Patellar taping for patellofemoral pain syndrome in adults (Review)

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This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2012, Issue 4

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[Intervention Review]

Patellar taping for patellofemoral pain syndrome in adults

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Editorial group: Cochrane Bone, Joint and Muscle Trauma Group.
Publication status and date: New, published in Issue 4, 2012.
Review content assessed as up-to-date: 20 November 2011.

Citation: Callaghan MJ, Selfe J. Patellar taping for patellofemoral pain syndrome in adults. *Cochrane Database of Systematic Reviews* 2012, Issue 4. Art. No.: CD006717. DOI: 10.1002/14651858.CD006717.pub2.

ABSTRACT

Background

Patellofemoral pain syndrome refers to the clinical presentation of knee pain related to changes in the patellofemoral joint. Patellofemoral pain syndrome usually has a gradual onset of pain with none of the features associated with other knee diseases or trauma. It is often treated by physiotherapists, who use a variety of techniques including patellar taping. This involves the application of adhesive sports medical tape applied directly to the skin over the patella on the front of the knee. Patients often report an instantaneous improvement in pain and function after the tape is applied, but its longer term effects are uncertain.

Objectives

The objective was to assess the effects, primarily on pain and function, of patellar taping for treating patellofemoral pain syndrome in adults.

Search methods

We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register, the Cochrane Central Register of Controlled Trials, MEDLINE, CINAHL, EMBASE, PEDro, SPORTDiscus, AMED, reference lists of articles, trial registers and conference proceedings. All were searched to August 2011.

Selection criteria

Randomised controlled trials and quasi-randomised controlled trials testing the effects of patellar taping on clinically relevant outcomes, pain and function, in adults with patellofemoral pain syndrome. We excluded studies testing only the immediate effects of tape application.

Data collection and analysis

Both review authors independently performed study selection, data extraction and assessment of risk of bias. Trialists were contacted for more information. Data were pooled where possible.

Main results

Five small heterogeneous randomised controlled trials, all at high risk of performance bias and most at risk of at least one other type of bias, were included. These involved approximately 200 participants with a diagnosis of patellofemoral pain syndrome. All compared taping versus control (no or placebo taping) and all included one or more co-interventions given to both taping and control group participants; this was prescribed exercise in four trials. The intensity and length of treatment was very varied: for example, length of treatment ranged from one week in one trial to three months in another. A meta-analysis of the visual analogue scale (VAS) pain data (scale 0 to 10: worst pain), measured in different ways, from four trials (data from 161 knees), found no statistically or clinically significant difference between taping and non taping in pain at the end of the treatment programmes (mean difference (MD) -0.15; 95% confidence interval (CI) -1.15 to 0.85; random-effects model used given the significant heterogeneity ($P < 0.0001$)). Data for other outcomes measuring function and activities of daily living were from single trials only and gave contradictory results.

Authors' conclusions

The currently available evidence from trials reporting clinically relevant outcomes is low quality and insufficient to draw conclusions on the effects of taping, whether used on its own or as part of a treatment programme. Further research involving large, preferably multi-centre, good quality and well reported randomised controlled trials that measure clinically important outcomes and long-term results is warranted. Before this, consensus is required on the diagnosis of patellofemoral pain syndrome, the standardisation of outcome measurement and an acceptable approach for patellar taping.

PLAIN LANGUAGE SUMMARY

Taping across the knee cap for adults with persistent pain at the front of the knee (patellofemoral pain)

Pain at the front of the knee (also known as anterior knee pain or patellofemoral pain) is a common problem which particularly affects those who do some form of sport or exercise. Typically, it gets worse when going up and down stairs, squatting, kneeling and sitting with the knee bent. It is a distinct and separate condition from knee arthritis.

Such anterior knee pain is often treated by physiotherapists, who use a variety of techniques. One such technique is the use of a simple piece of adhesive tape across the knee cap to control the positioning of the knee-cap (patella) and potentially reduce the pain during movement.

The review found five trials, involving around 200 participants with this condition, which compared the clinical use of taping with no taping. All five studies differed from each other in terms of the type of participants (one trial involved army recruits), length and schedule of the treatment programme and assessment of outcome. In four trials, participants of both taping and no or placebo taping groups were prescribed exercises. In part because both the therapist and the patient knew whether they were getting taping, some caution was necessary in interpreting the study results. Pooled results from four trials (161 knees) for the level of pain at the end of the treatment programme (ranging for one week to three months) showed no difference between those given taping and those not. Data for other outcomes measuring function and activities of daily living were from single trials only and gave different results.

The review concluded that the currently available evidence from trials reporting clinically relevant outcomes is and low quality and insufficient to draw conclusions on the effects of taping. However, before further trials are conducted, some consensus is required to establish the typical patients, taping technique and the best way of measuring outcome.

BACKGROUND

Description of the condition

Patellofemoral pain syndrome refers to the clinical presentation of knee pain related to changes in the patellofemoral joint. Patellofemoral pain syndrome usually has a gradual onset of pain with none of the features associated with other knee injuries or

diseases. Authors in the United Kingdom (Anderson 2003), mainland Europe (Witvrouw 2003), Australia (McConnell 1996) and the USA (Brechter 2002) have stated that 25% of the adult population present with patellofemoral pain at some point, but have cited data from studies involving sporting or military cohorts. As a recent population estimate for adults aged between 19 to 50 years is just over 25 million in England alone (ONS 2007), these estimates may indicate that patellofemoral pain syndrome is a considerable health burden. However, the true prevalence and incidence of patellofemoral pain syndrome in the population as a whole remains unknown (Callaghan 2007).

Patellofemoral pain syndrome can cause functional limitations (Callaghan 1996; Callaghan 2004). The best way to manage the condition remains controversial and treatment failure rates are reported to be high (Brown 2000). Researchers have shown that patients may have higher than expected levels of disability (Clark 2000b) and psychological morbidity (Jensen 2005). A significant number may still experience symptoms many years after diagnosis (Nimon 1998) and there are concerns that the syndrome may predispose to osteoarthritis (Utting 2005). However, the possibility that anterior knee pain is a risk factor for incident patellofemoral osteoarthritis warrants further attention (Thomas 2010). The aetiology of patellofemoral pain syndrome is also unclear, with some studies suggesting that biomechanical abnormalities may be precipitated by occupation, sports or footwear (Cheung 2006). Higher body mass indices have been observed in patients with patellofemoral pain syndrome (Clark 2000b) and this apparent association cannot be ignored given the increasing prevalence of obesity in society.

Anatomical considerations for this condition

The patellofemoral joint is a complex joint arrangement between the back of the patella (knee-cap) and the reciprocally shaped distal end of the femur (thigh bone). The patella is a rounded bone embedded in the quadriceps tendon and is the largest of its kind (a sesamoid bone) in the body. Its joint surface has a large flat area on the outside, a smaller convex area on the inside, which in turn has a smaller area at its extreme, usually described as the 'odd facet' (Goodfellow 1976). The patellofemoral joint is a synovial joint and is the least stable joint in the lower limb; it has six degrees of freedom of motion and very large forces of multiple times the body weight are applied rapidly through a wide range of motion during everyday functional activities (Selfe 2010b). The primary role of the patella is to increase the efficiency and mechanical advantage of the large quadriceps muscles on the front of the thigh (Malek 1981). It also has a role in distributing the compressive forces at the joint by increasing the contact area between patella and thigh bone. The patella provides a fulcrum for the static and dynamic stabilisation supports (Malek 1981). The static stabilisers of the patella are a variety of ligaments, bursae (fluid sacs) and fascial tissue that keep the patella in its position in the centre of the knee. The dynamic stabilisers are muscle and tendons, the most important of which are the quadriceps muscles and, to a lesser extent, the hamstrings at the back of the thigh.

Description of the intervention

Patellar taping is an inexpensive technique readily and often used in the treatment of patients with patellofemoral pain syndrome. The technique involves the application of adhesive sports medical tape directly to the skin over the patella on the front of the knee. Usually, this tape is applied by physiotherapists during a treatment session but it can also be applied by patients at home and left on during waking hours. A variety of taping methods and techniques are in use. These include variations in the type of tape (elastic or rigid), the direction of pull of the tape (medial, lateral, inferior, superior, rotational, or no directional pull at all) and the number of layers of tape applied over the patella.

How the intervention might work

The dominant theory from both orthopaedic and physiotherapy perspectives is that most patellofemoral pain is the result of some form of patellar malalignment. But although it is purported to be present in the majority of patients with gradual, non-arthritic and non-traumatic patellar pain, the same cannot be said for adolescents who usually have patella problems related to growth and development (Grelsamer 1998). Physical correction of malalignment is just one of the reasons why patellar taping is thought to be beneficial for patellofemoral pain syndrome and there is an implication that the correction of static stability may restore normal patellar tracking by also improving dynamic stability. McConnell 1986 originally described patellar taping as part of a treatment programme for patellofemoral pain syndrome and theorised that this technique could alter patellar alignment, enhance contractions of the vastus medialis oblique (VMO) muscle, and hence decrease pain. Although these theories how a taping intervention might work were accepted for many years, subsequent studies have been contradictory regarding the ability of taping to realign patellar position (Crossley 2000) and to enhance VMO contractions (Cerny 1995b). Nevertheless, a number of studies have shown that patellar taping does decrease pain in patients with patellofemoral pain syndrome (for example, Powers 1997b), although the mechanism for this symptomatic improvement remains unknown (Callaghan 1997; Selfe 2004).

Why it is important to do this review

While the true health burden of patellofemoral pain syndrome is not known, it is common in young active adults and a source of long term disability (Clark 2000b; Nimon 1998). The best way to manage the condition is not known and treatment failures

are frequent (Brown 2000). Patellar taping is commonly used in clinical practice for this condition either as a sole technique, or more commonly in conjunction with an exercise programme. We set out to systematically review the evidence for patellar taping for treating patellofemoral pain syndrome.

OBJECTIVES

To assess the effects, primarily on pain and function, of patellar taping for treating patellofemoral pain syndrome in adults.

METHODS

Criteria for considering studies for this review

Types of studies

We included randomised controlled trials and quasi-randomised controlled trials (a method of allocating participants to a treatment that is not strictly random; i.e. by date of birth, hospital record number, or alternation) evaluating patellar taping for adults with patellofemoral pain syndrome.

Types of participants

Adults, aged 18 and above, diagnosed with patellofemoral pain syndrome. Patellofemoral pain syndrome could include other terms or synonyms associated with the condition (e.g. anterior knee pain, patella malalignment syndrome, retropatellar pain) as long as those studies had applied criteria to exclude other causes of pain not related to the patellofemoral joint. Trials that treated patients after a patella fracture, patella dislocation or subluxation or patients with a history of recurrent dislocation and subluxation were excluded. Also excluded were trials involving patients with concomitant neurological, rheumatological or cardiovascular problems.

Types of interventions

We included studies comparing any kind of patellar taping, thus where patients were randomly allocated to receive any kind of adhesive tape across the patella, versus placebo taping (i.e. tape placed across the surface of the patella without correction to patella alignment) or no taping. Patellar taping could be the only intervention or applied with other interventions, such as home exercises, as long as the same interventions were provided to the control group as well.

We excluded studies that compared patellar taping with another intervention (such as exercises) or that compared composite interventions, that included patellar taping, with no intervention or different interventions.

Types of outcome measures

We considered the following outcome measures:

1. Pain during activities or at rest
   - Patient assessment scales such as (but not exclusively limited to) the visual analogue scale (VAS) and self-reported questionnaires subject and sensitive to patellofemoral pain syndrome such as the Kujala Patellofemoral Pain Score; the Functional Index Questionnaire; the Modified Functional Index Questionnaire; and other scoring systems related to the knee joint or patellofemoral pain syndrome.

2. Function
   - Patient functional assessment scales such as (but not exclusively limited to) the visual analogue scale (VAS) and self-reported questionnaires subject and sensitive to patellofemoral pain syndrome such as the Kujala Patellofemoral Pain Score; the Functional Index Questionnaire; the Modified Functional Index Questionnaire; and other scoring systems related to the knee joint or patellofemoral pain syndrome.

3. Activity levels
   - Patient activity assessment scales such as (but not exclusively limited to) the visual analogue scale (VAS) and self-reported questionnaires subject and sensitive to patellofemoral pain syndrome such as the Kujala Patellofemoral Pain Score; the Modified Functional Index Questionnaire (MFIQ); the Functional Index Questionnaire (FIQ); and other scoring systems related to the knee joint or patellofemoral pain syndrome.

4. Quality of life
   - Patient quality of life assessment scales such (but not exclusively limited to) self-reported questionnaires subject and sensitive to patellofemoral pain syndrome such as the Kujala Patellofemoral Pain Score; the Functional Index Questionnaire; the Modified Functional Index Questionnaire, the Western Ontario and McMaster University Osteoarthritis Index (WOMAC); and the Medical Outcomes study short form 36 (SF-36).

Timing of outcome assessment

The time points considered are as follows.

1. Immediately after the completion of a treatment programme.
2. Preferably at least six months follow-up when taping is used as part of a treatment programme.

We did not consider trials where outcome measures such EMG (electromyogram) data, gait analysis, patellar position or alignment were studied without pain evaluation.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (August 2011), the Cochrane Central Register of Controlled Trials (2011, Issue 5), MEDLINE (1950 to 20 August 2011), EMBASE (1980 to 20 August 2011), CINAHL (1982 to 20 August 2011), PEDro - The Physiotherapy Evidence Database (20 August 2011), SPORTDiscus (1830 to 20 August 2011), AMED (1985 to 20 August 2011). We also searched for theses via the following databases available through the University of Manchester and University of Central Lancashire libraries: the Thesis Canada Protocol; the Australian Digital Thesis Program; and ProQuest. For conference proceedings we searched the Chartered Society of Physiotherapy in-house library catalogue (20 August 2011). For ongoing trials we also searched using the metaRegister of Controlled Trials (mRCT) at Current Controlled Trials (20 August 2011). There were no language restrictions.

In MEDLINE (OVID ONLINE), the search strategy was combined with the first two sections of the optimal MEDLINE search strategy for randomised controlled trials (Higgins 2005) (Appendix 1). Search strategies for the Cochrane Central Register of Controlled Trials, EMBASE, CINAHL, PEDro, SPORTDiscus and AMED can also be found in Appendix 1.

Searching other resources

We searched reference lists of articles and contacted experts in the field in order to identify unpublished trials.

Data collection and analysis

Selection of studies

Both authors (MJC and JS) independently reviewed the title, abstract and descriptors of each paper identified from the results of the literature searches with the aim of selecting trials for the main review. We then reviewed the full text of the trials that appeared to meet the criteria. Consensus was reached between the two authors without need for third party intervention.

Data extraction and management

Both authors (MJC and JS) independently extracted trial data using a double extraction process. Details from included studies were then entered into RevMan by MJC. We made several attempts to contact trialists for additional information on trial methodology and missing data.

Assessment of risk of bias in included studies

Both authors (MJC and JS) independently assessed the risk of bias of included studies using The Cochrane Collaboration's 'Risk of bias' tool (Higgins 2008). We assessed risk of selection bias (based on an assessment of random sequence generation and allocation concealment), performance bias (based on assessment of blinding of participants and therapists administrating the treatment), detection bias (based on assessment of assessor blinding), attrition bias (based on assessment of completeness of outcome data), and 'other bias'. For 'other bias', we assessed comparability of the treatment groups at baseline, the inclusion of other care programmes for the participants, and the monitoring treatment compliance during the trial. Disagreement was resolved by consensus without recourse to third party intervention. Neither author was blinded to the authorship of studies.

Measures of treatment effect

Where available, quantitative data were presented for the outcomes listed for each trial. Mean differences and 95% confidence intervals were calculated for continuous data, and risk ratios and 95% confidence intervals were calculated for dichotomous outcome measures.

Unit of analysis issues

We did not address the potential for unit of analysis issues in our protocol. However, while the inclusion of bilateral cases in some trials is a problem, it was irresolvable because of lack of data.

Dealing with missing data

We contacted trial authors for missing data. Where data were available, we conducted intention-to-treat analyses performed but otherwise used the data as presented. There were insufficient data to conduct sensitivity analyses to explore the effects of drop outs and exclusions.

Assessment of heterogeneity

Heterogeneity between comparable trials was evaluated visually and its presence tested using the chi-squared test with a P value of < 0.1 being statistically significant. Consistency between the studies was also calculated using the I^2 test and larger values were considered as an indicator of substantial heterogeneity.

Data synthesis

For each study, the risk ratio (RR) and 95% confidence intervals (CI) were calculated for dichotomous outcomes and mean differences and 95% confidence intervals for continuous outcomes. While we planned to use the standardised mean difference where

it was necessary to combine the results from different scales, we made an exception for pain data that could be converted for presentation on a 10 cm visual analogue scale. When there was no heterogeneity, we pooled data using the fixed-effect model. If there was significant heterogeneity, we considered pooling data using the random-effects model.

Subgroup analysis and investigation of heterogeneity

Subgroup analyses were undertaken within RevMan for trials that included an exercise co-intervention and those that did not. We were unable to conduct our two other planned subgroup analyses to investigate gender (i.e. did females gain more benefit than males from taping?) and the population studied (i.e. trials that focused on the sporting population, the military population or the general adult population). We looked at the effect on the pain results from the exclusion of the only trial testing taping on people with acute patellofemoral pain.

Sensitivity analysis

There were insufficient data to perform our planned sensitivity analyses on various aspects of trial methodology such as concealment of allocation, inclusion and exclusion criteria and accounting for missing data. We looked at the effects of analysing the data with fixed-effect and random-effects models for pain.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies; Characteristics of studies awaiting classification.

Results of the search

Two hundred and eighty references were retrieved, from which 45 potentially eligible studies were identified. Of these, five studies were included, 36 were excluded and one study (Miller 2010), which is only published as a conference abstract, is awaiting assessment. All of the fully reported potentially eligible studies were published in English language journals except for Nafstad 1996, which was in Norweigian, and Wijnen 1996, which was in Dutch. Upon translation, both these trials were excluded.

Included studies

Details of all the five individual trials (Clark 2000a; Kowall 1996; Mason 2011; Tunay 2003; Whittingham 2004) can be found in the Characteristics of included studies. A summary of these is presented below.

Design

All five studies were randomised parallel group trials. Three trials (Clark 2000a; Mason 2011; Tunay 2003) had four treatment groups, but two groups in each of Mason 2011 and Tunay 2003 were excluded because they tested interventions that were outside the scope of this review. Kowall 1996 had two groups and Whittingham 2004 had three groups, of which one was a placebo control.

Sample sizes

In total, there were approximately 200 participants with a total of 216 knees diagnosed with patellofemoral pain syndrome. All five trials were small. The sample sizes ranged from 25 participants in Kowall 1996 to 81 in Clark 2000a. However, the numbers of participants in individual groups ranged from 10 (Whittingham 2004) to 22 (Clark 2000a).

Setting

The trials were conducted in one of four countries: Australia (Mason 2011), Turkey (Tunay 2003), UK (Clark 2000a; Whittingham 2004) and USA (Kowall 1996). Two trials were in the military setting (Tunay 2003; Whittingham 2004).

Participants

All participants had a diagnosis of patellofemoral pain syndrome. The variety of the criteria used in the trials for this diagnosis is evident from inspection of the Characteristics of included studies. Tunay 2003 did not describe the gender mix of their participants, although the probable military connection indicates the possibility of a larger proportion of males. The percentages of male participants ranged from 32% (Kowall 1996) to 80% (Whittingham 2004). Whittingham 2004, which involved military recruits, had the youngest population (mean age 18.7 years) and Mason 2011, the oldest population (mean age 45 years). Notably, Mason 2011, which had a wider age range of 13 to 82 years, specifically did not exclude patients with arthritis of the patellofemoral joint. Cases were described as "acute" in Whittingham 2004. While some participants, such as in Mason 2011, were under 18 years of age, we anticipate these would have been few in number. The duration of symptoms was at least one month and generally much longer in the other four trials. The mean duration of symptoms was 2.5 years in Kowall 1996, 71 months in Mason 2011, and 1.8 years in Tunay 2003. In Clark 2000a, 74% had symptoms for over 12 months. No details of previous treatment, if any, were provided in these four trials.

Interventions

Where available, details of the different methods (type and technique) for taping used in the five trials are presented in the Characteristics of included studies.

Clark 2000a had four treatment groups, and made two comparisons.

Two studies (Clark 2000a; Mason 2011) compared taping with no taping. All participants in these trials received education or advice. Four trials (Clark 2000a; Kowall 1996; Tunay 2003; Whittingham 2004) compared taping with exercises versus exercises without taping. As for the above comparison, all participants in Clark 2000a received education. In Tunay 2003, all participants had ice applied. Whittingham 2004 had two control groups, one of which had placebo taping. The intensity and length of treatment was very varied: for example, length of treatment ranged from one week in Mason 2011 to three months in Clark 2000a.

None of the trials reported on the prescription or use of analgesics. However, advice on pain controlling drugs was part of the education intervention provided in Clark 2000a.

Outcomes

Follow-up assessment was at the end of treatment in all five trials. Clark 2000a also followed up participants at 12 months.

All five trials recorded participants' pain levels using the visual analogue scale/score (VAS). The definitions of pain varied. Clark 2000a combined the results from two pain outcomes (one for climbing stairs and one for flat walking); Kowall 1996 measured pain during activities of daily living; Mason 2011 measured pain scores for four activities, including a self selected activity; Tunay 2003 did not provide details; and Whittingham 2004 reported average 24 hour pain and pain on stepping down.

Functional Index Questionnaire (FIQ) scores were reported by Whittingham 2004; Cincinnati knee activity score data were reported by Tunay 2003; WOMAC scores at end of treatment and 12 months by Clark 2000a. Clark 2000a also provided data on referral post-treatment and further physiotherapy, reported at 12 months.

Excluded studies

The reasons for excluding 36 studies are given in the Characteristics of excluded studies. Twenty-five studies were excluded because they only assessed the effect of patellar taping immediately post-application. Seven trials were excluded because they did not compare taping with no or placebo taping. The remaining four studies were excluded for a variety of other reasons.

Risk of bias in included studies

For more information about the risk of bias assessment, please see Figure 1 and Figure 2.

Figure 1. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

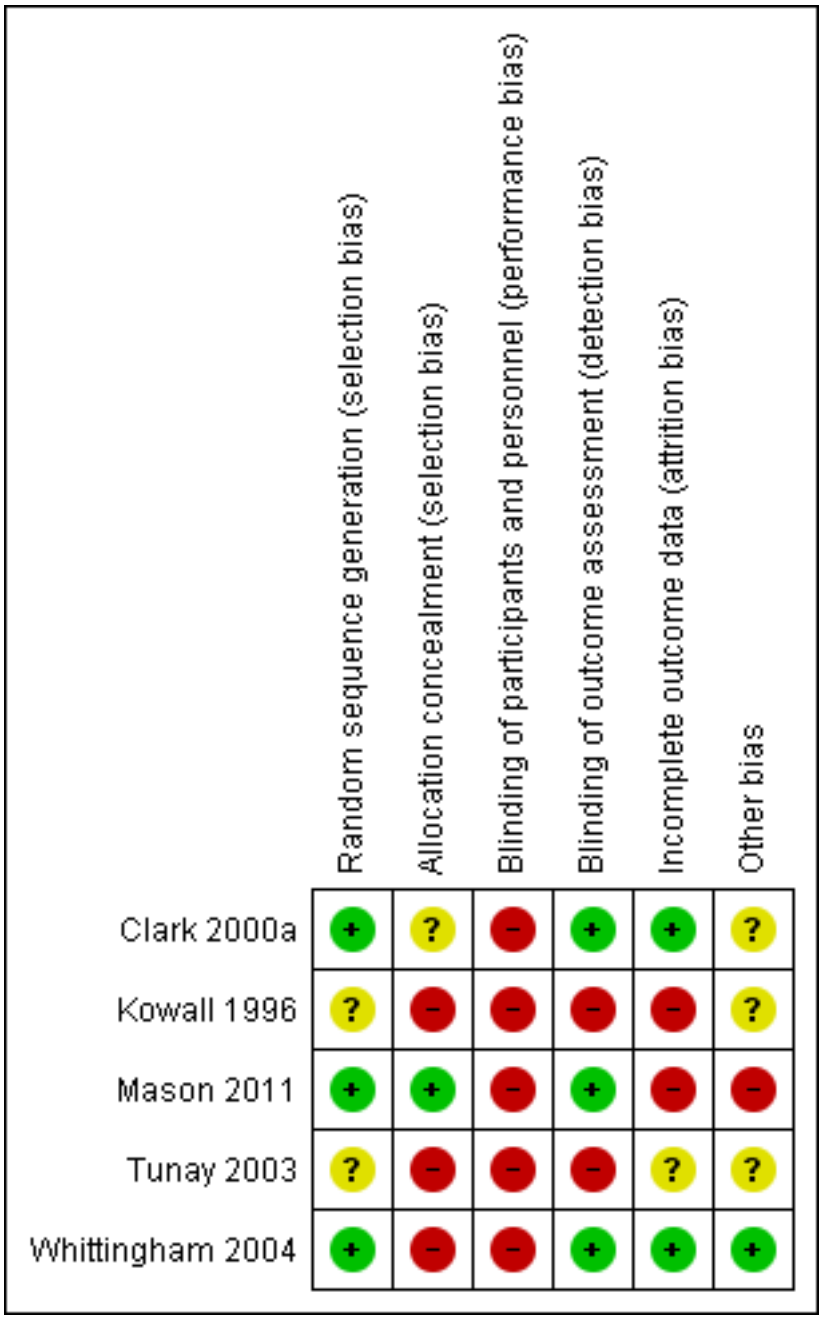
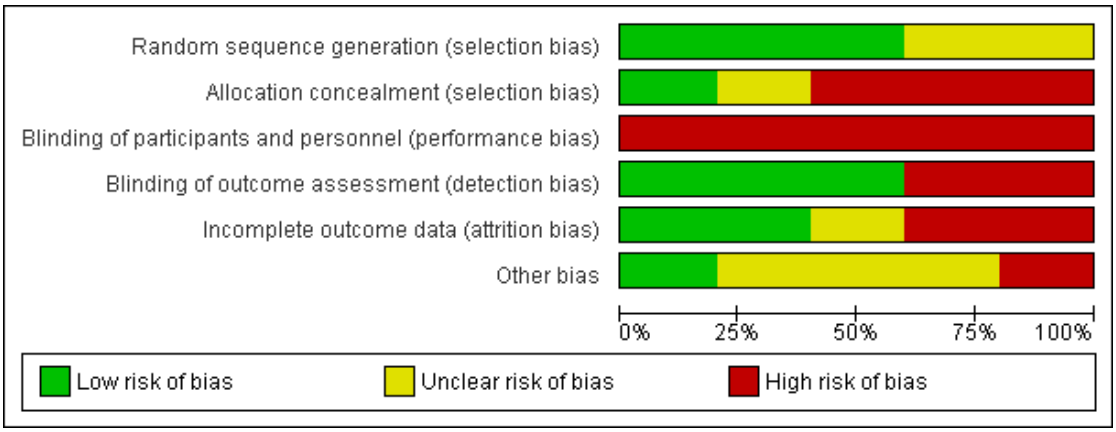


Figure 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.



Allocation

The independent administration of pre-numbered sealed envelopes meant that Mason 2011 was considered at low risk of selection bias. There was insufficient information to determine whether allocation concealment was achieved in Clark 2000a. The other three trials were considered at high risk of selection bias, relating to lack of allocation concealment. This was retrospective in Kowall 1996, where patients consented after randomisation but no details were given as to whether any refused consent.

Blinding

A major risk of bias was that no studies were able to blind the therapists who were giving the treatment. This was a difficult area to control because by the very nature of the complex interventions used, it was generally not possible to blind the participants to treatment.

Three studies (Clark 2000a; Mason 2011; Whittingham 2004) were considered to have achieved assessor blinding and thus were at low risk of detection bias.

Incomplete outcome data

Two trials (Clark 2000a; Whittingham 2004) were judged at low risk of attrition bias. Two trials (Kowall 1996; Mason 2011) were judged at high risk of bias, in part relating to potential unit of analyses problems reflecting the inclusion of bilateral cases. Tunay 2003 was judged at unclear risk of attrition bias.

Other potential sources of bias

Assessment of other bias resulted in a judgement of 'unclear risk' in three trials (Clark 2000a; Kowall 1996; Tunay 2003) and low risk in Whittingham 2004. However, we considered Mason 2011 was at high risk of bias given the lack of information on baseline characteristics and potential imbalance in people with patellofemoral osteoarthritis.

Effects of interventions

The effects of patellar taping were assessed by the main outcome measures of pain, functional scores, activity levels and quality of life. The two comparisons (taping versus no taping, and taping plus exercise versus exercise and no taping) are presented as two subgroups. The results for the two control groups of Whittingham 2004 were combined.

Pain during activities or at rest

Various pain data from four trials are presented in Analysis 1.1 using a random-effects model given the very significant heterogeneity (mean difference (MD) -0.15; 95% confidence interval (CI) -1.15 to 0.85; heterogeneity: $Chi^2 = 25.78$, df = 4 ($P < 0.0001$); $I^2 = 84\%$). The footnotes of Analysis 1.1 give details of the pain assessment and data for each trial. Pooled data from three of the four trials testing non-acute cases were homogeneous and also showed no significant effect, either clinical or statistical of taping on pain (*see* Analysis 1.2: MD 0.25; 95% CI -0.26 to 0.77). The test for

subgroup differences showed no difference between the taping on its own or when used with exercises (Chi^2 = 1.15, df = 1 (P = 0.28), I^2 = 13.0%). There were no usable data from Kowall 1996, which reported that there was no difference in improvement of patellofemoral pain between the two groups at four weeks. All participants of the taping group in Whittingham 2004, which recruited people with acute knee pain, had no pain at end of treatment at four weeks. Clark 2000a found no difference between the two groups at 12 months for either comparison (*see* Analysis 1.3).

Function and activities of daily living

All participants of the taping group in Whittingham 2004 had no problems as rated by the functional index questionnaire (FIQ) at the end of treatment at four weeks. In contrast, the scores of both control groups indicated some residual problems with function (*see* Analysis 1.4). Tunay 2003 found significantly better Cincinnati knee activity scores in the taping group at the end of the three week treatment period (*see* Analysis 1.5: MD 8.10, 95% CI 2.93 to 13.27). Clark 2000a found no significant differences between the two groups for either comparison in the WOMAC scores at the end of the three months treatment (*see* Analysis 1.6) or 12 months (*see* Analysis 1.7).

Clark 2000a also found no significant differences between the two groups for either comparison in post-treatment referrals (*see* Analysis 1.8) or further physiotherapy within 12 months (*see* Analysis 1.9).

There were insufficient data for any of other prespecified subgroup or sensitivity analyses.

DISCUSSION

Summary of main results

Five small heterogeneous trials, including around 200 patients (216 knees) with a diagnosis of patellofemoral pain syndrome, were included. All compared taping versus control (no or placebo taping) and all included one or more co-interventions; this was prescribed exercise in four trials. Pooled visual analogue data from four trials (161 knees) for various measures of pain at the end of treatment (this ranged from one week to three months) showed no significant benefit from taping. Separately, two trials found better results after taping for functional index questionnaire data and Cincinnati knee activity scores. Another trial found no significant benefit for taping in WOMAC scores at the end of treatment or at 12 months. The same trial also found no benefit from taping for subsequent referral or physiotherapy.

Overall completeness and applicability of evidence

The available evidence from trials testing the clinical effects of taping is little, amounting at maximum to pooled pain data for 161 knees. Even for this 'exploratory' analysis, the heterogeneous nature of the trial populations, interventions and outcome measures (both in timing and definition) is considerable.

In terms of the trial populations, there was considerable variation in the inclusion criteria and definition of patellofemoral pain syndrome among and often within the studies. The most common discrepancy was the length of time the patient had their patellofemoral pain at the time of recruitment. In one study, which involved army recruits, this was 'acute' (Whittingham 2004), whereas a lower limit of one month or more was applied for the other four studies. This means that it is possible that the patients were not comparable. Establishing inclusion and exclusion criteria for trials of patellofemoral pain syndrome will always be hampered by the lack of a gold standard diagnostic test for the condition. It remains essentially a diagnosis of exclusion reliant on description of symptoms and thorough clinical examination to exclude other causes of pain at the anterior part of the knee which are not directly related to the patellofemoral joint. Additionally, our focus was on non-arthritic patellofemoral pain but inclusion of patients with patellofemoral osteoarthritis was permitted by Mason 2011 and was likely given the older population and the long duration of symptoms (up to 15 years) in some patients.

The interventions also varied as did the co-interventions (e.g. exercise, education, ice). Some studies described in detail the method of taping used, including the technique and also the type of taping (e.g. Mason 2011), whereas others gave no description (e.g. Tunay 2003). There are anyway insufficient data to assess if there are differences in effect between a complex taping technique and a simple one. The frequency and intensity of taping (and co-interventions) also varied. Mason 2011, which compared taping versus control for one week only before moving onto a composite treatment, commented that "the objective improvement over such a short time period was unexpected". Whittingham 2004 found complete recovery from an acute episode after four weeks in the group given taping, and good improvement too (perhaps reflecting the advice to stop certain activities) in the two control groups. This reflects also the variation in the trial populations, but also links with the assessment of outcome, which was mainly at the end of the treatment programmes. Only Clark 2000a followed up trial participants subsequently.

One finding of this review was the disappointing lack of standardisation of even a simple outcome measure such as the visual analogue score for pain. This highlights an important methodological issue for future researchers into patellofemoral pain in general and the use of patellar taping in particular. Adopting a valid, reliable and standardised pain score is the obvious aim, but true standardisation is hampered by the fact that patients may declare different pain inducing activities when they use the visual analogue

score. These activities usually include stair ascent or descent, squatting, kneeling and prolonged sitting. There was no comparability among the trials in the use of other measures of pain and function, or the more generic self-reporting scales such as the WOMAC.

Quality of the evidence

As shown in the risk of bias summary (Figure 1), all five trials were at high of bias in least one domain, which was invariably performance bias reflecting the lack of blinding in those applying the taping and, generally, the trial participants. Poorly described or conducted randomisation, with insufficient attention to ensuring allocation concealment put three trial at high risk of selection bias. Assessor blinding, which should be possible for at least some outcomes, was not done in two studies. Unit of analysis problems, through the inclusion of patients with problems in both knees, and the incomplete information on loss to follow-up were also sources of bias. The quality of the evidence was also hampered by small sample sizes. Overall, the quality of the evidence, using the GRADE terminology, lies between 'Low quality' ("Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate") and 'Very low quality' ("We are very uncertain about the estimate").

Potential biases in the review process

Aside from the changes, which included incorporating updated methodology described in Differences between protocol and review, this review was conducted in accordance with our previously published protocol. We took care to search extensively for studies which were in abstract form but might have proceeded to full publication. We also made great efforts (and were generally successful) to contact authors of studies which were unpublished or were uncompleted trials to ascertain whether their data could be included. Several authors confirmed points for clarification and sent additional data; most of these trials were eventually considered to be ineligible because they did not answer our research question.

Agreements and disagreements with other studies or reviews

Another review in this area has looked at the immediate (very short term effect) of patellar taping (and bracing) on knee pain with and without knee osteoarthritis (Warden 2008). There were three trials in Warden 2008 that are also included in this Cochrane review (Clark 2000a; Kowall 1996; Whittingham 2004). The outcome used for in Warden 2008 was the visual analogue scale/score (VAS) (mm) for pain, but no comment was made about the variation in the nominated activity chosen to score the VAS. Warden 2008 compared also the effects of medial directed, lateral directed patellar taping, sham taping and no taping. No analysis was performed using other measures of function or activity.

AUTHORS' CONCLUSIONS

Implications for practice

Patellar taping is a relatively inexpensive and regularly used treatment intervention for patellofemoral pain syndrome. It is frequently used as part of an exercise and rehabilitation programme for this condition. However, the currently available evidence from trials reporting clinically relevant outcomes is low quality and insufficient to draw conclusions on the effects of taping, whether used on its own or as part of a treatment programme.

Implications for research

Although the exact mechanism of patellar taping for the treatment of patellofemoral pain syndrome is unclear, it remains an attractive intervention in terms of application and potential. The low quality clinical evidence available so far does not endorse patellar taping, showing minimal evidence of any effect. It is thus timely that clinicians' enthusiasm for this intervention should be put to the test by conducting large, preferably multi-centre, good quality and well reported randomised controlled trials that measure clinically important outcomes and long-term results. Before this, consensus is required on the diagnosis of patellofemoral pain syndrome, including the avoidance of including patients with osteoarthritis, the standardisation of outcome measurement and an acceptable approach for patellar taping. Some promising progress has been made in this regard in terms of terminology, including shifting away from labelling this condition as a syndrome (Ghent 2011). These are likely to enhance the successful initiation and conduct of such trials and the acceptability and applicability of their findings.

ACKNOWLEDGEMENTS

We would like to thank Helen Handoll, Peter Herbison, David Gerrard, Lesley Gillespie, Janet Wale and Arpana Verma for their helpful comments on the protocol and subsequent review. We would also like to thank Lindsey Elstub and Joanne Elliott at the Cochrane Bone, Joint and Muscle Trauma Group.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Clark 2000a

Methods	Observer blinded, randomised controlled trial.
Participants	UK 81 adults (45 male) with over 3 months of anterior knee pain. Mean age: 27.9 years (range 16 to 40 years). (Recruited from orthopaedic and rheumatology consultants and from general practitioners.) Duration of symptoms: 3 (< 3 months); 18 (3 to 12 months) ; 60 (> 12 months) Inclusion criteria: a history of anterior knee pain of more than three months Exclusion criteria: a history of true locking, patella dislocation, arthritis, any knee radiograph abnormality, ligament laxity (medial and lateral collateral ligament or anterior draw test), malignancy, infection, or previous knee physiotherapy
Interventions	Six treatments over period of 3 months. Length of time of each treatment not stated 1. Patellar taping, exercise & education (n = 20). Tape was applied from the lateral border of the patella pulling medially and upwards over the medial femoral condyle. Taping in this way should reduce pain on the squat test and wall/step down test. If this did not eliminate the pain then the taping was repeated in knee flexion. Type of tape used is not described. 2. Exercise & education (n = 20). 3. Patellar taping & education (n = 19). Taping as for group 1. 4. Education (n = 22). Details of co-interventions Education: leaflet "Knee pain in young adults" and sessions on (a) an explanation of the nature of anterior knee pain, the anatomy of the patellofemoral joint, and possible causes of anterior knee pain; (b) footwear and appropriate sporting activities; (c) pain controlling drugs; (d) stress relaxation techniques, ice and massage; (e) diet and weight advice; and (f) prognosis and self help. Exercise: stretching to the hamstring, iliotibial band, quadriceps and gastrocnemius muscles. Eccentric, isotonic and isometric strengthening exercises to the lower limb
Outcomes	Measured at baseline, 3 months (end of treatment) and 12 months (via postal questionnaire) Pain: two VAS: one for climbing stairs and one for flat walking. Total VAS score = 200 mm (adjusted to 10 cm for presentation in the review) Western Ontario and McMaster University Osteoarthritis Index (WOMAC) scores Hospital Anxiety and Depression (HAD) scores Quadriceps strength (Nm) Patient satisfaction Discharge/referral post treatment, and further physiotherapy (self-report)
Notes	Diary sheet given to help compliance.
Risk of bias	

Clark 2000a (*Continued*)

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"The patients were then randomly allocated by the physiotherapist to one of four groups using an individualised computer generated randomisation programme."
Allocation concealment (selection bias)	Unclear risk	Use of "individualised computer generated randomisation programme", but insufficient description of method to ensure allocation concealment
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants: not done. Therapists: not stated and unlikely due to nature of the treatments
Blinding of outcome assessment (detection bias) All outcomes	Low risk	"A blinded independent observer undertook the assessment on the sixth visit."
Incomplete outcome data (attrition bias) All outcomes	Low risk	"10 patients withdrew from the study and these were included on an intention to treat basis." Participant flow provided
Other bias	Unclear risk	Baseline characteristics of the four groups were comparable. "All four groups received the same advice. " but lack of information on duration of treatment sessions Diary sheets given to help compliance in exercise groups.

Kowall 1996

Methods	Randomised study
Participants	USA 25 participants (8 male), 10 of whom had bilateral complaints (35 knees). Mean age 29 years (range 14 to 40 years). Duration of symptoms: 2.5 years (range 1 month to 15 years) Inclusion criteria: unilateral or bilateral patellofemoral pain for more than 1 month, patient age between 14 and 40 years, ability to complete a 4-week formal physical therapy programme, and ability to comply with a 4-week home exercise programme. Exclusion criteria: history or clinical evidence of patellofemoral dislocation, synovial plicae, or meniscal or ligamentous injury. History of prior knee trauma or knee surgery

Kowall 1996 (*Continued*)

Interventions	Treatment: twice weekly for 4 weeks 1. Physical therapy and home exercise programme + patellar taping (n = 12 patients) . Taping technique described as the 'McConnell technique'. Type of tape used is not described 2. Physical therapy and home exercise group without patellar taping (n = 13 patients) Details of co-interventions Exercise: extensive stretching and quadriceps muscle-strengthening program. Quadriceps muscle strengthening involved progressive isometric, isotonic, and isokinetic exercises. Each group was instructed in a standard home exercise programme
Outcomes	Measured at baseline and after 4 weeks of treatment Pain during activities of daily living (VAS: 10 cm) Isokinetic quadriceps strength (Nm) EMG (electromyograph) activity of the quadriceps (vastus medialis / vastus lateralis ratio)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"Patients meeting the eligibility requirements were randomised ... Randomization was accomplished with a prerandomization technique in which patients were assigned to a treatment group before consenting to the assigned treatment." No details of method of sequence generation
Allocation concealment (selection bias)	High risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants: not described. Therapists: not possible due to the nature of the interventions
Blinding of outcome assessment (detection bias) All outcomes	High risk	Not described.
Incomplete outcome data (attrition bias) All outcomes	High risk	Intention-to-treat not stated. Dropouts not mentioned. Possible unit of analysis problems resulting from inclusion of bilateral cases
Other bias	Unclear risk	No data to judge baseline comparability of groups; but "The sex and age of the patients and duration of symptoms were essentially the same for Groups I and II." Similar care programmes likely. Home exercise compliance monitored with EMG, and Bio-Prompt computer whilst doing exercises

Mason 2011

Methods	Double blind, randomised controlled study.
Participants	Australia 30 knees belonging to an unknown number of participants with patellofemoral pain. Overall there were 41 participants (15 males, mean age 45 years, range 13 to 82 years) , 19 of whom had bilateral complaints (60 knees) recruited into the trial (see Notes). Duration of symptoms: mean 71 months Inclusion criteria: at least 1 month of retro or peripatellar pain, aggravated by 2 or more of the following - squatting, kneeling, ascending or descending stairs, running Exclusion criteria: patellar tendinitis, Osgood-Schlatter disease, hip joint osteoarthritis, meniscal symptoms, surgery, rheumatoid arthritis, synovitis, back pain, tibiofemoral osteoarthritis Note: Participants with patellofemoral osteoarthritis were not excluded
Interventions	One week of treatment. 1. Infrapatellar taping (n = 15 knees). Taping technique involved application of one layer of 50 mm hypoallergenic non rigid underwrap (Therfix, Physiomedic), three layers of 38 mm rigid zinc oxide (PhysioMed, Ausmedic). Tape applied with posterior, superior pressure under the patella 2. No treatment control (n = 15 knees). Details of co-interventions Education: all trial participants received an overview of knee anatomy and function, and advice on avoiding painful activities In the second week, all participants received a composite intervention of patellar taping, and quadriceps strengthening and stretching exercises
Outcomes	Measured at baseline and at weeks 1(post 'singular' intervention) and 2 week (post 'combined' interventions (taping, quadriceps strengthening and stretching)). Only week 1 data considered in review VAS pain scores for 4 activities: ascent of 7 stairs without support; descent of 7 stairs without support; 18 cm step down leading with non-injured leg; and a self selected activity Quadriceps strength isokinetic peak torque at 60º/sec Quadriceps tightness (length), prone lying heel to buttock distance with tape measure Pain free eccentric knee angle control test.
Notes	Data from the two other groups of this trial are not included in this review. One excluded group (15 knees) was given quadriceps strengthening with end range open chain knee extension; and the other group (15 knees) was given quadriceps stretching to rectus femoris in position individualised to each patient Random group allocation was performed and allocation concealment maintained by an independent person overseeing a sealed envelope method Patients completed a daily exercise compliance diary.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**

Random sequence generation (selection bias)	Low risk	Participants were "randomly allocated to one of four groups according to a selected, sealed and pre-numbered envelope". (Details of sequence generation were, however, missing.)
Allocation concealment (selection bias)	Low risk	"sealed and pre-numbered envelope". Not described in text but clarified as being conducted by an independent person by the lead author through personal communication (see Notes above)
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants: not possible due to the nature of the interventions. Therapists: the treating therapist was not blinded to the treatment grouping of the subjects
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Strategies to maintain assessor blinding described as: "All subjects were asked to wear long pants for the end of the first week assessment so that the assessing physiotherapist remained blinded towards the single modality treatment during that week."
Incomplete outcome data (attrition bias) All outcomes	High risk	No report of intention-to-treat analysis. No mention of drop outs. Possible unit of analysis problems resulting from inclusion of bilateral cases
Other bias	High risk	Mixture of osteoarthritis patellofemoral pain patients with non-osteoarthritis patellofemoral pain patients. Numbers with each pathology not described. No data describing comparability of groups at entry No information on comparability of other care but likely. "Each subject completed a weekly exercise diary indicating the number of sessions completed each day."

Tunay 2003

Methods	Randomised study
Participants	Turkey 40 participants with unilateral patellofemoral pain syndrome (no information on gender but likely to be mainly males given possible military connection). Mean age: 30.3 years. Duration of symptoms: mean 1.8 years (range 1 month to 5 years) Inclusion criteria: unilateral patellofemoral pain syndrome not less than 1 month Exclusion criteria: history or clinical findings of patellar dislocation, meniscal or ligamentous injury, synovial plicae, knee surgery and trauma
Interventions	Treatment for 3 weeks (15 sessions in total) 1. Patellar taping, ice and home exercises (n = 20) 2. Ice and home exercises (n = 20) Details of co-interventions Exercise: not described. Ice: not described.
Outcomes	Measured at baseline and after 3 weeks of treatment Pain intensity (VAS: 10 cm) Cincinnati Knee Activity Rating Scale Congruence angle, sulcus angle and patellar tilt angle from magnetic resonance imaging (MRI) The 'Q' angle Hamstring and iliotibial band flexibility Thigh circumference measurement Leg-length discrepancy
Notes	Data from the two other groups of this trial are not included in this review. One of these groups (20 participants) was given ice, electrical nerve stimulation, medial patellar glide and exercise by a physiotherapist; and the other group (20 participants) was given ice, electrical nerve stimulation, patellar taping and exercise by a physiotherapist

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"A prospective randomized study was designed ..." "The patients were divided into 4 groups matched for age and gender ....". No details of how randomised
Allocation concealment (selection bias)	High risk	Not described, but use of "matching" is of concern.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants: not described. Therapists: not possible due to the nature of the interventions
Blinding of outcome assessment (detection bias) All outcomes	High risk	Evaluations were described as being "done by an orthopaedic surgeon". No other details

Tunay 2003 (*Continued*)

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Intention-to-treat not mentioned. Unclear if there are drop outs
Other bias	Unclear risk	Comparable baseline characteristics. Lack of information to judge performance bias from differences in other care No compliance monitoring

Whittingham 2004

Methods	Randomised controlled trial
Participants	UK (military) 30 (male = 24) army recruits with a diagnosis of acute patellofemoral pain syndrome referred for physiotherapy by the Unit Medical Officer. Mean age 18.7 years. Duration of symptoms: acute Inclusion criteria: recruits with two from the following - pain on ascending and/or descending stairs, squatting, sitting for extended periods of time, or associated with an increase in physical activity. Aged 17 to 25 years, and able to give informed consent Exclusion criteria: history of subluxation or dislocation of the patella, anterior or posterior cruciate ligament insufficiency, previous knee surgery or meniscal damage, or any other underlying musculoskeletal problems that would have prevented the subject from performing the exercises
Interventions	Treatment for 4 weeks; daily sessions (no home exercises) 1. Patella taping and a standardised exercise programme (n = 10). Active taping technique: underwrap and one corrective strip of tape. Correction of patellar malalignments of tilt, rotation or glide as identified by the treating physiotherapist 2. Placebo taping and the same exercise programme (n = 10). Placebo taping: underwrap and one strip of tape with no correction of patellar position 3. Same exercise programme alone (n = 10) Type of adhesive tape not described. Details of co-interventions Exercise: non-weight-bearing isometric, inner-range isotonic and straight leg raise quadriceps exercises. A variety of weight-bearing exercises (e.g. squats). Stretches for the quadriceps, hamstrings, gastrocnemius, and iliotibial band. No home exercise programme
Outcomes	Measured at baseline and at weeks 1, 2, 3 and 4 during treatment VAS pain scores (10 cm): average over last 24 hours; during stepping down activity with tape and without tape applied Functional index questionnaire
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**

Random sequence generation (selection bias)	Low risk	"A block randomisation process was used, where subjects randomly chose 1 of 3 labelled envelopes to determine their group allocation. The next subject chose 1 of the remaining 2 envelopes and the third person was then assigned to the remaining group before the process was repeated. This ensured that there were even numbers of subjects in each group."
Allocation concealment (selection bias)	High risk	As described above. The allocation was not concealed for every third patient
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants: not possible due to the nature of the interventions Therapists: the treating therapist, "who was aware of group allocation, applied adhesive tape to the affected knee of subjects in the taping group and placebo taping group"
Blinding of outcome assessment (detection bias) All outcomes	Low risk	The assessor, who was blinded to group allocation, took all outcome measures
Incomplete outcome data (attrition bias) All outcomes	Low risk	"All subjects remained in the group to which they were originally assigned."
Other bias	Low risk	Baseline characteristics comparable in the three groups. "All subjects were placed on restricted duties (similar for all individuals) throughout the treatment period." Every participant attended daily at the same time for 4 weeks duration of the study (study was in a military setting) No home exercise programme prescribed and exercise compliance not needed

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Abd Elhafz Yehia 2011	This study was excluded because it compared open versus closed kinetic exercises; both groups received taping
Aminaka 2008	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Aminaka 2010	Published abstract with immediate pre and post taping effect

(*Continued*)

Arcand 1998	Abstract with immediate pre and post taping effect.
Aytar 2011	The trial assessed patients within 45 minutes of application of the tape and not as part of a treatment programme
Bockrath 1993	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Cerny 1995a	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Christou 2004	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Collins 2008	This was a single blinded randomised clinical trial primarily assessing foot orthotics. There was a group that had taping, but also had multimodal physiotherapy including stretching, exercise, education and biofeedback. Therefore it was difficult to guarantee that taping alone would cause the beneficial effect found in the study
Conway 1992	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Cowan 2002b	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Crome 1984	Abstract. The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Crossley 2002	This trial compared physical therapy, which included patellar taping, versus placebo therapy, which included placebo taping. It is excluded because it would be impossible to attribute the results to patellar taping alone
Derasari 2010	The trial assessed the effect of taping on kinematically assessed patellar position immediately post application and not as part of a treatment programme
Eburne 1996	Group 1 received no tape and Group 2 received tape. However, the two groups received different exercise regimens. So this study was excluded as the two programmes were substantially different to be certain that the differences were solely due to the allocation of tape
Ernst 1999	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Gerrard 1989	The study was an uncontrolled, non-randomised trial of taping as part of an exercise programme
Gilleard 1998	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme

(*Continued*)

Handfield 2000	The trial assessed the effect of taping on pain immediately and 24 hours post application and not as part of a treatment programme
Harrison 1999	This study was excluded because Group 2 received education and a strength and stretching programme but Group 3 received not only taping additionally, but also biofeedback. Therefore it cannot be guaranteed that taping was the sole different intervention between the groups
Herrington 2001	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Jancaitis 2007	Abstract. Two days of taping versus sham taping. Personal communication with author revealed that data were not available for fuller analysis
Kaya 2010	Although this has a three month patellar taping programme, all patellofemoral pain syndrome patients received taping.This is a within-group trial using the healthy knee for comparison and with a healthy control group
Keet 2007	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Lan 2010	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Loudon 2004	Although this was an eight week exercise programme, it was excluded because all groups including the control group received patellar taping
Mostamand 2010	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Nafstad 1996	This study was excluded because it compared exercise plus tape versus exercise plus elastic patellar brace
Ng 2002	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Powers 1997a	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Salsich 2002	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Selfe 2010a	Abstract reporting immediate pre and post taping effect only
Somes 1997	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme
Werner 1993	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme

(*Continued*)

Wijnen 1996	This was excluded for two reasons. Firstly, it compared patellar taping with an elasticated knee bandage so there was no 'no-taping' group. Secondly it was not possible to ascertain if the exercise programmes for both groups were comparable as there were no details for the programme given to the 'Couman group'
Wilson 2003	The trial assessed the effect of taping on pain immediately post application and not as part of a treatment programme

Characteristics of studies awaiting assessment *[ordered by study ID]*

Miller 2010

Methods	Randomised controlled trial
Participants	Females with unilateral or bilateral patellofemoral pain syndrome. History of patellofemoral pain over a period of six weeks; "top scores from patellar orientation tests"
Interventions	8 week treatment period 1. Taping plus exercise 2. Exercise only
Outcomes	Measured at weeks 1, 4 and 8 weeks Pain, functional activity.
Notes	Abstract only. Thirty volunteers but probably fewer after tests; also a third group (no treatment control) is not eligible for this review. The numbers randomised into the three groups are not reported

DATA AND ANALYSES

Comparison 1. Patellar taping versus no or placebo taping

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain: VAS (0: no pain to 10: worst pain) at end of treatment	4	161	Mean Difference (IV, Random, 95% CI)	-0.15 [-1.15, 0.85]
1.1 No exercise co-intervention	2	62	Mean Difference (IV, Random, 95% CI)	-0.10 [-0.91, 0.72]
1.2 Same exercises given to all participants	3	99	Mean Difference (IV, Random, 95% CI)	-0.16 [-1.67, 1.34]
2 Pain: VAS (0: no pain to 10: worst pain) at end of treatment (no 'acute' cases)	3	141	Mean Difference (IV, Fixed, 95% CI)	0.25 [-0.26, 0.77]
2.1 No exercise co-intervention	2	62	Mean Difference (IV, Fixed, 95% CI)	-0.10 [-0.91, 0.72]
2.2 Same exercises given to all participants	2	79	Mean Difference (IV, Fixed, 95% CI)	0.48 [-0.18, 1.14]
3 Pain: VAS (0: no pain to 10: worst pain) at 12 months	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1 No exercise co-intervention	1		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
3.2 Same exercises given to all participants	1		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
4 Functional index questionnaire (FIQ) score (16 = no problems) at end of treatment	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 No exercise co-intervention	0		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
4.2 Same exercises given to all participants	1		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
5 Cincinnati knee activity score (100 = full activity) at end of treatment	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 No exercise co-intervention	0		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
5.2 Same exercises given to all participants	1		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
6 WOMAC score (0: no problems to 96: extreme problems) at end of treatment	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
6.1 No exercise co-intervention	1		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
6.2 Same exercises given to all participants	1		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]

7 WOMAC score (0: no problems to 96: extreme problems) at 12 months	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
7.1 No exercise co-intervention	1	Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
7.2 Same exercises given to all participants	1	Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
8 Referred for further treatment (after 3 months)	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
8.1 No exercise co-intervention	1	Risk Ratio (M-H, Fixed, 95% CI)	0.0 [0.0, 0.0]
8.2 Same exercises given to all participants	1	Risk Ratio (M-H, Fixed, 95% CI)	0.0 [0.0, 0.0]
9 Further course of physiotherapy (after 3 months)	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
9.1 No exercise co-intervention	1	Risk Ratio (M-H, Fixed, 95% CI)	0.0 [0.0, 0.0]
9.2 Same exercises given to all participants	1	Risk Ratio (M-H, Fixed, 95% CI)	0.0 [0.0, 0.0]

Analysis 1.1. Comparison 1 Patellar taping versus no or placebo taping, Outcome 1 Pain: VAS (0: no pain to 10: worst pain) at end of treatment.

Review: Patellar taping for patellofemoral pain syndrome in adults

Comparison: 1 Patellar taping versus no or placebo taping

Outcome: 1 Pain: VAS (0: no pain to 10: worst pain) at end of treatment

Study or subgroup	Tape N	Tape Mean(SD)	No or placebo tape N	No or placebo tape Mean(SD)	Mean Difference IV,Random,95% CI	Weight	Mean Difference IV,Random,95% CI
1 No exercise co-intervention							
Clark 2000a (1)	16	1.8 (1.44)	16	1.5 (2)		18.2 %	0.30 [-0.91, 1.51]
Mason 2011 (2)	15	1.83 (1.6)	15	2.26 (1.5)		19.0 %	-0.43 [-1.54, 0.68]
Subtotal (95% CI)	**31**		**31**			**37.1 %**	**-0.10 [-0.91, 0.72]**
Heterogeneity: Tau?? = 0.0; Chi?? = 0.76, df = 1 (P = 0.38); I?? =0.0%							
Test for overall effect: Z = 0.23 (P = 0.82)							
2 Same exercises given to all participants							
Clark 2000a (3)	18	2.89 (1.94)	21	2.08 (2.03)		17.9 %	0.81 [-0.44, 2.06]
Tunay 2003 (4)	20	2.7 (1.38)	20	2.35 (1.13)		21.5 %	0.35 [-0.43, 1.13]
Whittingham 2004 (5)	10	0 (0.1)	10	1.45 (0.73)		23.5 %	-1.45 [-1.91, -0.99]
Subtotal (95% CI)	**48**		**51**			**62.9 %**	**-0.16 [-1.67, 1.34]**
Heterogeneity: Tau?? = 1.57; Chi?? = 22.47, df = 2 (P = 0.00001); I?? =91%							
(5) Pain on step down. 0.1 added in as SD for Tape group to show data. At 4 weeks.							

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Study or subgroup	Tape N	Tape Mean(SD)	No or placebo tape N	No or placebo tape Mean(SD)	Mean Difference IV,Random,95% CI	Weight	Mean Difference IV,Random,95% CI
Test for overall effect: Z = 0.21 (P = 0.83)							
Total (95% CI)	**79**		**82**			**100.0 %**	**-0.15 [-1.15, 0.85]**
Heterogeneity: Tau?? = 1.05; Chi?? = 25.78, df = 4 (P = 0.00004); I?? =84%							
Test for overall effect: Z = 0.29 (P = 0.77)							
Test for subgroup differences: Chi?? = 0.01, df = 1 (P = 0.94), I?? =0.0%							

(1) Combined VAS (pain on climbing stairs and flat walking) / 20. At 3 months.

(2) Pain for self-reported activity. At 1 week. Note this is for knees not patients.

(3) Combined VAS (pain on climbing stairs and flat walking) / 20. At 3 months.

(4) Pain (not described). At 3 weeks.

(5) Pain on step down. 0.1 added in as SD for Tape group to show data. At 4 weeks.

Analysis 1.2. Comparison 1 Patellar taping versus no or placebo taping, Outcome 2 Pain: VAS (0: no pain to 10: worst pain) at end of treatment (no 'acute' cases).

Review: Patellar taping for patellofemoral pain syndrome in adults

Comparison: 1 Patellar taping versus no or placebo taping

Outcome: 2 Pain: VAS (0: no pain to 10: worst pain) at end of treatment (no 'acute' cases)

Study or subgroup	Tape N	Tape Mean(SD)	No or placebo tape N	No or placebo tape Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 No exercise co-intervention							
Clark 2000a	16	1.8 (1.44)	16	1.5 (2)		18.2 %	0.30 [-0.91, 1.51]
Mason 2011	15	1.83 (1.6)	15	2.26 (1.5)		21.5 %	-0.43 [-1.54, 0.68]
Subtotal (95% CI)	**31**		**31**			**39.7 %**	**-0.10 [-0.91, 0.72]**
Heterogeneity: Chi?? = 0.76, df = 1 (P = 0.38); I?? =0.0%							
Test for overall effect: Z = 0.23 (P = 0.82)							
2 Same exercises given to all participants							
Clark 2000a	18	2.89 (1.94)	21	2.08 (2.03)		17.0 %	0.81 [-0.44, 2.06]
Tunay 2003	20	2.7 (1.38)	20	2.35 (1.13)		43.3 %	0.35 [-0.43, 1.13]
Subtotal (95% CI)	**38**		**41**			**60.3 %**	**0.48 [-0.18, 1.14]**

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Study or subgroup	Tape N	Mean(SD)	No or placebo tape N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Heterogeneity: Chi?? = 0.37, df = 1 (P = 0.54); I?? =0.0%							
Test for overall effect: Z = 1.42 (P = 0.16)							
Total (95% CI)	**69**		**72**			**100.0 %**	**0.25 [-0.26, 0.77]**
Heterogeneity: Chi?? = 2.29, df = 3 (P = 0.52); I?? =0.0%							
Test for overall effect: Z = 0.96 (P = 0.34)							
Test for subgroup differences: Chi?? = 1.15, df = 1 (P = 0.28), I?? =13%							

Analysis 1.3. Comparison 1 Patellar taping versus no or placebo taping, Outcome 3 Pain: VAS (0: no pain to 10: worst pain) at 12 months.

Review: Patellar taping for patellofemoral pain syndrome in adults

Comparison: 1 Patellar taping versus no or placebo taping

Outcome: 3 Pain: VAS (0: no pain to 10: worst pain) at 12 months

Study or subgroup	Tape N	Mean(SD)	No or placebo tape N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 No exercise co-intervention						
Clark 2000a	12	3.87 (3.14)	15	2.59 (2.69)		1.28 [-0.96, 3.52]
2 Same exercises given to all participants						
Clark 2000a	10	1.76 (2.26)	12	1.89 (2.17)		-0.13 [-1.99, 1.73]

Analysis 1.4. Comparison 1 Patellar taping versus no or placebo taping, Outcome 4 Functional index questionnaire (FIQ) score (16 = no problems) at end of treatment.

Review: Patellar taping for patellofemoral pain syndrome in adults

Comparison: 1 Patellar taping versus no or placebo taping

Outcome: 4 Functional index questionnaire (FIQ) score (16 = no problems) at end of treatment

Study or subgroup	Tape		No or placebo tape		Mean Difference	Mean Difference
	N	Mean(SD)	N	Mean(SD)	IV,Fixed,95% CI	IV,Fixed,95% CI
1 No exercise co-intervention						
2 Same exercises given to all participants						
Whittingham 2004	10	16 (0.1)	10	13.5 (1.1)		2.50 [1.82, 3.18]

Analysis 1.5. Comparison 1 Patellar taping versus no or placebo taping, Outcome 5 Cincinnati knee activity score (100 = full activity) at end of treatment.

Review: Patellar taping for patellofemoral pain syndrome in adults

Comparison: 1 Patellar taping versus no or placebo taping

Outcome: 5 Cincinnati knee activity score (100 = full activity) at end of treatment

Study or subgroup	Tape		No or placebo tape		Mean Difference	Mean Difference
	N	Mean(SD)	N	Mean(SD)	IV,Fixed,95% CI	IV,Fixed,95% CI
1 No exercise co-intervention						
2 Same exercises given to all participants						
Tunay 2003	20	83 (8.3)	20	74.9 (8.39)		8.10 [2.93, 13.27]

Analysis 1.6. Comparison 1 Patellar taping versus no or placebo taping, Outcome 6 WOMAC score (0: no problems to 96: extreme problems) at end of treatment.

Review: Patellar taping for patellofemoral pain syndrome in adults

Comparison: 1 Patellar taping versus no or placebo taping

Outcome: 6 WOMAC score (0: no problems to 96: extreme problems) at end of treatment

Study or subgroup	Tape N	Mean(SD)	No or placebo tape N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 No exercise co-intervention						
Clark 2000a	18	20.9 (15.5)	21	13.8 (15.8)		7.10 [-2.75, 16.95]
2 Same exercises given to all participants						
Clark 2000a	16	11.5 (10.5)	16	10 (11.8)		1.50 [-6.24, 9.24]

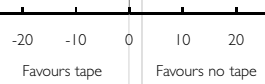
Analysis 1.7. Comparison 1 Patellar taping versus no or placebo taping, Outcome 7 WOMAC score (0: no problems to 96: extreme problems) at 12 months.

Review: Patellar taping for patellofemoral pain syndrome in adults

Comparison: 1 Patellar taping versus no or placebo taping

Outcome: 7 WOMAC score (0: no problems to 96: extreme problems) at 12 months

Study or subgroup	Tape N	Mean(SD)	No or placebo tape N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 No exercise co-intervention						
Clark 2000a	12	27.6 (22.7)	15	22 (21.3)		5.60 [-11.17, 22.37]
2 Same exercises given to all participants						
Clark 2000a	10	14.8 (18)	12	15.6 (16.2)		-0.80 [-15.24, 13.64]



Analysis 1.8. Comparison 1 Patellar taping versus no or placebo taping, Outcome 8 Referred for further treatment (after 3 months).

Review: Patellar taping for patellofemoral pain syndrome in adults

Comparison: 1 Patellar taping versus no or placebo taping

Outcome: 8 Referred for further treatment (after 3 months)

Study or subgroup	Tape n/N	No or placebo tape n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 No exercise co-intervention				
Clark 2000a	11/19	9/22		1.42 [0.75, 2.66]
2 Same exercises given to all participants				
Clark 2000a	1/20	0/20		3.00 [0.13, 69.52]

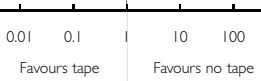
Analysis 1.9. Comparison 1 Patellar taping versus no or placebo taping, Outcome 9 Further course of physiotherapy (after 3 months).

Review: Patellar taping for patellofemoral pain syndrome in adults

Comparison: 1 Patellar taping versus no or placebo taping

Outcome: 9 Further course of physiotherapy (after 3 months)

Study or subgroup	Tape n/N	No or placebo tape n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 No exercise co-intervention				
Clark 2000a	3/19	5/22		0.69 [0.19, 2.53]
2 Same exercises given to all participants				
Clark 2000a	2/20	2/20		1.00 [0.16, 6.42]



APPENDICES

Appendix 1. Search strategies

The Cochrane Library (Wiley InterScience)

#1 MeSH descriptor Arthralgia, this term only
#2 MeSH descriptor Patella, this term only
#3 (patellofemoral or patello-femoral) NEAR/3 (joint*):ti,ab,kw
#4 (#2 OR #3)
#5 (#1 AND #4)
#6 (anterior knee pain):ti,ab,kw
#7 MeSH descriptor Patellofemoral Pain Syndrome, this term only
#8 (patellofemoral or patello-femoral) ADJ (pain or syndrome or dysfunction):ti,ab,kw
#9 (lateral compression or lateral facet or lateral pressure or odd facet) ADJ (syndrome):ti,ab,kw
#10 MeSH descriptor Chondromalacia Patellae, this term only
#11 (chrondromal* or chondropath*) ADJ (knee or patell* or femoropatell* or femoro-patell* or regropatell* or retro-patell*):ti,ab,kw
#12 (#6 OR #7 OR #8 OR #9 OR #10 OR #11)
#13 (taping or tape*):ti,ab,kw
#14 strap*:ti,ab,kw
#15 McConnell AND (knee* or patell*):ti,ab,kw
#16 (#13 OR #14 OR #15)
#17 (#5 OR #12)
#18 (#16 AND #17)

MEDLINE (OVID ONLINE)

1. Arthralgia/
2. Patella/
3. ((patellofemoral or patello-femoral) adj (joint)).tw
4. 1 and (or/2-3)
5. anterior knee pain.tw
6. Patellofemoral pain syndrome/
7. ((Patello-femoral or patellofemoral) adj (pain or syndrome or dysfunction)).tw
8. ((lateral compression or lateral facet or lateral pressure or odd facet) adj (syndrome)).tw
9. Chondromalacia patellae/
10. ((chondromal$ or chondropath$) adj (knee or patell$ or femoropatell$ or femoro-patell$ or retropatell$ or retro-patell$)).tw
11. or/5-10
12. (taping or tape$).tw
13. strap$.tw
14. (McConnell and (knee$ or patell$)).tw
15. or/12-14
16. (or/4,11) and 15
17. randomized controlled trial.pt
18. controlled clinical trial.pt
19. Randomized Controlled Trials/
20. Random Allocation/
21. Double Blind Method/
22. Single Blind Method/
23. or/17-22
24. Animals/ not Humans/
25. 23 not 24

26. clinical trial.pt
27. exp Clinical Trials as topic/
28. (clinic$ adj25 trial$).tw
29. ((singl$ or doubl$ or trebl$ or tripl$) adj (mask$ or blind$)).tw
30. Placebos/
31. placebo$.tw
32. random$.tw
33. Research Design/
34. or/26-33
35. 34 not 24
36. 35 not 25
37. or/25,36
38. and/16,37

EMBASE (OVID ONLINE)

1. Arthralgia/
2. Patella/
3. Patellofemoral joint/
4. 1 and (or/2,3)
5. anterior knee pain.tw
6. Patellofemoral pain syndrome/
7. ((patello-femoral or patellofemoral) adj (pain or syndrome or dysfunction)).tw
8. ((lateral compression or lateral facet or lateral pressure or odd facet) adj (syndrome)).tw
9. Patella chondromalacia/
10. ((chondromal$ or chondropath$) adj (knee or patell$ or femoropatell$ or femoro-patell$ or retropatell$ or retro-patell$)).tw
11. or/5-10
12. (taping$ or tape$).tw
13. strap$.tw
14. (McConnell and (knee or patell$)).tw
15. or/12-14
16. (or/4,11) and 15
17. Clinical trial/
18. Randomized Controlled trial/
19. Randomisation/
20. Double Blind Procedure/
21. Single Blind Procedure/
22. Crossover Procedure/
23. Placebo/
24. randomi?ed controlled trial$.tw
25. RCT.tw
26. random allocation.tw
27. randomly allocated.tw
28. allocated randomly.tw
29. (allocated adj2 random).tw
30. single blind$.tw
31. double blind$.tw
32. ((triple or treble) adj (blind$)).tw
33. placebo$.tw
34. Prospective study/
35. or/17-34
36. Case study/
37. case report.tw

38. Abstract report/ or Letter/
39. or/36-38
40. 35 not 39
41. limit 40 to human
42. and/16,41

CINAHL (EBSCO)

1. Arthralgia/
2. Patella/
3. ((patellofemoral or patello-femoral) adj (joint)).tw
4. 1 and (or/2,3)
5. anterior knee pain.tw
6. Patellofemoral pain syndrome/
7. ((patello-femoral or patellofemoral) adj (pain or syndrome or dysfunction)).tw
8. ((lateral compression or lateral facet or lateral pressure or odd facet) adj (syndrome)).tw
9. Chondromalacia patella/
10. ((chondromal$ or chondropath$) adj (knee or patell$ or femoro$ or femoro-patell$ or retropatell$ or retro-patell$)).tw
11. or/5-10
12. "Taping and strapping"/
13. (taping or tape$).tw
14. strap$.tw
15. (McConnell and (knee$ or patell$)).tw
16. or/12-15
17. (or/4,11) and 16
18. exp Clinical Trials/
19. exp Evaluation Research/
20. exp Comparative Studies/
21. exp Crossover Design/
22. clinical trial.pt
23. or/18-22
24. ((clinical or controlled or comparative or placebo or prospective or randomi#ed) adj3 (trial or study)).tw
25. (random$ adj7 (allocat$ or allot$ or assign$ or basis$ or divid$ or order$)).tw
26. ((singl$ or doubl$ or trebl$ or tripl$) adj7 (blind$ or mask$)).tw
27. (cross?over$ or (cross adj1 over$)).tw
28. ((allocat$ or allot$ or assign$ or divid$) adj3 (condition$ or experiment$ or intervention$ or treatment$ or therap$ or control$ or group$)).tw
29. or/24-28
30. or/23,29
31. and/17,30

PEDro

Abstract & Title: (tape* or taping)
Therapy: no selection
Problem: no selection
Body part: lower leg or knee
Subdiscipline: no selection
Method: clinical trial
Match all search terms (AND)

SPORTDiscus (EBSCO)

1. Knee/
2. Knee joint/
3. Patella/
4. Patellofemoral joint/
5. or/1-4
6. anterior knee pain.tw
7. Patellofemoral pain syndrome/
8. ((patello-femoral or patellofemoral) adj (pain or syndrome or dysfunction)).tw
9. ((lateral compression or lateral facet or lateral pressure or odd facet) adj (syndrome)).tw
10. Chondromalacia/
11. (chondromal$ or chondropath$) adj (knee or patell$ or femoropatell$ or femoro-patell$ or retropatell$ or retro-patell$).tw
12. or/ 6-11
13. (tape$ or taping).tw
14. strap$.tw
15. (McConnell and (knee$ or patell$)).tw
16. or/13-15
17. (or/ 5,12) and 16
18. ((clinic$ or controlled or comparative or placebo or prospective or randomi#ed) adj3 (trial or study)).tw
19. (random$ adj7 (allocat$ or allot$ or assign$ or basis$ or divid$ or order$)).tw
20. ((singl$ or doubl$ or trebl$ or tripl$) adj7 (blind$ or mask$)).tw
21. (cross?over$ or (cross adj1 over$)).tw
22. randomi?ed control$ trial$.tw
23. ((allocat$ or allot$ or assign$ or divid$) adj3 (condition$ or experiment$ or intervention$ or treatment$ or therap$ or control$ or group$)).tw
24. placebo$.tw
25. or/18-24
30. and/17,25

AMED (OVID ONLINE)

1. Arthralgia/
2. Patella/
3. ((patellofemoral or patello-femoral) adj (joint)).tw
4. 1 and (or/2,3)
5. anterior knee pain.tw
6. Patellofemoral pain/
7. ((patello-femoral or patellofemoral) adj (pain or syndrome or dysfunction)).tw
8. ((lateral compression or lateral facet or lateral pressure or odd facet) adj (syndrome)).tw
9. ((chondromal$ or chondropath$) adj (knee or patell$ or femoro$ or femoro-patell$ or retropatell$ or retro-patell$)).tw
10. or/ 5-9
11. (taping or tape$).tw
12. strap$.tw
13. ((McConnell) and (knee$ or patell$)).tw
14. or/11-13
15. (or/4,10) and 14
16. randomized controlled trial.pt
17. controlled clinical trial.pt
18. Randomized Controlled Trials/
19. Random Allocation/
20. Double-Blind Method/
21. or/16-20
22. Animals/ not Humans/

23. 21 not 22
24. clinical trial.pt
25. exp Clinical Trials/
26. (clinic$ adj25 trial$).tw
27. ((singl$ or doubl$ or trebl$ or tripl$) adj (mask$ or blind$)).tw
28. Placebos/
29. placebo$.tw
30. random$.tw
31. Research Design/
32. (latin adj square).tw
33. or/24-32
34. 33 not 22
35. 34 not 23
36. and/15,23
37. and/15,35
38. or/ 36,37

HISTORY

Protocol first published: Issue 3, 2007

Review first published: Issue 4, 2012

Date	Event	Description
11 September 2008	Amended	Converted to new review format.

CONTRIBUTIONS OF AUTHORS

Michael Callaghan and James Selfe conceived the idea and wrote the protocol. They performed the search, performed study selection, reviewed the included studies and drafted the review. Michael Callaghan is the guarantor of the review.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- University of Manchester, UK.
- University of Central Lancashire, UK.

External sources

- Department of Health Post Doctoral Award, UK.
- Arthritis Research, UK.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

We clarified that our intention was to compare tape versus no or placebo tape and thus we excluded studies that compared patellar taping with another intervention (such as exercises) or that compared composite interventions, that included patellar taping, with no intervention or different interventions.

In the protocol under the title 'Timepoints considered', we stated that we would consider studies that analysed the effect of patellar taping immediately post application. We have removed this and have only considered patellar taping when it was used as part of a treatment programme for a sustained period. We have also removed 'change of range of motion' as one of the 'Types of outcome measures'.

In accordance with the latest Cochrane recommendations, we have completely replaced the quality assessment tool with the 'Risk of bias' tool.

INDEX TERMS

Medical Subject Headings (MeSH)

*Bandages; *Surgical Tape; Pain Measurement [methods]; Patellofemoral Pain Syndrome [*therapy]; Randomized Controlled Trials as Topic; Treatment Outcome

MeSH check words

Adult; Humans