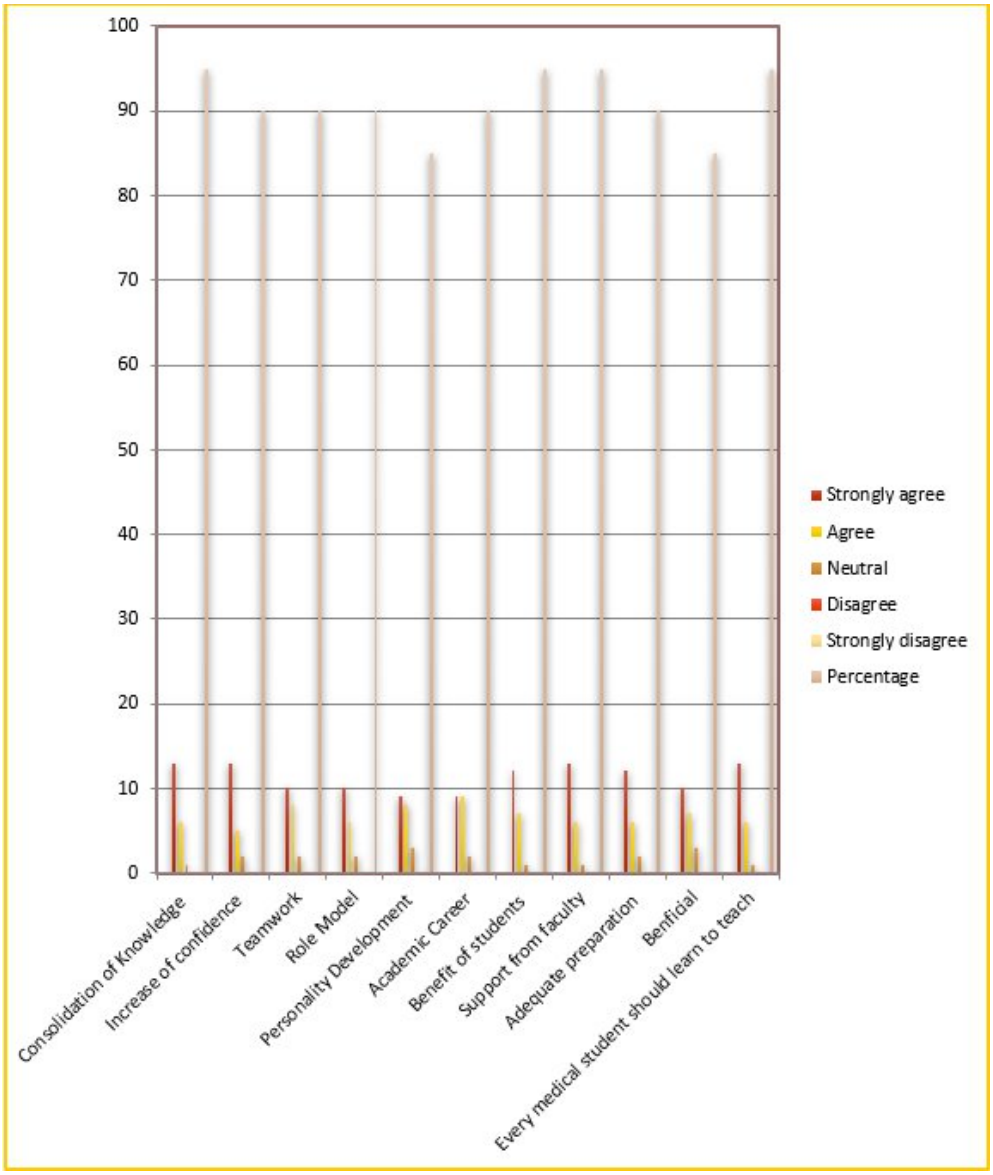


FIGURE-2: Peer Tutor Perceptions of Peer Assisted Learning on Likert scale. (20)

On analysis of Table 2 more than 95% of the peer tutor agreed that they had opportunity to consolidate their knowledge and 90% peer tutor agreed that they had increased their confidence in tutoring and presentation skill also better alongwith understanding of their importance of teamwork.

Studied variables	Strongly agree		Agree		Neutral		Disagree		Strongly disagree		Percentage of agreement
	No	(%)	No	(%)	No	(%)	No	(%)	No	(%)	
Peer tutors' knowledge											
The tutor's knowledge was appropriate for the required level of teaching	91 (51.12)		78 (43.82)		9 (5.05)		0		0		94.94
The tutor	90		74		10		3		0		92.13

provided appropriate guidance that targeted my needs	(50.56)	(41.57)	(5.61)	(1.68)		
Peer tutors' attitude						
The tutor is approachable and happy to answer questions	141 (79.21)	32 (17.97)	4 (2.24)	0	1 (0.56)	97.18
The tutor creates a welcoming learning environment	140 (78.65)	35 (19.66)	3 (1.68)	0	0	98.31
Overall, I feel that I adequately benefitted from this experience	120 (67.41)	52 (29.21)	3 (1.68)	2 (1.12)	1 (0.56)	96.62
Peer-teaching preferences						
Peers can perform well in the role of tutors	89 (50)	75 (42.13)	19 (10.67)	4 (2.24)	1 (0.56)	92.13
Peer-assisted teaching is more beneficial for the student than the tutor	55 (30.89)	63 (35.39)	55 (30.89)	4 (2.24)	1 (0.56)	66.28
Learners' general perceptions of peer teaching and mentoring						
Peer-assisted teaching is an effective teaching strategy	124 (69.66)(	50 (28.08)	4 (2.24)			97.74
I prefer being taught by a peer tutor than via traditional teaching	105 (58.98)	58 (32.58)	13 (7.3)	2 (1.12)	0	91.56

I am more willing to engage in sessions taught by a peer tutor than during traditional teaching	106 (59.55)	63 (35.39)	8 (4.49)	1 (0.56)	0	94.94
I feel more confident learning	110 (61.79)	55 (30.89)	13 (7.3)	0	0	92.68

TABLE-3: – Peer Listener Perceptions of Peer – Assisted Teaching (N=178)

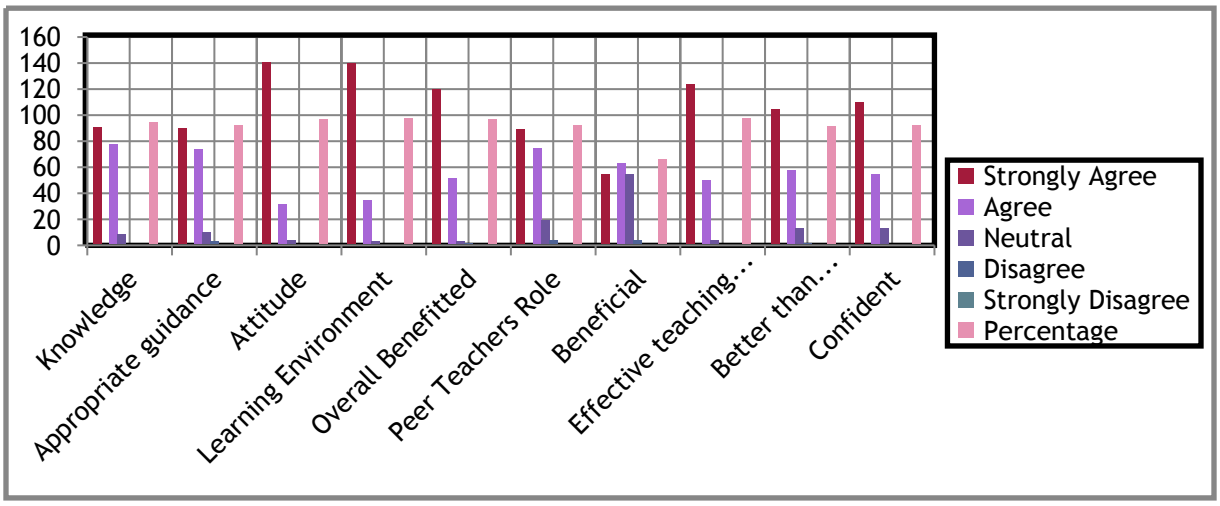


FIGURE-3: Peer Listeners Perceptions of Peer Assisted Learning on Likert scale (N=178)

It is established from table 3 that more than 90% peer listeners agreed that peer tutor had appropriate knowledge to teaching and for guidance. More than 95% peer listeners agreed that peer tutor were approachable and created welcoming environment for which they were benefited. 90% peer listeners agreed that peer tutors performed well in their teaching roles and they can serve as effective teachers.

As evident from Table-3, more than 90% peer listeners agreed that peer tutor had appropriate knowledge to teaching and for guidance. More than 95% peer listeners agreed that peer tutor were approachable and created welcoming environment for which they were benefited .90% peer listeners agreed that peer tutors performed well in their teaching roles and can serve as effective teachers.

		Strongly agree no (%)	Agree no (%)	Neutral no (%)	Disagree no (%)	Strongly Disagree no (%)	Percentage of agreement
1.	PAL is more interesting than traditional teaching .	11	5	4	0	0	80
2.	PAL was enjoyable and beneficial for the students	10	8	2	0	0	90
3.	PAL increased confidence in students	14	4	2	0	0	90

4.	Is an effective method for teaching .	14	4	2	0	0	90	
5.	PAL is time consuming	10	5	5	0	0	85	
6.	Pal activity is feasible	12	7	1	0	0	100	
7. .	Whole activity was motivating for faculty	14	6	0	0	0	95	
8.	I recommended this method to be used in other department	15	5	0	0	0	100	

TABLE -4: Faculty response of Peer assisted Learning on Likert scale (20)

As it is clear from analysis from the table 4, the faculty responses – 90% of faculty found PAL sessions are enjoyable, increases confidence of the students. They also supported PAL as effective method of teaching and learning. All of them agreed PAL as feasible TLM and they agreed to recommend the same as TLM in other departments.

DISCUSSION:

In the present study, peer listeners provided overwhelmingly positive feedback on the efficacy of their peer tutors. Over 90% of peer listeners reported that tutors possessed the requisite knowledge and guidance skills to deliver effective instruction. More than 95% agreed that tutors were approachable and fostered a welcoming environment, which significantly contributed to their learning benefits.[6] Additionally, 90% of peer listeners rated the tutors' teaching performance highly, affirming their potential as effective educators. This perception aligns with the inherent advantages of peer tutors- being closer in age and experience to learners, they better understand the specific challenges and difficulties faced by students. Consequently, students feel more comfortable disclosing their academic struggles and concerns to peers than to faculty, promoting deeper and more candid interactions.

From the perspective of peer tutors, medical students exhibited equally favorable perceptions. The act of preparing to teach compels students to construct personalized learning frameworks, enabling them to articulate concepts clearly to their peers.[7] Empirical evidence supports the positive outcomes of this strategy, including enhanced knowledge consolidation. In this study, over 95% of peer tutors reported opportunities to reinforce their own understanding of the material. Furthermore, 90% noted gains in tutoring confidence, presentation skills, and appreciation for teamwork dynamics.[8] These findings highlight the mutual benefits of PAL for both tutors and learners. For student learners, PAL facilitates holistic development across cognitive, psychomotor, and affective domains, leading to improved self-confidence, autonomy, clinical reasoning abilities, self-evaluation skills and collaborative competencies. [9]For student tutors, the program hones individual knowledge, technical skills, and professional attitudes while cultivating essential interaction and leadership abilities through practical application.

Faculty members in the Department of Physiology, expressed high satisfaction with the students' enhanced academic performance attributable to PAL implementation. An impressive 90% of faculty endorsed PAL as an effective teaching modality, citing its benefits in boosting student confidence and motivation. They advocated for its broader adoption across other departments, highlighting its potential to elevate overall educational quality.

The advantages of PAL extend beyond immediate academic gains, contributing to a more dynamic and student-centered learning ecosystem.[10] By leveraging near-peer relationships, PAL bridges the gap between theoretical instruction and practical application, allowing students to contextualize complex physiological concepts in a supportive, low-stakes environment.[11] Tutors, in turn, experience a reciprocal learning loop, where teaching reinforces mastery and exposes knowledge gaps for targeted remediation.[12] This bidirectional reinforcement aligns with social constructivist theories of learning, where knowledge is co-created through interpersonal dialogue rather than passive reception.[13]

Quantitative data from the study further validates these observations. High agreement rates among peer listeners (90-95%) on tutor competence and approachability suggest that PAL not only disseminates knowledge[14] effectively but also cultivates a psychologically safe space conducive to inquiry. Similarly, tutors' self-reported improvements in confidence and teamwork reflect the program's role in developing soft skills critical for future clinical practice. Faculty endorsement at 90% reinforces the strategy's scalability and institutional viability.[15,16]

CONCLUSION:

Peer-assisted learning (PAL) offers medical students a valuable platform to reinforce their knowledge, enhance tutoring confidence, and acquire practical teaching experience. This approach not only refines teaching proficiency but also bolsters communication skills through structured peer interactions. The provision of immediate feedback during sessions further optimizes learning outcomes by enabling real-time clarification and adjustment of misconceptions.

Students participating in PAL demonstrate heightened motivation and engagement, fostering a deeper interest in the subject matter. When integrated longitudinally—from the outset of the curriculum and sustained throughout—it cultivates essential professional competencies, ultimately producing competent Indian Medical Graduates (IMGs) aligned with national educational standards.

Participant responses to this innovative teaching-learning method were overwhelmingly positive. Students perceived PAL as engaging, relevant, and efficacious, promoting active involvement in the learning process. This shift encourages self-directed learning, empowering learners to take ownership of their educational journey. Additionally, PAL significantly boosts students' self-assurance in tutoring and presentation abilities, preparing them for collaborative clinical environments.

Institutional adoption of PAL has been robust, with college faculty embracing it as a core teaching-learning strategy. This evolution transforms traditional educators from didactic instructors into facilitators who guide and support student autonomy. By leveraging near-peer dynamics, PAL bridges experiential gaps, enhances knowledge retention, and aligns with competency-based medical education frameworks.

LIMITATIONS OF THE STUDY:

There must be must be a longitudinal study to get intermediate and long-term outcome in these students till they go and communicate with actual patients.

A comparative study could have been done where one control group would have undergone teaching through the traditional way and the other group would have been taught through PAL session. Educational projects require a lot of involvement and support of colleagues. If the same thing could be done in other departments also that would really bring meaning to what we are trying to achieve – enhanced learning and motivation.

Future Prospect:

Getting strong support from students and faculty for peer-assisted learning (PAL) sessions in enhancing undergraduate Physiology education, it would be better if we can introduce this plans to expand these initiatives. On a personal level request from my side to the administration to atleast try PAL across other departments which should be aimed at targeting intermediate and long-term project outcomes.

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