

EFFECTIVENESS OF STRETCHING MOBILIZATION WITH OR WITHOUT SHORT-WAVE DIATHERMY IN FROZEN SHOULDER AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS: A COMPARATIVE STUDY

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ABSTRACT

Background: Frozen shoulder (adhesive capsulitis) is characterized by shoulder pain and progressive restriction of active and passive range of motion. Type 2 diabetes mellitus is a recognized associated condition and may complicate shoulder rehabilitation.

Objective: To compare changes in pain and shoulder range of motion following physiotherapy interventions in patients with frozen shoulder associated with type 2 diabetes mellitus.

Methods: This comparative study included 28 participants with type 2 diabetes mellitus and frozen shoulder, divided into Group A (n=14) and Group B (n=14). The project report describes Group A as receiving stretching and mobilization and Group B as receiving stretching, mobilization, and short-wave diathermy. Outcomes were assessed before and after intervention using the Visual Analogue Scale (VAS) and universal goniometer for shoulder external rotation, abduction, and flexion. The report describes a 3–4-week intervention period,

with three sessions per week; the study duration was reported as six months. Within-group tests and between-group tests were selected according to data distribution.

Results: VAS decreased from 7.07 ± 0.83 to 2.86 ± 0.66 in Group A and from 7.36 ± 0.93 to 3.07 ± 0.73 in Group B (reported within-group $p=0.001$ for both). External rotation increased from $21.36^\circ \pm 2.53^\circ$ to $43.21^\circ \pm 4.93^\circ$ in Group A and from $22.86^\circ \pm 5.08^\circ$ to 47.64°

$\pm 6.32^\circ$ in Group B (reported $p=0.001$ for both). The report also describes significant pre–post improvements in abduction and flexion in both groups. Between-group differences were reported for post-treatment abduction ($p=0.040$) and flexion ($p=0.043$), favouring Group A; differences in VAS and external rotation were not statistically significant.

Conclusion: Both treatment groups showed improvement in pain and shoulder mobility over the intervention period. The available report does not establish a clear between-group advantage for pain or external rotation. Findings for abduction and flexion favoured Group A, but interpretation should remain cautious because of the small sample and inconsistencies in the source report.

Keywords: Adhesive capsulitis; frozen shoulder; type 2 diabetes mellitus; stretching; joint mobilization; short-wave diathermy; physiotherapy.

INTRODUCTION

Frozen shoulder, also termed adhesive capsulitis, is a painful condition associated with progressive restriction of shoulder movement, affecting daily activities and functional independence. Both active and passive glenohumeral movements may be limited. The condition is commonly described in middle-aged and older adults, and diabetes mellitus is an important associated risk factor.

In people with type 2 diabetes mellitus, metabolic changes may contribute to connective-tissue alterations and capsular stiffness. Pain and reduced shoulder mobility can interfere with dressing, grooming, reaching overhead, and other activities of daily living. Physiotherapy commonly aims to reduce pain, restore mobility, and improve functional use of the upper limb. Stretching and joint mobilization are used to address soft-tissue and capsular restrictions. Short-wave diathermy is a thermal modality that may be used as an adjunct in selected patients. However, the comparative contribution of adding short-wave diathermy to stretching and mobilization should be evaluated using clearly defined groups and standardized outcomes. This study compared pre- and post-intervention pain and shoulder range of motion in patients with frozen shoulder associated with type 2 diabetes mellitus.

AIM AND OBJECTIVES

Aim: To compare the effects of stretching and mobilization with stretching, mobilization, and short-wave diathermy on pain and shoulder range of motion in patients with frozen shoulder associated with type 2 diabetes mellitus.

- To assess pain before and after intervention using the Visual Analogue Scale.
- To measure shoulder external rotation, abduction, and flexion using a universal goniometer before and after intervention.
- To compare pre–post changes within each group and outcomes between groups.

MATERIALS AND METHODS

Study design and setting

A comparative study was conducted at Wanless Hospital, Miraj Medical Centre's College of Physiotherapy, Miraj, Maharashtra, India. The project report states a total study duration of six months.

Participants and sampling

Twenty-eight participants were included using convenient sampling, with 14 participants in each group. The reported inclusion criteria were a clinical diagnosis of frozen shoulder, type 2 diabetes mellitus, age 40–65 years, either sex, and shoulder pain with movement restriction for more than three months. Exclusion criteria were recent shoulder fracture or surgery, rheumatoid arthritis or a neurological disorder affecting the shoulder, severe cardiac condition or contraindication to diathermy, and steroid injection during the preceding three months.

Interventions

Group A: stretching and shoulder mobilization.

Group B: stretching and shoulder mobilization combined with short-wave diathermy.

The project protocol describes short-wave diathermy for 15–20 minutes in a comfortable sitting or supine position, three sessions per week. Mobilization was described as including grades I–V, end-range mobilization, and scapular mobilization within the participant's tolerance. Passive and active-assisted stretching was described for shoulder flexion, abduction, internal rotation, and external rotation, with each stretch held for 15–30 seconds and repeated 3–5 times. A home exercise programme was advised. The report gives the intervention period as approximately 3–4 weeks (12 sessions in the abstract). The exact device settings, electrode arrangement, and detailed progression were not reported in the material reviewed.

Outcome measures

- Pain intensity: Visual Analogue Scale (VAS).
- Shoulder range of motion: universal goniometer for external rotation, abduction, and flexion.

Although SPADI is listed as a planned outcome measure in the project report, numerical SPADI results were not provided in the results tables or master chart available for this manuscript; therefore, SPADI findings are not reported.

Procedure and ethics

The project report indicates institutional ethics committee clearance, screening against eligibility criteria, explanation of the study, and written informed consent. Baseline outcomes were recorded before treatment and reassessed after the intervention. Before submission, the authors should insert the ethics committee name, approval number, and approval date exactly as recorded in the approval letter.

Statistical analysis

The project report states that analyses were performed using PSPP. Normality was assessed with the Shapiro–Wilk test. Paired-sample Wilcoxon tests were reported for VAS and external rotation; paired-sample t tests were described for normally distributed variables. Between-group analyses were described as independent-samples t tests or Mann–Whitney tests according to distribution. A p value <0.05 was considered statistically significant. The final manuscript should verify that each reported test matches the distribution and the actual dataset, and should provide exact test statistics and confidence intervals where available.

RESULTS

A total of 28 participants were included, with 14 in each group. Participants were aged 47–64 years according to the age distribution table. Mean age was 55.43 ± 4.73 years in Group A and 56.64 ± 4.41 years in Group B; the between-group difference was not statistically significant ($p=0.489$). The discussion section of the project report records 17 women and 11 men; the gender-frequency table elsewhere in the report contains an inconsistent total and should be corrected before submission.

Table 1. Pain intensity (VAS) before and after intervention

Group	Pre-intervention, mean $\pm$ SD	Post-intervention, mean $\pm$ SD	Reported within-group p
Group A (n=14)	7.07 $\pm$ 0.83	2.86 $\pm$ 0.66	0.001
Group B (n=14)	7.36 $\pm$ 0.93	3.07 $\pm$ 0.73	0.001

VAS decreased by a reported mean of 4.21 points in Group A and 4.29 points in Group B. The project report states that the between-group comparison was not significant at baseline ($p=0.408$) or after intervention ($p=0.417$).

Table 2. Shoulder external rotation before and after intervention

Group	Pre-intervention, mean $\pm$ SD	Post-intervention, mean $\pm$ SD	Reported within-group p
Group A (n=14)	21.36° $\pm$ 2.53°	43.21° $\pm$ 4.93°	0.001
Group B (n=14)	22.86° $\pm$ 5.08°	47.64° $\pm$ 6.32°	0.001

External rotation increased in both groups. The report gives mean improvements of 21.86° in Group A and 24.79° in Group B. Between-group comparisons were reported as non-significant at baseline ($p=0.221$) and post-intervention ($p=0.076$).

Table 3. Shoulder abduction and flexion

Outcome	Group A pre $\rightarrow$ post	Group B pre $\rightarrow$ post	Within-group p	Between-group post p
Abduction	73.93° $\pm$ 6.26° $\rightarrow$ 126.07° $\pm$ 6.26°	74.29° $\pm$ 10.45° $\rightarrow$ 119.00° $\pm$ 10.52°	0.001 in both groups	0.040
Flexion	91.07° $\pm$ 6.26° $\rightarrow$ 141.07° $\pm$ 6.84°	89.29° $\pm$ 10.45° $\rightarrow$ 133.93° $\pm$ 10.50°	0.001 in both groups	0.043

The project report indicates improvements in abduction and flexion in both groups. Post-intervention values were higher in Group A than Group B, with reported between-group p values of 0.040 for abduction and 0.043 for flexion.

DISCUSSION

The findings reported in this study indicate that both groups improved in pain and shoulder mobility after the treatment period. Mean VAS scores decreased substantially in both groups, and external rotation, abduction, and flexion increased. These within-group changes suggest that the physiotherapy programmes used in both groups were associated with short-term improvement in this sample. The between-group analysis reported no statistically significant difference in VAS or external rotation. Thus, the available results do not show that adding short-wave diathermy produced a clear additional benefit for these outcomes. Although the report describes higher post-intervention abduction and flexion in Group A, the group labels and intervention contrast must be checked against the original

protocol before interpreting this finding. If Group A received stretching and mobilization alone and Group B received the same treatment plus short-wave diathermy, the reported post-treatment means favour the group without diathermy for abduction and flexion; this should not be interpreted as evidence of harm or inferiority without verifying allocation, treatment fidelity, and the statistical analysis.

The results should be interpreted cautiously because the sample was small, convenient sampling was used, and follow-up beyond the immediate post-intervention assessment was not reported. Although SPADI was listed as an outcome, no numerical SPADI data were supplied, so functional disability cannot be evaluated from the presented results. The source document also contains inconsistencies in participant demographics and descriptions of assessment procedures that require correction before publication.

CONCLUSION

In this comparative study of 28 patients with frozen shoulder associated with type 2 diabetes mellitus, both groups showed reported pre-post reductions in pain and improvements in shoulder external rotation, abduction, and flexion. Between-group differences were not statistically significant for VAS or external rotation, while post-intervention abduction and flexion were reported to differ significantly, with higher means in Group A. Because of the small sample and inconsistencies in the project report, these findings should be considered preliminary. Larger studies with clearly documented group allocation, standardized treatment parameters, complete functional outcome data, and longer follow-up are needed.

LIMITATIONS

- Small sample size (28 participants) and convenient sampling limit generalizability.
- The report does not provide long-term follow-up.
- Numerical SPADI results are unavailable, so functional disability cannot be assessed in this manuscript.
- Diabetes-related variables, including duration of diabetes and glycaemic control, are not reported in the results.
- The project report contains inconsistencies in gender totals, intervention descriptions, and some methodological wording; these must be reconciled against source records.

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