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Protocol

Randomized controlled trial of an E-learning program for physiotherapy students to improve the management of rotator cuff related shoulder pain: a study protocol

Bahar Ayberk*, Mine Gülden Polat

Department of Physiotherapy and Rehabilitation, Marmara University, İstanbul, Turkey

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***Correspondence:**
Bahar Ayberk,
E-mail: bhargnes@gmail.com

ABSTRACT

Background: The majority of shoulder complaints are occurred due to rotator cuff pathologies. Although conservative treatments including physiotherapy are acknowledged as the first-line treatment approach in the management of shoulder pain, the uptake of physiotherapy practice is variable. One possible explanation of this could be the poor evidence-based knowledge mobilization to practice. The aim of the study was to evaluate the efficacy of an E-learning program on physiotherapy students' knowledge of evidence-based Rotator cuff-related shoulder pain (RCRSP) management and their confidence in applying this care compared to a control group.
Methods: A randomized controlled study will be carried with 146 fourth-year physiotherapy students. Students will be assigned to one of two groups: E-learning (N=73) or control (N=73). The outcomes will be: (1) RCRSP knowledge and clinical reasoning skills, and (2) self-reported confidence in RCRSP knowledge and clinical reasoning abilities. Both measurements will be held at baseline and post-intervention.
Conclusions: This is the first trial to investigate if a specifically designed E-learning program besides a regular learning curriculum, improves students' knowledge and self-confidence in the RCRSP management. Enhancing students' after-graduation readiness to manage patients with RCRSP may help to allow patients access to evidence-informed physiotherapists.
Trial registration: This trial was registered on clinicalTrials.gov on 17 June 2021 (NCT04952623)

Keywords: E-learning, Rotator cuff injuries, Physiotherapy education

INTRODUCTION

The Rotator cuff-related pathologies (RCRSP) constitute 70% of shoulder pain complaints.[1] Shoulder pain is not a short-lasting problem for the majority of patients. Shoulder pain and functional difficulties following rotator cuff-related pathology severely interfere with daily life activities. Forty percent of the patients complain of recurrent symptoms within 12 months from the onset of the disease.[2] Moreover, poor long-term outcomes cause the majority of patients to seek more invasive and expensive treatment options such as injections or surgery.[3] Conservative therapies, such as physiotherapy and rehabilitation, are often considered as the first-line treatment strategy for shoulder pain, however, there is considerable variation in physiotherapy practice.[4,5] According to studies on physiotherapists' preferences about the care of RCRSP, clinicians tend to prefer passive treatment modalities as well as evidence-based treatment strategies.[6]

Researchers also emphasized that there still is a gap between literature evidence and physiotherapy practice which is due to the lack of effective knowledge mobilization.[6] Therefore, the ineffectual knowledge mobilization reveals the importance of alternative learning

methods such as E-learning programs to be designed to increase physiotherapy students' knowledge and management skills about RCRSP.

The delivery of education by using electronic technologies is known as E-learning.[7] E-learning is an advantageous way of learning because it is low-cost, highly accessible, and allows personalized content and learning speed.[8] In addition, E-learning adapts adult learning paradigms because of its' interactivity and combinability with the other learning models.[9] Moreover, E-learning programs are alternative learning methods to improve healthcare professionals' evidence-based knowledge and practice and have been widely studied in the literature.[10-14] The effects of E-learning interventions on physiotherapists' and physiotherapy students' knowledge on different pathologies such as rheumatoid arthritis, spinal cord, and fall rehabilitation have been documented before.[12,13,15,16] On the other hand, there is a limitation of evidence about the effects of an E-learning program on the knowledge of physiotherapy students concerning shoulder pain. As a result, the purpose of this research is to evaluate the effect of participating in an RCRSP E-learning program on physiotherapy students' knowledge of evidence-based RCRSP management and their levels of confidence in implementing this knowledge, compared with the control group.

METHODS

Trial design

Consolidated Standards of Reporting Trials (CONSORT) statement will be followed to execute the randomized controlled trial (Figure 1).[17] Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT) statement will be used to construct and present the study protocol.[18] Educational content was outlined by following the template for intervention description and replication checklist.[19]

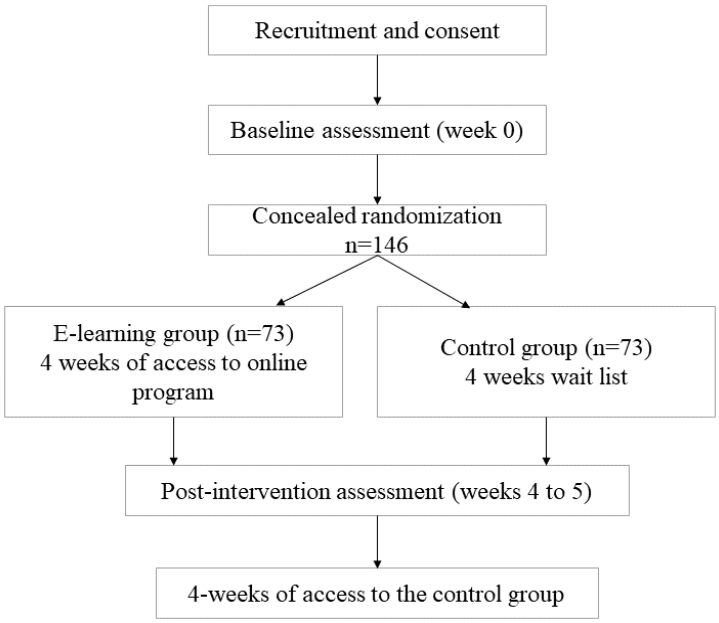

Figure 1: Trial design.

Recruitment

One hundred forty-six students will be recruited through advertising posted on social media via physiotherapy student clubs or in the newsletters of Turkish Physiotherapy Associations.

The recruitment advertisements will include information about the study and a consent link if the student demands to participate. The students who give consent to participate will be contacted by a researcher and informed about the further steps of the study.

The recruitment process will begin in February 2022.

Eligibility criteria

Participants must be fourth-year undergraduate physiotherapy students to be eligible for the study.

The students who are not enrolled in fourth grade will be excluded.

Randomization

To ensure allocation concealment, randomization will be administered by a researcher who is not engaged in recruiting or reporting process. Participants will randomly be assigned to one of two groups: E-learning or control. To

maintain intergroup balance, a computer-generated random number sequence will be utilized.

Intervention

The RCRSP E-learning program is a self-paced online training created by the research group based on current evidence-based research.[20-23] The E-learning program was prepared using the ADDIE Instructional design model.[24] The program comprises a brief introduction followed by three modules that cover RCRSP definition, symptoms, evaluation and diagnosis, and comprehensive RCRSP management (Table 1).

Table 1: The description of intervention in accordance with the Temple for Intervention Description and Replication (TIDieR) checklist.

Name	E-learning program for physiotherapy students on Rotator cuff-related shoulder pain (RCRSP).
Why	E-learning interventions have been shown to be as beneficial as traditional learning interventions, with the added advantages of being more accessible and user-friendly (Wentling, 2000).
What materials	The E-learning program consists of texts, infographics, and instructional videos.
What procedures	The E-learning program has three modules as outlined below: Module 1: Introduction -Understanding RCRSP Module 2: Assessment -Physiotherapy assessment -Literature evidence about special orthopedic tests and imaging methods -Shoulder symptom modification procedure Module 3: Treatment -Patient education -Exercise -Other treatment methods
Who provided	The E-learning program has been designed and developed by the authors according to the ADDIE Instructional Design Model (Muruganantham, 2015).
How	The E-learning program is an individually delivered self-paced online activity.
Where	Students access the online content through www.rmftr.com website.
When and how much	Each student will have four weeks to complete the E-learning program.
Tailoring	The online content will be the same for all participants.

Outcomes

The outcome measures will be collected from participants by completing the RCRSP achievement test and self-reported confidence in knowledge related to RCRSP at two-time points. The outcome measures will be completed by both groups at baseline (week 0) and post-intervention (weeks 4-5). To avoid contamination, the correct answers to the outcome measure (RCRSP achievement test) are not given and hence cannot be shared among participants. Furthermore, a demographic information survey will be applied at baseline.

Randomized controlled trial

The outcome measures will be: (a) RCRSP achievement test: The test was designed by the authors according to current literature.[20-23] The aim of the test was to measure the participants' knowledge about rotator cuff anatomy and kinesiology, rotator cuff tendinopathy mechanism, RCRSP symptoms, RCRSP management strategies, and interventions. The test consists of 18 multiple-choice questions. The Kuder Richardson 20 reliability coefficient of the test is 0.84. In addition, the average difficulty of the test is moderate (0.59) and its distinctiveness is very good (0.52). Therefore, the RCRSP achievement test is a reliable and valid measurement tool; and (b) self-reported confidence in RCRSP-related knowledge and clinical skills: The researchers used a 5-point Likert scale to create this questionnaire. The questionnaire includes three items. Participants will be asked to score their self-confidence to practice evidence-based intervention based on their knowledge and clinical abilities.

Control group

The control group will access the E-learning program 4-5 weeks after the baseline assessment measures are completed.

Sample size considerations

With an 80% power and a two-tailed of 0.05, a total sample of 112 students is necessary to achieve a moderate effect size (d=0.5) of an increase in clinical knowledge of evidence-based RCRSP care. We intend to recruit 146 individuals with an assumption of a potential 30% dropout rate. Estimates of the dropout rate and effect size were determined in accordance with the previous similar research.[12]

Analysis of outcomes

The inter-group differences at baseline will be analyzed by using an independent t-test for the achievement test and Mann-Whitney U tests for the self-reported confidence questionnaire. To specify if the E-learning group improves in knowledge and confidence related to RCRSP compared to the control group, an intention-to-treat analysis will be used. To determine the change of scores from the baseline

to post-intervention between groups, an independent t-test will be used for the achievement test and the Mann-Whitney U test will be used for measuring the confidence of the participants. All statistical analyses will be conducted by using SPSS software and the researcher who is responsible for data analysis will be blinded to group allocation.

DISCUSSION

Given the nature of shoulder pain and its negative consequences on patients' everyday lives, and despite physiotherapy is one of the first-line treatment methods, the practice preferences of physiotherapists are variable. There is a lack of learning methods to knowledge mobilization between the literature and practice. As far as we know, no research has been carried to demonstrate the efficacy of an E-learning program on physiotherapy students' knowledge and clinical skills related to RCRSP management. This trial aims to investigate if a specifically designed E-learning program besides a regular learning curriculum, improves students' knowledge and self-confidence in the care of patients with RCRSP.

The learning analytics of this trial could allow to identify the students' background knowledge level about RCRSP and to make inferences about the existing curriculum.

CONCLUSION

Enhancing students' after-graduation readiness to manage patients with RCRSP may help to allow patients access to evidence-informed physiotherapists. Increasing students' skills before graduation could cause an opportunity to increase workforce capacity in primary care.

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Ethical approval: The permission was obtained from Marmara University Ethics Committee (Protocol number:16.11.2020-95)

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