Deep transverse friction massage for treating tendinitis (Review)


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Deep transverse friction massage for treating tendinitis

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ABSTRACT

Background

Deep transverse friction massage (DTFM) is one of several physiotherapy interventions suggested for the management of tendinitis pain.

Objectives

To assess the efficacy of DTFM for treating tendinitis.

Search strategy

We searched the MEDLINE, EMBASE, HealthSTAR, Sports Discus, CINAHL, the Cochrane Controlled Trials Register, PEDro, the specialized registry of the Cochrane musculoskeletal group and the Cochrane field of Physical and Related Therapies up to the end of June 2002. The reference list of the trials and key experts in the area were also consulted for additional studies.

Selection criteria

All randomized controlled trials (RCTs) and controlled clinical trials (CCTs) comparing therapeutic ultrasound with control or another active intervention in patients with all types of tendinitis, such as iliotibial band friction syndrome and extensor carpi radialis tendinitis (i.e. tennis elbow or lateral epicondylitis or lateral epicondylitis humeri), were selected.

Data collection and analysis

Two reviewers determined the studies to be included based upon the inclusion and exclusion criteria (LB, VR). Data were independently abstracted by two reviewers (VR, LB), and checked by a third reviewer (BS) using a pre-developed form of the Cochrane Musculoskeletal Group.

The two reviewers, using a validated checklist, assessed the methodological quality of the RCTs and CCTs independently. The pooled analysis was performed using weighted mean differences (WMDs) for continuous outcomes.
Main results

One RCT included patients with ITBFS. DTFM combined with rest, stretching exercises, cryotherapy and therapeutic ultrasound was compared to the control group (rest, stretching exercises, cryotherapy and therapeutic ultrasound only). This trial showed no statistical difference in the three types of pain relief measured after four consecutive sessions of DTFM combined with other physiotherapy modalities for runners. There was a clinically important relative percentage difference in pain while running of 22%. A RCT on ECRT showed no statistical difference in pain relief, grip strength and the three types of functional status measured after 9 consecutive sessions within 5 weeks of DTFM compared with other physiotherapy modalities.

Authors’ conclusions

DTFM combined with other physiotherapy modalities did not show consistent benefit over the control of pain, or improvement of grip strength and functional status for patients with ITBFS or for patients with ECRT. These conclusions are limited by the small sample size of the included RCTs. No conclusions can be drawn concerning the use or non use of DTFM for the treatment of ITBFS. Future trials, utilizing specific ITBFS methods and adequate sample sizes are needed, before conclusions can be drawn regarding the specific effect of DTFM on tendinitis.

Plain Language Summary

Deep transverse friction massage for the treatment of tendinitis

This is a systematic review of two randomised clinical trials (RCTs) on the efficacy of deep transverse friction massage in the treatment of tendinitis. These RCTs showed no benefit of deep transverse friction massage combined with concurrent physiotherapy modalities, when compared to either a control group with the same physiotherapy modalities, excluding deep transverse friction massage, or other active therapies such as phonophoresis or therapeutic ultrasound combined to placebo ointment, for the following outcomes: pain relief involved in the iliotibial band friction syndrome in runners, pain relief, improved functional status and increased grip strength involved in extensor carpi radialis tendinitis. These conclusions are limited by the lack of studies available, the use of subjective and non-validated scales for measuring pain, the combination of several physiotherapy modalities and the low sample size of the RCTs included in this systematic review.

Background

Extensor carpi radialis tendinitis (ECRT) (i.e. tennis elbow or lateral epicondylitis or lateralis epicondylitis humeri) is a local inflammation near the proximal attachments of wrist extensors, characterised by pain in palpation of the lateral epicondyle of the humerus and in resisted movements against wrist extension (Struijs 2002). The prevalence of ECRT varies between 1 and 10% and occurs between the ages of 34 and 74 years (Allander 1974). Stratford 1989 reported that ECRT does not seem to be a degenerative condition, as its prevalence declines after the age of 42 (Allander 1974). It is a syndrome of overuse (e.g. use of computer mouse or during racquet sports) that can result in considerable socioeconomic costs due to prolonged leave of absence from work (Struijs 2002).

Iliotibial band friction syndrome (ITBFS) is an overuse musculoskeletal injury, frequently observed in long distance runners, cyclists, football players and military personnel. The incidence of ITBFS varies between 1.6%-52% depending upon the population studied (Kirk 2000, Jordaan 1994, Pinshaw 1984). The mechanism of ITBFS appears to be the repetitive friction of the iliotibial band moving over the lateral femoral condyle during knee flexion/extension (Schwellnus 1991). The etiology of the ITBFS is multifactorial (Messier 1988). Three main factors have been identified in current literature: 1) biomechanical factors such as maximum normalized braking force (Messier 1995) 2) anthropometric factors such as leg length discrepancy and width of the iliotibial band (Messier 1988, Orchard 1996) and 3) training factors such as weekly distance and downhill running (Messier 1995, Messier 1988, Orchard 1996).

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OBJECTIVES

To assess the effectiveness of DTFM for treating tendinitis.

METHODS

For example, the surgical approach includes the resection of the impinging portion of the iliotibial band (Kirk 2000, Martens 1989). The goals of the rehabilitation approach to the treatment of ITBFS includes: 1) the control of pain and inflammation (Cyriax 1975 a, Cyriax 1975 b, Thaunton 1987); 2) the correction of biomechanical deficiencies (Thaunton 1987); 3) the restoration of motion (Hart 1994) and 4) the increase in strength, endurance and function (Hart 1994, Thaunton 1987); 5) the prevention of re-injury (Hart 1994) and 6) the gradual return to training (Thaunton 1987).

Deep transverse friction massage (DTFM) is a technique popularised by Dr. James Cyriax (Cyriax 1975 a, Cyriax 1975 b) for pain and inflammation relief in musculoskeletal conditions. DTFM may be part of a physiotherapy program offered in the treatment of various musculoskeletal conditions. DTFM is a technique that attempts to reduce abnormal fibrous adhesions and makes scar tissue more mobile in sub-acute and chronic inflammatory conditions by realigning the normal soft tissue fibres (Schwellnus 1992, Walker 1984). It has been indicated that DTFM also enhances normal healing conditions by breaking cross bridges and preventing abnormal scarring. Its mechanical action causes hyperaemia, which results in increased blood flow to the area (Schwellnus 1992).

To our knowledge, no meta-analysis or literature reviews have reported the efficacy of this type of massage in their scientific reports (Chapman 1991, Furlan 2001, Green 1998, van der Heijden 1997). The American Physical Therapy Association (APTA) guidelines (1998) recommend massage for musculoskeletal conditions, though the APTA guidelines do not differentiate between types of massage. However, these guidelines are not based on evidence from comparative controlled trials. There is a need to provide clinicians with evidence that will enable them to make informed decisions regarding treatment options.

This systematic review of DTFM for ITBFS was initially conducted as part of a guideline development project entitled the Philadelphia Panel Guidelines on Rehabilitation Interventions (Philadelphia 2001). The Philadelphia Panel recommends that there is insufficient evidence to include or exclude DTFM in the treatment of ITBFS (level I, grade C for pain). Other guidelines such as ACR (ACR 1996, ACR 2000), BMJ (BJM 2000) and Manal and Snyder-Mackler (Manal 1996) did not evaluate any type of massage, as a treatment intervention for knee conditions. To our knowledge, there is no existing guidelines on massage for ECRT.

Criteria for considering studies for this review

Types of studies

According to a priori protocol, all randomized controlled trials (RCT), controlled clinical trials without randomization (CCT), case-control and cohort studies were included. The results were graded according to the strength of the study design. No language limitations were imposed. Abstracts were accepted.

Types of participants

Only trials with subjects aged 18 years and over, with clinical confirmation of the diagnosis of tendinitis (For instance: ITBFS and ECRT) were included. Inclusion criteria for ITBFS were comprised of 1) the history of pain on the lateral aspect of the knee during running; 2) tenderness over the lateral femoral condyle at rest and 3) aggravation of symptoms at 30 degrees of knee flexion. For ECRT, inclusion criteria comprised of 1) tenderness in palpation over the lateral aspect of the elbow; 2) pain in the lateral aspect of the elbow during resisted wrist extension.

Types of interventions

Trials comparing DTFM to placebo, no therapy or active treatments were accepted. Concurrent therapy was accepted, providing that it was given equally to all treatment groups.

Types of outcome measures

The primary measure of effectiveness was pain relief, as suggested by the third conference of Outcome Measures in Rheumatology (OMERACT) (Bellamy 1997). In addition to these outcomes, one of the authors (LB) has developed a theoretical framework for important outcome measures for physiotherapy interventions (Morin 1996). These outcomes were assessed as secondary measures of effectiveness and include: 1) Joint range of motion (ROM); 2) Muscle strength; 3) Endurance; 4) Functional status.

Search methods for identification of studies

We searched MEDLINE, EMBASE, HealthSTAR, Sports Discus, CINAHL, the Cochrane Controlled Trials Register (CCTR), PEDro, the specialized registry of the Cochrane musculoskeletal group and the Cochrane field of Physical and Related Therapies were searched using the keyword and textword search strategy shown below up to and including June 2002 according to the exhaustive search strategy for RCTs designed for the Cochrane Collaboration (Dickersin 1994), with modifications proposed by Haynes 1994. Additional terms for study design were used to identify observational studies including: case-control, cohort, comparative study and clinical trials.
The electronic search was complemented by the following hand searches: 1) Bibliographic references; and 2) Current Contents up to November 2000 (to identify articles not yet indexed in MEDLINE).
Nineteen references were retrieved by search. Only one study was included (Schwellnus 1992, Stratford 1989).

The strategy is as follows
Database: MEDLINE <1960 to June 2002>

1 pain.tw ,hw . 35196
2 activities of daily living/ 4866
3 (joint$ adj4 (mobility or flexibility)).tw . 197
4 (return$ adj3 (work or leisure)).tw . 781
5 (function$ adj2 (status or abilit$)).tw . 3151
6 (stiffness or swelling or swollen or tender 7925
7 (flexion or extension or abduction or adduc 12214
8 range of motion, articular/ 3237
9 (range adj2 motion).tw . 1338
10 (strength or power).tw . 21995
11 (grip$ or force or rotation).tw . 14952
12 (dynamometer$ or goniometer).tw . 543
13 absenteeism/ or absenteeis.t.w . 549
14 (sick leave or sick day$ or absence).tw . 44482
15 sick leave/ 217
16 (disabilit$ or (work$ adj compensation)).tw 7547
17 cost$.tw . 26237
18 exp economics/ or ec.fs. 40380
19 or/1-18 189590
20 exp exercise therapy/ 1527
21 (exercis$ or aerobic$).tw . 18114
22 (ergometer$ or pulley$).tw . 1083
23 (weights or hydraulics or robotics).tw . 5300
24 (elastic or ergonomic$).tw . 3114
25 body mechanic$.tw . 22
26 (posture or kinesthetic or stretch$).tw . 5805
27 (propriocept$ or development$).tw . 110911
28 (perceptual or resistance).tw . 36548
29 (gait or locomotion or sensory).tw . 13473
30 (neuromuscular or muscular).tw . 8345
31 (flexibili$ or torque).tw . 3446
32 (force or extensibilit$).tw . 10232
33 (strength$).tw . 14523
34 continuous passive motion.tw . 42
35 motion therapy, continuous passive/ 63
36 or/20-36 217565
37 heat/tu 113
38 (heat or hot or ice).tw . 15919
39 cryotherapy,sh.tw . 598
40 diathermy.sh.tw . 224
42 hydrotherapy,sh.sh . 92
43 (vapocoolant or phonophoresis).tw . 24
44 (aquatic or whirlpool or bath$).tw . 4608
45 balneotherapy.t.w . 33
46 exp hyperthermia, induced/ 1645
47 (hypertherm$ or thermotherapy).tw . 2663
48 (fluidotherapy or compression).tw . 5607
49 (table or taping).tw . 3207
50 or/38-49 32466
51 exp ultrasonography/ 21742
52 ultrasonic therapy/ or us.fs . 24879
53 (ultrasound$ or ultrasonic$).tw . 14151
54 short wave therapy.t.w . 3
55 ultrasonograph$ .tw . 8440
56 or/51-55 39268
57 exp electric stimulation therapy/ 1322
58 ((electric$ adj nerve) or therapy).tw . 91184
59 (electric$ adj (stimulation or muscle)).tw . 3520
60 electrostimulation.t.w . 221
61 electroanalgiesia.t.w . 2
62 (tens or altens).tw . 410
63 electroacupuncture.t.w . 112
64 neuromuscular$ electric$.tw . 25
65 (high volt or pulsed or current).tw . 50816
66 (electromagnetic or electrotherap$).tw . 1124
67 iontophoresis.t.w . 339
68 or/57-67 141997
69 “biofeedback (psychology)”/.t . 399
70 biofeedback.t.w . 353
71 facilitation.t.w . 1881
72 bobath.t.w . 12
73 adaptive shortening.t.w . 2
74 or/69-73 2397
75 traction.sh,tw . 988
76 massage,tw,hw . 554
77 percussion/ 95
78 (percussion or petrissage or tapotement).tw . 266
79 or/75-78 1857
80 knee.sh,tw . 6312
81 knee injuries/ 1185
82 exp knee joint/ 3485
83 (menisc$ or meniscus).t.w . 552
84 semilunar cartilage$ .t.w . 1
85 medial collateral ligament, knee/ 110
86 medial collateral ligament$ .t.w . 164
87 anterior cruciate ligament/ 1092
88 cruciate ligament$ .t.w . 1241
89 patella$.t.w . 1185
90 or/80-89 8332
91 74 or 37 219264
92 50 or 79 34132
93 56 or 68 176207
94 or/91-93 387530
Data collection and analysis

Two independent reviewers (VR, LB) examined the titles and abstracts of the trials identified by the search strategy to select trials that met the inclusion criteria. All trials classified as relevant by at least one of the reviewers, were retrieved. The retrieved articles were re-examined to ensure that they met the inclusion criteria. The results of the individual trials were extracted from each of the included trials using pre-determined extraction forms by two independent reviewers (LB, VR). The data was cross-checked by a third reviewer (BS). The extraction forms were developed and pilot-tested, based on other forms used by the Cochrane musculoskeletal review group. The extraction form documented specific information about DTFM including 1) the characteristics of the technique; 2) methods of therapeutic application such as the duration, frequency, rhythm, pressure, and total number of sessions. The final data values were based on consensus of the two reviewers.

Data analysis: For continuous data, weighted mean differences (WMDs) were calculated. The pooled analysis was performed using WMDs for pain relief as described as 1) daily pain; 2) pain while running and 3) percentage of maximum pain when running for ITBFS and 4) pain intensity; 5) grip strength and 6) functional status (3 different measurements) for ECRT. For dichotomous data, relative risk ratios were calculated. The data analysis was performed using relative risk ratios for the number of patients with improved function.

RESULTS

Description of studies

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


Only two trials met the inclusion criteria (Schwellnus 1992, Stratford 1989). The first RCT (Schwellnus 1991) compared two groups: one received combined physiotherapy interventions and DTFM, and the other received combined physiotherapy interventions without DTFM. The study duration was four consecutive treatment sessions. A total of 17 patients with ITBFS were randomized. All patients in this study were prescribed rest, stretching exercises, cryotherapy and therapeutic ultrasound. The mean age was 27.6 years old, the disease duration was 48.5 weeks, the years of running experience were 6.6, and the weekly distance in kilometres was 54.5 for both groups. The injury severity was 3.4 out of a maximum possible of four.

The second included RCT on efficacy of DTFM examined the treatment of DTFM for ECRT (Stratford 1989) and had several comparison groups: 1) DTFM combined with therapeutic ultrasound and placebo ointment (n=11) versus therapeutic ultrasound combined with placebo ointment (n=9) and 2) DTFM compared to phonophoresis (n=10) versus phonophoresis alone (n=10) were included in the analysis. No concurrent treatment was involved. The mean age was 43.3 years old and the symptom duration was 4.25 weeks.

Risk of bias in included studies

Methodological quality was assessed using a validated checklist (Jadad 1996, Clark 1999). Components of quality included the quality of randomisation, double-blinding and description of withdrawals. Two independent reviewers (LB, VR) assessed quality and differences were resolved by consensus. This scale includes...
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Effects of interventions

The methodological quality of the RCT for ITBFS included in this systematic review (Schwellnus 1992), scored a total of two points. This study scored half a point for randomisation, no points for double-blinding, and full points for the reporting of withdrawals and dropouts. The methodological quality of the RCT for ECRT included in this systematic review (Stratford 1989), scored a total of four points. This study scored total points for randomisation and double-blinding, and no points for the reporting of withdrawals and dropouts. The RCT for ITBFS (Schwellnus 1992) showed no statistical significant difference in the three types of pain relief measured after four consecutive sessions of DTFM combined with physiotherapy modalities for runners. Weighted mean differences (WMDs) were obtained for daily pain (WMDs 0.40, 95% CI: 0.00, 0.80), pain while running (WMDs 3.00, 95% CI: -5.08, 11.08) and percentage of maximum pain when running (WMDs 0.10, 95% CI: -3.77, 3.97) assessments. These correspond to a relative difference in the change between groups of 0% for daily pain, 22% for pain while running and 12% for % maximum pain while running. The RCT for ECRT (Stratford 1989) showed no statistically significant difference in pain intensity, grip strength and functional status (3 different measurements) after nine consecutive sessions of DTFM combined with physiotherapy modalities. Weighted mean differences (WMDs) and relative risk ratios (RR) were computed for the comparison group: DTFM combined with therapeutic ultrasound and placebo ointment (n=11) versus therapeutic ultrasound combined to placebo ointment (n=9) for pain (WMDs 16.50, 95% CI: -6.15, 39.15), grip strength (WMDs 0.10, 95% CI: -0.16, 0.36), function (VAS 0-100) (WMDs -1.80, 95% CI: -18.64, 15.04), pain-free function (WMDs 1.10, 95% CI: -1.00, 3.20) and functional status (RR 3.3, 95% CI: 0.4, 24.3) assessments. WMDs and OR were also calculated for the comparison group: DTFM compared to phonophoresis (n=10) versus phonophoresis alone (n=10) for pain (WMDs 2.8, 95% CI: -19.96, 25.56), grip strength (WMDs -0.20, 95% CI: -0.46, 0.06), function (VAS 0-100) (WMDs 3.70, 95% CI: -14.13, 21.53), pain-free function (WMDs 0.10, 95% CI: -2.27, 2.47) and functional status (RR 0.67, 95% CI: 0.1, 3.2) assessments.

DISCUSSION

Deep transverse friction massage combined with additional physiotherapy modalities did not demonstrate a consistent clinically important benefit when compared to a control in the treatment of ITBFS (Schwellnus 1992) and of ECRT (Stratford 1989). However, there was a clinically important difference of 22% in pain, while running in presence of symptomatic ITBFS, though not statistically significant. The effect of DTFM was not specific, as combined interventions were used in the involved comparison groups. Confounding variables, such as characteristics of the device, characteristics of the therapeutic application, characteristics of the population, characteristics of the disease and methodological considerations might have contributed to the lack of effect (Morin 1996). The characteristics of the technique described by Cyriax (Cyriax 1975 a, Cyriax 1975 b), such as years of experience of the therapist; characteristics of the application (pressure, rhythm and progression, and frequency), duration of the treatment sessions and the treatment schedule; characteristics of the population (age, gender); characteristics of the disease (chronic vs acute conditions) and weakness of methodological considerations (randomization method, non proper comparison groups, sample size, study duration, non validated outcome measures) (Schwellnus 1992, Stratford 1989) in combination with poor quality of the trial (Schwellnus 1992), may have contributed to the non conclusive results on the effectiveness of DTFM for tendinitis. The RCT conducted by Stratford 1989 was very well conducted and it provided a good description of the method. However, no ‘massage only’ group was included to measure the specific effect of DTFM. The RCTs included in this systematic review highlights a common problem of the trials of rehabilitation interventions: difficulty or inability to double blind, which contributes to the low methodological quality.

A recent meta-analysis on massage for low back pain found non conclusive results (Furlan 2001). However, it was not the same type of massage or area treated. The Philadelphia Panel (2001) recommends that there is poor evidence to include or exclude DTFM alone as therapy intervention for treating tendinitis (level I, grade C for pain) (Philadelphia 2001).

In the current RCTs (Schwellnus 1992, Stratford 1989), DTFM was performed to reduce tendinitis symptoms. The inflammation and pain observed in tendinitis are frequently due to three main factors: 1) biomechanical factors; 2) anthropometric factors and 3) training factors. Pain is an indirect symptom. Based on the identified factors, pain could therefore be controlled more effectively through other physiotherapy interventions such as strengthening and postural exercises, or changes in functional and sporting activities that correct biomechanical deficiencies (Thaunton 1987); restore motion (Hart 1994); increase strength, endurance and function (Hart 1994, Thaunton 1987); and gradually return to training (Thaunton 1987).

In conclusion, deep transverse friction massage combined with other physiotherapy modalities did not significantly reduce tendinitis symptoms compared to control group. More well-designed
RCTs are needed before including or excluding this specific type of massage in the treatment of this condition.

**AUTHORS’ CONCLUSIONS**

**Implications for practice**

There is no evidence of clinically important benefit of deep transverse friction massage for treating tendinitis. It is clear that more well designed studies are necessary before drawing conclusions about the efficacy or lack of efficacy of deep transverse friction massage for treating symptomatic tendinitis.

**Implications for research**

In order to justify the use of deep transverse friction massage in the treatment of tendinitis, a high quality randomized trial, using validated outcome measures and high quality reporting methods is needed.

**ACKNOWLEDGEMENTS**

The authors thank Judith Robitaille, Michel Boudreau and Michael Saginur for help with the data extraction and literature retrieval and the editorial team of the Cochrane Musculoskeletal Group for valuable comments on early drafts.

**REFERENCES**

**References to studies included in this review**

Schwellnus 1992 *(published data only)*


Stratford 1989 *(published data only)*


**References to studies excluded from this review**

Balke 1989 *(published data only)*


Chiarello 1997 *(published data only)*


Crosman 1984 *(published data only)*


Feehan 1989 *(published data only)*

* Feehan RC. The efficacy of using transverse friction massage on improving active and passive range of motion in the client with chronic knee dysfunction. The Union Institute 1989:64.

Pellecchia 1994 *(published data only)*


Thomee 1997 *(published data only)*


Zhang 1987 *(published data only)*


**Additional references**

ACR 1996


ACR 2000


Allander 1974


APTA 2001


BJM 2000

Deep transverse friction massage for treating tendinitis (Review)

Chapman 1991

Clark 1999

Cyriax 1975a

Cyriax 1975b

Furlan 2001

Green 1998

Hart 1994

Haynes 1994

Jadad 1996

Jones 1987

Jordaan 1994

Kirk 2000

Manal 1996

Martens 1989

Messier 1988

Messier 1995

Morin 1996

Philadelphia 2001

Pinshaw 1984

Schwellnus 1991

Strujs 2002

Thaunton 1987

van der Heijden 1997
Walker 1984


* Indicates the major publication for the study
### Characteristics of included studies (ordered by study ID)

**Schwellnus 1992**

| Methods | Randomized, assessor-blinded trial.  
| Sample size at entry: deep transverse friction (DTF) 10, ctrl 10  
| Treatment duration: 10 days  
| Follow-up: 14 days  
| Exclusions: DTF 1, ctrl 2 |
|---|---|
| Participants | visitors to a sports injury clinic with unilateral chronic (>4wks) iliotibial band syndrome causing pain severe enough to restrict running distance or speed (grade 3), or to prevent it altogether (grade 4)  
| exclusions: <18 yrs old, history of previous knee surgery, concomitant medical therapy  
| Age (SE?): mass 25 (6), ctrl 29 (5)--p=0.20 student t-test  
| Weeks injured (SE?): mass 23 (17), ctrl 74 (95)  
| Years running (SE?): 7.7 (5.5), 5.4 (6.2)  
| Km run per weeks (SE?): 45 (15), 64 (30)  
| Grade of injury (SE?): 3.4 (0.5), 3.4 (0.5) |
| Interventions | Deep transverse friction:  
| treated anatomical area: most tender area  
| treatment duration: 2min of light friction, then 8min of harder friction  
| pressure: constant, such that discomfort was experienced, but not severe pain.  
| technique: pressure was applied with the index finger and reinforced with ring finger, thumb pivot; brisk motion was initiated from shoulder, wrist flexible, hand stiff  
| Concurrent treatment (2wks):  
| rest apart from 3 * 30min treatmill tests  
| ice 20min twice daily  
| stretch of iliotibial band, daily  
| ultrasound: 1MHz, 0.5W/cm/cm (continuous), 5-7min * 6 days |
| Outcomes | Mean pain daily recall, total pain while running, % max pain experienced while running |
| Notes | R: 1  
| B: 1  
| W: 0  
| Total = 2/5  
| one patient excluded for refusal to comply |

### Risk of bias

<table>
<thead>
<tr>
<th>Item</th>
<th>Authors' judgement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocation concealment?</td>
<td>Unclear</td>
<td>D - Not used</td>
</tr>
</tbody>
</table>
## Methods
Randomized controlled trial, parallel group, combination of interventions
Gr 1: ultrasound and placebo ointment without frictions
Gr 2: Ultrasound and placebo ointment with frictions
Gr 3: phonophoresis without frictions
Gr 4: phonophoresis with frictions
Sample size at entry: 40
Gr 1: 9
Gr 2: 11
Gr 3: 10
Gr 4: 10
# male / # female
Total: 20 / 20
Gr 1: 2 / 7
Gr 2: 5 / 6
Gr 3: 5 / 5
Gr 4: 8 / 2

## Participants
Inclusion: those that complained of discomfort at or about the lateral epicondyle; pain at the lateral aspect of the elbow during resisted wrist extension; radial deviation during complete elbow extension; tenderness in palpation over, or at one of the following areas: 1. origin of extensor carpi radialis longus tendon 2. origin of extensor carpi radialis brevis tendon 3. extensor carpi radialis brevis at tendon body 4. extensor carpi radialis brevis tendon with tenderness extending from origin to the tendon body
Exclusion: combined lesions; bilateral elbow problems at initial assessment; history of prior surgery; history of an injection to the elbow within the past 6 months
Age (mean, SD)
Gr 1: 43.8, 9.8
Gr 2: 44.6, 9.8
Gr 3: 40.1, 8.3
Gr 4: 44.7, 8.7
Disease duration (months: mean, SD)
Gr 1: 4.3, 3.2
Gr 2: 2.1, 1.2
Gr 3: 5.2, 7.2
Gr 4: 5.4, 4.1

## Interventions
Deep transverse friction.
Anatomical area: elbow
Duration: 10 minutes, 3 x week, 9 treatment sessions.
Position of patient: for lesion at origin of the extensor carpi radialis longus or brevis tendon, elbow flexed at 90 degrees with forearm fully supinated; if lesion at or included tendon body or extensor carpi radialis brevis tendon: elbow flexed at 45 degrees with forearm pronated
Concurrent treatment for Gr 2 and Gr 4:
Gr 2: ultrasound and placebo ointment + massage
ultrasound: dosage varied from 1.3 w/cm2 continous outpout to 0.5 w/cm2 pulsed (1:4). Application technique: soundhead moved in slow concentric circles, while maintaining soundhead contact with the patient at the same time. 6 minutes.
Gr 4: phonophoresis + massage.
Phonophoresis: 10% hydrocortisone ointment used with ultrasound treatment
Outcomes

1. Pain:
   - pain-free function (8 pain-free item, 8 = better)
   - pain VAS (0-100 mm; 0 = worst)
2. Grip strength
   - ration index of pain-free grip-strength (grip strength: kg force. Ratio is pain-free grip divided by the maximum grip of uninvolved limb)
3. Function:
   - function VAS (0-100 mm; 0 = worst)
4. Functional status (success or failure to perform pain-free strengthening program for the wrist extensor muscles, with the elbow extended, without subsequent regression within 2 weeks of follow-up)

Notes

R: 2
B: 2
W: 0
Total: 4 / 5

Risk of bias

<table>
<thead>
<tr>
<th>Item</th>
<th>Authors' judgement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocation concealment?</td>
<td>Yes</td>
<td>A - Adequate</td>
</tr>
</tbody>
</table>

Characteristics of excluded studies  [ordered by study ID]

<table>
<thead>
<tr>
<th>Study</th>
<th>Reason for exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balke 1989</td>
<td>not tendinitis</td>
</tr>
<tr>
<td>Chiarello 1997</td>
<td>healthy subjects</td>
</tr>
<tr>
<td>Crosman 1984</td>
<td>healthy subjects</td>
</tr>
<tr>
<td>Feehan 1989</td>
<td>not tendinitis</td>
</tr>
<tr>
<td>Pellecchia 1994</td>
<td>combined modalities</td>
</tr>
<tr>
<td>Thomee 1997</td>
<td>not massage therapy</td>
</tr>
<tr>
<td>Zhang 1987</td>
<td>excluded due to study design</td>
</tr>
</tbody>
</table>
### DATA AND ANALYSES

**Comparison 1. Massage vs. Control - End of Treatment (2 weeks)**

<table>
<thead>
<tr>
<th>Outcome or subgroup title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Pain</td>
<td>1</td>
<td></td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>Subtotals only</td>
</tr>
<tr>
<td>1.1 Daily pain</td>
<td>1</td>
<td>17</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>0.4 [0.00, 0.80]</td>
</tr>
<tr>
<td>1.2 Pain while running</td>
<td>1</td>
<td>17</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>3.00 [-5.08, 11.08]</td>
</tr>
<tr>
<td>1.3 % of maximum pain when running</td>
<td>1</td>
<td>17</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>0.10 [-3.77, 3.97]</td>
</tr>
</tbody>
</table>

**Comparison 2. Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks)**

<table>
<thead>
<tr>
<th>Outcome or subgroup title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Pain (VAS 0-100, 0 = worst)</td>
<td>1</td>
<td>20</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>16.50 [-6.15, 39.15]</td>
</tr>
<tr>
<td>2 Grip strength (ratio index, higher is better)</td>
<td>1</td>
<td>20</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>0.10 [-0.16, 0.36]</td>
</tr>
<tr>
<td>3 Function (VAS 0-100, 0 = worst)</td>
<td>1</td>
<td>20</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-1.80 [-18.64, 15.04]</td>
</tr>
<tr>
<td>4 Function (pain-free function; average number of pain-free items; higher is better)</td>
<td>1</td>
<td>20</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>1.10 [-1.00, 3.20]</td>
</tr>
<tr>
<td>5 Functional status (number of successes to perform strengthening program)</td>
<td>1</td>
<td>20</td>
<td>Risk Ratio (M-H, Fixed, 95% CI)</td>
<td>3.27 [0.44, 24.34]</td>
</tr>
</tbody>
</table>

**Comparison 3. Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks)**

<table>
<thead>
<tr>
<th>Outcome or subgroup title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Pain (VAS 0-100, 0 = worst)</td>
<td>1</td>
<td>20</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>2.80 [-19.96, 25.56]</td>
</tr>
<tr>
<td>2 Grip strength (ratio index, higher is better)</td>
<td>1</td>
<td>20</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-0.20 [-0.46, 0.06]</td>
</tr>
<tr>
<td>3 Function (VAS 0-100, 0 = worst)</td>
<td>1</td>
<td>20</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>3.70 [-14.13, 21.53]</td>
</tr>
<tr>
<td>4 Function (pain-free function; average number of pain-free items; higher is better)</td>
<td>1</td>
<td>20</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>0.10 [-2.27, 2.47]</td>
</tr>
</tbody>
</table>
### Analysis 1.1. Comparison 1 Massage vs. Control - End of Treatment (2 weeks), Outcome 1 Pain.

Review: Deep transverse friction massage for treating tendinitis

Comparison: 1 Massage vs. Control - End of Treatment (2 weeks)

Outcome: 1 Pain

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment Mean (SD)</th>
<th>Control Mean (SD)</th>
<th>Mean Difference (M-H, Fixed, 95% CI)</th>
<th>Weight</th>
<th>Mean Difference (M-H, Fixed, 95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily pain</td>
<td>Schwellnus 1992</td>
<td>9 -0.6 (0.3)</td>
<td>8 -1 (0.5)</td>
<td>100.0%</td>
<td>0.40 [0.00, 0.80]</td>
</tr>
<tr>
<td></td>
<td>Subtotal (95% CI)</td>
<td>9 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test for overall effect: Z = 1.97 (P = 0.049)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain while running</td>
<td>Schwellnus 1992</td>
<td>9 -20 (9)</td>
<td>8 -23 (8)</td>
<td>100.0%</td>
<td>3.00 [-5.08, 11.08]</td>
</tr>
<tr>
<td></td>
<td>Subtotal (95% CI)</td>
<td>9 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test for overall effect: Z = 0.73 (P = 0.47)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3% of maximum pain when running</td>
<td>Schwellnus 1992</td>
<td>9 -8 (5)</td>
<td>8 -8.1 (3)</td>
<td>100.0%</td>
<td>0.10 [-3.77, 3.97]</td>
</tr>
<tr>
<td></td>
<td>Subtotal (95% CI)</td>
<td>9 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test for overall effect: Z = 0.05 (P = 0.96)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test for subgroup differences: Chi² = 0.42, df = 2 (P = 0.81), I² = 0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Analysis 2.1. Comparison 2 Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks), Outcome 1 Pain (VAS 0-100, 0 = worst).

Review: Deep transverse friction massage for treating tendinitis

Comparison: 2 Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks)

Outcome: 1 Pain (VAS 0-100, 0 = worst)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N Mean(SD)</td>
<td>N Mean(SD)</td>
<td>N/Fixed,95% CI</td>
<td>N/Fixed,95% CI</td>
<td></td>
</tr>
<tr>
<td>Stratford 1989</td>
<td>11 44.8 (33.4)</td>
<td>9 28.3 (17)</td>
<td>100.0 %</td>
<td>16.50 [-6.15, 39.15 ]</td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>11</td>
<td>9</td>
<td>100.0 %</td>
<td>16.50 [-6.15, 39.15 ]</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: not applicable

Test for overall effect: Z = 1.43 (P = 0.15)

Test for subgroup differences: Not applicable

Analysis 2.2. Comparison 2 Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks), Outcome 2 Grip strength (ratio index, higher is better).

Review: Deep transverse friction massage for treating tendinitis

Comparison: 2 Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks)

Outcome: 2 Grip strength (ratio index, higher is better)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N Mean(SD)</td>
<td>N Mean(SD)</td>
<td>N/Fixed,95% CI</td>
<td>N/Fixed,95% CI</td>
<td></td>
</tr>
<tr>
<td>Stratford 1989</td>
<td>11 0.7 (0.3)</td>
<td>9 0.6 (0.3)</td>
<td>100.0 %</td>
<td>0.10 [-0.16, 0.36 ]</td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>11</td>
<td>9</td>
<td>100.0 %</td>
<td>0.10 [-0.16, 0.36 ]</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: not applicable

Test for overall effect: Z = 0.74 (P = 0.46)

Test for subgroup differences: Not applicable
### Analysis 2.3. Comparison 2 Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks), Outcome 3 Function (VAS 0-100, 0 = worst).

Review: Deep transverse friction massage for treating tendinitis

Comparison: 2 Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks)

Outcome: 3 Function (VAS 0-100, 0 = worst)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N Mean(SD)</td>
<td>N Mean(SD)</td>
<td>(IV,Fixed,95% CI)</td>
<td></td>
<td>(IV,Fixed,95% CI)</td>
</tr>
<tr>
<td>Stratford 1989</td>
<td>11 76.3 (21.9)</td>
<td>9 78.1 (16.5)</td>
<td>-1.80 [ -18.64, 15.04 ]</td>
<td>100.0 %</td>
<td>-1.80 [ -18.64, 15.04 ]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>11 9</td>
<td>100.0 %</td>
<td>-1.80 [ -18.64, 15.04 ]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: not applicable
Test for overall effect: Z = 0.21 (P = 0.83)
Test for subgroup differences: Not applicable

---

### Analysis 2.4. Comparison 2 Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks), Outcome 4 Function (pain-free function; average number of pain-free items; higher is better).

Review: Deep transverse friction massage for treating tendinitis

Comparison: 2 Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks)

Outcome: 4 Function (pain-free function; average number of pain-free items; higher is better)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N Mean(SD)</td>
<td>N Mean(SD)</td>
<td>(IV,Fixed,95% CI)</td>
<td></td>
<td>(IV,Fixed,95% CI)</td>
</tr>
<tr>
<td>Stratford 1989</td>
<td>11 3.8 (2.7)</td>
<td>9 2.7 (2.1)</td>
<td>1.10 [ -1.00, 3.20 ]</td>
<td>100.0 %</td>
<td>1.10 [ -1.00, 3.20 ]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>11 9</td>
<td>100.0 %</td>
<td>1.10 [ -1.00, 3.20 ]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: not applicable
Test for overall effect: Z = 1.02 (P = 0.31)
Test for subgroup differences: Not applicable

---

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**Analysis 2.5.** Comparison 2 Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks), Outcome 5 Functional status (number of successes to perform strengthening program).

**Review:** Deep transverse friction massage for treating tendinitis

**Comparison:** 2 Massage + us and placebo ointment vs control (us + placebo ointment only) (Follow-up 2 weeks)

**Outcome:** 5 Functional status (number of successes to perform strengthening program)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Risk Ratio</th>
<th>Weight</th>
<th>Risk Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td>M-H,Fixed,95% CI</td>
<td></td>
<td>M-H,Fixed,95% CI</td>
</tr>
<tr>
<td>Stratford 1989</td>
<td>4/11</td>
<td>1/9</td>
<td>100.0 %</td>
<td>3.27 [ 0.44, 24.34 ]</td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>11</td>
<td>9</td>
<td>100.0 %</td>
<td>3.27 [ 0.44, 24.34 ]</td>
<td></td>
</tr>
</tbody>
</table>

Total events: 4 (Treatment), 1 (Control)

Heterogeneity: not applicable

Test for overall effect: Z = 1.16 (P = 0.25)

---

**Analysis 3.1.** Comparison 3 Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks), Outcome 1 Pain (VAS 0-100, 0 = worst).

**Review:** Deep transverse friction massage for treating tendinitis

**Comparison:** 3 Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks)

**Outcome:** 1 Pain (VAS 0-100, 0 = worst)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N Mean(SD)</td>
<td>N Mean(SD)</td>
<td>N/Fixed,95% CI</td>
<td></td>
<td>N/Fixed,95% CI</td>
</tr>
<tr>
<td>Stratford 1989</td>
<td>10 24.6 (20.6)</td>
<td>10 21.8 (30.4)</td>
<td>100.0 %</td>
<td>2.80 [-19.96, 25.56 ]</td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>10</td>
<td>10</td>
<td>100.0 %</td>
<td>2.80 [-19.96, 25.56 ]</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: not applicable

Test for overall effect: Z = 0.24 (P = 0.81)

Test for subgroup differences: Not applicable
Analysis 3.2. Comparison 3 Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks),
Outcome 2 Grip strength (ratio index, higher is better).

Review: Deep transverse friction massage for treating tendinitis

Comparison: 3 Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks)

Outcome: 2 Grip strength (ratio index, higher is better)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stratford 1989</td>
<td>10</td>
<td>10</td>
<td>-0.20 [ -0.46, 0.06 ]</td>
<td>100.0 %</td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>10</td>
<td>10</td>
<td>-0.20 [ -0.46, 0.06 ]</td>
<td>100.0 %</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: not applicable
Test for overall effect: Z = 1.49 (P = 0.14)
Test for subgroup differences: Not applicable

Analysis 3.3. Comparison 3 Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks),
Outcome 3 Function (VAS 0-100, 0 = worst).

Review: Deep transverse friction massage for treating tendinitis

Comparison: 3 Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks)

Outcome: 3 Function (VAS 0-100, 0 = worst)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stratford 1989</td>
<td>10</td>
<td>10</td>
<td>3.70 [ -14.13, 21.53 ]</td>
<td>100.0 %</td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>10</td>
<td>10</td>
<td>3.70 [ -14.13, 21.53 ]</td>
<td>100.0 %</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: not applicable
Test for overall effect: Z = 0.41 (P = 0.68)
Test for subgroup differences: Not applicable
Analysis 3.4. Comparison 3 Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks), Outcome 4 Function (pain-free function; average number of pain-free items; higher is better).

Review: Deep transverse friction massage for treating tendinitis

Comparison: 3 Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks)

Outcome: 4 Function (pain-free function; average number of pain-free items; higher is better)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean(SD)</td>
<td>N</td>
<td>Mean(SD)</td>
<td>IV,Fixed,95% CI</td>
</tr>
<tr>
<td>Stratford 1989</td>
<td>10</td>
<td>3.7 (2.8)</td>
<td>10</td>
<td>3.6 (2.6)</td>
<td>100.0 % [ -2.27, 2.47 ]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>10</td>
<td></td>
<td>10</td>
<td></td>
<td>100.0 % [ -2.27, 2.47 ]</td>
</tr>
</tbody>
</table>

Heterogeneity: not applicable
Test for overall effect: Z = 0.08 (P = 0.93)
Test for subgroup differences: Not applicable

Analysis 3.5. Comparison 3 Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks), Outcome 5 Functional status (number of successes to perform strengthening program).

Review: Deep transverse friction massage for treating tendinitis

Comparison: 3 Massage + phonophoresis vs control (phonophoresis only) (Follow-up 2 weeks)

Outcome: 5 Functional status (number of successes to perform strengthening program)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Risk Ratio</th>
<th>Weight</th>
<th>Risk Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td>M-H,Fixed,95% CI</td>
<td>100.0 %</td>
<td>M-H,Fixed,95% CI</td>
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<td>Stratford 1989</td>
<td>2/10</td>
<td>3/10</td>
<td>0.67 [ 0.14, 3.17 ]</td>
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<tr>
<td>Total (95% CI)</td>
<td>10</td>
<td>10</td>
<td>100.0 %</td>
<td>0.67 [ 0.14, 3.17 ]</td>
<td></td>
</tr>
</tbody>
</table>

Total events: 2 (Treatment), 3 (Control)
Heterogeneity: not applicable
Test for overall effect: Z = 0.51 (P = 0.61)
WHAT'S NEW

Last assessed as up-to-date: 18 August 2002.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Description</th>
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<tr>
<td>22 September 2008</td>
<td>Amended</td>
<td>Converted to new review format. C026-R</td>
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HISTORY

Review first published: Issue 1, 2002

CONTRIBUTIONS OF AUTHORS

LB, LC, SM was responsible for writing the manuscript, extracting and analyzing data and selecting trials of the initial review.

VR contributed data extraction, updated of the selection of the reference list, update of the analyses and update of the interpretation of results.

JM developed the search strategy.

BS, PT and GW contributed methodological expertise and commented on early drafts.

DECLARATIONS OF INTEREST

None known

SOURCES OF SUPPORT

Internal sources

- Institute for Population Health, University of Ottawa, Canada.
- Ottawa Health Research Institute, Canada.

External sources

- No sources of support supplied
INDEX TERMS

Medical Subject Headings (MeSH)
*Ultrasonic Therapy; Clinical Trials as Topic; Combined Modality Therapy; Cryotherapy; Rest; Tendinopathy [*therapy]

MeSH check words
Humans