Research Article

Peer-Assisted Learning in Medical Institute

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Abstract

Objectives: To assess the efficacy of peer-assisted learning (PAL) among undergraduate medical students.

Methodology: We conducted a systematic review according to the PRISMA guidelines 2020. Data were collected from PubMed, PakMediNet, and Science direct using keywords. From 1911 articles in a search result, 890 were initially selected after duplicate removal and records removed based on time and language. The titles and abstracts were used to filter these 890 publications. After these, 16 comprehensive papers in total that matched our methodology were selected, from which data extraction was done. Original articles, cross-sectional studies, and randomized controlled trials published between 2018 to 2022 that assessed the usefulness of peer-assisted learning (PAL) among undergraduate pupils were included. All non-English articles were excluded. Commentaries, personal opinions, and conference proceedings were also excluded.

Results: Sixteen studies were eligible for inclusion and among them, fourteen studies (87.5 percent) were found to have sufficient and complete data to enable systematic review. Nine of these studies (64 percent) showed a significant improvement in examination scores and skills. Four (28.5 percent) of these studies indicated an increased level of motivation and confidence in the practical field. Out of all these, there is only one study that showed no important change between the PAL section and the control section.

Conclusion: The efficiency of peer-assisted learning has been demonstrated in improving the knowledge and to some extent academic performance of medical students. However, an adaptation of this method as an institutional tool will require long-term controlled studies to solidify the stance.

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Keywords: Peer-assisted learning (PAL), Systematic review, Medical students.

NTRODUCTION:

Peer-assisted learning (PAL) is a well-liked technique in various institutes, professional schooling, and everywhere connecting a procedure of interaction and socialization among pupils.1 PAL is an activity in which learners, who are not professional teachers, help other students in their academics.2 Generally, it refers to those people who are from the same social class helping others.3 A major problem faced by medical students is understanding, retaining, and then application of a difficult volume of medical information and related skills in a short framework of time during their studies.4 Therefore, PAL is a widely accepted educational method and is practiced by students in helping their fellows.

When compared to passive learning, active learning is expected to provide pupils with more knowledge and improved learning skills exposed to a variety of educational opportunities.5 eschewing conventional lecture hall educational approaches in favor of more student-centered active learning techniques has resulted in an evolution in medical education and training.6 During the past few years, the learning attitude of medical students has changed a lot and they no longer rely on didactic approaches; rather, they favor interactive lessons, peer-assisted learning methods, and active learning.7 This makes it necessary to look at practical solutions and approaches to interactive learning to cope with this pool of knowledge.

In medical and health professions, large amounts of data from various research are available reflecting the success of the PAL program.8-12 PAL program gives more time for individualized learning, interaction with same-level students, healthier environment for discussions.13 Compared to teachers, experienced students are more likely to offer preparation tips that apply to their fellow students.14 Pupils could feel at ease discussing their problems and doubts in a comfortable and friendly peer-assisted learning environment. Tutors also explain well at an understandable level to tutees.15 Recent studies found that peer tutoring has proven to be beneficial in terms of learning and preparation, forming a community, and acquiring applicable skills and guidance in a small-group setting.16 PAL may be utilized to enhance understanding an understanding of clinical skills (e.g. ECG) in medical students.17 Surgical skills taught through PAL resulted in increased confidence of medical students within a short period.18

Different comparative studies have been done to assess the efficacy of peer-assisted learning with faculty-assisted learning(FAL). PAL leads to a better understanding and retention of knowledge as compared to faculty-led training.18,19 Peer-led teaching sessions also help in reducing anxiety.19 A comparative study found that overall performance in academics and learning was not any higher in the PAL group as compared to the FAL group.20 Another study claimed PAL to be ineffective in improving the knowledge of medical students.21 However, PAL being a useful strategy may be used as a valuable adjunct to faculty-led teaching in medical schools.17-20

Literature has presented contraindicating statements about the effectiveness of PAL.22 Some researchers have proven the effectiveness of PAL in medical education8-19 while others claim it to be ineffective.20,21

This systematic review aims to determine the effect of PAL on undergraduate medical education. This research is designed to observe the outcomes of peer-assisted learning on the advancement of skills, understanding of concepts, active learning, and development of communication skills among students of undergraduate medical education

METHODS AND METHOD:

RESEARCH DESIGN:

A thorough examination was done in compliance with Preferred Related Items for Systematic review and Meta-Analysis (PRISMA) guidelines.

RESEARCH DURATION:

The time limit for included studies was from 2018_2022.

SAMPLING TECHNIQUE:

Three databases PubMed, PakMediNet, and Science Direct were used for conducting this review.

SAMPLE SELECTION:

Inclusion Criteria:

The Original research articles that explored the effectiveness of PAL in medical students exclusively and not in clinicians were included.

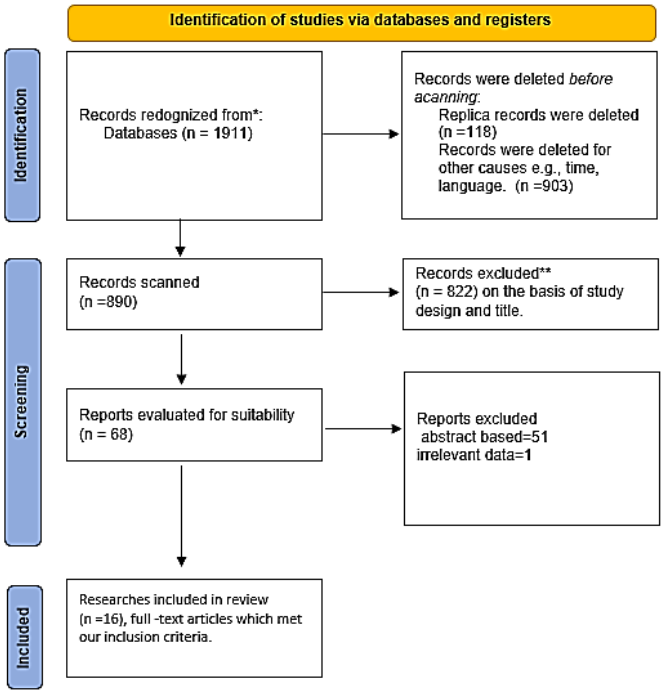
Cross-sectional studies and randomized control studies were included.

Exclusion Criteria:

1. Commentaries, personal opinions, and conference proceedings were excluded.
2. All the non-English articles were excluded.
3. Identified studies were uploaded on Mendeley and duplicates were removed.
4. The papers were extracted based on title and abstract and only full-text articles were reviewed.

RESULTS

Sixteen studies were eligible for inclusion and among them, fourteen studies (87.5 percent) were found to have sufficient and complete data to enable systematic review. Nine of these studies (64 percent) showed a significant improvement in examination scores and skills. Four (28.5 percent) of these studies indicated an increased level of motivation and confidence in the practical field. Out of all these, there is only one study that showed no discernible variation between the control section and the PAL section.

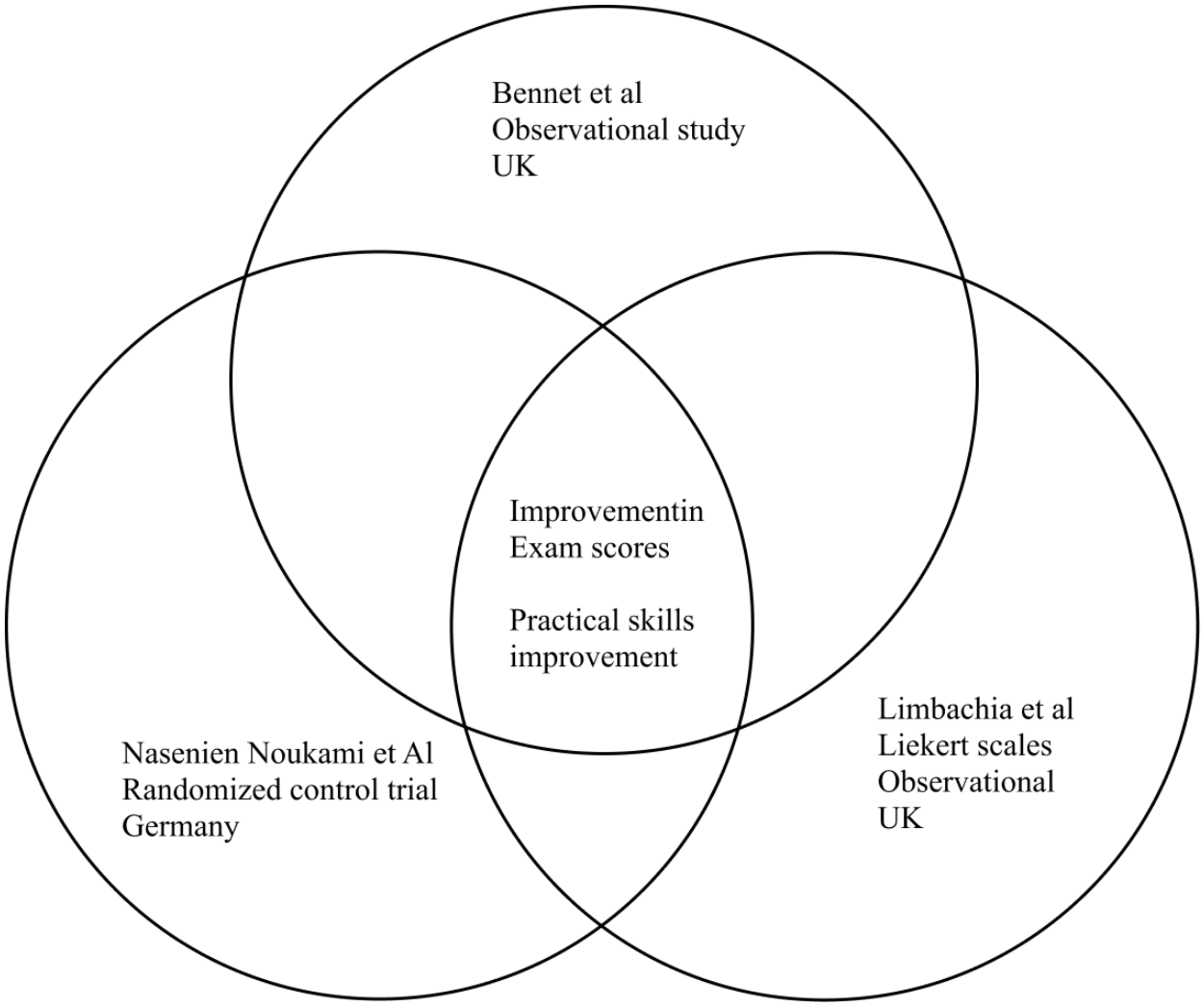


Sr. No.	STUDY ID			CHARACTERISTICS OF SAMPLE				COMPARATOR	OUTCOME	LIMITATION
	AUTHOR	YEAR	COUNTRY	STUDY DESIGN	TUTORS	TUTEES	DISCIPLINE			
1.	Saad M. AlShareef	2020	KSA	retrospective analysis	Faculty members Volunteer students	Fifth-year students	Internal Medicine	Between peer-led learning and faculty-led teaching activities	Students performed worse on subjects taught in peer-assisted groups.	There was no heterogeneity.
2.	Bennett et al.	2018	UK	An observational study (pre and post - course surveys)	Senior medical students, Foundation doctors	Medical students	Surgery	NA	Peer-assisted learning is an effective and feasible method for teaching surgical skills and improving confidence.	1) Selection bias. Further study is required to determine long-term effects.
3	Surabenjawong et al.	2020	USA	Randomized crossover trial	Nursing students	Nursing students	Basic airway management	Between peer-to-peer learning and training by an expert instructor	PAL was on the same level as standard techniques.	Inmaintaining long-term knowledge and skills, the efficacy of PAL is not compared with standard studies.
4	Zhang et al.,	2020	USA	An observational study (pre and post - course surveys)	students	students	pharmacogenomics	Between attendees and non-attendees of peer-led study sessions for student performance .Pre-course and post-course surveys for student perception.	Peer-led study sessions had a minimal impact on student performance and exam scores. Perception surveys indicated students believed that peer-led study session helps in building confidence and clarifying questions.	Optional study session attendance and varied attendance resulted in inconsistent participation and low attendance.
5.	Sethi et al.	2022	India	An observational study (pre and post - course surveys)	Medical interns	Second-year medical students	Ophthalmology	NA	PAL is an effective method for learning and teaching. Teaching pressure can be reduced	The impact of difficulty levels on the outcome the of study has not been observed.

6.	Limbachia et al.	2018	UK	An observational study (pre and post - course surveys)	Senior medical students, Foundation doctors	Medical students	Surgery	NA	Peer-assisted learning leads to improvement in confidence and skills both.	NA
7.	Demak et al.	2021	Indonesia	Quasi-experimental study	3rd-year medical studen	2nd-year medical student	Pharmacology learning	Peer-assisted and non-peer-assisted learners	In experimental studies, student motivation was higher than in the control group but performance score was less than the control group	N/A
8.	Lu et al.	2022	USA	An observational study (pre and post-course survey)	Senior medical students and general surgery resident	1st-year medical students	Learning Basic surgical skills	Pre-course v/s post-course survey response	Students showed an improvement in confidence to perform knot ties and sutures	Small sample size, student selection bias.
9.	Jawhari et al.	2021	Saudi Arabia	Cross-sectional study	Senior medical student	Junior medical student	Clinical research skills	Self-directed learning vs peer assisted learning	Improvement in scores, perception of knowledge, and self-confidence.	N/A
10.	Schaffer et al.	2021	UK	Descriptive study	Senior medical students taught by the surgeon	medical students	Basic laparoscopic skills	Comparison of the effectiveness of PAL between preclinical and clinical medical students	PAL was effective in teaching laparoscopic skills to students	Students, selection bias
11.	Uppal et al.	2020	India	Experimental study	Faculty member, Senior medical student	Medical student	biochemistry	Comparison between students taught by seniors vs those taught by faculty	small group teaching is better than the traditional method.	N/A

12.	Taylor et al.	2021	UK	Observational study	Medical Students	Medical Students	Neuro-anatomy	NA	An improvement in the perceived knowledge of students was observed and they appeared to be more confident in learning neuroanatomy. This novel study method invoked excitement among the students and made their learning enjoyable.	The absence of a control group and the small sample size were the main limitations of the study. So the results of the study could not be generalized globally to medical students.
13.	Brunelli et al.	2020	Italy	An observational study (pre and post – study assessment)	5th Yr. medical students	5th Yr. medical students	Medicine	NA	There was an improvement in correct answers by the students in the post-interventional study assessment as compared to the pre-interventional study assessment. Also, students were more satisfied with the method (PAL).	The sample size was small. A control group that would have been taught by professional teachers was not studied.
14.	Nourkami-Tutdibi et al.	2020	Germany	Randomized controlled trial	Volunteer Students	Students	Ultrasound	NA	Students gained significant knowledge and their performance on the test was improved. PAL was found to be effective in knowledge retention.	The sample size was small (40). The clinical application of the knowledge gained by the students in this study was not assessed.

15.	Hamza et al.	2019	Germany	Cross-sectional study	trained students	undergraduate students	basic obstetric and gynecological ultrasound	. NA	This method is useful to teach students gynecological and ultrasound skills	It should be further evaluated in its effectiveness.
16.	Frisch et al.	2020	USA	Cross-sectional study	peer (MS2 students) led small group and faculty-led large group	undergraduate medical students in the first year	physiology	peers over faculty	PAL proved to be more effective than the faculty based learning	1) exposure of students before starting the course was not controlled 2)Group size differences



A study conducted by Limbachia et. al (2018) assessed the course and questions finished by 34 students. The mean improvement on Likert scales (1–10) is as follows: (+1.32) WHO medical checklist Hand washing/cleaning (+1.79), donning a gown or a glove (+1.09), tying a knot (+1.97), interrupting a stitch (+1.72), and continuing a stitch (+1.03). Additionally, students filled out Likert scales (1–5) to rate how well the curriculum about medical school readied them for medical postings (2.09) if the course was recommended (4.91), and whether it increased their intention to begin a profession in surgery (4.35). 23

In another study conducted by Bennet et. al (2018), the mean scores for all eight domains increased overall. Cleaning, knot tying, interrupted sutures, continuous sutures, gloving, vertical mattress sutures, and local anesthetic all had mean developments between pre-course and post-course.

In a research performed by Zhang et. al (2020), there were no discernible differences between the attendance groups. Attending students had a considerably better chance than non-attending students in the spring of 2017 of passing 2 of their 6 examinations (p =.04, p =.0029) and having better marks on one examination (p =.02). Attendees and non-attendees had substantially different average exam scores in the spring of 2017 (p =.03), but not in the spring of 2016 (p =.38). According to insight studies, pupils thought that participating allowed them to show their competence and develop confidence. Furthermore, students said that compared to the classroom, they felt more comfortable addressing queries during group sessions.34

A survey was conducted by Sethi et. al (2021). The survey received responses from 82 out of 100 tutees and 21 out of 24 tutors in total. The second DOPS session greatly enhanced the first (p = 0.001) for all clinical abilities, and tutors thought they were knowledgeable and helpful as teachers. The NPAL sessions were useful for the tutees in gaining clinical skills. Before and after tests mark considerably increased (p = 0.001), and the end-of-term assessment revealed that all clinical skills were applied satisfactorily.24

120 trainees from 3 followers accomplished the assignment over the study period. The average student marks (percent of right answers) for queries about lectures were (n = 85, M = 68.7, 95 percent CI: 66.4-70.9). Those pertaining to case scenarios were (n = 34, M = 68.6, CI: 65.1-72.1),

. The ones related to tutorials showed (n = 15, M = 64.9, CI: 59.9-69.8). Additionally, concerning seminars the results showed (n = 24, M = 60.0, CI: 56.5-63.5) differed statistically significantly (p.00 The first cohort performed statistically significantly better than the other 2 followers (group 2 M was 57.2, CI: 51.8-62.5 and group 3 M showed 60.5, CI: 58.1-63.0; p.001) when relating to overall scores. (M = 79.7, CI: 77.9-81.6). These were the outcomes of the research performed by Al Shareef et. al (2020). 21

In another study by Surabenjawong et. al (2020), a significant increase in skill rating grades and a huge effect size was noted, in 48 students who participated

in peer-to-peer learning (p-value. 002) to undergo insertion into the oropharyngeal airway, 1.14 (p-value. 001) for nasopharyngeal airway insertion, and 0.81 (p-value. 003) for bag-mask ventilation) had peer-to-peer learning. Scores obtained before and after learning nothing varied (p-value of 0.13 and.22, correspondingly). Both teams claimed higher levels of confidence.32

In terms of the level of motivation regarding interest (79.09 13.11 vs. 75.24 13.46; p = 0.411), the value of motivation (80.89 11.57 vs. 76.54 12.20; p = 0.292), perception of motivation (66.26 7.44 vs. 666.20 10.09; p = 0.977), also overall motivation (76.33 9.33 vs. 73.31 In comparison to the treatment group, it was shown by Demak et. al (20210 that the control section had a better performance score (60.45 6.39 vs. 60.67 4.72; p = 0.649).35

Results of the study conducted by Lu et. al (2022) evaluated the after-course assessments of confidence perception in themselves to execute different knot-ties and closures all improved meaningly (p <0.05) compared to pre-course values. All of the students acknowledged that the course fueled their ambition to work in surgery. Overall, students gave the course optimistic reviews.33

The pre-test score was much lower than the post-course knowledge score. This was the finding of Jawhari et. al (2021). The way that students perceived peer-assisted learning was favorable. Peer-assisted learning was favored by more than 90 percent of the students over traditional instruction. The tutors also had remarkably favorable opinions of peer-assisted teaching. Peer teaching was well-received by younger pupils who scored more knowledge points on the post-test.29

In the study by Brunelli et. al (2020), 62 students were given PAL intervention attention. When analyzed both generally and by area (HP/CRM), the difference in the total right responses between the pre-and post-intervention surveys revealed a clinically meaningful increase (P 0.0001). CRM had higher student satisfaction than the HP region (P = 0.0041).30

Results of the study conducted by Nourkami-Tutdibi et. al (2020) had average results of 13.1 for the before-test and 83.5 (maximum of 100 points) for the post-test, all sections demonstrated a statistically noteworthy enhancement in their applied abilities and information after the training (p 0.001). The final mark after a year was 78.7, which was virtually identical to the post-test result.26

Hamza et. al (2019) studied the efficacy of student tutor-based short teaching courses. This ultrasonography course attracted 111 students. A statistically significant improvement was seen in the multiple-choice, subjective, and practical multiple-choice questions (MCQ) exam (50 vs. 90 percent, p 0.05). Learners demonstrated strong acceptance (Likert 1.7) and medical skill acquisition during the practical phase (Likert 1.8). The kids gave the student tutors a good mark as well (Likert 1.3)25

Over the three review sessions, in a study by Frisch et. al (2020), 146 MSI responses were gathered. Examination review workshops were well-attended, with 104 MSIs participating in 69.8 percent of the peer-led and faculty-led workshops, 23.5 percent of

the peer-led discussion, and 6.6 percent of either the live session or later viewing of the recordings.19

DISCUSSION:

Peer-assisted learning is a non-conventional teaching methodology that has been used by a lot of students worldwide. However, it has not been adopted as an official teaching strategy.

On the other hand, medical education is at crossroads. The efforts of mankind and research work have resulted in exponential growth in medical knowledge. As a result, medical knowledge is not limited to a few domains but includes a vast variety of several domains. It imposes escalating pressure on medical students to acquire this knowledge through different sources. Peer-assisted learning can prove itself as an important adjunct to faculty-led teaching methodology. Our review considers the influence of peer-assisted learning on several characteristics of surgical schooling including academic scores, confidence, and skill enhancement particularly surgical skills.

A total of 16 articles met the inclusion criteria and they include researches which were conducted in several parts of the world including the USA, Saudi Arabia, Germany, Italy, and India.

Out of 16 articles studied, 11 articles have provided us with sufficient information regarding enhanced performance through peer-assisted learning. Several studies have also supported the gain in confidence through peer-assisted learning. However, 3 studies suggested no impact or minimal influence of peer-assisted learning on students' efficiency. Both negative and positive impacts are discussed. These studies suggested that peer-assisted learning can help us in developing interests in a particular field. It can help us to cut down the cost associated with medical education and alleviate the escalating pressures on already burdened medical colleges. These studies also impose great stress on quality control, tutor learning, and ensuring the commitment of tutor students towards peer-assisted learning.

Out of 11 articles that suggested enhanced performance, some articles were particularly relevant to surgical skills.

Bennet et al. (2018) conducted an observational study in which 70 students participated in surgical skill courses in eight domains from December 2016 to January 2017. Mean improvement in scores was observed in four of the eight domains including knot tying as well as different kinds of sutures.18

Limbachia et al. (2018) conducted an observational study in which 34 students participated and Likert scales have shown improvement in performing surgical skills.

The review also focuses on studies that have shown improved academic performance and other skills through peer-assisted learning.23

Sethi et al. (2022) conducted an observational study for evaluating near PAL for teaching ophthalmology skills. Comparison of the marks before and after the test displayed important enhancement ($p=0.001$). Also, a satisfactory improvement was observed in the performance of clinical skills.24

A. Hamza et al. (2019) conducted a cross-sectional study for assessing the effectiveness of undergraduate obstetric and gynecological ultrasono-

graphy courses taught by student tutors. This ultrasonography course has 111 students enrolled. There was a significant increase in the scores of multiple choice questions as well as subjective and practical (50 vs. 90 percent, $p<0.05$). Students in the practical round reported a high level of recognition and subjective medical skill acquisition. The student tutors were also given high marks by the students.25

Nasenien-Nourkami (2019) et al. conducted a randomized controlled trial in which knowledge of long-term preservation after Peer-Assisted Abdominal Ultrasound Teaching was assessed by .40 student volunteers enlisted for the course, out of which 15 students were assessed next year. All groups improved their practical abilities and knowledge acquisition significantly following the schooling, with mean values of 13.1 for the pre-test compared to 83.5 (maximum 100 points) for the post-test ($p<0.001$). The total marks after one year were 78.7, which did not change much from the post-test score. As an outcome, PAL is an effective strategy for long-term learning.26

Taylor et al. (2021) performed observational research in which forty-two second-year psychology pupils took part in a two-hour neuroanatomy session led by third-year undergraduate medical students. The scores after teaching were statistically substantially higher ($p<0.005$).

• Student learners' gained level of knowledge was considerably greater after the workshop than before ($p<0.005$).

• Following the workshop, students felt noticeably less worried about learning anatomy in the laboratory than they had earlier ($p<0.008$)

• After the workshop, student learners were noticeably more enthusiastic about learning neuro-anatomy in the lab ($p<0.045$).27

Frisch et al. (2020) performed cross-sectional research to demonstrate the preference of peers over faculty. by comparing peer-led sessions and peer lead sessions. The results demonstrated that peer-led review sessions were more helpful than faculty-led review sessions in helping them grasp the application of physiological principles. Students also felt that peer-led small-group sessions reduced anxiety more than faculty-led sessions.19

Sierra Schaffer et al. (2021) conducted a descriptive study for evaluating the role of PAL in laparoscopic simulation training.31 medical students participated in the training. (12 pre-clinical,19 clinical). Task A's pre-simulation was finished by the clinical students 25 percent quicker than the pre-clinical learners. However, the mean time after simulation for each section was found to be similar. As a result, clinical learners were more informed than pre-clinical learners across all knowledge subjects immediately following the simulation (pre-clinical = 54.4 percent of cohort accurate, clinical = 77.5 percent of cohort correct).28

Abdulkarim et al. (2021) performed cross-sectional research in which the attitudes and views of 121 students and 38 tutors about peer teaching were assessed. The post-course knowledge score outperformed the pre-test score substantially. Pupils viewed peer-assisted learning favorably. Peer-assisted learning was favored by more than a

90percent of students over traditional instruction. Similarly, instructors had overwhelmingly favorable attitudes toward peer-assisted learning.29

Laura Brunelli et al. (2020) did observational research (before and post-assessment) to investigate the influence of HP and CRM PAL interventions on the knowledge level of medical students. There were 62 students evaluated. When analyzed worldwide and by region (HP/CRM), the variation in total correct responses between pre-and post-intervention surveys revealed a statistically important enhancement ($p<0.0001$).30

Vibha Uppal et al. (2020) conducted an experimental study in which jigsaw learning was used as a form of PAL. Following the completion of the jigsaw activity, the marks of pupils from group 2018-2019 on the topic "Nucleotide metabolism and DNA repair" in internal evaluations were compared to the marks of students from group 2017-2018 in the same subject. The 2017-2018 batch and the 2018-2019 group test results were compared. The topic's maximum marks were ten points. The batches' mean SDs were 5.12 0.79 and 7.45 0.90, respectively. This distinction was shown to be statistically important.31

Surabenjawong et al. (2022) conducted a randomized crossover trial with 48 students in which peer-assisted learning resulted in significantly higher scores in oropharyngeal airway insertion($p=0.002$) nasopharyngeal airway insertion($p<0.001$) and bag-mask ventilation.32

Several studies supported enhanced confidence through peer-assisted learning. These studies have indicated enhanced motivation and positive perception of students towards peer-assisted learning. It can be attributable to the fact that students feel comfortable learning and asking questions from their peers as compared to faculty members. Peer-assisted learning also helps in boosting confidence among peer tutors and enhances their academic performance as well.

Lu et al. (2022) conducted observational research in which 1st-year medical students partook in a suturing and knot tying course given by older students, and post-course self-confidence was significantly raised ($p<0.05$l for executing various sutures and knot ties). This activity also helped the students in inculcating interest in surgery as a field for pursuing in the future.33

Bennet et al (2018) also reported enhanced confidence as it is 87.1 percent of students felt unprepared for the surgical placement before the course but post-course students rated their confidence 7 out of 10 in all the domains except local anaesthesia.18

Limbachia et al (2018) and Zhang et al (2020) also reported enhanced confidence among students through peer-assisted learning.23,34

Several studies, however, reported minimal to no impact and even negative impact of peer-assisted learning on the performance of learners.

Zhang et al (2020) conducted an observational study where students participated in pharmacogenomics courses in 2016 and 2017. No important variations were observed in the two sections in Spring 2016. However, significant improvement was observed in 2017 through peer-assisted learning. Overall this

study suggested a minimal impact of peer-assisted learning on performance.34

Demak et al (2021) conducted an experimental study on second-year medical students. The performance scores were higher in the control group as compared to the experimental group (the group where students were involved in peer-assisted learning) (p =0.649). Peer-assisted learning was reported to be inferior to conventional teaching methods in this study.35

Al Shareef et al (2020) conducted a cohort study in which 120 students participated in 3 cohorts. The first cohort had significantly improved grades than the other two student cohorts performed on questions from the peer-taught seminars. These results are because of poor teaching by peer teachers, lack of quality control and tutor learning, and lack of commitment to the designed peer-assisted activity. Thus quality control programs, monitoring, and evaluation can play an important role to make peer-assisted learning a productive activity in such cases.21.

CONCLUSION:

Peer-assisted learning has gained significance over the last few years in this modern era of ever-increasing knowledge and ever-changing medical science. PAL, at the same level or in a senior-junior relationship, is a great instructional tool in terms of enhancing academic performance. Even more striking were the results obtained in the enhancement of surgical skills. Although few studies found little or no improvement and some studies find a negative influence of PAL on learning, it can be concluded that PAL, though unconventional and unofficial, has proven to be beneficial to medical students. Moving forward, to adopt PAL as a formal instructional tool, further research is needed to solidify the statement.

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