

Effects of Electroacupuncture on Pain, Shoulder Function, and Quality of Life in Subjects with Frozen Shoulder: A Pre–Post Interventional Study

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Abstract

Background: Frozen shoulder (adhesive capsulitis) is a painful, progressive restriction of active and passive shoulder motion. Electroacupuncture combines classical acupuncture with low-frequency electrical stimulation and is used to relieve pain, reduce muscle spasm, and improve joint mobility.

Objectives: To evaluate the effect of electroacupuncture on pain intensity, shoulder function, and quality of life in subjects with frozen shoulder.

Materials and Methods: A single-group pre–post interventional study was conducted on 10 participants (8 female, 2 male) with clinically diagnosed frozen shoulder at GNCYMC&H, Mysore. Electroacupuncture (25–30 min daily for 10 days) was administered at selected local and distal points. Outcomes were Visual Analogue Scale (VAS) for pain, a pain assessment scale, Constant–Murley score, and a quality-of-life (QOL) questionnaire. Data were analysed using Wilcoxon signed-rank and paired t-tests; effect sizes were expressed as Cohen's d.

Results: All outcomes improved highly significantly. VAS decreased from 7.82 ± 0.82 to 3.35 ± 0.78 ($\Delta -4.47$, $p = 0.002$, $d = -4.16$). Pain assessment scale decreased from 0.62 ± 0.11 to 0.27 ± 0.08 ($\Delta -0.34$, $p = 0.002$, $d = -3.02$). Constant–Murley score increased from 32.00 ± 5.64 to 67.80 ± 9.13 ($\Delta +35.80$, $p = 0.002$, $d = 4.52$). QOL score decreased from 70.20 ± 6.89 to 46.80 ± 8.83 ($\Delta -23.40$, $p = 0.002$, $d = -3.32$), interpreted as improvement with the instrument used. Every participant improved on every measure.

Conclusion: Electroacupuncture produced large, statistically significant reductions in pain and substantial gains in shoulder function and quality of life over 10 days in subjects with frozen shoulder. Larger controlled trials are warranted.

Keywords: *Frozen shoulder; adhesive capsulitis; electroacupuncture; Visual Analogue Scale; Constant–Murley score; pain; naturopathy*

1. Introduction

Frozen shoulder (adhesive capsulitis) is characterised by progressive pain and global restriction of both active and passive shoulder motion due to capsular inflammation, fibrosis, and contracture [1,8,9]. It affects approximately 2–5% of the general adult population, with higher prevalence in diabetes, and is most common between 40 and 60 years of age [1,2,10]. The condition typically evolves through freezing, frozen, and thawing phases and may leave residual functional limitation [3,4].

Conventional management includes analgesics, intra-articular corticosteroids, physiotherapy, and, in refractory cases, manipulation or surgery [31,32]. Naturopathic approaches utilise hydrotherapy, mud therapy, massage, yoga, and acupuncture. Electroacupuncture combines classical needling with low-frequency electrical stimulation and is proposed to promote endogenous opioid release, reduce protective muscle spasm, improve local circulation, and facilitate restoration of mobility [7,39–43]. The present study evaluated a 10-day electroacupuncture protocol on pain, shoulder function, and quality of life in frozen shoulder.

2. Aims and Objectives

Primary objective: To evaluate the effect of electroacupuncture in modulating pain among subjects with frozen shoulder.

Secondary objectives:

1. To assess changes in shoulder function using the Constant–Murley score.
2. To assess changes in quality of life.

3. Review of Literature

Pathogenesis involves synovial inflammation, fibroblast activation, excess type I and III collagen deposition, and contracture of the coracohumeral ligament and rotator interval, reducing joint volume [8,17–20]. Clinical features include night pain, progressive stiffness (especially external rotation), and functional disability [9,14–16]. Electroacupuncture is reported to relieve musculoskeletal pain through segmental and descending inhibitory mechanisms, reduce peri-articular spasm, and improve local blood flow [7,39–43]. Evidence specific to frozen shoulder supports its potential as an adjunctive modality.

4. Materials and Methods

4.1 Study Design and Setting

A single-group pre–post interventional study was conducted at the Outpatient Department of Government Nature Cure and Yoga Medical College & Hospital (GNCYMC&H), Mysore.

4.2 Participants

Ten participants (8 female, 2 male) with clinically diagnosed frozen shoulder were enrolled. All completed the protocol.

Inclusion criteria:

- Clinical diagnosis of frozen shoulder
- Willingness to provide written informed consent

Exclusion criteria:

- Pregnancy, severe bleeding disorder, metal allergy
- Cardiac pacemaker or ICD, active malignancy

4.3 Ethical Considerations

Written informed consent was obtained. Participation was voluntary and confidentiality was maintained.

4.4 Intervention

Electroacupuncture was administered daily for 10 days (session duration 25–30 minutes) at selected local and distal acupuncture points commonly used for shoulder pain and dysfunction (including LI15, TW14, SI9–11, GB21, UB11, and Ashi points), with low-frequency electrical stimulation applied through the needles under supervision.

4.5 Outcome Measures

Visual Analogue Scale (VAS) for pain intensity (0–10; lower = less pain).

Pain assessment scale (lower = less pain).

Constant–Murley score (higher = better shoulder function).

Quality of Life (QOL) questionnaire (in this instrument, lower post scores were interpreted as improved quality of life consistent with pain reduction).

4.6 Statistical Analysis

Descriptive statistics were calculated. Normality of difference scores was assessed by Shapiro–Wilk test. Wilcoxon signed-rank (primary) and paired t-tests were reported. Effect size was Cohen's d (paired). Significance was set at two-tailed $\alpha = 0.05$.

5. Results

All 10 participants completed the intervention (8 female, 2 male).

5.1 Primary Outcomes

Table 1 presents descriptive statistics and Table 2 summarises change scores and inferential results.

Outcome	Time	Mean	SD	Median	Min	Max
VAS (0–10)	Pre	7.82	0.82	8.00	6.7	9.0
	Post	3.35	0.78	3.25	2.0	4.5
Pain Assessment Scale	Pre	0.62	0.11	0.56	0.47	0.79
	Post	0.27	0.08	0.28	0.07	0.38
Constant–Murley	Pre	32.00	5.64	32.0	24	40
	Post	67.80	9.13	67.0	52	84
QOL Score	Pre	70.20	6.89	71.0	54	78
	Post	46.80	8.83	49.0	31	59

Table 1. Descriptive statistics ($n = 10$)

Outcome	Mean Δ	SD Δ	Wilcoxon p	t-test p	Cohen's d	Improved
VAS	−4.47	1.07	0.002	<0.0001	−4.16	10/10
Pain Assessment	−0.34	0.11	0.002	<0.0001	−3.02	10/10
Constant–Murley	+35.80	7.91	0.002	<0.0001	4.52	10/10
QOL Score	−23.40	7.06	0.002	<0.0001	−3.32	10/10

Table 2. Change scores and inferential statistics ($n = 10$). All participants improved on every measure.

5.2 Graphical Representation of Results

Figure 1 presents grouped mean $\pm$ SD comparisons. Figure 2 shows individual outcome panels.

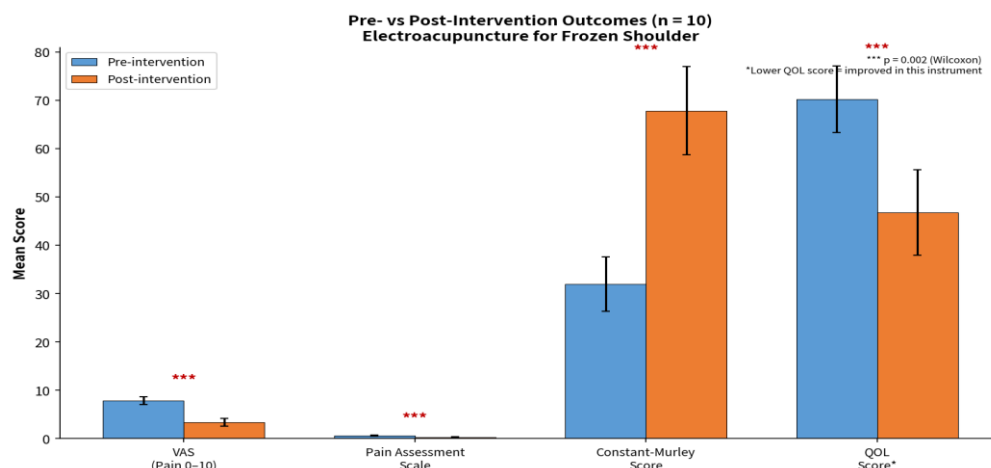


Figure 1. Mean pre- and post-intervention scores ($\pm$ SD). *** $p = 0.002$.

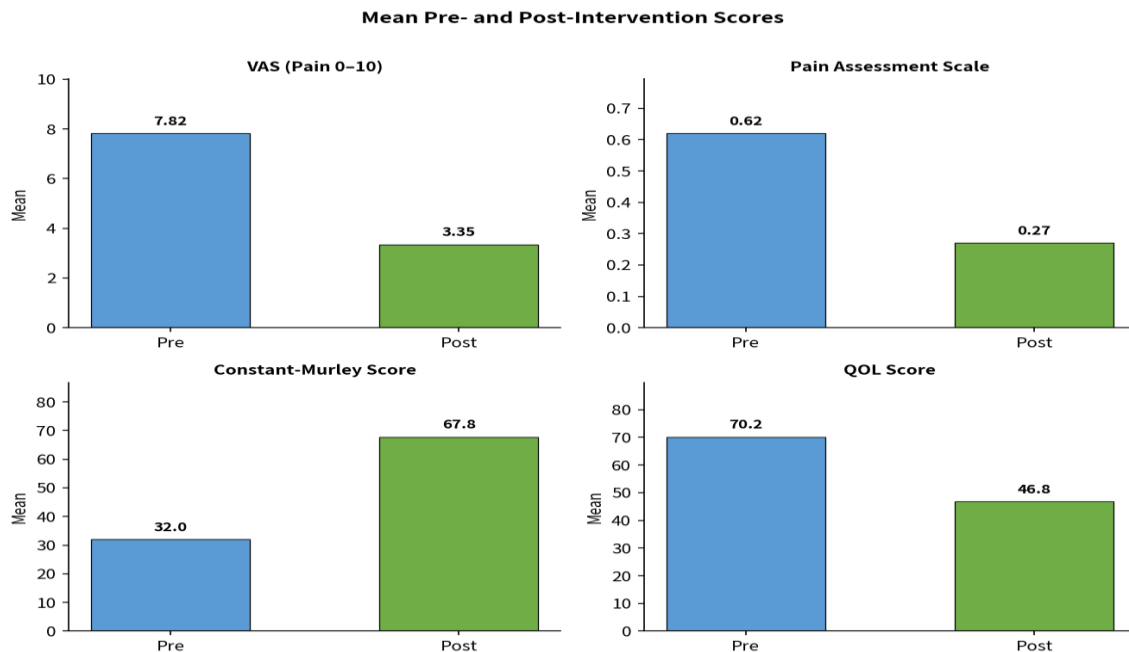


Figure 2. Mean pre- and post-intervention scores for each outcome measure.

6. Discussion

In this single-group pre–post study, a 10-day course of electroacupuncture produced highly significant and clinically large reductions in pain (VAS and pain assessment scale) and substantial improvements in shoulder function (Constant–Murley score) and quality of life. Effect sizes were extremely large ($|d|$ 3.02–4.52), and every participant improved on every measure.

These findings are consistent with the proposed mechanisms of electroacupuncture—endogenous opioid release, reduction of protective muscle spasm, improved local circulation, and facilitation of capsular mobility [7,39–43]—and with prior reports of acupuncture-based interventions in adhesive capsulitis.

Limitations include the small sample size ($n = 10$), absence of a control or sham group, short duration, single-centre design, and lack of long-term follow-up. The scoring direction of the QOL instrument should be confirmed against the original validation; the observed decrease was interpreted as improvement in line with concurrent pain and function changes. Larger randomised controlled trials with objective range-of-motion measures and longer follow-up are required.

Nevertheless, the consistency of response, magnitude of effect, and safety profile support further evaluation of electroacupuncture as a non-pharmacological option for pain and functional limitation in frozen shoulder.

7. Conclusion

Within the limitations of this single-group pre–post study, electroacupuncture significantly reduced pain and substantially improved shoulder function and quality of life in subjects with frozen shoulder over a 10-day period. The intervention was safe and well tolerated. These preliminary findings support its potential as a naturopathic adjunct and warrant confirmation in larger controlled trials.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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