

## A Systematic Review of the Effects of the Electrotherapy Alone And Therapeutic Exercises On Functional Range Of Motion For Patient With Idiopathic Frozen Shoulder

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### Abstract

**Background and Objective:** Idiopathic frozen shoulder, also known as adhesive capsulitis, is one of the most common causes of shoulder pain and disability. The prevalence of idiopathic frozen shoulder is 2 to 3% of the general population. Idiopathic frozen shoulder will start silently and has 3 phases; First phase is known as 'Painful Phase', the second phase is known as 'Freezing (Adhesive) Phase', Third phase named 'Throwing (Resolution) Phase'. There are a varieties of treatment options for idiopathic frozen shoulder both surgical and nonsurgical 8 such as low power laser therapy, (TENS), massage, stretching exercises, ultrasound, shortwave diathermy (SWD), Hot pack (HP). Therefore, the objective of this systematic review was to describe the effects of the electrotherapy alone and therapeutic exercises on functional range of motion for patient with idiopathic frozen shoulder.

**Method:** The literature search will be restricted to English language publications from 1990 through 2011. Several databases will be searched to find relevant studies, including Medline, Embase, CINHAL Centre for Reviews and Dissemination, OAIster, Physiotherapy Evidence Database (PEDro), and The Cochrane Database of Systematic Reviews. Papers were selected a participants consisted of Men and Women had symptoms of idiopathic frozen shoulder such as pain or disability. The therapists used electro therapy will compare to no treatment, placebo, or other therapy, such as Hot-Pack, Interferential Electrotherapy, and Low-Level Laser Therapy physical modalities.

**Result:** Search of databases with selected keywords revealed 9 articles on the use of Electrotherapy for the treatment of Idiopathic Frozen Shoulder. Two studies were descriptive clinical reports and the remaining seven articles met in all inclusion criteria and were included. We discussed all the studies on which there was agreement in determining Sackett's level of evidence, and consensus decision was achieved for all studies. Studies according to the PEDro scale: All the studies with scores ranging from 4 to 9 were classified. All studies will provide sufficient details to allow repetition of the intervention protocol.

**Conclusion:** The treatment average was from 4- 6 weeks in most on articles. We excluded seven articles two used electrotherapy alone, and five used electrotherapy with other modalities. The articles with electrotherapy alone have no significant or limited significant, and the other five articles with is electrotherapy with others has seen significantly improvement in ROM, relief pain and Quality of life, but in modified constant score was have limited improvement.

**Keyword:** acupuncture, adhesive capsulitis, hot-pack, interferential electrotherapy, low-level laser therapy.

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### I. Introduction

The objective of this systematic review was to describe the effects of the electrotherapy alone and therapeutic exercises on functional range of motion for patient with idiopathic frozen shoulder.

Idiopathic Frozen Shoulder also known as adhesive capsulitis, it is one of the most common causes of shoulder pain and disability<sup>1</sup>.

Idiopathic frozen shoulder usually affects patients aged 40 and 70, with female more commonly affected than male<sup>1</sup> in either or both shoulders. There are many causes of the idiopathic frozen shoulder such as idiopathic or due to some predisposing risk factors like; diabetes, physical inactivity, previous disorders of shoulder, cervical spondylitis, coronary artery diseases, pulmonary tuberculosis, chronic obstructive pulmonary disease (COPD), bronchial carcinoma, hyperthyroidism, hemiplegia, brain tumors, epilepsy and Parkinson disease.<sup>2-3</sup> But There is a higher incidence of idiopathic frozen shoulder among patients with diabetes (10-30%) compared with the general population.<sup>4</sup>

Idiopathic frozen shoulder will start silently and has 3 phases; First phase is known as 'Painful Phase' that represents with severe pain and restricted range of motion. This phase lasts about 2-9 months. The second phase is known as 'Freezing (Adhesive) Phase' that lasts about 3-9 months, in which there is fibrosis of tissue surrounding the shoulder with associated pain decreases and more reduction of range of motion. Third phase

named 'Throwing (Resolution) Phase' characterized by subsidence of pain and also the lost motions are resolved. This phase lasts about 12–18 months<sup>5</sup>.

A patient with this condition was to be distinguished from a patient with full passive motion who had motion less due to such other causes as weakness or paralysis. The wholemark-findingin-patient with idiopathic frozen shoulder was that active motion and passive were the same. Subjects have difficulty in dressing, performing personal hygiene<sup>12</sup>, and, performing activities that require overhead movement, reaching, and/or rotation<sup>11</sup>. The patients with FSS attempt to compensate the loss of shoulder active ROM by using other muscles and increasing scapular rotation to accomplish various activities. This places additional strain on the other muscle groups, leaving themoverloaded and tender<sup>13</sup>.

Impact Frozen Shoulder in activity of daily living: Decreased shoulder mobility has serious functional implications in the elderly as the shoulder is a very complex joint that is crucial to many activities of daily living. Adhesive capsulitis (AC) or idiopathic frozen shoulder (IFS) is a condition characterized by an insidious and progressive loss of active and passive mobility of glenohumeral joint, presumably due to capsular contracture<sup>34</sup>.

There are a varieties of treatment options for idiopathic frozen shoulder both surgical and nonsurgical<sup>8</sup>. Physical therapy have essential roles of management of idiopathic frozen shoulder. These include low power laser therapy, transcutaneous electrical nerve stimulation (TENS), massage, stretching exercises<sup>7</sup>, ultrasound<sup>9</sup>, shortwave diathermy (SWD)<sup>10</sup>, and hot pack (HP)<sup>9-10</sup>.

Evaluate the clinical effectiveness of strategies currently used in the NHS for the management of primary idiopathic frozen shoulder and identify the most appropriate intervention by stage of condition; identify any gaps in the evidence, undertake value of information analysis to assess the potential value of future research on interventions for idiopathic frozen shoulder and make specific recommendations for further research.

## **II. Materials And Methods**

### **Literature search**

The literature search was restricted to English language publications from 1990 through 2011. Several databases will search to find relevant studies, including Medline, Embase, CINHAL Centre for Reviews and Dissemination, OAIster, Physiotherapy Evidence Database (PEDro), and The Cochrane Database of Systematic Reviews. The following keywords will use to search the databases Acupuncture, Adhesive Capsulitis, Idiopathic Frozen Shoulder, Frozen Shoulder, Hot-Pack, Interferential Electrotherapy, Low-Level Laser Therapy, Pain, Range Of Motion, Shockwave Therapy, Shortwave Diathermy, Ultrasonic Therapy, and Ultrasound Therapy. A review of references will list in the articles will also perform, for additional articles that met our criteria.

### **Design:**

Randomized controlled and uncontrolled studies will include in this review because the design and results of well-planned uncontrolled studies can provide information about the clinical management of Adhesive Capsulitis<sup>14, 15</sup>.

### **Participants:**

Men and Women had symptoms of idiopathic frozen shoulder such as pain or disability.

### **Types of interventions**

The use of electro therapy will compare to no treatment, placebo, or other therapeutic modalities, such as Hot-Pack, Interferential Electrotherapy, Low-Level Laser Therapy, and physical modalities.

### **Types of outcome measures**

The volume and/or circumference of the unaffected limb had to serve as a control for the affected upper limb with adhesive capsulitis. The difference in the volume and/or circumference had to will be express as a percentage value.

### **Review criteria**

The studies will categorize according to Sackett's rules of evidence<sup>14</sup>. Sackett's five levels of evidence are as follows: (1) level I, large randomized controlled trial with a low false-positive or false-negative errors (high power); (2) level II, small randomized controlled trial with high false positive or false-negative errors; (3) level III, nonrandomized, concurrent cohort comparisons between contemporaneous subjects who will and will not receive the intervention; (4) level IV, nonrandomized, historical cohort comparisons between current subjects who will receive the intervention and former subjects who will not receive the intervention; and (5) level V, case series without controls. In studies with level V evidence, the clinical outcome of a group of subjects is will describe, but no control group or condition will include, and thus, no control of extraneous

variables is undertaken. As suggested by previously published critical reviews, Sackett's levels of evidence I through V can will be modify because in certain conditions a pure control group can pose potential ethical conflicts<sup>19, 20</sup>. Thus, studies where other treatments will compare with the electro therapy treatment were considered appropriate for inclusion in this review.

#### **Assessment of methodological quality**

The methodological quality of each trial will rate with the PEDro scale, based on the Delphi list<sup>21</sup>. The PEDro scale is based on 11 items which will includes specified eligibility criteria, random allocation, concealed allocation, baseline comparability, blinded subjects, blinded therapists, blinded assessors, adequate follow-up, intention-to-treat analysis, between-group comparisons, and point estimates and variability. The eligibility criterion will relate to external validity and will not use to calculate the PEDro score. The PEDro scale scores range from 1 to 10; higher PEDro scores indicated higher method quality. Because there were no published validated cutoff scores for the PEDro scale, the following criteria were used to rate method quality: PEDro score of less than 5 indicates low quality and PEDro score of 5 or higher indicates high quality. However, the reliability of the PEDro scale has been evaluated previously and showed good reliability (ICC0.68) among raters<sup>42</sup>. Three reviewers independently will screen the search results from selected articles for closer scrutiny. After that, two reviewers separately critically will assess and will score each of the articles and will present their findings to the entire group. In case of any disagreement, a third reviewer will intervene, and an agreement will achieve to reach consensus. When a trial will be already rate according to the PEDro scale and its score will confirm on the Physiotherapy Evidence Database, this score will use.

### **III. Results:**

#### **Literature search and level of evidence**

Search of databases with selected keywords revealed 9articles on the use of Electrotherapy for the treatment of Idiopathic Frozen Shoulder. Two studies were descriptive clinical reports and thus were excluded. The remaining seven articlesmet in all inclusion criteria and were included. Inter-rater agreement between three independent reviewers on the level of evidence was attained for all the seven studies (100 %). We discussed all the studies on which there was agreement in determining Sackett's level of evidence, and consensus decision was achieved for all studies. Based on Sackett'slevel of evidence, all the studies were classified as level II<sup>22-26</sup>. The characteristics and level of evidence of the included trials are summarized in Table 1.

#### **Methodological quality:**

Quality assessment of the included studies according to the PEDro scale is listed in Table 2. All the papers already had their methodological quality previously assessed using the PEDro scale<sup>27-33</sup>. Four papers scored less than 7 points<sup>27-29, 31</sup>, and three papers scored seven and more<sup>30, 32-33</sup>, indicating high and low quality of rigor, respectively. All the studies with scores ranging from 4 to 9 were classified as level II<sup>27-33</sup>. In these studies, the criteria satisfied were most often related to statistical issues, such as the "similarities of the groups at baseline are reported for all outcomes," "results of between-group comparisons are reported," and "study provides both point measures and measures of variability for at least 1 key outcome"<sup>27-33</sup>. Most of the trials used random allocation to assign participants into intervention groups<sup>27-33</sup>, and of these, two trials<sup>30, 31</sup> used concealed allocation. In five of the studies<sup>27-28, 30-31, 33</sup> the use of blinded outcome assessors was explicitly described. In one study<sup>32</sup> the therapists performing the assessment for idiopathic frozen shoulder were blinded to group assignment. In five of the seven studies<sup>27-28, 30-31, 33</sup> adequate follow-up was described (85.5–100 %). In two of the studies<sup>30, 32</sup> have reported intention-to-treat analysis. Within these seven studies, there were four different definitions for idiopathic frozen shoulder. In two of the studies<sup>27, 29</sup>, Subject had to have a common cause of shoulder pain affecting 2–5% of the general population. Shoulder pain and stiffness are accompanied by severe disability often resulting in absenteeism from work, inability to perform leisure activities and utilization of health care resources. In three studies, is an idiopathic and progressive disease, which is identified by pain and decreased range of motion (ROM) of the shoulder and shoulder joint capsule fibrosis<sup>28,29,33</sup>.In the remaining study<sup>31</sup> Primary adhesive capsulitis and frozen shoulder are current terms used to describe an insidious onset of painful stiffness of the glenohumeral joint. Secondary adhesive capsulitis, on the other hand, is associated with a known predisposing condition of the shoulder (e.g., humerus fracture, shoulder dislocation, avascular necrosis, osteoarthritis, or stroke).

All studies will provide sufficient details to allow repetition of the intervention protocol. However, a variety in the parameters will use to make comparisons between studies will bedifficult. The intervention was used for frozen shoulder wasnot similar in each studies which are in the study<sup>27</sup>Electroacupuncture group. All the subjects in this group will receive EA treatment for 10 sessions over a 4-week period (2–3 times a week) and Interferential electrotherapy group. The subjects in this group will receive IFE treatment for 10 sessions over 4 weeks, in this study<sup>28</sup>. The subjects in the Short Wave Diathermy and Hot Packs groups will receive the

treatments 3 times per week for 4 weeks. Each treatment session will last for 20 min, in another study<sup>29</sup>. Both groups will treat with Transcutaneous Electrical Nerve Stimulation, Cold Packs, and nonsteroidal anti-inflammatory drugs; and will give glenohumeral ROM exercises. The scapulothoracic exercises will be performed only by the second group for 12 weeks. In one of the study<sup>30</sup> participants will be randomly assigned to either manual therapy and directed exercise or placebo (sham ultrasound), Twice weekly for 2 weeks then once weekly for 4 weeks. In the last three studies<sup>31, 32, 33</sup>, the intervention will be 6 therapy sessions consisting of application of therapeutic ultrasound, joint mobilization, and upper-body ergometer exercise and sessions will be 15.4 days for Anterior Mobilization group and for the Posterior Mobilization group will be 21.6 days<sup>31</sup>. The study<sup>32</sup> True or sham Ultrasound three times a week for four weeks and all other aspects of treatment remained constant (ROM exercises and NSAIDs or ROM exercises) in every six months for the duration of the study (3 years). The last study<sup>33</sup> Intervention group will receive extracorporeal shockwave therapy (ESWT) once a week for 4 weeks and the control group will receive sham Shockwave therapy once a week for 4 weeks. In the studies discussed, treatment frequency will be at three times per week for several weeks at a time (interspersed with a block of no treatment), with up to 10 sessions over 4 weeks<sup>27-28, 32</sup>. Of the seven studies reviewed, there will be three methods will use to measure a different studies which are: (1) Visual analogue scale (VAS)<sup>27-29</sup>, (2) goniometer<sup>29, 33</sup>, (3) The Shoulder Pain and Disability Index (SPADI)<sup>31, 33</sup>. However, the number and location of sites at which measurements were taken vary greatly from study to study<sup>27-33</sup>.

**Table 1-** Level of evidence and characteristics of the reviewed studies

Title	Authors	Study design \ level of evidence	Participation	Intervention	Duration \ follow-up	Outcome measure	Results
Effectiveness of Electroacupuncture and Interferential Electrotherapy In the Management of Frozen Shoulder (2008)	Gladys L. Y. Cheing, PhD, Eric M. L. So, MSc and Clare Y. L. Chao, MSc.	A double-blinded, randomized, controlled trial.	70 subjects (22 men, 48 women) with idiopathic frozen shoulder. The subjects were randomly allocated into: (1) the EA group (n = 24); (2) IFE group (n = 23); or (3) control group (n = 23).	All the subjects in this group received EA treatment for 10 sessions over a 4-week period (2-3 times a week), the subjects in this group received IFE treatment for 10 sessions over 4 weeks, the subjects were recruited from a waiting list.	4 weeks.	Constant Murley Assessment (CMA) score, Visual analogue scale (VAS).	Demographic data were compared and no significant difference was found between groups.
Effects of Deep and Superficial Heating In the Management of Frozen Shoulder (2008)	May S. F. Leung, MSc and Gladys L. Y. Cheing, PhD	A single-blinded, randomized controlled study.	30 subjects (9 men and 21 women), allocated into one of the following 3 groups: (i) SWD plus stretching (n = 10); (ii) HP plus stretching (n = 10); or (iii) stretching exercises alone (n = 10).	The subjects in the SWD and HP groups received the treatments 3 times per week for 4 weeks. Each treatment session lasted for 20 min.	4 weeks.	The American Shoulder and Elbow Surgeons (ASES), visual analogue scale (VAS), activities of daily living (ADL).	A significant improvement was seen in all groups except in group of shoulder flexion range. Improvement in the shoulder score index and in the ROM was significantly better in the groups DH than SH.

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Comparison of the Outcomes of Two Different Exercise Programs on Frozen Shoulder (2010)	DeryaCelik.	Randomized controlled study.	29 subjects (22 female and 7 male patients), 2 groups (14 in the first group and 15 in the second group).	Both groups were treated with TENS, CP, and NSAID; and were given glenohumeral ROM exercises. Only the second group performed the scapulothoracic exercises.	12 weeks.	Modified Constant score, visual analog scale (VAS), and goniometer.	The modified Constant score was not significantly different between the groups before and after treatment. VAS score was better in the second group at 6 w. Improvement in ROM was significantly better in the second group at 12 w.
Efficacy and Cost-Effectiveness of Physiotherapy Following Glenohumeral Joint Distension for Adhesive Capsulitis: A Randomized Trial (2007)	Rachelle Buchbinder, Joanne M. Youd, Sally Green, Alicia Stein, Andrew Forbes, Anthony Harris, Kim Bennell, Simon Bell, And Warwick J. L. Wright.	Randomized, controlled trial.	A total of 156 participants, and 144 completed the study.	participants were randomly assigned to either manual therapy and directed exercise or placebo (sham ultrasound), Twice weekly for 2 weeks then once weekly for 4 weeks	6 months.	(JMY), The Shoulder Pain and Disability Index (SPADI), gravity inclinometer (in degrees), the distance (in cm), the Short Form 36 Health Survey (SF-36),	Both groups improved over time with no significant differences in improvement between groups for pain, function, or quality of life at any time point. Significant differences favored the physiotherapy group for all active shoulder movements
The Effect of Anterior Versus Posterior Glide Joint Mobilization on External Rotation Range of Motion in Patients With Shoulder Adhesive Capsulitis (2007)	Andrea J. Johnson, DPTSc• Joseph J. Godges, DPT• Grenith J. Zimmerman, PhD• Leroy L. Ounanian, MD	Randomized clinical trial.	58 consecutive patients, with a primary diagnosis of shoulder adhesive capsulitis and exhibiting a specific external rotation ROM deficit were randomly assigned to 1 of 2 treatment groups	6 therapy sessions consisting of application of therapeutic ultrasound, joint mobilization, and upper-body ergometer exercise.	AM group was 15.4 days and for the PM group was 21.6 days.	Functional Questionnaire Scores, External Rotation ROM, Pain Scores	No significant difference in shoulder external rotation ROM between groups prior to initiating the treatment program. A significant difference was present by the third treatment
Ultrasound Therapy of Subacromial Bursitis A Double Blind Trial (2014)	DEBORAH SWAN DOWNING and ARTHUR WEINSTEIN	randomized double blind trial	Twenty patients (9, sham US; 11, true US)	True or sham US three times a week for four weeks. All other aspects of treatment remained constant (ROM exercises and NSAIDs or ROM exercises)	3 years.	Erythrocyte sedimentation rate (ESR) test, Descriptive Pain Scale, Student's <i>t</i> test, sign test.	No significant difference was found between the sham or true US groups.

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Efficacy of Extracorporeal Shockwave Therapy in Frozen Shoulder (2014)	Babak Vahdatpour, Parisa Taheri, Abolghasem Zare Zade, and Saeed Moradian	randomized clinical trial	A total of 36 patients were enrolled in the study. Eligible patients were allocated into two groups	Intervention group received extra corporeal shockwave therapy (ESWT) once a week for 4 weeks. The control group received sham Shockwave therapy once a week for 4 weeks.	4 weeks.	The Shoulder Pain and Disability Index (SPADI), goniometer,	Improvement was more satisfactory in the intervention group, but the mean internal rotation did not differ significantly in two groups
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**Table 2** Quality assessment of the included studies according to the PEDro scale

Authors	Title	Eligibility criteria	Random allocation	Concealed allocation to groups	Baseline comparability	Blinded subjects	Blinded therapists	Blinded assessors	Adequate follow-up	Intention-to-treat analysis	Between-group analysis	Point estimates of variability	Total score
Gladys L. Y. Cheing, PhD, Eric M. L. So, MSc and Clare Y. L. Chao, MSc.	Effectiveness of Electroacupuncture and Interferential Electrotherapy In the Management of Frozen Shoulder (2008)	No	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	6
May S. F. Leung, MScand Gladys L. Y. Cheing, PhD	Effects of Deep and Superficial Heating In the Management of Frozen Shoulder (2008)	No	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	6
DeryaCelik.	Comparison of the Outcomes of Two Different Exercise Programs on Frozen Shoulder (2010)	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4
Rachelle Buchbinder, Joanne M. Youd, Sally Green, Alicia Stein, Andrew Forbes, Anthony Harris, Kim Bennell, Simon Bell, And Warwick J. L. Wright.	Efficacy and Cost-Effectiveness of Physiotherapy Following Glenohumeral Joint Distension for Adhesive Capsulitis: A Randomized Trial (2007)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	9
Andrea J. Johnson, DPTSc• Joseph J. Godges, DPT• Grenith J. Zimmerman, PhD• Leroy L. Ounanian, MD	The Effect of Anterior Versus Posterior Glide Joint Mobilization on External Rotation	Yes	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	6

	Range of Motion in Patients With Shoulder Adhesive Capsulitis (2007)												
DEBORAH SWAN DOWNING and ARTHUR WEINSTEIN	Ultrasound Therapy of Subacromial Bursitis. A Double Blind Trial (2014)	No	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	7
Babak Vahdatpour, Parisa Taheri, Abolghasem Zare Zade, and Saeed Moradian	Efficacy of Extracorporeal Shockwave Therapy in Frozen Shoulder (2014)	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	7

#### IV. Discussion

One of the members of our research group he thinks an evaluating clinical effectiveness of strategy which used in NHS is benefit in management of primary idiopathic frozen shoulder in intervention of each stages of condition, and other researcher thinking to allow repetition of the intervention protocol. However, a variety in the parameters will use to make comparisons between studies will be difficult. The intervention was used for idiopathic frozen shoulder was not similar in each studies which are in study to get the best result in the treatment of idiopathic frozen shoulder, the third researcher has a different idea for the best intervention in idiopathic frozen shoulder which is a better evidence according to the PEDro scale and sackett level to differentiate between the poor and power study and choose the best of all the studies. This finding demonstrated that the addition of electrotherapy to other modalities better than using electrotherapy alone which we seen in improvement in the functional activity especially in decrease pain, increase ROM actively and Quality of life will be higher in idiopathic frozenshoulder patient because the activity of daily living revealed almost more independent so we recommendis the best improvement quicker relief the symptoms of the idiopathic frozen shoulder. While we search for the articles we didn't find enough studiess that was done for the same topic.

#### V. Conclusion

The treatment average was from 4- 6 weeks in most of the articles. We excluded seven articles; two used electrotherapy alone, and five used electrotherapy with other modalities. The articles with electrotherapy alone have no significant or limited significant improvement, and the other five articles witch is electrotherapy with others has seen significantly improvement in ROM, relief pain, and Quality of life, but in modified constant score was have limited improvement.

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