PharmD students experiences on end year clerkship evaluation using objective structured clinical exam (OSCE) method at JSS College of Pharmacy, Mysuru, India

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ABSTRACT

Objectives: To assess the PharmD student's experiences about end year clerkship evaluation conducted using Objective Structured Clinical Exam (OSCE) format at JSS College of Pharmacy, Mysuru, India.

Methods: The student's experiences were captured using a newly developed, 14-item, 5-point Likert's scale feedback form. The results were analyzed and presented descriptively. The Mann-Whitney U test was used to compare the Likert's scale responses between the sex, entry level for PharmD and performance in the end year exam, whereas the Spearman's rank correlation coefficient test was used to measure the strength of association between the Likert's' scale responses and these variables. A p value of <0.05 was considered statistically significant.

Results: Thirty-seven students of fifth year PharmD attended the end year clerkship evaluation and provided their feedback. Out of the 14-items, the most frequent response in eleven items was strongly agree and in three items it was agree. The Mann-Whitney U test revealed statistically significant differences between regular and post-baccalaureate students with respect to Likert's scale responses in all the domains ($p < 0.02$). The Spearman's rank correlation test revealed no association between the students' performance and their experiences with OSCE as an assessment tool for the end year clerkship exam.

Conclusions: The study results demonstrate that OSCE is an alternative and preferred method of evaluating the clinical skills and competencies of fifth year PharmD students in their end year clerkship exam in India.

Innovation: For the first time in India, the JSS College of Pharmacy, Mysuru, had successfully implemented the OSCE method for evaluating PharmD students' clerkship in their end year exam and had assessed their experiences about OSCE as an assessment tool.

1. Introduction

Clerkship is an important component of Doctor of Pharmacy (PharmD) curriculum that helps the students to understand the pharmaceutical care services and role of clinical pharmacists in the healthcare system. A well-designed clerkship program and objective evaluation of its outcomes equip the pharmacy students with necessary skills and competencies required to practice the profession [1,2].

Objective Structured Clinical Exam (OSCE) is one such standardized tool that is used to objectively assess the clinical skills and competencies of pharmacy students globally [3-5]. OSCE was first developed for assessing medical student's competencies at Ninewells Hospital and Medical School, Dundee in 1979 [6]. The purpose of OSCE is to assess the students' performance on clinical tasks and objective evaluation of students' knowledge, skills, and behaviors using simulated clinical environments [7,8]. OSCE prepares students to make independent

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decisions, using the available information and communicating with the simulated patient or simulated other healthcare provider [9-11]. In addition, OSCE help the students and the evaluators to assess the necessary skills in a time efficient manner. It also minimized the subjectivity in evaluating students' skills and competencies [11]. Today, OSCE is a component of qualifying examination to practice pharmacy in some countries [12,13].

Several studies conducted in different parts of the world provide good evidence that OSCE is the preferred method for assessing the skills and competencies of pharmacy students. A study conducted in Malaysia used a twenty-item tool to assess their students' views on OSCE, and reports that most of the students provided a positive opinion about OSCE as an assessment method for pharmacy students [4]. A Jordanian study by Almuqdadi A et al., shows a high satisfaction with the overall OSCE process among pharmacy students [7]. A study conducted at School of Pharmacy, University of Hertfordshire, United Kingdom, demonstrated that in contrast to traditional method of assessment, OSCE prepares the students for clinical practice [11]. Dymek J et al., cites the feedback provided by the Polish pharmacy students' saying that OSCE is a reliable tool to assess their practical skills and indicated that the students accepted the new form of evaluation [14]. The respondents in a study conducted by Kristina SA et al., at Faculty of Pharmacy, Universitas Gadjah Mada, Indonesia, also preferred OSCE for evaluating their skills and competencies [15].

OSCE is used as an evaluation tool for pharmacy students globally. Though PharmD program was introduced in India in 2008, and the pharmacy schools and affiliated hospitals have become the pharmacy practice experiential settings, imparting pharmacy practice training, currently, OSCE it is not practiced either as formative or summative assessments in India [16]. Consequently, there are no published literature in this regard from India. Starting from 2021-22 academic year, the JSS College of Pharmacy, Mysuru, had introduced OSCE for some of the formative assessments. Recently, the board of studies for Pharmacy Practice, JSS Academy of Higher Education & Research, Mysuru has approved the proposal for implementing OSCE as an assessment method, for the fifth year PharmD clerkship evaluation in end-year exam. Though OSCE is an objective and preferred method for assessing the skills and competencies of pharmacy students, it is important to endorse this novel method from students' perspectives, especially when they are exposed to it for the first time as a method of end year assessment. Additionally, given the limited publications on use of OSCE as an end year assessment tool for PharmD students, this is the first study to fill a gap in the OSCE literature from India. Therefore, we conducted this study to assess the PharmD students' experiences about end year clerkship evaluation conducted in OSCE format at JSS College of Pharmacy, Mysuru, India.

2. Methods

2.1. Study design, study site, and ethical approval

This cross-sectional study was conducted in May 2023, at JSS College of Pharmacy, Mysuru, Karnataka, India. The study was approved by the Institutional Ethics Committee, JSS Medical College, Mysuru (JSSMC/ IEC/090721/19 NCT/2021–22). All the study participants were enrolled in the study after obtaining their written informed consent. The study was carried out in accordance with the Declaration of Helsinki. The study data was handled only by the study investigators and the privacy of participants data was observed.

2.2. Study tool

The students' experiences on PharmD clerkship evaluation using OSCE method was assessed using a newly developed and validated, 14-item, 5-point Likert scale feedback form. The 14-items in the feedback form were categorized into four domains namely, domain-1: support prior to & during the OSCE (2-items), domain-2: quality of the OSCE

cases, simulated patients & props (3-items), domain-3: appropriateness of the skills evaluated & time allotted (5-items), and domain-4: preference for OSCE (4-items). The responses for each item ranged between strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree, which were numerically coded as 5, 4, 3, 2, and 1 respectively.

The tool was initially developed by referring to similar published literature and by modifying the items as required for this study [3-6,8,14,15]. Further, the tool was subjected for content validation by a team of experts. The validation team consists of the Dean of Internal Quality Assurance Cell, Associate Dean of College of Pharmacy, one professor, one associate professor, one assistant professor, one lecturer and two research scholars. The initial tool with 17-items was distributed to the validation team and were asked to rate their judgement on the degree of relevancy of each item. Their responses were measured using a 4-point scale, which is defined as; 1 = item is not relevant, 2 = item is somewhat relevant, 3 = item is quite relevant and 4 = item is highly relevant to the measured domain. The item level content validity index (I-CVI) and scale level validity index (S-CVI) were calculated. As the number of experts in the validation team were more than five, the minimum acceptable values for I-CVI and S-CVI were set to 0.8. After removing three items with I-CVI score <0.8, indicating poor relevance, a 14-item scale was finalized. The I-CVI and S-CVI scores were recalculated and was found to be >0.88 and 0.96 respectively. We used 0.8 as a cutoff for Cronbach's alpha which is consistent with "Good" rating (0.8–0.9) [17-20]. The internal consistency was also measured for the final 14-item scale and Cronbach's alpha was found to be 0.84.

2.3. Study procedure

The standard OSCE procedure was used, in which students were moving from one station to another in a cyclic manner, attempted and displayed their clinical skills and competencies in solving various real-life scenarios within the stipulated time [21,22]. Before starting the OSCE, the students had an interactive orientation about the flow of end year OSCE using a PowerPoint slide. The presentation included information about the total number of stations, types of stations (interactive and non-interactive) and time limit for each station. A total of ten OSCE stations were developed, evaluated each for ten marks and total OSCE was for seventy marks as prescribed by the Pharmacy Council of India [16]. Among ten stations, three were interactive; that required the students to interact with the examiner and solve the given scenario (patient counselling, provision of drug information and viva-voce), four were non-interactive; students need not to interact with the examiner but need to apply their skills to resolve the scenario and document it in the OSCE booklet (identification of clinical features of a disease/disorder, lab data interpretation, causality assessment of an adverse drug reaction and identification of drug related problems) and another three were rest stations. The various competency domains assessed during the end year OSCE are tabulated in Table 1. OSCE was conducted in four batches (three batches with 10 students each and one batch with 7 students), on the same day. The time allotted for each station was five minutes and in fifty minutes ten students completed the exam. In two-hundred minutes (approx. Three and a half hours) all the thirty-seven students completed the exam.

At the end of the OSCE, a 10–15-min feedback session was conducted in which students provided their feedback using the study tool. Students were also requested to provide their additional comments, if any, pertaining to the clerkship exam conducted in the OSCE method. Though the feedback form was designed for self-administration, during the feedback session a few items were read and explained to facilitate the students for providing the response for each item. This was done because few students were unclear about the phrases that we used in item 5 and 7 of the OSCE feedback form. For item 5 they considered the medication delivery devices provided in the patient counselling station as the "only prop". Therefore, it was clarified to them about the other props such as various drug information resources that were provided in drug

Table 1

The competency domains assessed during the fifth year PharmD end year clerkship evaluation.

Station no.	Station type	Competency domain*	Task given	Elaboration of the tasks
1	Non-interactive	Pharmaceutical care planning	Identification of clinical features of a disease/ disorder	Students identified the clinical features of Parkinson's disease and pulmonary tuberculosis.
2	Non-interactive	Pharmaceutical care planning	Lab data interpretation	Students interpreted the hematology and thyroid profile of patients.
3	Non-interactive	Delivering clinical pharmacy services	Causality assessment of adverse drug reaction	Students assessed the causality of adverse drug reaction using Naranjo's algorithm.
4	Rest station	–	–	–
5	Interactive	Knowledge of therapeutics	Patient counselling on prescribed medications	Students counselled patient on appropriate use of metered-dose inhaler and insulin pen using medication delivery devices (props).
6	Rest station	–	–	–
7	Non-interactive	Knowledge of therapeutics	Identification & resolving of drug-related problems	Students identified and resolved two drug-related problems in patients with hypertension and malaria.
8	Interactive	Delivering clinical pharmacy services	Drug information query	Students provided the drug information service on pediatric dosing using various drug information sources (props).
9	Rest station	–	–	–
10	Interactive	Knowledge of therapeutics	Viva-voce	Students answered viva-voce questions.

* As prescribed by the Pharmacy Council of India [16].

information station. In station 7, They were not clear about the term "learning outcome" referred to in this item. Therefore, it was explained to them to make sure that the student understands the items adequately and provides their responses accordingly as per their experience in the end year OSCE. The collected responses were numerically coded and were entered into Microsoft® Excel® for Microsoft 365 MSO (Version 2302 Build 16.0.16130.20186) for further analysis.

2.4. Statistical analysis

Descriptive statistic was used to analyze the data. Data was presented as frequencies, percentages and mean ± SD to report the responses for each item of the Likert's' scale. The responses were grouped according to respondents' sex (male and female), entry level for PharmD (regular versus postbaccalaureate PharmD) and performance in the end year exam ($\leq$ 74% versus $\geq$75%). The regular PharmD students are the one who joined PharmD program straight after their grade 12, while the post baccalaureate students joined the program after their bachelor's degree in pharmacy. The students who scored >75% were declared "pass with distinction", whereas between 60 and 74% as "pass with first class". The 75% cutoff indicates competency whereas 60–74% is still a passing score. The Mann-Whitney U test was used to compare the Likert scale responses between these subgroups. The Spearman's rank correlation coefficient test was used to measure the strength of association between the Likert's' scale responses and sex, entry level for PharmD & performance in the end year exam [23]. All the statistical analyses were carried out using JMP Pro-15 statistical software and a p value of <0.05 was considered statistically significant.

3. Results

A total of thirty-seven students of fifth year PharmD attended the end year clerkship evaluation in OSCE method and provided their feedback, accounting for 100% response rate. Most of the students were females (23, 62.1%). Among 37 students, 29 (78.3%) were regular PharmD students and the remaining eight (21.6%) were PharmD post-baccalaureate students. A total of 23 students scored $\geq$75% and fourteen students scored $\leq$74% in their end year clerkship exam. Most of the respondents provided their feedback as either strongly agree (49.4%) or agree (41.3%) for all the 14-items. The item viz. responses for the 14-item OSCE feedback are presented in Table 2.

The Mann-Whitney U test revealed that there was a statistically significant ($p < 0.05$) difference in median (IQR) scores in all the four domains between regular and post baccalaureate students. The details are presented in Table 3.

The Spearman's rank correlation coefficient test showed a non-significant, slightly negative correlation between male and female respondents ($\rho = -0.2231, p = 0.443$), students who scored $\leq$74% and $\geq$75% in the end year exam ($\rho = -0.1820, p = 0.5334$), whereas a slightly positive but non-significant correlation was found between regular and postbaccalaureate PharmD students ($\rho = 0.0726, p = 0.8644$) with respect to Likert's scale responses. However, there was no significant correlation observed between exam scores and overall satisfaction levels among students ($\rho = -0.05, p = 0.7698$).

4. Discussion and conclusion

4.1. Discussion

PharmD is a six-year program in India, and in the fifth year, students will be undergoing clerkship [16]. During clerkship, students attend the ward rounds daily, and get exposure to provision of various clinical pharmacy services to hospital in-patients. These ward activities will be documented in a clerkship diary and will be evaluated by the preceptors during internal exams. For the end year exam, students will be provided with a clinical case, that students will dissect and present before the examiners [16]. During the case presentation, students will apply all their clinical skills in dissecting the case and provide appropriate pharmaceutical care plans that they had acquired during the clerkship. This whole process, that is collecting a clinical case from the ward, dissecting it, designing suitable pharmaceutical care plans, and presenting it before the examiners takes a minimum of two hours for each student. Additionally, it will be a hectic situation for the examiners also, as each student takes around 30–40 min to present the case, that needs to be carefully evaluated. There will be 40 such students in total, that accounts for a minimum of twenty hours of exam. Moreover, this evaluation will be largely subjective in nature.

On the other hand, OSCEs objectively evaluate the students'

Table 2
Students feedback on PharmD clerkship evaluation using OSCE [N = 37].

Item	SA	AG	NAND	DA	SD	Mean ± SD
Support prior to & during the OSCE:						
1. The information provided during OSCE briefing was sufficient and appropriate.	**21 (56.8)**	14 (37.8)	0 (0)	2 (5.4)	0 (0)	4.5 ± 0.7
2. The instructions for each station were clear; I was aware what I was expected to do.	**21 (56.8)**	15 (40.5)	1 (2.7)	0 (0)	0 (0)	4.5 ± 0.7
Quality of the OSCE cases, simulated patients & props used:						
3. The OSCE stations were representations of real-life practice events.	**19 (51.4)**	16 (43.2)	2 (5.4)	0 (0)	0 (0)	4.5 ± 0.7
4. The simulated patients were realistic for the character that they portrayed.	**22 (59.5)**	13 (35.1)	0 (0)	2 (5.4)	0 (0)	4.5 ± 0.7
5. The resources (props) provided in the OSCE stations were adequate.	17 (45.9)	**17 (45.9)**	3 (8.1)	0 (0)	0 (0)	4.4 ± 0.7
Appropriateness of the skills evaluated, and time allotted:						
6. The OSCE evaluated wide range of skills and practical techniques gained during clerkship.	17 (45.9)	**18 (48.6)**	2 (5.4)	0 (0)	0 (0)	4.4 ± 0.7
7. The skills evaluated were reasonably matching with the learning outcomes of the clerkship.	15 (40.5)	**19 (51.4)**	3 (8.1)	0 (0)	0 (0)	4.3 ± 1.4
8. In contrast to conventional practical exams, OSCE clearly evaluates skilled and unskilled students.	15 (40.5)	**16 (43.5)**	3 (8.1)	3 (8.1)	0 (0)	4.2 ± 0.7
9. OSCE is an appropriate method of evaluating practical skills gained during clerkship.	16 (43.2)	**16 (43.2)**	3 (8.1)	2 (5.4)	0 (0)	4.2 ± 1.4
10. The time allotted for each OSCE station was adequate.	16 (43.2)	**16 (43.2)**	4 (10.8)	1 (2.7)	0 (0)	4.3 ± 0.0
Preferences for OSCE:						
11. OSCE improved my practical knowledge and skills.	**20 (54.1)**	15 (40.5)	1 (2.7)	1 (2.7)	0 (0)	4.5 ± 0.7
12. OSCE is less stressful compared to conventional / regular practical exams.	**17 (45.9)**	11 (29.7)	8 (21.6)	1 (2.7)	0 (0)	4.2 ± 0.7
13. I prefer OSCE for evaluating practical skills gained in clerkship.	**18 (48.6)**	14 (37.8)	4 (10.8)	1 (2.7)	0 (0)	4.3 ± 0.7
14. Overall, the clerkship exam using OSCE method was well organized.	**22 (59.5)**	14 (37.8)	1 (2.7)	0 (0)	0 (0)	4.6 ± 0.7

SA: Strongly agree; AG: Agree; NAND: Neither agree nor disagree; DA: Disagree; SD: Strongly disagree.

Table 3
Domain viz. comparison of Likert scale scores among different study groups using Mann-Whitney *U* test.

Domain	Sex		Entry level		Performance in ESE	
	Male (n = 14)	Female (n = 23)	PB (n = 8)	Regular (n = 29)	<75% (n = 14)	≥75% (n = 23)
Support prior to & during the OSCE:						
Mean rank	18.36	19.39	26.56	16.91	17.54	19.89
z score	0.309		2.450		0.705	
p-value	0.793		**0.023***		0.526	
Quality of the OSCE cases, simulated patients & props used:						
Mean rank	16.18	20.72	27.56	16.64	18.86	19.09
z score	1.287		2.626		0.065	
p-value	0.219		**0.009***		0.963	
Appropriateness of the skills evaluated, and time allotted:						
Mean rank	15.36	21.22	30.63	15.79	19.04	18.98
z score	1.625		3.490		0.016	
p-value	0.115		**0.000***		0.988	
Preferences for OSCE:						
Mean rank	13.79	22.17	26.69	16.88	19.79	18.52
z score	2.347		2.330		0.354	
p-value	**0.022***		**0.021***		0.745	
Overall:						
Mean rank	15	21.43	29.56	16.09	18.82	19.11
z score	1.762		3.132		0.079	
p-value	0.082		**0.001***		0.938	

* *p*-value <0.05 is statistically significant.

in which 10 or 12 students will be completing their evaluation and the total time required for all the students to complete their evaluation will be four hours, for forty students. Thereby requiring around one-fourth of the time as compared to conventional practical exams, that makes OSCE a time efficient approach of student assessment.

We used a 14-item validated feedback form, to capture the students' experiences about i) support prior to & during the OSCE, ii) quality of the OSCE cases, simulated patients & props used, iii) appropriateness of the skills evaluated & time allotted and iv) preferences for the OSCE. Out of the 14-items, the most frequent response in eleven items was "strongly agree" and in three items it was "agree". In addition, the mean scores >4 in all the 14-items demonstrates that the end year exam in OSCE format was conducted with all the necessary support for the students to exhibit the skills that they had acquired during their year-long clerkship and didactic courses, through the best quality cases and props.

A study conducted by Elnaem et al., in Malaysia, suggest that a majority (53.6%) of the student respondents agreed that the OSCE was well organized, with appropriate skills evaluated using the quality OSCE cases. These findings are very much like our study results. [4]. In a Jordanian study reported that 85.2% of its respondents agreed that the high-quality OSCE cases were used and 76.4% of students agreed that the skills evaluated were appropriate [7]. These observations were very much like the responses obtained for domain 2 and 3 in our study, where >90% of our study respondents either strongly agreed or agreed that the end year OSCE used quality cases, simulated patients, & props and appropriateness of the skills evaluated.

A study conducted by Branch C revealed that 85% their study respondents either strongly agreed or agreed that the skills evaluated & time allotted was appropriate, and 74% of the respondents had strong agreement or agreement on quality of OSCE cases, simulated patients

knowledge and clinical skills in a simulated environment [3-5]. The students will be provided with real-life scenarios as individual stations, to assess multiple skills that they have acquired during their daily clerkship. Usually, 10 or 12 stations will be developed to assess different skill sets of students in OSCE. The time for each OSCE will be 50–60 min,

and resources provided. Whereas only 16% of the respondents preferred for OSCE as an assessment method [9]. In contrast, a higher percentage (96%, 93%, 89% and 88%) of our study participants either strongly agreed or agreed on these domains. Out of the four domains, in domain 1, 2 and 4, the most frequent response was '*strongly agree*'. This suggests that the interactive orientation session about the flow of end year OSCE provided the students with confidence to perform better in the OSCE. In addition, the quality of the OSCE cases/scenarios and tasks, the supporting materials to perform the given task such as drug information resources, medication delivery devices, medication packages and simulated patients adequately facilitated the students' performance. This could be the probable reason for them to prefer OSCE method over the conventional method of end year clerkship assessment. However, in domain-3 the most frequent response recorded was "agree", this could be due to the inadequate understanding of the students about the course learning outcomes. This can be improved by including a small presentation about the overall learning outcomes of the clerkship during the interactive orientation sessions in future.

An Indonesian study also evaluated the implementation of OSCE in six domains namely, relevancy of scenarios with real practice, degree of learning, fairness of assessment, simulated patient consistency, level of difficulty, time adequacy and acceptance. In all the six domains the mean scores were 3.5 (out of 4) except for the item that assessed the time adequacy, for which the mean score was 2.1 [15]. Our study is slightly different with respect to scoring system where our respondents scored each item on a scale of 1 to 5 and the mean scores in all the 14-items of the feedback tool were >4.2, indicating that most of the respondents were in favor of OSCE for evaluating their skills and competencies.

In a study conducted in Saudi Arabia, certain aspects of OSCE were evaluated that were like the items that we assessed in domain 3 & 4 of our feedback form. The study reported the percentage of respondents either agreed or strongly agreed on, OSCE administration (93%), time allotted (93.1%), OSCE as a tool to highlighting the strengths and weakness in skills & knowledge of students (95.8%) and recommendation for OSCE workshops before each rotation (88.9%) [24]. These observations were nearly same to the corresponding percentages of responses for domains 3 (87%) and 4 (88%) in our study.

Though a couple of students in our study had disagreement with some of the items, it is noteworthy that none of the students had strong disagreement on any of the items in the feedback. This suggests that though a few students had minor difficulties in some aspects of the OSCE method of evaluation, overall, most (32/37) of the students preferred OSCE as the best evaluating tool to assess their practical skills in the clerkship exam. A study that involved thirty-nine pharmacy graduates in United Kingdom also reports that in contrast to traditional method of assessment, OSCE helped the students to prepare themselves for the clinical practice [11]. Similarly, in a study conducted by Dymek J et al., 183 fifth-year pharmacy students opined that OSCE is a reliable tool to assess their practical skills and indicated that the students accepted the new form of evaluation [14]. Most (41%) of the respondents in a study conducted by Martin RD, to evaluate the usefulness of OSCE in assessing the clinical competencies of 109 third year pharmacy students during their introductory pharmacy practice experience, also reported that OSCE as a reliable alternative to traditional preceptor evaluations [25].

Further, the Mann-Whitney U test has revealed statistically significant differences between regular and postbaccalaureate students' mean rank scores in all the four domains. This could be because, as compared to naive regular PharmD students, the postbaccalaureate students had good understanding of the support provided in the form of discussions, orientations and mock exam conducted prior to end year exam ($z = 2.450, p = 0.023$), nature of the cases, simulated patients and props used during the end year exam ($z = 2.626, p = 0.009$), appropriateness of the skills evaluated ($z = 3.490, p < 0.001$) and thus preferences for OSCE ($z = 2.330, p = 0.021$). Similarly, statistically significant differences were also observed between male and female students where, female students had high mean rank as compared to male students indicating higher

preferences for OSCE ($z = 2.347, p = 0.022$).

The Spearman's rank correlation coefficient test showed no association between the Likert's scale responses and performance of the respondents in the end year exam. This suggests that the experiences shared by the students with respect to the end year exam in OSCE format were not influenced by their performances in the end year exam. These results are consistent with a study conducted by Branch C, where 128 s year PharmD students reported that their acceptance of OSCE as an assessment tool was not dependent on their performance in the OSCE [9].

Overall, our study results demonstrate that in comparison to existing traditional practical exams that take long hours of subjective assessment, and OSCE being an objective as well as time efficient method it could be a probable tool to assess the PharmD students' skills and competencies in India. The implementation of OSCE as an assessment method at all the PharmD schools across India not only provides an objective and uniform style of evaluation but also make them practice ready before entering the actual practice of pharmacy. In addition, it also requires the pharmacy schools across India to equip their faculty as well as students, through appropriate education, training, workshops, and orientation programs for the smooth implementation of OSCE as an assessment method for PharmD students. The main limitations of this study were a smaller number of cohorts, which is unavoidable as the number of admissions are restricted to maximum of forty students in PharmD. Secondly, as it was the end year exam, we had access only to the total score of the students and therefore we were not able to analyze the students' performances in individual OSCE stations and compare that to the students' satisfaction level about OSCE.

4.2. Innovation

Though OSCE is the preferred method for assessing the clinical skills among health science students since decades, and an important component of several qualifying exams for health science graduates globally, evaluation following its implementation is important, as it involves application of OSCE method in a new environment.

Therefore, in this study we assessed the experiences of PharmD students' and preferences for OSCE in evaluating their clinical skills and competencies as the OSCE was implemented for the first time in Indian context at JSS College of Pharmacy, Mysuru. In addition, we wanted to understand students' views for improving the system to match their learning needs at our institution. This study also filled the gap in the OSCE literature especially in the pharmacy curriculum in India.

4.3. Conclusion

OSCE was successfully implemented as the assessment tool for the end year clerkship exam for fifth year PharmD students at JSS College of Pharmacy, Mysuru, India. The students were satisfied with respect to the support provided to them during the OSCE, quality of the OSCE cases, simulated patients, props, and appropriateness of the skills evaluated. The study results also demonstrate that OSCE is an alternative and preferred method as compared to conventional practical exams to evaluate skills and competencies of PharmD students in their end year clerkship exam.

CRediT authorship contribution statement

Atiqulla Shariff: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Teggina Math Pramod Kumar:** Resources, Project administration. **Srikanth Malavalli Siddalingegowda:** Supervision, Project administration. **Shahid Ud Din Wani:** Writing – review & editing, Validation, Data curation. **Yasmin Elsobky:** Resources, Project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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