



Original Article

A Comparison of DOAP vs. Traditional teaching learning method among undergraduate medical students: An Educational interventional study

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ABSTRACT

Introduction: Competency-based medical education (CBME) promotes active, skill-based learning to improve knowledge and clinical competence. However, evidence comparing the Demonstration–Observance–Assistance–Performance (DOAP) method with traditional teaching among undergraduate medical students is limited. Therefore, this study compared the effectiveness of the two teaching methods using pre- and post-test assessments and evaluated students' perceptions.

Material and methodology: An educational interventional study was conducted among 50 second-year undergraduate medical students at C.U. Shah Medical College from January to June 2026. Participants were randomly allocated into the Traditional Teaching (n = 25) and DOAP (n = 25) groups using lottery randomization. Knowledge was assessed using pre- and post-tests, and students' perceptions were evaluated using a pretested structured questionnaire. Data were analysed using SPSS version 26, with Chi-square/Fisher's exact test, Student's t-test, paired t-test, and Mann–Whitney U test; p < 0.05 was considered statistically significant.

Results: Baseline characteristics and pre-test knowledge scores were comparable between the DOAP and Traditional Teaching groups (p > 0.05). The DOAP group demonstrated significantly higher post-test scores (17.84 ± 1.56 vs. 14.76 ± 2.01), greater knowledge improvement (9.20 ± 1.84 vs. 6.40 ± 1.71), and a higher proportion of excellent performers (76.0% vs. 32.0%) than the Traditional Teaching group (all p < 0.01). Although both groups showed significant improvement after the intervention (p < 0.001), students in the DOAP group reported more positive perceptions across all evaluated learning domains.

Conclusion: The DOAP teaching-learning method was more effective than the traditional teaching method in improving knowledge, academic performance, and students' learning experience. Integrating DOAP into undergraduate medical education may strengthen competency-based learning and clinical skills training.

Keywords: DOAP, Medical education, Undergraduate medical students, CBME, Teaching learning methods, Educational intervention.

INTRODUCTION

Competency-Based Medical Education (CBME) has been introduced in India by the National Medical Commission (NMC) in conjunction with numerous other nations.[1] It is believed that the Indian Medical Graduate (IMG) will be equipped

with the fundamental skills necessary to perform the many functions of a community's first-line contact physician. In several stages, the skills of knows, knows-how, shows, shows-how, and does are obtained, and within the internship phase, the does/performs levels of particular skills are reached.

A new approach in CBME that prioritizes student-centered teaching-learning methods (TLM) is concentrating on change in TLM. It is also advised to use student-directed learning (SDL), small group teaching and learning (SGT/L), simulation and guided conditions, and skill labs. In contrast to the conventional approaches, the formative and summative evaluations that use Objective Structured Clinical Examinations (OSCE), Mini-Clinical Examinations (Mini-CEX), Objective Structured Practical Examinations (OSPE), Direct Observation of Practical Skills (DOPS), etc., are addressed. [1,2]

The primary components of SGT/L include Case-Based Learning (CBL), Problem Based Learning (PBL), Video-Assisted Learning (VAL)/Video-Based Learning (VBL), Demonstration-Observation-Assistance-Performance (DOAP), and group discussions. Small group approaches have the added advantage of allowing for more student engagement and more individual attention. Computer-based audio visuals, models, figurines, standardized patients, actual patients, and teacher or facilitator training can all be used to enhance small group instruction.

While previous training methods included demonstrations, with DOAP, students see the teacher demonstrate and have the chance to help and perform in a simulated setting, on standardized patients, and on actual patients under supervision and on their own.[3]

The benefits of DOAP include: students receive individualized attention; they can ask questions; the classes can be adjusted to meet the needs and interactions of the students; students can be evaluated (formative assessment) concurrently during the performance and assistance phases; and students have access to feedback and learning.[4] The traditional way of teaching gave more importance to theoretical knowledge rather than clinical skills. Hence, graduates, in spite of having basic knowledge of a clinical scenario, were not fully confident in converting the said knowledge into skills required in day-to-day practice, especially those skills related to patient communication and ethics. [5,6] So, we are conducting this study with view to check effectiveness of DOAP method over traditional didactic teaching learning method among undergraduate medical students of Surendra Nagar district as there is a paucity of this type of studies has been noted.

MATERIALS AND METHODS

Study design and setting

A prospective educational interventional study was conducted among second-year MBBS students in the Department of Community Medicine ,C.U.Shah Medical College, Surendranagar, during the study period from 1 January 2025 to 30 June 2025. The study compared the effectiveness of the Demonstration–Observation–Assistance–Performance (DOAP) method with the traditional teaching-learning method in improving students' learning outcomes and assessed their perceptions of the two teaching methods. The study included second-year MBBS students who voluntarily agreed to participate and provided written informed consent. Students who did not provide consent were excluded from the study. There were no other exclusion criteria. The sample size was calculated for comparison of two independent means using estimates from previously published studies, considering a 5% level of significance and 80% statistical power. A total sample size of 50 students was obtained, with 25 students allocated to the intervention (DOAP) group and 25 students to the traditional teaching group.

50 (25 in control group and 25 in intervention group) ⁴

$$\text{sample size} = \frac{(z\beta + z\alpha/2)^2 (SD_1^2 + SD_2^2)}{(\mu_1 - \mu_2)^2}$$

Level of significance fixed at 5%

Power at 80%

SD₁ and SD₂ from previous studies

μ₁ and μ₂ from previous studies

Eligible students were enrolled using a non-probability sampling technique. Following enrolment, participants were randomly allocated into two equal groups using a simple randomization method based on the serial number of a currency note. Students assigned an even number were allocated to the DOAP group, whereas those assigned an odd number were allocated to the traditional teaching group.

Intervention

Students in the intervention group received teaching through the Demonstration–Observation–Assistance–Performance (DOAP) method with the topic of use of Horrock's Apparatus. The faculty first demonstrated the procedure, after which students observed the demonstration, assisted under supervision, and subsequently performed the procedure independently with appropriate guidance and feedback.

Students in the control group received conventional teaching through the traditional teaching-learning method, consisting of routine classroom instruction and practical demonstration as per the departmental teaching schedule.

The same faculty member conducted both teaching sessions to maintain uniformity in content and delivery. Students' knowledge was assessed using an Objective Structured Practical Examination (OSPE). A pre-test was administered before the teaching session to determine baseline knowledge, followed by a post-test after completion of the intervention to evaluate knowledge acquisition. The same assessment tool and scoring criteria were used for both groups. Students' perceptions regarding the teaching-learning methods were assessed after completion of the intervention using a structured, self-administered questionnaire containing items related to understanding of the topic, confidence, retention of knowledge, and interaction with the faculty. Responses were recorded on a five-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree."

The demographic variables included age and gender. The independent variable was the teaching-learning method (DOAP or traditional teaching), while the dependent variables were pre-test score, post-test score, improvement in knowledge score, and students' perception of the teaching-learning method.

Validation and reliability of the perception questionnaire

A structured perception questionnaire was developed after reviewing the relevant literature on educational interventions and the DOAP teaching method. The questionnaire comprised items assessing students' perceptions regarding understanding of the topic, confidence in performing the procedure, retention of knowledge, interaction with the faculty, and overall satisfaction with the teaching-learning method. Responses were recorded on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The questionnaire was subjected to content validation by a panel of five experts from the Departments of Community Medicine and Medical Education to assess the relevance, clarity, and comprehensiveness of each item. Based on their suggestions, necessary modifications were incorporated before final administration.

A pilot study was conducted among 10 second-year MBBS students who were not included in the final study to evaluate the clarity and feasibility of the questionnaire. The internal consistency of the questionnaire was assessed using Cronbach's alpha coefficient, and a value of 0.84 indicated good reliability. Data from the pilot study were excluded from the final analysis.

Data management and statistical analysis

The collected data were entered into Microsoft Excel and analysed using Statistical Package for the Social Sciences (SPSS) software, version v26 (IBM Corp., Armonk, NY, USA). Quantitative variables were summarized using mean and standard deviation or median and interquartile range, depending on the distribution of data, whereas categorical variables were expressed as frequencies and percentages.

The normality of continuous variables was assessed before inferential analysis. Baseline characteristics and mean knowledge scores between the two groups were compared using the independent Student's t-test for normally distributed data or the Mann-Whitney U test for non-normally distributed data. Within-group comparison of pre-test and post-test scores was performed using the paired t-test. Categorical variables, including students' perception, were compared using the Chi-square test or Fisher's exact test, as appropriate. A p-value of less than 0.05 was considered statistically significant.

Ethical considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee of C.U.Shah Medical College (Approval No. : CUSMC/IEC(HR)/RP/9/2024/Fina Approval/195/2024). Written informed consent was obtained from all participants prior to enrolment. Confidentiality and anonymity of the participants were maintained throughout the study, and participation was entirely voluntary. No conflict of interest was declared.

RESULTS

A total of 50 second-year MBBS students participated in the study. All students completed the pre-test, intervention, post-test and perception questionnaire. Total 25 students were allocated to the DOAP group and other 25 to the Traditional Teaching group.

Table 1. Baseline demographic characteristics of study participants (N = 50)

Variable	DOAP (n=25)	Traditional (n=25)	Total (N=50)	P value
Age (years): Mean $\pm$ SD	20.12 $\pm$ 0.61	20.24 $\pm$ 0.58	20.18 $\pm$ 0.59	0.482
Gender				
Male	13 (52.0%)	11 (44.0%)	24 (48.0%)	0.569
Female	12 (48.0%)	14 (56.0%)	26 (52.0%)	

[Table 1] Showing the mean age of students in the DOAP group was 20.12 ± 0.61 years, while in the Traditional Teaching group it was 20.24 ± 0.58 years. The difference was not statistically significant ($p = 0.482$). Gender distribution was also comparable between the two groups ($p = 0.569$).

Table 2. Comparison of pre-test scores and post test scores between the two groups

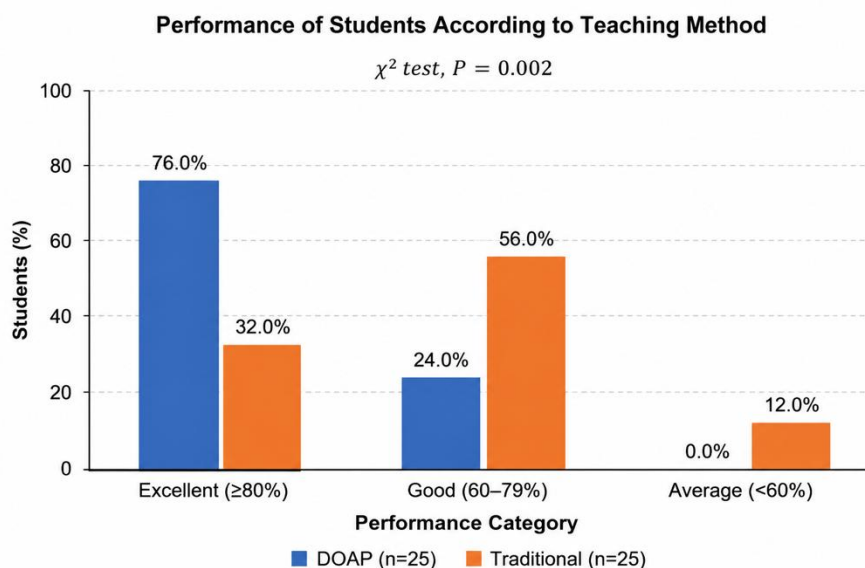
Group	Pre-test scores		Post-test scores	
	Mean $\pm$ SD	Median (IQR)	Mean $\pm$ SD	Median (IQR)
DOAP	8.64 ± 2.11	9 (7-10)	17.84 ± 1.56	18 (17-19)
Traditional	8.36 ± 2.03	8 (7-10)	14.76 ± 2.01	15 (13-16)
P value	0.645		<0.001	

[Table 2] compares the baseline knowledge scores of students before the intervention and post-intervention assessment scores. The mean pre-test score was 8.64 ± 2.11 in the DOAP group and 8.36 ± 2.03 in the Traditional Teaching group. Student t test was applied and difference was not statistically significant ($p = 0.645$). Students taught using the DOAP method achieved a significantly higher mean post-test score (17.84 ± 1.56) compared to those taught using the Traditional Teaching method (14.76 ± 2.01). Student t test was applied and this difference was statistically significant ($p < 0.001$).

Table 3. Within-group comparison of pre-test and post-test scores

Group	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Difference	P value
DOAP	8.64 ± 2.11	17.84 ± 1.56	9.20	<0.05
Traditional	8.36 ± 2.03	14.76 ± 2.01	6.40	<0.05

[Table 3] compares pre-test and post-test scores within each group. Both teaching methods resulted in statistically significant improvement in students' knowledge following the intervention ($p < 0.001$). Also, The mean improvement score was 9.20 ± 1.84 among students trained using DOAP compared with 6.40 ± 1.71 among students taught using the Traditional Teaching method. The difference was statistically significant ($p < 0.001$).



[Figure 1]

[Figure 1] Illustrated that the distribution of performance differed significantly between the two teaching methods ($P = 0.002$). A significantly higher proportion of students in the DOAP group achieved excellent performance (76.0%) than in the Traditional group (32.0%). In contrast, good performance was more common in the Traditional group (56.0% vs. 24.0%), and average performance was observed only among students taught using the Traditional method (12.0%).

Table 4. Students' perception regarding teaching-learning methods

Statement	DOAP Positive response n (%)	Traditional Positive response n (%)
Improved understanding	24 (96.0)	17 (68.0)
Increased confidence	24 (96.0)	15 (60.0)
Better retention of knowledge	24 (96.0)	16 (64.0)
Better interaction with faculty	24 (96.0)	18 (72.0)

*Positive response = Strongly Agree + Agree (Score between 10–30 = Negative response , Score between 31–50 = Positive response in both Traditional teaching learning method and DOAP)

[Table 4] shows a substantially higher proportion of students in the DOAP group reported positive responses across all assessed domains compared with the Traditional Teaching group. In the DOAP group, 96.0% of students agreed that the method improved their understanding, increased their confidence, enhanced retention of knowledge, and promoted better interaction with faculty. In contrast, positive responses in the Traditional Teaching group ranged from 60.0% to 72.0%, with 68.0% reporting improved understanding, 60.0% increased confidence, 64.0% better retention of knowledge, and 72.0% better interaction with faculty. These findings indicate that the DOAP method was perceived more favourably than the traditional teaching-learning method across all evaluated domains.

DISCUSSION

The present study demonstrated that the DOAP method was significantly more effective than the traditional teaching-learning method in improving knowledge acquisition, practical performance, and students' perception among second-year MBBS students. Although both groups were comparable at baseline, students trained using DOAP achieved significantly higher post-test scores and greater knowledge improvement than those receiving traditional teaching.[7]

Our findings are comparable with those reported by Potsangbam et al., who demonstrated superior procedural learning and recall using the DOAP method compared with conventional teaching. Similarly, students in our study achieved significantly higher post-test scores and a greater proportion attained excellent performance (76% vs. 32%).[8]

Likewise, Das et al. reported significantly better competency, confidence and learner satisfaction among students trained using DOAP, which is consistent with our findings where 96% of students reported improved understanding, confidence, retention and faculty interaction.[9]

Potsangbam and Paunikar also observed significantly higher OSCE scores and learner satisfaction among MBBS students taught using DOAP. Their findings support our observation that repeated supervised practice and immediate feedback enhance competency.[10]

Strengths of our study include randomized allocation, standardized teaching, OSPE-based assessment and a validated questionnaire. Limitations include the single-centre design, relatively small sample size and lack of long-term follow-up. Future multicentre studies are recommended.

CONCLUSION & RECOMMENDATION

The DOAP method was more effective than the traditional teaching-learning method in improving knowledge, practical performance, and students' perceptions among second-year MBBS students. Students trained using DOAP achieved significantly higher post-test scores, greater knowledge gain, and more favourable perceptions regarding understanding, confidence, knowledge retention, and faculty interaction. These findings suggest that the DOAP method is an effective competency-based teaching strategy for undergraduate medical education. Incorporating structured DOAP sessions into routine practical teaching may enhance students' procedural competence and learning experience.

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