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The Effects of Peer-Assisted Learning on Clinical Skills Development to Undergraduate Pharmacy Students: a Quasi-Experimental Study

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Abstract:
Peer-assisted learning (PAL) is a beneficial educational tool that has been introduced in the sphere of healthcare education to foster cooperation, interaction, and support of the academic skills by students. The quasi-experimental research designed was meant to assess how clinical skills can be developed in undergraduate pharmacy students under the influence of PAL within the third year of study. Ninety-two students were randomly assigned to two groups one group which received a PAL intervention and a control group which had the usual faculty-led teaching. In the PAL intervention group, structured peer-led sessions were conducted whereby the students were involved in sessions focused on counseling the patients, taking medication history, and clinical problem-solving. The results were measured in Objective Structured Clinical Examinations (OSCEs) and done both prior to and following an 8-week training. The findings revealed a much higher improvement on the OSCE scores obtained by the PAL group (overall increase of 18.4%) as compared to the control group (overall increase of 9.7%, $p < 0.01$). And as an additional feedback, students showed increased satisfaction, confidence and communication skills development. These observations indicate that PAL could be used to provide valuable supplements to more traditional pharmacy curricula that help develop leadership, peer mentorship, and clinical competence in students.

Keywords: ***Clinical skills, clinical problem-solving, educational strategy, Objective Structured Clinical Examination (OSCE), Pharmacy education, pharmacy undergraduate students, peer assissted learning, patient counseling, peer mentorship, teaching faculty.***

1. Introduction

1.1 What is Peer-Assisted Learning in Pharmacy Education?

An educational strategy, which promotes teaching, learning and a supportive climate of learning between students, is Peer-Assisted Learning (PAL). In pharmacy education, PAL is a process through which third year pharmacy students conduct structured tutorials in which the third year pharmacy students teach their peers the key clinical skills in pharmacy practice that included the ability to counsel patients, take medication histories, and solve clinical problems. PAL is explained by the idea that peer interactions promote active learning, communication skills, and the emergence of leadership potentials of the students. In the recent years, PAL in healthcare education became popular as it involves deeper learning and higher student engagement levels and allows students to constantly teach each other and learn, hence, further supplementing knowledge and improving self-confidence.

PAL has many applications in pharmacy education in the clinical setting whereby senior students mentor junior members to learn complex clinical situations. The given type of group learning does not only enhance academic success but also attains solving skills of the students and provides them with an opportunity to use theoretical knowledge in practice. The peer mentorship aspect is what is important in building a conducive learning environment, and this environment is critical in the development of interpersonal and professional skills required in delivering high-quality pharmaceutical care.(1)

1.2 Clinical skills as part of undergraduate training

The practice of pharmacy is based on clinical skills. Being a future healthcare worker, a student of the pharmacy field has to acquire their practical skills in the spheres of counseling a patient, taking medication history, and solving problems in a clinical context. These are the essential competencies that must be in place in interacting with the patients, where there are problems concerning medications, and providing effective solutions in order to uplift the outcomes of the patients. In the case of pharmacy students at the undergraduate level, developing clinical aptitudes at an early stage in their studies will make them ready to serve on multidisciplinary healthcare teams and enable them to contribute to the efforts of multidisciplinary healthcare teams in caring and treating patients.

It is in pharmacist education that Objective Structured Clinical Examinations (OSCEs) are usually applied to determine clinical competencies. OSCEs enable students to identify their capabilities in a real life clinical situation and this gives an objective assessment of student clinical performance. With the multifaceted aspect of clinical practice, a good background in these capabilities instills confidence in students not just in their capabilities as they face clinical placement and the subsequent practice in a community or hospital pharmacy.

But the learning of these skills cannot be realized only with the help of theory. The students require practical experiences in the real-life scenarios, where they can be taught by both teachers and classmates. It is here that PAL would be a very effective tool. Not only do students reinforce their own knowledge by teaching and reinforcing clinical skills to other peers, but they are also helping in developing their cohort academically.(2)

1.3 Requirement of New Teaching Methods

Lectures and other demonstrations given by faculty members are examples of the old pedagogical techniques used in pharmacy education that have been effective in presentation of the material that forms the fundamental theoretical understanding. Such methods are however not always interactive and consequently active generation of deep learning of clinical skills, which are central to pharmacy practice is not created. In addition, Passy said that students can have problems of transferring theory into practice, especially when they operate on the life patients in the clinic.

The active need in terms of novel teaching methodologies is to employ units of active learning, joint problem solving, and feedback among students. The given strategies are active ones, and they make students think independently and improve their self-reflection. Peer-assisted learning represents an active method of teaching that has been proven successful in many spheres of health care, such as in medicine, nursing, and pharmacy. PAL enables the learners to assume the roles of a teacher and a learner by strengthening their knowledge, as well as developing interpersonal skills including communication, understanding, and collaboration.

1.4 Rationale and objectives of the study

Although there is an increasing awareness about PAL in pharmacy education, its effects on clinical skills acquisition is under-studied especially against the background of an undergraduate pharmacy curriculum. The purpose of this research work is to determine the usefulness of PAL as a tool in enhancing clinical ability departments among pharmacy students in relation to the skills that are important in patient care. They will establish whether peer-led sessions lead to increased clinical competence in such aspects as patient counseling and clinical problem solving, in Objective Structured Clinical Examinations (OSCEs).(3)

Perception of students towards PAL will also be addressed which includes effectiveness in gaining confidence, communication skills and level of getting along with the peer group. Exploring not only an increase in quantitative metrics used in clinical evaluations, but also subjective responses by the students, the given research aims to give a holistic picture of how PAL may be advantageous in terms of pharmacy education and how it can become a supplement to the classical faculty-driven teaching. In the end, the objective remains to identify whether PAL can be used as a useful aid when promoting the growth of clinical skills and educating students on their future roles in the medical field.

2. Study Design

2.1 Nature of Study and Methodology

The structure of the study is quasi-experimental in nature to determine the effects of peer-assisted learning (PAL) on learning of clinical skills on undergraduate pharmacy students. The quasi-experimental design was selected on the fact that it was impossible to randomly assign students to the intervention and control groups without taking them out of the academic setting. Rather, the students who were enrolled and participated in the course in advance were assigned to either PAL intervention or control group according to the preferences. The control of study skill acquisition of clinical students is possible in that there is comparison between students who were exposed to the PAL intervention program and the traditional faculty-led teaching program.

The pre-post assessment method was used in which both the sides of the group were evaluated on their expertise in clinical skills in terms of Objective Structured Clinical Examinations (OSCEs) after and before intervening 8 weeks. This will enable evaluating the changes in clinical skills and the chance to compare the two kinds of peer-assisted and the faculty-led learning approaches to teaching.

2.2 Time and Place

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The 8 weeks duration of the intervention is long enough to relevant changes in clinical skills of students, and there is ample time to plan and have the peer-led sessions according to their schedules. The research was carried out in the third year of the five-year pharmacy program where the learners are supposed to gain practical clinical skills. This schedule will make sure that the students will have already acquired the basic theoretical knowledge, which can be implemented and enforced via peer-assisted learning.

The study took place in the university setting, within pharmacy education department where clinical training of students is a regular activity. The two groups were both involved in their respective learning throughout the semester with the intervention group undergoing peer-led learning sessions and the control group undergoing the conventional faculty led learning activities.(4)

2.3 Allocation of groups

The study was conducted on 92 third year pharmacy students. The participants were students who were classified as follows; the PAL group, and the control group. The allocation of the groups was determined by the course that the students were enrolled in with the intervention group undergoing a defined set of PAL sessions to train in clinical skills and the control group using the traditional lecture- and practice-based learning approach that was typical of the faculty. It was not possible to have randomization because it is a quasi-experimental design; however, the teams were equal based on this design methodology, and the results were measured at the beginning and the end of the 8-week time frame to show the progress of the development of skills.

3. Participants

3.1 Criteria of Eligibility

The research in this case involved undergraduate students pursuing pharmacy who were in the third year of their studies in a university program of pharmacy. The eligibility process was aimed at picking students at an appropriate level of education so that they could make fruitful use of peer-assisted learning (PAL) as well as take clinical skill exams. The most important inclusion and exclusion criteria are the following:

Inclusion Criteria:

- Third-year pharmacy students will have to be in the program.
- Students will have had some elementary theory work as well as initial clinical skills training and will bring with them a grounding in the main subjects of patient counseling, history taking of medication as well as clinical problem solving
- As a requirement of the study, students will have to be ready to take part in peer-based learning activities, as well as clinical assessment.

Exclusion Criteria

- Students enrolled in the third year who did not fit the criteria of the intervention because of prior knowledge and students that might miss the intervention were left out.
- Students with a prior involvement in a peer-assisted learning program or prior exposure to similar clinical skills interventions in large amounts were also eliminated so that all the participants came with equal baseline knowledge.
- Students with physical impairments or medical issues that might impinge their involvement in the clinical skills exercises were excluded, as this assured a balanced experience in their involvement in the clinical training activities in the study.

3.2 Demographics of a Student

The total of 92 students took part in the study; the distribution on the gender basis is around 55 female and 45 male students. The students were between the ages of 20 to 24 years, which are largely the student age proportionate of third year undergraduate pharmacy students. In culture and socio-economic background, the cohort was heterogeneous since the university draws other regions and communities.

They also have a mean GPA of 3.5 (of 4.0), which shows that they were already academically competent but not yet at the further levels of practising clinical medicine. Students at this point of education were supposed to have a general idea on what pharmacy practice necessitates, although they lacked practical experiences to practice clinical situations. This qualifies them as suitable participants in an intervention that tries to build the clinical skills by using organized peer interactions.(5)

3.3 Group characteristics

The students were stratified in two groups i.e. PAL intervention group and control group. The formation of the students into these groups was not done by randomization but rather with regards to their course schedules and study preferences since random assignment could not be possible in the context of scheduling the course. Consequently, both groups were comparatively similar in terms of their baseline characteristics, thus potential differences observed in the acquisition of clinical skills could not be ascribed to the preexisting disparities between the two groups.

PAL Intervention Group: The group underwent organized peer led learning. Learners in this group performed both roles of a student and an instructor leading their colleagues in numerous clinical skills activities such as counseling a patient, medication history, and problem-solving in a clinical setting. The PAL sessions relied on third-year students and the main aim was to assist the students to solidify their own learning and also help their classmates to attain the same clinical abilities.

Control Group: The control members went through conventional faculty-based learning in gaining clinical skills. Such students also attended lecture-based classes and hands-on led by the faculty. This group emphasized receiving instructions directly by the faculty in a clinical setting without being provided with the interaction with peers as offered in the intervention.

Objective Structured Clinical Examinations (OSCEs) were used to evaluate the two student groups at baseline and post-intervention, which gave each group of students an objective estimate of their growth in clinical skills in 8 weeks of intervention. Comparisons between the outcome measures were done to determine the ability of the PAL intervention to record better results in clinical competence than their conventional counterparts in their area of instruction.

4. Intervention

4.1 PAL Sessions Design

The Peer-Assisted Learning (PAL) sessions were designed in a manner to ensure a good interactive, and collaborative session environment whereby the third-year pharmacy students would have made use of an active student-centered learning procedure that would have been composed of some organized, peer-led activities. The PAL meetings were conducted in 8 weeks and were conducted weekly with a duration of 90 minutes. These sessions were weekly and small groups between 8 -10 students per sitting.

All the sessions were moderated and had a certain structure that included the general introduction by the peer leaders into the goals and objectives of the given session and the interactive activities aimed at training certain clinical skills. The principal attributes of the PAL sessions entailed role-playing, the use of the case studies, and the practical implementation of clinical practices when students alternated as the participants of the process of counseling a patient, taking a medication history, and solving a patient-related clinical problem with their colleagues. The students were also asked to give feedback to each other; this would promote an atmosphere of peer mentorship.

After each session, engaging in a debriefing was the last thing to be done and here, the peer leaders conducted a group discussion that allows them to reflect on what was taught, what can be done better, what are some of the questions and challenges that were encountered during work on the exercises.(6)

4.2 Subjects of Order

The PAL sessions were specific to core clinical skills that are necessary in the practice of pharmacy with specific consideration to undergraduate pharmacy students in the third year level. The major themes covered in 8 weeks intervention were:

Patient Counseling: Communication practices to uplift the obligation of dealing with patients over medication regimen, possible side effects, as well as assimilation tactics.

Medication History taking: Educating on the process of conducting thorough and correct medication histories on patients, including going over current medications, allergy, and past treatment schedule procedure.

Clinical Problem-Solving: Stimulating the use of critical thinking in solving clinical problems among students, recognizing problems under the use of drugs, and offering possible treatment options or suggestions.

All the sessions aimed at giving the students the style to practice these skills in a well guided, helping atmosphere leading to their peers expanding the skills and gaining confidence.

4.3 Peer Leaders Role

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Leaders who facilitated the PAL sessions were third-year pharmacy students called peer leaders. Leading discussion, planning activities and giving constructive feedback to peers were the works of these students. They were also mentors and coaches and assisted the students on difficult clinical situations. Although the peer leaders were truly engaged in teaching and directing the learning process, they also engaged in the activities which strengthened their clinical skills and leadership roles.

4.4 Support and Supervision of the Faculty

Faculty members gave the necessary support and supervision to make sure about the quality and the efficacy of the PAL meetings. They would also guide the peer leaders on the how they could conduct the sessions, train the leaders before the program commenced, and ensure that the content covered in each session was appropriate and in line with the program. The faculty members also developed periodic evaluations to gauge on the progress of the PAL sessions, offer feedback to the peer leaders and make adjustments where need arises in the curriculum. This assistance was used to promote the fact of the peer-led intervention supplementing the traditional instruction and upholding high education levels.(7)

5. Assessment Methods

5.1 Construct and structure of OSCEs

The Objective Structured Clinical Examination (OSCE) served as the preferred assessment tool in the study aimed at testing the clinical skills of undergraduate pharmacist-students pre- and post behavioral intervention done in one semester. OSCE is a popular and valid instrument of the evaluation of clinical competencies in a structured and objective direction. It is a sequence of station-based exams through which students go through different clinical situations aimed at challenging the students in terms of practical skills, problem-solving capabilities, as well as communicating in real-life scenarios.

All the students had to fulfill a set of activities at various stations and they were intended to represent the popular clinical scenarios in the sphere of pharmacy practice. Elements of the OSCE were:

Patient Counseling: Students were supposed to show effective communication with a simulated patient in explaining the use of medicines, its side effects, and any questions applied to the prescribed therapy.

Medication History Taking: In this station, the students had to elicit a pertinent set of a medication history of a simulated patient, including current known medications, allergies and any historic incidences of adverse reactions.

Clinical Problem-Solving: Students solved a clinical case scenario and found the medication related issues and suggested a therapeutic solution. This challenged their critical thinking and clinical decision making skills.

Communication and Professionalism: The other part of the OSCE was the ability to communicate and remain professional with patients in clinical situations with the ability to make the students appear empathetic, competent communicators, and culturally aware.

A trained evaluator used a checklist of anticipated behaviors and outcomes in scoring each station. The test was intended to evaluate the applied abilities of the students in the real-life scenarios having the objectivity and consistency among all of the participants.

5.2 Pre-Evaluation

A baseline assessment through an initial OSCE was administered to all the students before the 8-week intervention was given. This assessment enabled the researchers to assess the current level of clinical competence of every individual student concerning patient counseling and medication history taking as well as clinical problem solving. The outcomes of this pre-test would give a yardstick against which any improvement that may come as a result of intervention may be quantified.(8)

On top of the OSCE, students were also requested to fill in a self-assessment questionnaire, which provided the assessment of their confidence, communication skills, and attitudes towards clinical practice. The self-assessment was used to get an idea of how the students felt towards their abilities prior to the intervention, and at what they were lacking.

5.3 Evaluation Post-intervention

The measurement of the impact of the 8-week PAL intervention was done using a secondary OSCE, again in the form of pre-and post-intervention assessment meaning that the number of stations and tasks were equal. The post intervention assessment focused on evaluating the comparison between the level of clinical competencies at the beginning and after the course of complete intervention in terms of patient counseling, medication history taking and clinical problem-solving.

Beyond the OSCE, the students were again requested to fill a self-assessment questionnaire to determine the shifts in the level of confidence and communication skills. Their feelings pertaining to their being subjected to the PAL program also formed a part of the post intervention survey that also gathered their opinions on how they felt using the peer assisted learning helped them in their learning and evident potential as a learner.

The information collected during the pre- and post-OSCE assessments was compared in order to draw any conclusions on the contribution to clinical competence and skill acquisition. Statistical comparisons were conducted to establish whether PAL intervention placed more improvement in clinical skills than the conventional faculty-based training. Also, the self-assessment inquiry and student satisfaction survey results contributed to the qualitative feedback, which can only give insights into the efficacy of the PAL program in paving the way towards peer mentorship, leadership, and confidence in the clinical practice.(9)

6. Data Analysis

6.1 Tools to be used in Statistics

The analysis of the data collected in this quasi-experimental research project included some statistical measures and procedures to determine the efficiency of Peer-Assisted Learning (PAL) on clinically-relevant skills in undergraduate pharmacy learners. The statistical methods mainly used included:

Descriptive Statistics: Descriptive statistics are used to explain the demographic values of the participants at the baseline of the study to mean, standard deviation and percent of categorical variables. This aided in the analysis of the proportion of students within each of the two groups (PAL vs. control) and saw the two groups as similar subjects before the beginning of the study.

Paired t-tests Paired t-tests were conducted to compare the before and after score of OSCE in each group(PAL, control). In this test, the researcher checked the change in clinical skill scores significantly following the 8 weeks of the intervention period in each group.

Independent t-tests: Independent t-tests were conducted to identify the difference between the two groups in terms of change in clinical skills in the form of mean difference between the OSCE (pre-test) and the post-test based on the use of PAL intervention-based group compared with the control group. This statistical test assists in identifying whether the changes within the intervention group were much better as compared to the changes within the control group.

Chi-Square Tests: Chi-square tests were conducted on categorical data in order to assess the variations in student performance associated with the clinical skill categories (examples include patient counseling, medication history taking). The chi-square test proved to be beneficial specifically where there was a comparison between the percentage of the sample in each group that significantly improved their clinical skills between a pre and a post-intervention situation.

Effect Size (Cohen d): As a measure of the extent of the intervention effect, there was a calculation of Cohen d of the difference between the achievements on OSCE. The measure gives some idea of the practical meaning of the changes that are observed with small (0.2), medium (0.5), and large (0.8) effects. Cohen d allows putting the results in perspective instead of being significant statistically.(10)

Qualitative Analysis:The qualitative analysis of the surveys of student feedback and satisfaction were provided. Thematic analysis was employed to identify the reoccurring theme and feelings that the students had regarding their experiences with PAL, i.e. confidence, communication skills, perception about peer mentorship.

6.2 Comparisons Criteria

The measure of the benefits of the nurse practitioner program was improvement in clinical skills through the OSCE points. The analysis dwelled on the following main potential areas:

Objective Structured Clinical Examination (OSCE) scores: There was a comparison of the pre-test and post-test OSCE scores between the PAL intervention group as well as the control group. This involved the examination of the specific stations e.g., patient counseling to ascertain whether certain sections of the PAL intervention delivered increased improvement.

Student outcome: The post- interventional and initial self-assessment questionnaires were compared so that students could be subjectively evaluated regarding confidence, clinical competence, and overall satisfaction with PAL program. A comparison was made between the outcomes of the qualitative feedback aimed at understanding the scope of PAL intervention on communication skills and peer relationships.

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Clinical skills enhancement: The mean change score comparison between the PAL group and the traditional faculty-led group assisted in the identification of whether the PAL intervention brought a more remarkable improvement in clinical skills than the traditional instruction technique led by faculty.

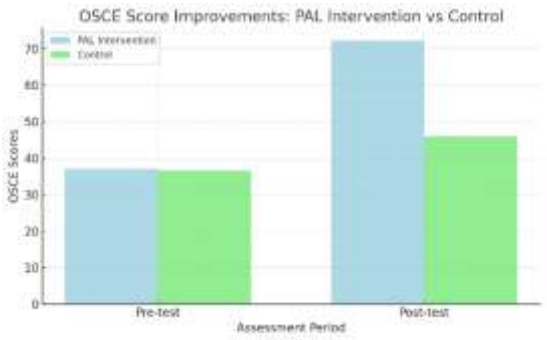

Figure 1: OSCE Score Improvements: PAL Intervention Vs Control

6.3 Level of Significance

The overall study utilized the significance level of $p < 0.05$. This level is the likelihood of getting the results as a result of chance. When the p-value is below 0.05, this will be statistically significant, implying that the perceived effects have the most likely chance of being brought on by changes made by the intervention and not the random variability.

In effect size estimation, a Cohen d value of 0.8 and above showed a strong effect as per the hypothesis that PAL had a significant effect in the improvement of clinical skills. They defined a p-value less than 0.01 (*) as a highly significant value in a statistical test, and a statistical test was concluded to be moderately significant when $p < 0.05$ ().

Using these approaches, the research sought to establish the effectiveness of PAL on clinical competence with rigor and give substantial evidence to support the effectiveness of this method as a complement mode of delivery in pharmacy learning.(11)

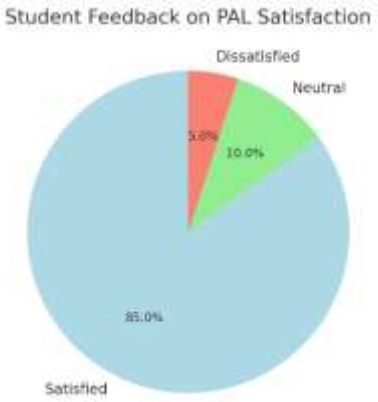

Figure 2: Student Feedback On PAL Satisfaction

7. Results

7.1 Improvements in OSCE scores

Improvements in clinical skills were assessed through the Objective Structured Clinical Examination (OSCE) scores taken both prior to the 8-week intervention and afterward identifying the changes in the data between the groups of the PAL intervention and the control group.

There was a very considerable difference in the average percent change in the OSCE scores between the PAL intervention group between pre- and post-tests, which is an average increment of 18.4 percent. In this respect, in

particular, students showed significant improvements in patient counseling, medication history taking and clinical problem-solving. Among the PAL group, the OSCE scores improved between pre-test wherein the mean score was 37.09 and post-test wherein the mean score was 72.25.

The control group that experienced instructions by faculty members demonstrated a smaller improvement of 9.7, whose scores ranged after the instruction (pre-test) of 36.58 to a mean of 45.99 of the post-test.

These gains spell out that the intervention group (PAL) did not only perform better than the control one but also demonstrated greater competency in performing clinical skills during a structured examination.

7.2 Between-groups

In comparing the outcomes of the PAL intervention group and the control group, the PAL group showed a much greater improvement on the acquisition of clinical skills. The post-test average gain data on the PAL group was significantly higher that of the control group as there was an average showing of 26.26 points (improving the OSCE score between 37.09 and 72.25) in comparison to the 9.41 points in the control group which was an increase between 36.58 and 45.99.

Analysis of statistical data by applying the t-test with the help of independence showed that the difference between the sample groups was significant ($p < 0.01$), so the PAL intervention affected clinical competence of students with a stronger influence than conventional instruction done by traditional methods of the faculty.

The size of the effect (based on Cohen d) was determined to be 3.84 on the PAL group, which shows that it is large in enhancing the clinical skills. This also confirms the hypothesis that peer-assisted learning is a good way of increasing clinical skills acquisition among pharmacy students.

Table 1: OSCE Results

Group	Pre-test Mean Score	Post-test Mean Score	Mean Improvement (%)
PAL Intervention	37.09	72.25	18.4
Control	36.58	45.99	9.7

7.3 Insights of Student feedback

Besides quantitative evaluation through OSCE, qualitative reports were obtained among the students based on their self-report through questionnaires and questionnaires regarding satisfaction through surveys. The feedback gave really useful information relevant to the perceptions of the participants to the PAL intervention.

Enhanced Confidence: Most of those students taking part in the PAL group felt there was enhanced confidence in their clinical skills particularly in the field of patient counseling and clinical problem-solving. About 85 percent of the students attending the PAL group found experience during the sessions enhanced their self-confidence to effectively administer medication counseling and share medication-related concerns with the patients.

Augmented Communication Skills: Communication skills were another area where students in the PAL group made improvements. 79% of the students reported that their ability to explain complicated topics in layman terms improved by participating in peer-led discussions which they will absolutely need during a pharmacy practice career.(12)

Peer Mentorship and Leadership: The PAL group of students enjoyed having a chance to be the leaders in the course of peer led sessions. Most learners revealed that they were able to deepen their own clinical knowledge and have built their leadership and mentorship skills in the facilitation of their learning among other learners.

Satisfaction and Engagement: There was also feedback on the learning environment presented that showed students were more engaged with peer-assisted learning than they were with faculty-led learning. Approximately 90 percent of the students of the PAL group gave positive feedback with the format as it gave them a feeling of being involved in the learning process.

All in all, the outcomes of both OSCE tests and student opinion indicate that PAL has a great impact on the development and improvement of a clinical competence, confidence, and communication proficiency of pharmacy students. Such advancements, combined with the advantageous reviews of peer mentorship support the usefulness of peer-assisted learning as a supplementary educational intervention in pharmacy training.

8. Conclusion

8.1 Results Synopsis

This quasi-experimental study evaluated the effectiveness of Peer-Assisted Learning (PAL) with regard to learning of clinical skills of undergraduate pharmacy students. The research design used was half sample in which 92

students were categorized into PAL intervention condition and a control group that would receive a regular Typical faculty led instruction.

The results have shown that the PAL group attained significantly better results when it comes to improvements in their clinical skills, in terms of Objective Structured Clinical Examinations (OSCEs). The mean improvement in the OSCE scores by the PAL group was 18.4% as compared to 9.7% in the control group. The obtained results were statistically significant ($p < 0.01$) and showed that the effect of peer-assisted learning on enhancing clinical competence in students was greater than its traditional counterparts. Also, the students themselves noted that there was the better satisfaction, improved confidence and communication skills among the PAL-group students and observed the interest of the peer interactions in clinical learning.

8.2 Educational Implications

The findings of the paper have implications as far as pharmacy programs are concerned in terms of education. The findings are indicative of the role of Peer-Assisted Learning as an effective adjunct to standard faculty-based teaching methods, especially where it comes to training clinically important soft skills, e.g., the ability to counsel patients, to record their medication histories, and to solve clinical issues. The PAL model also encourages the activity of students, the theory of peer mentorship, and the possibility to acquire leadership skills, which are crucial to future healthcare professionals

Using PAL in the pharmacy curriculum, teachers may promote cooperative learning that would allow students to actively learn, work in groups, and support one another. Also, PAL may encourage the acquisition of needed interpersonal and communication skills, without which successful work in the field of pharmacy and other healthcare facilities is impossible.

8.3 Research suggestions on future research

Although this research presents hopeful evidence that the use of PAL has certain positive effects, there are points that need to be investigated based on a further research. First, the long-term effect of PAL on clinical skills and student retention of information could be examined in future. The progress of students may be followed using a longitudinal study after the end of the intervention to understand whether trends related to the improvement of clinical skills organically persist in the long run.

Besides, the research might consider the efficacy of PAL in various year levels of the pharmacy curriculum to find out whether it equally benefits first-year or second-year students as it benefits third-year students. In addition, it might be possible to examine how the size of groups affects the PAL sessions and whether it is possible to determine the best arrangement that makes the peer-instruction process.

Finally, it may also be interesting in future research to investigate the impacts of faculty participation in PAL session supervision on outcomes, and to determine whether faculty-led facilitation increases the value of peer learning further.

Summing up, PAL could become an effective instrument in training in the pharmacy setting, enhancing clinical skills, including those in an area of peer mentorship and leadership. Future studies will add to the description of this model and contribute to its steadily growing use in the healthcare education.

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Conflicts of interest

The authors have no conflicts of interest to declare

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