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Cochrane review summary

Is neuromuscular electrical stimulation effective for management of patellofemoral pain syndrome? A Cochrane Review summary with commentary

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The aim of this commentary is to discuss the rehabilitation perspectives of the Cochrane review "Neuromuscular electrical stimulation (NMES) for patellofemoral pain syndrome" by Martimbianco et al. (2017),[a]. This review was produced with the support of the Cochrane Bone, Joint and Muscle Trauma Group. This Cochrane Corner is produced in agreement with John Wiley & Sons, Ltd by Cochrane Rehabilitation.

1. Background

Patellofemoral pain syndrome is a common musculoskeletal disorder primarily affecting adolescents and young adults. It is also known as patella malalignment syndrome, chondromalacia patellae, and anterior knee pain syndrome. Patellofemoral pain may present in the anterior or retropatellar knee region. It is aggravated by activities such as running, prolonged sitting, stair climbing, kneeling, or squatting, because all these activities tend to overload the patellofemoral joint (Collins et al., 2013). The proposed risk factors of patellofemoral pain syndrome include mechanical and structural changes in the patellofemoral joint, maltracking of the patella, weakness of the quadriceps muscles (quadriceps musculature), poor muscle flexibility, and altered lower extremity kinematics (Bolgla and Boling, 2011). There are no specific laboratory and radiological tests for the diagnosis of this condition. It is largely based on presenting symptoms and a thorough musculoskeletal clinical examination (Manske and Davies, 2016). The mainstay of the treatment is conservative (non-surgical). This includes use of oral analgesic medications and physical therapy. Physical therapy includes closed and open chain strengthening exercises, stretching exercises, education and advice, patellar taping, joint mobilization and foot orthoses.[3,] (Rixe et al., 2013). However, it is important to note that there is no evidence that a single treatment modality works for all patients with patellofemoral pain (Saltychev et al., 2018). Exercise therapy is considered as an essential intervention for patellofemoral pain but in some cases it exacerbated the pain (Dye, 2005). Therefore, neuromuscular electrical stimulation (NMES) has been proposed as a complementary therapy to the exercise program. This modality is being widely used by physical therapists but so far there are no clear guidelines or recommendations for the use of NMES for treating patients with patellofemoral pain.

2. Neuromuscular electrical stimulation (NMES) for patellofemoral pain syndrome (Martimbianco et al., 2017)

2.1. What is the aim of this cochrane review?

The aim of this Cochrane review was to assess benefits and harms of NMES for people suffering from patellofemoral pain.

2.2. What was studied in the cochrane review?

The authors only included randomized controlled clinical trials (RCT) evaluating the use of NMES for people with patellofemoral pain. The intervention studied was NMES. It was compared with no treatment and sham or placebo treatment (stimulation parameters below threshold level), or exercise. Authors also included trials which compared different programs of NMES (differences in frequencies, intensity and duration). Eight RCTs were selected after a literature search. The review population was 345 adults in which a diagnosis of patellofemoral pain was made based on clinical examination, MRI and X-rays. Participants with other knee conditions were excluded. The mean age of

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[a] The abstract/plain language summary of this Cochrane Review is taken from a Cochrane Review previously published in the Cochrane Database of Systematic Reviews (2017), Issue 12, Art No.: CD011289. DOI 10.1002/14651858.CD011289.pub 2 (see www.cochranelibrary.com for information). Cochrane Reviews are regularly updated as new evidence emerges and in response to feedback, and Cochrane Database of Systematic Reviews should be consulted for the most recent version of the review.The views expressed in the summary with commentary are those of the Cochrane Corner author(s) and do not represent the Cochrane Library or Wiley.

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trial participants ranged from 25 to 43 years and the majority of participants were women (53–100%). The minimum duration of symptoms was from one to six months. The outcomes studied were divided into primary and secondary outcomes. The primary outcomes were knee pain (assessed by visual analogue scale – VAS), knee function measured by Kujala Patellofemoral Score and Lysholm score, and adverse events after use of NMES (for example skin injuries, excessive discomfort, excessive fatigue, bradycardia or other cardiac arrhythmia, or substantially increased pain as a direct effect of treatment). Secondary outcome measures were objectively measured performance tests such as the hop test, health-related quality of life, participant satisfaction and muscle strength, such as measurement by isokinetic dynamometer.

2.3. Search methodology and up-to-dateness of the cochrane review?

The literature search was performed in May 2017 using the following information sources: Cochrane Bone, Joint and Muscle Trauma Group Specialized Register; Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, Embase, the Physiotherapy Evidence Database (PEDro), Cumulative Index to Nursing and Allied Health Literature (CINAHL), SPORTDiscus, Allied and Complementary Medicine Database (AMED), Latin American and Caribbean Health Sciences, the WHO International Clinical Trials Registry Platform, ClinicalTrials.gov, and the ISRCTN registry. The authors did not apply any restrictions based on publication status or language.

2.4. What are the main results of the cochrane review?

The review included 8 heterogeneous RCTs, with a total of 345 participants.

Four studies compared different multiple-session NMES combined with exercise versus exercise (two studies compared NMES plus exercise versus exercise alone (n = 42 for 6 weeks and n = 29 for 12 weeks); in one study, patellar taping was added to both groups (n = 30 for 6 weeks); and in the fourth study, patellar taping and ice were added (n = 40 for 3 weeks). For this comparison, the review found the following.

- There is very low-quality evidence that NMES is associated with pain reduction (which may not be clinically relevant) at the end of treatment.
- There is very low-quality evidence of effect of NMES on knee function
- There is inconclusive and very low-quality evidence of effect of NMES on knee pain and function at one-year follow-up
- None of the 4 studies reported on adverse effects of treatment

One study with 94 participants compared NMES (for 4 h/day for 4 weeks) with isometric and isokinetic exercises. The review found the following.

- There is very low-quality evidence of no important difference between the NMES and exercise groups in knee function at post-treatment. However, NMES protocol used was not similar to the routinely used clinical practice protocol
- There was no report on knee pain or adverse events in the study

Two studies compared different types of NMES. One study with 14 participants compared high-low frequencies NMES delivered simultaneously versus high-low frequencies NMES delivered sequentially for 6 weeks; and the other study with 74 participants compared high-low frequencies NMES with fixed frequency NMES for 6 weeks. The review found the following.

- There is very low-quality evidence of no important differences between simultaneously delivered frequencies NMES and the sequentially delivered frequencies or fixed frequency NMES regarding overall knee pain, knee function, or quadriceps fatigue (as an adverse event) post-treatment (at the end of six weeks of intervention)

The review questioned the clinical relevance of the results of the final study, which was a laboratory study with 22 participants compared NMES with sham NMES, using a single 15-min session.

2.5. How did the authors conclude on the evidence?

The authors concluded that the evidence available up to May 2017 was insufficient to inform on the role of NMES for the treatment of patellofemoral pain in clinical practice. It is not clear if the use of multiple sessions of NMES combined with exercise versus exercise results in a clinically important difference in knee pain or knee function at the end of the treatment or at one year. There were no data on adverse effects. The authors pointed also to the need to develop a formal diagnostic criterion of patellofemoral pain and to standardize the application parameters of NMES.

2.6. What are the implications of the cochrane evidence for practice in rehabilitation?

Knee pain is a common complaint and frequently seen in clinical practice by rehabilitation professionals (physiatrists and physical therapists). Patellofemoral pain syndrome is a common cause of knee pain which can lead to prolonged discomfort and a poor quality of life. Many options for conservative management are available, including NMES. Since the evidence for the use of NMES for managing patellofemoral pain is not strong or conclusive, rehabilitation professionals should be cautious in advising this treatment and must carefully assess the possible benefits and harms of the intervention and discuss them with the patients.

There is also a need to develop consensus on the definition and diagnostic criteria of patellofemoral pain syndrome and to clearly outline the parameters and develop guidelines for application of NMES for patellofemoral pain.

Conflicts of interest

None.

Disclosures

The author declares no conflicts of interest.

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