

Research Article

Effect of friction massage and post facilitation stretch in relieving symptoms related to upper cross syndrome: A randomized clinical trial

Zahoor Ahmed^{1*}, Ataur Rahman Shahi¹, Khaista Bacha², Mahnoor Ali³

ABSTRACT

Background: Upper Cross Syndrome (UCS) is a postural dysfunction that often results from prolonged poor posture, associated with neck pain, shoulder discomfort, reduced range of motion, and muscle fatigue, and significantly impacts daily activities and quality of life. Friction massage (FM) and post-facilitation stretch (PFS) are gaining attention for their potential effectiveness in relieving symptoms and improving muscular balance.

Objective: to determine the effectiveness of friction massage and post-facilitation stretch (PFS) in relieving symptoms of the upper cross syndrome (UCS).

Methods: A randomized clinical trial was conducted on n=60 participants of both genders aged 20-50 years, diagnosed cases of upper cross syndrome. All participants were divided into Group A received friction massage (FM) while Group B received post-facilitation stretch (PFS) in addition to conventional physical therapy (CPT). Each participant received one month of intervention. The data was collected through a visual analog scale (VAS) and neck disability index (NDI) at the baseline, after the 2nd week, and 4th week.

Results: The mean age of the n=60 participants was 42.23±9.15 years. The results of RM-ANOVA showed significant improvement ($p < 0.001$) in pain intensity and neck disability in both groups at each level of assessment till at the end of 4th week of intervention. While comparing both groups, no significant difference ($p \geq 0.05$) was observed between the groups throughout the treatment duration.

Conclusion: The friction massage and PFS were equally effective in improving neck pain and disability in patients with UCS having the distinct mechanism of action, may be overshadowed by Conventional physical therapy.

Keywords: disability; friction massage; muscle energy technique; neck pain, pain, post facilitation stretch; upper cross syndrome.

Designation & Affiliation

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INTRODUCTION

Upper Cross Syndrome (UCS) is a postural dysfunction that often results from prolonged poor posture, is associated with neck pain, shoulder discomfort, reduced range of motion, and muscle fatigue, and significantly impacts daily activities and quality of life[1]. It often results from repetitive tasks and involves tightness in the upper trapezius, levator scapulae, and pectoralis minor, coupled with weakness in the middle trapezius and serratus anterior leading to prolonged poor posture[2]. Sometimes it is associated with temporomandibular dysfunction as well, showing a complex relation between neck posture and TMJ biomechanics[3].

Physical therapy in Upper Cross Syndrome (UCS) is indicated to address muscular weakness and postural deviations[4, 5]. Different therapeutic interventions including muscle energy techniques (METs) and therapeutic exercises, have shown significant effects in reducing pain, range of motion, and disability among patients[2, 6, 7]

THE deep friction massage is also used to break down adhesions, increasing circulation, and decreasing muscular tightness[8]. The literature has suggested that deep friction massage can be effective for managing the myofascial pain syndromes, tendinopathies, and muscle tightness by improving localized blood flow and decreasing muscle spasm[9, 10]. The friction massage may also help alleviate muscle tightness in the upper trapezius and pectorals, potentially reducing pain and improving the range of motion in patients with upper cross syndrome[10].

Post-facilitation stretch (PFS), which is a muscle energy technique (MET) technique significantly increases flexibility, decreases stiffness, improves neuromuscular function, and is useful for addressing muscle imbalances in UCS[11, 12]. Both the muscle Energy Techniques (MET) and deep friction massage show different effects on pain reduction and range of motion improvement in patients with UCS[13].

There are several methods available for the management of upper cross syndrome in literature, but the comparison between deep friction massage and post-facilitation stretching (PFS) has not yet been explored. Moreover, no study was found specifically investigating the PFS application for UCS. Given these gaps, the objective of this study is to compare the effects of both friction massage and post-facilitation stretching in reducing UCS symptoms. The study could contribute to establishing evidence-based protocols, promoting both patients and healthcare professionals.

METHODOLOGY

Study design: A two-arm, double-blinded, randomized clinical trial was conducted from June 2023 - December 2024 at Physical Therapy department of Halima Siraj Hospital Rawalpindi, after approval (Ref # HSH/062023-4) from Medical Director. Informed consent was obtained from all the study participants and assuring the confidentiality of the privacy according to the Deceleration of Helsinki. The purpose of the study was explained to all the participants before the study.

Participants: The participants of both genders aged between 20-50 years, diagnosed cases of the upper cross syndrome, and showed a willingness to participate, were included in the study. However, participants with any inflammatory disease, cervical spine trauma, cervical spine tumors, cervical spine instability, and open wounds and scars were excluded from the study.

Sample size: The total sample size of n=62 participants is required to achieve a power of 80% for detecting a medium effect size ($F=0.3$) and a significance level (α) of 0.05. A total of n=86 subjects were evaluated for eligibility and due to accessibility n=26 did not participate in the study. Finally, the data of n=60 participants were randomly allocated to group A (n=30) and group B (n=30) and analyzed. (Figure 1)

Randomization & blinding: Randomization was done through the lottery method and participants were divided into two groups group A, and Group B (n=30 participants in each group) as shown in figure Randomization was done by the person who wasn't directly involved in the study. The study was double-blinded; thus, the therapist and the patient were kept blind. Patients were unaware of the other treatment procedures while treating physiotherapists were blinded to the assessment, which was done by the other researcher.

Intervention: All participants in both groups received conventional physical therapy (CPT) including TENS therapy for pain relief, administered 3 times per week for 15 minutes. Ultrasound therapy was also incorporated 3 times per week for 7 minutes, primarily targeting tight muscles like the pectorals and upper trapezius to aid in muscle relaxation. Finally, The strengthening exercises including Chin tucks, which strengthen the deep cervical flexors, were performed 3 times per week in 3 sets of 10–12 repetitions. Moreover, scapular stabilization exercises such as Y, T, and W exercises were prescribed 3 times per week with 3 sets of 10 repetitions to enhance the function of the lower trapezius and rhomboids. (Figure 2)

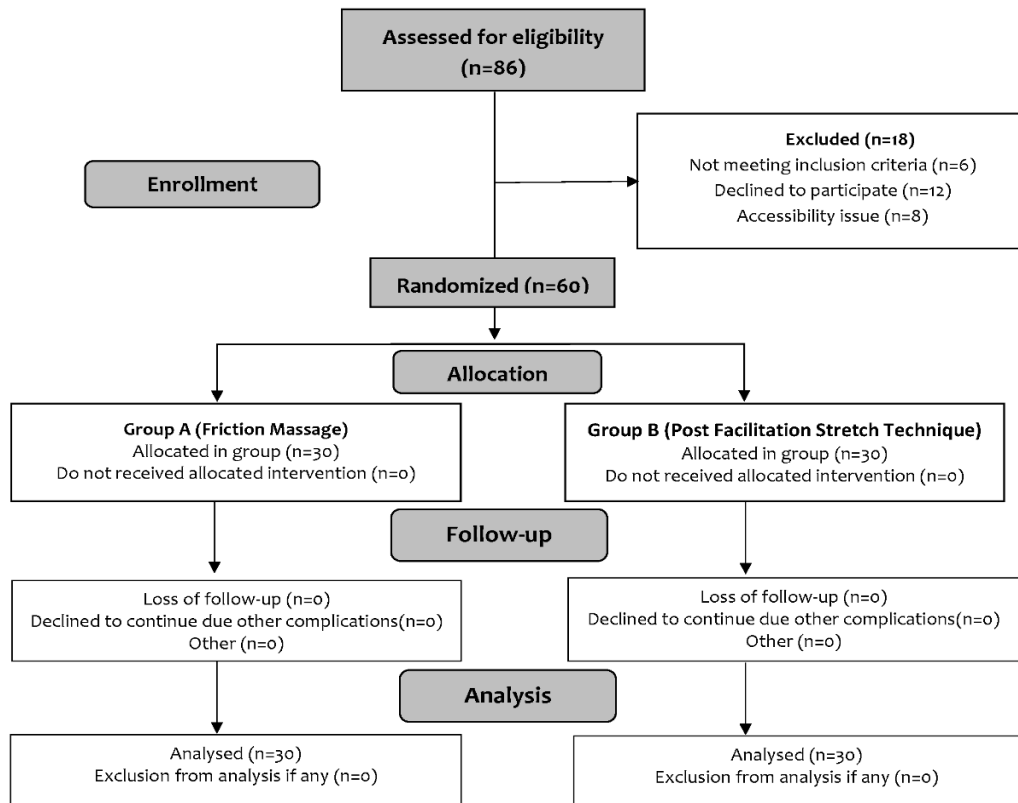


Figure 1: Consort Diagram

In addition to CPT, group a received 3 sessions/week of friction massage (FM) for four weeks with moderate pressure for 10-15 minutes per area (Upper trapezius, levator scapulae, and pectorals) in a single session to release muscle adhesion and improve circulation. Group B also received 3 sessions/week for a four-week, post-facilitation stretch (PFS) with gentle to moderate contraction of the upper trapezius, levator scapulae, and pectorals followed by a 30-sec passive stretch of 2-3 sets in each session.

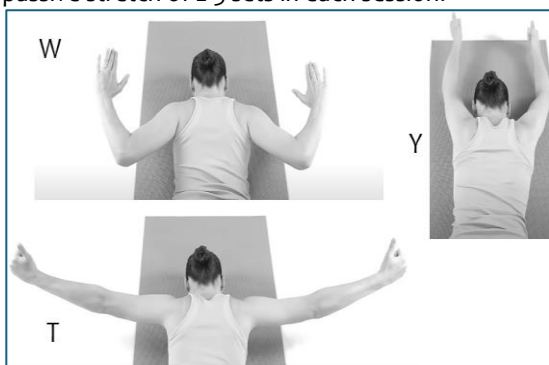


Figure 2: Y, T and W Exercises for lower trapezius and Rhomboids

Data collection: The demographic data in terms of age, gender, and BMI were collected at the baseline. The Visual Analogue Scale (VAS) was used to determine the pain, and The Neck Disability Index (NDI) was used to determine the level of disability. The data of outcome measures were collected at baseline, 2nd week, and after 4th week.

Data analysis: For the descriptive statistics, mean, standard deviation, frequency, and

percentages were used. To evaluate within-group effectiveness, RM-ANOVA was used, while an independent t-test was used for between-group differences at each assessment level. The data was analyzed through SPSS version 26 and the level of significance was set at $p < 0.05$.

RESULTS

The mean age of the $n=60$ participants was 42.23 ± 9.15 years. A total of $n=19$ participants were males and the remaining $n=41$ were females. Most of the participants had a healthy weight range (23.96 ± 4.13 kg/m²). The frequency distribution can be seen in figure 3

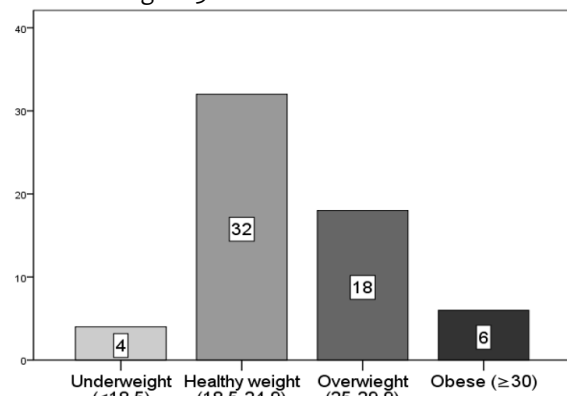


Figure 3: Frequency distribution of BMI

The results of RM-ANOVA showed significant improvement ($p < 0.001$) in pain intensity and neck disability in both groups at each level of assessment till at the end of 4th week of intervention.

Table 1: With-in group changes (VAS & NDI)

	Group A (Friction Massage)				Group B (Post Facilitation Stretch Technique)				
	Mean	SD	MD/F(df)	p-value	Mean	SD	MD/F(df)	p-value	
VAS	Baseline	6.43	1.69	1.76	^a 0.001***	6.24	1.86	1.77	^a 0.001***
	After 2 nd week	4.67	1.70	3.68*	^b 0.001***	4.47	1.79	3.71	^b 0.001***
	After 4 th week	.98	1.03	260.77(1.03, 30.13)	^c 0.001***	.75	.82	218.75(1.03,30.04)	^c 0.001***
NDI Score	Baseline	22.27	12.22	14	^a 0.001***	17.67	9.05	9.56*	^a 0.001***
	After 2 nd week	8.27	10.07	1.800*	^b 0.001***	8.10	7.54	1.76	^b 0.001***
	After 4 th week	6.47	9.43	56.19(1.01, 29.28)	^c 0.001***	6.33	7.09	40.81(1.01,29.31)	^c 0.001***

Significance level: $p < 0.05^*$, $p < 0.01^{**}$, $p < 0.001^{***}$ ^abaseline versus 2nd week, ^b2nd week versus 4th week, ^cbaseline versus 4th week; VAS- Visual Analogue Scale; NDI-Neck disability Index; SD- Standard Deviation; MD-Mean Difference; df-Degree of freedom

While comparing both groups, no significant difference ($p \geq 0.05$) was observed between the

groups throughout the treatment duration. (Table 2)

Table 2: Comparison between groups (VAS & NDI)

	Group A (Friction Massage)		Group B (Post Facilitation Stretch)		MD	p-value	
	Mean	SD	Mean	SD			
	VAS	Baseline	6.43	1.693			6.24
VAS	After 2 nd week	4.67	1.709	4.47	1.795	.200	.660
	After 4 th week	.98	1.030	.75	.821	.230	.343
NDI	Baseline	22.27	12.228	17.67	9.057	4.600	.103
	After 2 nd week	8.27	10.079	8.10	7.549	.167	.942
	After 4 th week	6.47	9.438	6.33	7.097	.133	.951

Significance level: $p < 0.05^*$, $p < 0.01^{**}$, $p < 0.001^{***}$

VAS- Visual Analogue Scale; NDI-Neck disability Index; SD- Standard Deviation; MD-Mean Difference; df-Degree of freedom

DISCUSSION

The aim of the study was to determine the effectiveness of friction massage and post-facilitation stretch in improving pain and disability measured through VAS and NDI. It was hypothesized that friction massage is more effective as compared to PFS. However, the results of the study didn't show any significant difference between both interventions in improving pain and disability.

In a recent study, friction massage significantly improved pain and disability from baseline to follow-ups of 4 weeks in upper cross syndrome. The possible reason for the reduction in pain is traumatic hyperemia induced by friction massage, which reduces pain metabolites. Also, it destroys adhesions and optimizes the quality of scar tissue and mechanoreceptor stimulation, which produces afferent impulses that stimulate temporary analgesia [8, 14]. These factors may contribute to a decrease in pain and thus reduce pain-related disability and improve the patient's functional status[14]. Similar findings were observed in the literature, highlighting the manual therapies effectiveness, including massage, for the management of pain and improvement in functional outcomes in wide musculoskeletal conditions[15, 16].

Furthermore, significant improvement was observed in pain and disability after post-facilitation stretch throughout the treatment duration. The improvement may also be due to the inhibition of Golgi tendon, which occurred after stretching that relax the muscles and significantly reduces the pain[17]. Post-facilitation stretch relaxes muscles after maximum stretch, which decreases pain and

may leads to improved pain-related disability[18, 19].

When comparing differences between groups, both interventions showed significant improvement and no difference was found between groups in pain and disability, may be due to similar physiological effects[15, 20, 21] The inclusion of conventional physical therapy (CPT) in both groups may have confounded results by contributing equally to pain and disability reduction[22]. Additionally, overlapping benefits of interventions could have further masked differences[23].

As per results and discussion, conventional physical therapy confounded the results, If the strengthening component which is already a comprehensive protocol for posture correction may overshadow the effect of both interventions.

CONCLUSION

Both friction massage and post-facilitation stretch improved pain and disability equally. These findings may be due to CPT, which likely contributed equally to symptom improvement in both groups as a confounder. Future studies should be without conventional Physical Therapy to avoid overlapping effect, use larger sample sizes, and measures to better distinguish the independent effects of these interventions.

DECLARATIONS & STATEMENTS

Author's Contribution

ZA: substantial contributions to the conception and design of the study.

ZA and MA: acquisition of data for the study.

ARS and KB: analysis of the data for the study.

ZA, ARS and MA: interpretation of data for the study.

ZA, KB: drafted the work.

ZA, ARS, KB and MA: revised it critically for important intellectual content.

ZA, ARS, KB and MA: final approval of the version to be published and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed to the article and approved the submitted version.

Ethical Statement

The study was conducted from June 2023 - December 2024 at Physical Therapy department of Halima Siraj Hospital Rawalpindi, after approval (Ref # HSH/062023-4) from Medical Director. Informed consent was obtained from all the study participants and assuring the confidentiality of the privacy according to the Declaration of Helsinki

Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Acknowledgments

None to declare.

Conflicts of Interest

The authors declare no conflict of interest.

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