Original Article

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Critical Appraisal Skills Training to Undergraduate Medical Students: A Randomized Control Study

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Abstract

Introduction: Critical appraisal skills are presumed to perform a principal part in evidence-based health education and practice methods. This study aimed to design an educational intervention around critical appraisal in this context, evaluate the efficacy of the teaching methods, and investigate critical appraisal skills training to undergraduate medical students.

Methods: In this prospective Randomized Control Trial (RCT), 256 sixth-year undergraduate medical students from Shiraz University of Medical Science, Shiraz, Iran, participated. 124 of the students were not taught critical thinking methods as a control group, and 132 participants were taught critical thinking methods by multi-media and attended an online Critical Appraisal Skills (CAS) training workshop as an intervention group. We used the Critical Appraisal Skills Programme (CASP) questionnaire to evaluate students' knowledge, attitude, confidence, and appraisal skills. This questionnaire was translated into Persian for the first time in Iran by Shokooh Varai, et al. They investigated its validity and reliability, the reliability of the questionnaire being obtained by the Richardson Index (0.75), and the validity being confirmed by some faculty members of Tehran Nursing and Midwifery School. To compare both control and intervention groups, we used an independent t-test and a Chi-Square test at a significance level of 5%, and to analyze the demographic information, we applied some descriptive statistics: frequency, frequency percentage, mean and standard deviation. All of the statistical approaches were analyzed, using SPSS 22.

Results: In all dimensions of the critical appraisal skills, medical students who completed the critical appraisal multi-media training and workshop performed better than those who did not (control group), and this difference was statistically significant ($P<0.05$). Moreover, the Chi-Square test results showed no statistical relationship between the groups regarding the demographic variables ($P>0.05$). Also, the Cohen's D effect size values in the knowledge and confidence dimensions were greater than 0.5; this meant a large effect. Regarding the attitude and appraises Skill dimensions, the effect size was between 0.2 and 0.5, which meant a medium effect.

Conclusion: Teaching critical appraisal skills through multi-media and CAS online workshops to medical students effectively improves the students' knowledge and confidence in appraising articles. This teaching also indicated a medium effect on students' attitudes and behavior. Our findings can justify implementing critical appraisal skills teaching modules in the undergraduate medical education curriculum.

Keywords: Critical appraisal, Evidence-based medicine, Medical education, Medical students, Training

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participants' attitudes (17, 18).

Our study indicated that a critical appraisal workshop had a positive, significant effect on the knowledge of the intervention group. These results are in line with Hyde C et al. and Thomas et al's. (18, 19).

When comparing our results to previous studies, it must be pointed out that using multi-media in this study was significant and caused improvements in knowledge, attitude, confidence, and appraising skills. By transferring everything online, multi-media saves time, money, and resources. In terms of education, it makes learning accessible in every place (20).

The findings of this study afford only inadequate support for such teaching. However, it is essential to put this outcome in a proper educational setting. The half-day online critical appraisal skills workshop assessed in this trial has been widely spread, and its period and set-up are regular with many previous critical appraisal training interventions (21).

However, it is possibly unworkable to suppose that the half-day workshop estimated in this trial would result in deviations in professional performance. This is sustained by an enormous body of data and theory on altering professional training (22).

Critical appraisal projects in the undergraduate classroom can be effective strategies for student participation. As students learn to navigate scientific literature in a community of practice, it becomes less intimidating (23, 24). It causes an increase in time and opportunities for continuous professional development and research, which may play a leading role in promoting the health of medical students (25). The most substantial part of critical appraisal training may modestly be to explain to members the accessibility of high-quality evidence. Additional discussion is consequently required about progressing critical appraisals skills training on the way to outcome such evidence and the starring role of health-care librarians and the new enterprises such as the National Electronic Library for Health. Several commentators have criticized previous evaluations of critical appraisal skills teaching for not using investigational strategies (26-28).

One of the strengths of the current study is that the design is RCT with the acceptable number of medical students in Shiraz Medical School, which is one of the major medical schools in the South of Iran. Another strength is that it was done based on the Oxford Regional Health Authority's Critical Appraisal Skills Program, which was designed using McMaster University's teaching methodologies in Canada (6). Self-directed learning, small group teaching approaches, and the significance of embedding education within the clinical decision-making process are major characteristics of the 'McMaster model (29).

Potential limitations of this study

As with all research, this study had restrictions. While specific improvements are statistically significant, we are unable to determine whether or not they are educationally meaningful. Another restriction is that the study is a single-center study; thus, generalizability is limited.

We might have prepared the students for the questionnaire during the workshop or through multi-media training, but, to overcome this limitation, we enlisted the assistance of an outside observer to supervise the educational parts.

Another drawback is that we did not use a pretest to compare the same students before and after training and instead used this test exclusively for posttests. However, pretest-posttest improves internal validity but sacrifices external validity to do so (30).

Conclusion

Teaching critical appraisal skills through multi-media and CAS online workshops to medical students effectively improves students' knowledge and confidence in appraising articles. This teaching also indicated a medium effect on students' attitudes and behavior. Further research is necessary to see whether this strategy leads to increased critical appraisal skills in actual clinical situations. Our findings can justify implementing critical appraisal skill teaching modules in the undergraduate medical education curriculum.

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Authors' contribution

S.S, M.A, M.M, A.A, M.M, H.Z, F.V contributed to the conception and design of the work; the acquisition, analysis, or interpretation of data for the work. All Authors contributed in drafting and revising the manuscript critically for important intellectual content. All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work in