Assessing the Effectiveness of Evidence Based Practice Course on Clinical Practice of Physiotherapy Students Using Objective Structured Clinical Examination (OSCE)

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ABSTRACT

Objective: To assess the effectiveness of the EBP course on clinical practice of graduate physiotherapy students using OSCE stations.

Materials and Methods: Thirty students of post graduate physiotherapy participated in an EBP course workshop of 30 hours (5 days) in Mangalore, Karnataka, India. The EBP course was designed to teach core EBP knowledge and skills based on the EBP 5 step model. EBP OSCE tool was developed and applied to test the effectiveness of EBP course.

Results: The inter-rater reliability of OSCE tool was good (ICC = 0.98, 95% CI: 0.93 to 0.99) and highly acceptable Internal consistency (Cronbach’s alpha = 0.99) reflects how consistently different OSCE station measure the unified construct, i.e., EBP clinical skills.

Before the EBP course, the participants had a mean score of 39% overall, Post course evaluation, the mean percentage of student’s performance increased to 69%, indicating 30% improvement with significant improvement at each EBP OSCE stations (p<0.001).

Conclusion: Short EBP course delivered in workshop mode was effective in improving EBP knowledge and skills of graduate physiotherapy students. This study demonstrated the use of OSCE to test the EBP knowledge and skills in different clinical vignettes.

Keywords: evidence based practice in physiotherapy, OSCE, EBP
INTRODUCTION
Evidence based physiotherapy practice is building clinical decisions informed by the most pertinent and valid evidence available. Those patients who receive evidence-based therapies (EBP) have better outcomes than those who do not. For developing countries, to efficiently utilize the healthcare resources, it is necessary for every profession that its members understand and possess skills of evidence-based practice. The evidence based practice under physiotherapy is supported or requires appropriate, high quality clinical researches, patients’ preferences and physiotherapists’ practical knowledge. EBP in physiotherapy has become feasible in recent years, through accessibility of high-quality clinical research and clinical guidelines. The translation of research to evidence based physiotherapy practice are affected by barriers such as incompetent curricula targeting evidence based practice oriented skills, lack of training to utilize available resources, poor access to journals and time taken to locate the online evidences. Little is known about knowledge and skills of physiotherapists in evidence based practice in India. Observational studies suggest that one way to ‘future proof’ health care professionals, is to train them in the necessary skills to support life-long learning through the five step model of Evidence based practice. Educators are encouraged to develop curricula of such training programs based on the 5-step model described in the “Sicily Statement on Evidence Based Practice” as core principles of EBP. To measure and document this transformation, instructors need valid and reliable instruments to assess learners EBP competence. As a subjective form of assessments, ie, self-reports and learner satisfaction questionnaires were prone to responders own perception on their performance, might not reflect actual performance and outcome. The Fresno and Berlin tools were found to be reliable and valid instruments to assess all strides of the EBP process; with objective measured outcomes.

Recent evidences from literatures demonstrated Objective Structured Clinical Exam (OSCE) as a reliable and versatile tool to assess student clinical and communication skills. However, the OSCE could be great scope to test competencies as this simulates ‘real-life’ situations that the student may encounter in the clinical environment. Recently, several studies have reported preliminary evidences exploring the assessing EBP competency via OSCEs with good construct validity and reliability. Therefore the present study was aimed to investigate the effect of EBP course on student’s EBP knowledge and skills. Secondly to develop and validate OSCE stations those assess EBP knowledge and skills of physiotherapy students. The study also finds out and documents the physiotherapy student’s current practice, skills and understanding of evidence-based practice to inform efforts to increase the use of the evidence base in physiotherapy. We hypothesized that the teaching short term EBP course through OSCE methodology in physiotherapy students significantly increases participants’ EBP knowledge and skills.

MATERIALS AND METHODS
Participants: Total thirty randomly chosen Post Graduate students out of 80 enrolled participants, willing to participate workshop mediated study from the Srinivas College of Physiotherapy and Research Centre (SCPTRC) in Mangalore, Karnataka, India, were taken in study based up on selection criteria and consequently complied consent procedures. Research and development wing of Rajiv Gandhi University of Health sciences, Bangalore approved research proposal and monitored proceedings. For a sample size calculation, we used power (90%) and type I error rate less than 0.10 (for significant)
with larger anticipated effect size of teaching intervention in single direction effect (Cohen d > 1). This yielded minimum total sample size of twenty eight. This institution attracts population from all four zones of nation India for seeking Graduation and Post-Graduation in Physiotherapy discipline. Students selected had completed at least one year of clinical training in the physiotherapy clinic and hospital and did not attend any EBP course previously.

ETHICAL CLEARANCE
Approval for collecting data and reporting results was obtained from the institutional review board prior to initiating the study.

Materials used
2. Subscription access through Helinet, provided by Rajiv Gandhi University of Health Sciences (RGUHS) and other freely available resources such as PubMed, PEDro and Cochrane Database of Systematic reviews and Clinical trials.
3. Clinical Assessment tool kit.
4. OSCE checklists for all four stations.
5. Standardized Patients.
6. Examiner experienced in OSCE

Expert team
Four faculty members who have more than 8 years clinical experience and teaching Research Methodology and Physiotherapy Clinical Practice from affiliated colleges of Rajiv Gandhi university of health sciences formed our team of experts.

Resource persons
Four physiotherapists in the position not less than associate professors at Rajiv Gandhi University of Health Sciences has formulated overall OSCE questions, PICO formatting, searching strategies, therapy protocol and guided steps of EBP clinical practice from real patient scenarios to simulated patients scenarios. Three physiotherapists in the position not less than associate professors from Manipal University and Rajiv Gandhi University of Health Sciences also participated as to redefine about tasks. A resource person from the education technology field, Mangalore University was participated in all steps of teaching EBP curriculum to the participants through OSCE.

Procedure
We developed altogether 4 EBP OSCE stations for the respective 4 out of 5 steps of EBP model, using Frohna and Fliegel (2006) EBP evaluation. Stations were structured by team of four EBP experts, The assessed skills included were (a) asking a focused clinical question based on a case scenario (ASK), (b) carrying out appropriate search for a given clinical question (ACQUIRE) (c) marking out the points for validity and applicability of given research study (APPRAISAL), and (d) developing a therapy protocol using clinical knowledge, research evidences and after discussion with the patient (APPLY). Our expert team also developed 4 EBP OSCE checklists for respective 4 EBP OSCE stations. The mechanics of checklists were content-oriented and included items related to the task at specific station. The assessment was case based scenario and specific content were minimized by selecting common clinical orthopaedic condition; Tennis Elbow. The station was designed so that performance on each station was independent of the results.
from the prior station, which thereby isolated the assessment of each EBP skill. The total time duration for completion of all EBP OSCE station was kept to 85 minutes.

Educational Intervention
EBP course was conducted in the form of 30 hours (five days) workshop. A course curriculum was made by our team of experts based on the 5-step model described in the Sicily Statement on Evidence Based Practice\textsuperscript{13}. Seven resource persons delivered information in the workshop, 3 are from our team of experts and 4 are the expert teachers from the others institutions in Mangalore. Students are provided with the handouts materials and workbook to practice PICO format, search strategies, critical appraisal and writing therapy protocol during practical session.

Statistical Analysis
Microsoft Excel and IBM SPSS 20\textsuperscript{th} version was used for statistical analysis. The validity and reliability of EBP OSCE checklist was measured. Performance of the five participants at each EBP OSCE station scored by 3 examiners was analysed to measured inter rated reliability. Two-way mixed effects model for intraclass correlations coefficient test was used to measure inter rater reliability and internal reliability and consistency between the examiners by using Cronbach’s alpha.

To investigate physiotherapy students’ current knowledge, skills and understanding of evidence-based practice, we have put pre data to descriptive analysis. Each OSCE station score is converted to percentile and was then categorized as

- Poor EBP knowledge and skills (Fail) – less than 40%
- Fair EBP knowledge and skills (Borderline) – 40% to 50%
- Good EBP knowledge and skills (Pass) – 50% to 75%
- Excellent EBP knowledge and skills (Above expectation) – above 75%

This system of analysing OSCE scores is evident with work of Timothy (2006)\textsuperscript{27}

To check the effectiveness of EBP course on clinical practice of physiotherapy students, we measured the mean difference between the pre and post EBP OSCE scores. The normality of the data was tested by visual inspection of the plotted data and by putting the data to descriptive analysis for Skewness in SPSS. We found that all the data fall under the ±2 Skewness which is indicative of normal distribution. Therefore Paired samples t-test was used to test hypothesis, keeping p-value less than 0.05 (p<0.05) for statistical significance as convention.

RESULTS
There was good inter rater reliability (ICC = 0.98) with 95% CI of 0.93 to 0.99 (p<0.0001) among the three examiners for the five selected participants at all EBP OSCE stations (Table – 1). The internal reliability and consistency between the examiners as measured by Cronbach’s alpha was 0.99 considered highly acceptable. Content validity was established by expert opinion. Analysis of the current level of EBP knowledge and skills reveals 52% of the participants with overall poor level of EBP knowledge and skills while others with fair (23%) to good (15%). Only 10% of the participants show overall excellent level of EBP knowledge and skills (graph – 1). Analysis of pre and post EBP OSCE scores reveals overall 30% improvement. Before the EBP course, the participants achieved a mean score of 39% overall, showing that, on the average, they had little EBP knowledge and skills. Post intervention, the mean percentage of student’s performance increased to 69% with significant improvement at each EBP OSCE station. The mean and standard deviation for pre and post scores at each EBP OSCE is presented in Table – 2. Pre and post mean percentage of student’s performance at each EBP OSCE station is illustrated
in Graph – 2. Using a difference score as the criterion in a paired samples t-test, the mean difference between pre and post EBP OSCE score was analysed which reveals statistically significant result (Table – 3).

Table – 1: Intraclass Correlation Coefficient test for Interrater Reliability among the three examiners for the five selected participants at all EBP OSCE stations

<table>
<thead>
<tr>
<th>Intraclass Correlation</th>
<th>95% Confidence Interval</th>
<th>F Test with True Value 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
</tr>
<tr>
<td>Single Measures</td>
<td>.986\textsuperscript{a}</td>
<td>.936</td>
</tr>
<tr>
<td>Average Measures</td>
<td>.995\textsuperscript{c}</td>
<td>.978</td>
</tr>
</tbody>
</table>

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.
b. Type A intraclass correlation coefficients using an absolute agreement definition.
c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Table – 2: Pre and post mean and standard deviation of scores for each EBP OSCE

<table>
<thead>
<tr>
<th>Paired Samples Statistics</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Mean</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 POST-EBP OSCE - 1</td>
<td>23.83</td>
<td>30</td>
<td>3.16</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>PRE-EBP OSCE - 1</td>
<td>12.70</td>
<td>30</td>
<td>4.13</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>POST-EBP OSCE - 1A</td>
<td>12.86</td>
<td>30</td>
<td>1.38</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>Pair 2 POST-EBP OSCE - 2</td>
<td>11.50</td>
<td>30</td>
<td>1.07</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>PRE-EBP OSCE - 2</td>
<td>6.40</td>
<td>30</td>
<td>2.20</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>POST-EBP OSCE - 3</td>
<td>12.66</td>
<td>30</td>
<td>1.95</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>PRE-EBP OSCE - 3</td>
<td>7.70</td>
<td>30</td>
<td>2.21</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>POST-EBP OSCE - 4</td>
<td>6.86</td>
<td>30</td>
<td>.693</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>Pair 5 POST-EBP OSCE - 4</td>
<td>3.98</td>
<td>30</td>
<td>1.57</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>PRE-EBP OSCE - 4A</td>
<td>2.86</td>
<td>30</td>
<td>.864</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Pair 6 POST-EBP OSCE - 4A</td>
<td>2.38</td>
<td>30</td>
<td>1.05</td>
<td>0.19</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. The paired sample test results for the pre and post scores for each EBP OSCE.

<table>
<thead>
<tr>
<th>Paired Samples Test</th>
<th>Paired Differences</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1a</td>
<td>PRE-EBP OSCE - 1</td>
<td>POST-EBP OSCE - 1</td>
<td>9.55</td>
<td>12.71</td>
<td>4.42</td>
</tr>
<tr>
<td></td>
<td>PRE-EBP OSCE - 1A</td>
<td>POST-EBP OSCE - 1A</td>
<td>5.94</td>
<td>9.11</td>
<td>9.73</td>
</tr>
<tr>
<td>Pair 2b</td>
<td>PRE-EBP OSCE - 2</td>
<td>POST-EBP OSCE - 2</td>
<td>4.30</td>
<td>5.89</td>
<td>13.05</td>
</tr>
<tr>
<td></td>
<td>PRE-EBP OSCE - 3</td>
<td>POST-EBP OSCE - 3</td>
<td>3.91</td>
<td>6.02</td>
<td>9.639</td>
</tr>
<tr>
<td>Pair 3c</td>
<td>PRE-EBP OSCE - 4</td>
<td>POST-EBP OSCE - 4</td>
<td>2.25</td>
<td>3.51</td>
<td>9.372</td>
</tr>
<tr>
<td></td>
<td>PRE-EBP OSCE - 4A</td>
<td>POST-EBP OSCE - 4A</td>
<td>0.274</td>
<td>0.685</td>
<td>4.781</td>
</tr>
</tbody>
</table>

a) Significant improvement in knowledge and skills for clinical interview, with 95% CI of 9.55 to 12.71 (p<0.0001) after an EBP course.
b) Significant improvement in knowledge and skills for formulating structured clinical question, with 95% CI of 5.94 to 9.11 (p<0.0001) after an EBP course.
c) Significant improvement in knowledge and skills for literature searching, with 95% CI of 4.30 to 5.89 (p<0.0001) after an EBP course.
d) Significant improvement in knowledge and skills for research study appraisal, with 95% CI of 3.91 to 6.02 (p<0.0001) after an EBP course.
e) Significant improvement in knowledge and skills for treatment planning, with 95% CI of 2.25 to 3.51 (p<0.0001) after an EBP course.
f) Significant improvement in knowledge and skills for developing therapy protocol, with 95% CI of 0.27 to 0.68 (p<0.0001) after an EBP course.

Figure 1. Overall current level of EBP knowledge and skills among students (n=30)
DISCUSSION

We developed and demonstrated EBP OSCE stations and checklist with good content validity and reliability so that context specific EBP knowledge and skills in physiotherapy can be evaluated rather conventionally using highly reliable multiple-choice testing\(^\text{17,28,29}\). Also there was good statistically significant reliability (ICC = 0.98) in between the assessors for each EBP OSCE with 95% CI of 0.93 to 0.99 (\(p<0.0001\)) and highly acceptable internal consistency with Cronbach’s alpha 0.99 between the assessors. This simulation based OSCE EBP evaluation of competencies will serve as better example as it make experience the student concurrent apply EBP while treating patients and OSCE will provide feedback on fidelity of the practice.

However, a clinical case-scenario based approach used in our EBP OSCE may better measure the EBP knowledge and skills, as it involves immersing the students in the patient context to a greater degree via simulating real patient clinical scenario. In addition, our EBP OSCE is flexible and can be used to test the EBP knowledge and skills of physiotherapy students with different clinical case situation. Previous studies also reported a good psychometric properties of the OSCE methodology in assessing student clinical competencies, practical and communication skills\(^\text{18,19}\).

Current level of EBP Knowledge and skills of participants measured by analysing pre data, using our EBP OSCE showed overall poor performance by more than half of participants (52%). Previous studies on level of EBP knowledge and skills of students have been limited. Ross Iles and Megan (2006) carried out a survey to investigate Australian physiotherapists on “self-reported practice, skills and knowledge of evidence-based practice” and found only 59% of the respondent reported frequently formulating a structured question to address a knowledge gap\(^\text{30}\). Results of our study shows 70% of students were poor in formulating clinical question for a given case scenario. A clearly defined question can make searching for information a well-organized and successful undertaking, so on the later EBP steps. However, assessment tool used by Ross Iles and
Megan (2006) survey tool was limited to measure only the EBP knowledge of participants and to lesser extent the EBP skills. Whereas EBP OSCE used in our study quantitatively describes the current level of EBP knowledge and skills of students as our EBP OSCE is based on case scenario approached and the content is very specific to EBP components.

Our short term EBP course intervention of 30 hours delivered in the form of 5 day workshop found to improve EBP knowledge and skills. Use short courses in EBP to improve knowledge and skills is evident with previous studies also. A recent systematic review of 23 studies in EBM training demonstrated that resident EBM skills are much more likely to improve when the duration of training was at least eight hours. Similar results was documented by Fritsche, et al (2002) who found that, an Intensive 3 day courses in evidence based medicine delivered through tutor facilitated small groups, results in a significant increase in competencies of evidence based medicine of medical students and doctors. Most of the studies that evaluate training residents in EBP have been done in medicine and nursing discipline. Little information is known about EBP skills of physiotherapy professionals. This study demonstrates that significant gains in EBP knowledge and skills with brief intervention of 15 hours administered in the form of workshop. This is an important point, particularly for curriculum framers in physiotherapy discipline as physiotherapy has become feasible with the enormous increase published research studies in recent years and accessibility of high-quality clinical research and clinical guidelines have become a major feature of physiotherapy provision. Introduction of similar educational courses at an early level to physiotherapy graduates may be advantageous as they will be able to use these skills as a foundation to develop and build upon during their clinical training including inpatient and outpatient rotations. Previous research has demonstrated that an integrated approach to EBP skills training, where EBP skills are integrated with patient care through the attending rounds and/or cases taken from resident’s actual patient care, results in better acquisition of EBP skills. This study attempted to simulate an integrated clinical case scenario approach in OSCE methodology which is potentially simulates real life situations that the student may encounter in the clinical environment.

There are some limitations to this study; firstly single case and single institution was chosen to represent psychometrics of OSCE and EBP, although we achieved good inter-rater reliability, multiple cases should include for future work enabling more real clinical situations (diagnostic and history components).

Future studies involving multiple institutions combined with multiple cases need to examined to reveal what extent the validity and reliability components of OSCE and EBP were affected.

Though this method (OSCE) found to effective in assessing EBP skills expansion can be tried as no one method is likely to be a solution. We are encouraged by the initial success of the method described in this study and also believe this will rekindle other evaluation methods.

**CONCLUSION**

Case specific OSCE could be used effective tool to test the competency of EBP knowledge and skills using different clinical vignettes.
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