

Effect of Myofascial Release and Soft Tissue Mobilization versus Interferential Therapy with Exercises on Neck Musculoskeletal Related Syndromes: A Before and After Study

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Cite as: Ndahiriwe CC, Bucyana E, Tuyizere M, Hakizimana M, Nshimiyimana J, Assuman N, Gasana J, Rukundo JD, Semana JMV, Jayavel A. Effect of Myofascial Release and Soft Tissue Mobilization versus Interferential Therapy with Exercises on Neck Musculoskeletal Related Syndromes: A Before and After Study. *Rwanda J Med Health Sci.* 2024;7(3):403-410. <https://dx.doi.org/10.4314/rjmhs.v7i3.2.2>.

Abstract

Background

Neck-related musculoskeletal disorders are classified among the top disabling conditions leading to discomfort, pain and functional restrictions which impact people's functions and performance.

Aim

To assess the effects of soft tissue mobilization versus interferential therapy with exercises among adults with neck musculoskeletal syndromes.

Materials and Methods

Thirty-two (32) participants in this study were randomly allocated to two groups. Experimental (n=16) received myofascial release and soft tissue mobilization. Control (n=16) received interferential therapy with conventional neck exercises for 6 weeks. Numeric Pain Rating Scale (NPRS) Scores and Neck Disability Index (NDI) were used to measure the effect of the treatment interventions.

Results

The findings from this intervention study showed a significant improvement in pain and disability. Unpaired (independent) t-test on NPRS and NDI scores between groups (NPRS t-test: -3.693 p=0.001) and (NDI t-test: -8.472, p=0.001) thus, favoring Myofascial release and soft tissue mobilization compared to IFT and exercises.

Conclusion

Myofascial release and soft tissue mobilisation treatment provided greater benefits in terms of reduction of functional limitations and pain. IFT and exercise therapy showed improvement suggesting that a combination of both treatment approaches may yield better results than single treatment modality alone.

Rwanda J Med Health Sci 2024;7(3):403-410

Keywords: Myofascial Release; Soft tissue mobilization; Interferential therapy and Posture

Introduction

Globally, musculoskeletal disorders (MSDs) are increasing and impact different populations from discomfort to disability complications and socioeconomically. [1,2] Musculoskeletal disorders have socioeconomic costs which impact the individual, families and institutions in which individuals are working manifested by absenteeism, cost of care resulting in reduced productivity at both sides. For example, in most western countries, the cost of care from musculoskeletal management alone was beyond USD 500 million.[3] This emanates from the fact that companies may suffer declined productivity due to absenteeism of their employees suffering from neck pain.[4,5] Thus, the cost of health care would increase tremendously when preventive and treatment measures are not taken early resulting in increased indirect costs, labor turnover and reduced quality of life.[5,6]

Management of neck musculoskeletal syndromes has been extensively assessed from manipulations, exercises and surgery in complicated instances.[4–6] However, controversies still exist on the best management methods that result in improved quality of life with efficient results in terms of time and cost. The management of the neck associated disorders does not spare the closer look and assessment of the shoulder and the scapular levels due to complexity of anatomical muscular arrangement of the cervical thoracic region. [4] There is a need to focus on the associated biomechanics and patho-mechanics of those muscles in the clinical practice for the holistic management of the patients.[2,3,7–9]

Conventional and new physiotherapy modalities (i.e. physical therapy) have been shown to be effective in the management of MSDs. For instance, one study [7] reported that after one week of five acupuncture treatment sessions there was a significantly greater improvement in motion related

pain compared with massage with a mean difference of 24.22 degrees of motion (95% CI = 16.5–31.9), $P=0.0052$) than those in who were exposed to sham laser therapy(17.28 (95%CI: 10.0-24.6), $P=0.327$). Another study in Iran [8] that compared the myofascial release over electrotherapeutic treatment, concluded that the participants who received myofascial release compared to their electrotherapy counterparts, showed significant reduction of pain intensity, pressure pain threshold, and neck disability index.

Most of the studies have been done to assess the effectiveness of single modality intervention rather than combined interventions approach.[5,8,10] While others had used low level of evidence in terms of methodologies such as case studies,[11] epidemiological investigations studied only the neck related patterns such as prevalence, risk factors and incidence. [2,12] Therefore, this study identified the gap in assessing the effects of physiotherapy techniques on neck muscle-related disorders, especially using comprehensive combined treatment modalities in more rigorous methods using a before and after study where more treatment sessions and a long period (3 sessions per week for six weeks) were given to the participants. This study aimed to assess the effect of Myofascial release (MFR) and Soft Tissue Mobilization (STM) on neck-muscles related syndromes compared to Interferential Therapy (IFT) and conventional exercises.

Materials and Methods

Study Design and Settings

A before and after study design, was conducted among patients who reported mechanical neck muscle-related syndromes who reported pains and some forms of disabilities, where 32 participants who met the inclusion criteria, were recruited for the study at Out Patient Department (OPD), SRM Hospital and Research Center Kancheepuram district, Tamil Nadu State, India.

Participants and eligibility criteria

The study recruited participants who reported non-traumatic neck pain and should at least have reported the neck-related complaints within a 3-6 months' duration of symptoms. Excluded were people who had already developed radicular symptoms to the upper extremity and those with traumatic neck issues such as fractures mostly arising from accidents.

Sampling and group allocation

Random allocation of participants was done by a simple random sampling technique in either intervention or control group which was based on how the participants came one after another in OPD for management referred from Orthopedic and other departments. The odd numbers were assigned to the control (n=16) and even numbers to intervention group (n=16), with participants remaining blind about the group to which they belonged. Figure 1 flow diagram shows the selection process of the participants into the study.

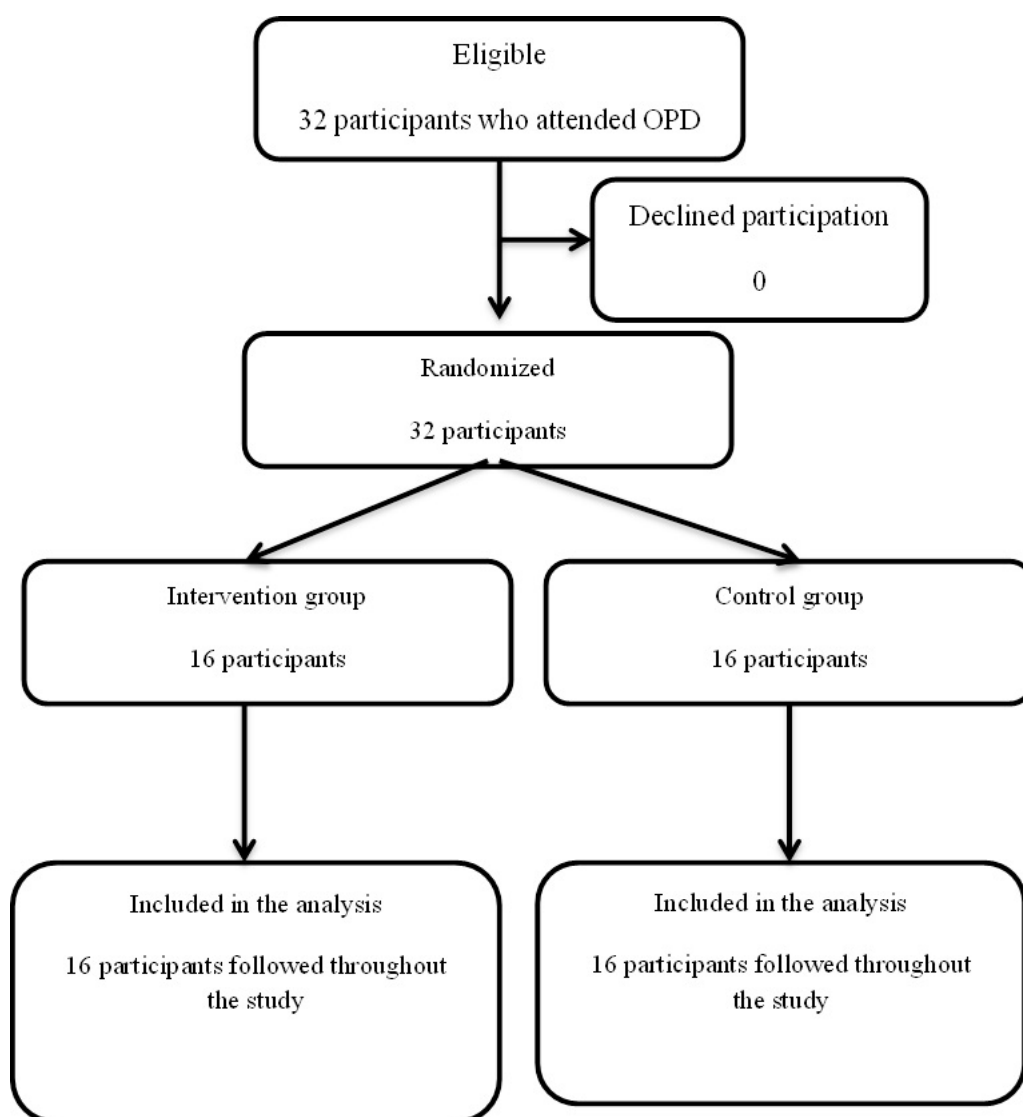


Figure 1. Flow diagram of participants' group allocation

Interventions and procedures

The intervention group received friction massage, sustained pressure, perpendicular pressure and parallel pressure techniques on the affected muscles with desired effects of MFR on superficial and easily palpable neck muscles (trapezius, STCM, rhomboids and soft tissues involved) by use of both simultaneously each session MFR and STM for 10 minutes, where 4 minutes were at myofascial release and 6 remaining minutes were for STM. Postural correction exercises were given to target deep neck muscles namely flexors and extensors. The technique was applied mainly to the sternocleidomastoid, Upper and middle trapezius and Rhomboid muscles following the fiber orientation of the muscles from insertion to origin.[10]

For the sternocleidomastoid, the manual techniques were applied from both clavicles to the mastoid process. As for the upper trapezius, the orientation was done from top of the shoulder proximal to the acromion toward the spinous processes of lower cervical vertebrae. In the case of the Rhomboid, the technique was applied from the thoracic spinous process toward the scapulae.[10]

The control group received interferential therapy with four (4) active electrodes, using program number 12 with 4KHZ frequency, constant mode and intensity to patient's tolerance of the physioMed IFT machine for 12 minutes combined with neck and shoulder normal physiologic exercises such as flexion, extension, side rotations which were prescribed in the form of the routine conventional exercises as 10 repetitions, 3 sets 2 times daily for each exercise.

Materials and tools

Neck disability index which was shown to have a high test-retest reliability of 0.93, 95% confidence interval and robust internal consistency of 0.86, 95% confidence interval and NPRS were chosen as tools to check before and after a series of treatments. The NPRS showed moderate reliability of ICC = 0.72; 95% CI: 0.08–0.90,

but when used with NDI it was reported to be well suited for short-term self-reporting for patients.[13,14]

Data analysis

Data Obtained was entered in excel sheet, then transferred to IBM SPSS Statistics for Windows version 20.0 (IBM Corp, Armonk, NY, USA). Normality tests were done for all continuous variables. Descriptive statistics were used to analyze the demographic characteristics of the participants. Paired and independent t test were done to assess the within group effects and between comparison on pain and disability related scores.

Ethical considerations

The clearance was obtained from the Dean of College of Physiotherapy and served as ethical clearance No. IEC/2018/114. All participants were informed about the study; their participation was voluntary. The informed consent forms were given to the participants and participants had rights to withdraw from the study at any time.

Results

Demographics and Characteristics of the participants

The demographic and baseline data measurement are presented in Table 1 and Table 2 including age and gender demographics, Pain scores (NPRS) and Disability scores (NDI)

This study included a total of 32 participants of whom 11(34.4%) were males and 21(65.6%) females. The mean age was 40.6 (SD = 11) years. Regarding the initial pain score, the average NPRS was 7/10, the minimum 5/10 and the maximum was 8/10. The NDI mean percentage was 23.53%, while the minimum and maximum were 18% and 34% respectively (Table 1).

Table 1. Demographic and Baseline Results on Age, Pain scores and Neck Disability Index

Variables	Min.	Max.	Mean	SD
Age in Years (N=32)	21	57	40.66	11.08
NPRS Pre test	5	8	7.06	0.88
NDI % Pre Test	18	34	23.53	4.20

Abbreviations: NPRS=Numerical Pain Rating Scale; NDI=Neck Disability Index, SD=Standard deviation

Pain values and neck disability percentage at the start of the study averaged around 7.06 (SD=0.88) and 23.53 (SD=4.2)% respectively. The minimum and maximum pain and neck disability values were 5 to 8 and 18 to 34 % respectively. Table 2 presents the gender distribution frequency, whereby the majority were females 65.6%

Table 2. Gender frequency distribution

Gender	Frequency	Percentage
Male	11	34.4
Female	21	65.6
Total	32	100

Pre- and Post-test Statistics on Pain (NPRS) and Disability (NDI)

Table 3 summarises the post-tests in experimental and control groups, before and after intervention regarding pain and disability and paired t-tests for significance testing. Regarding pain, there was a significant improvement from 7.13 (SD=0.81) to 0.63 (SD=0.96) in pain scores average (p<0.001). Concerning disability, the improvement in average was from 24 (SD=4.10)% to 0.81 (SD=1.11)%, p<0.001. As for the control group, there was improvement in pain and neck disability whereby the average values of pain and disability, scores improved significantly from 6.88 (SD=0.96) to 1.88 (SD=0.96), p<0.001, and 23.06 (SD=4.39) to 5.13 (SD=1.71), p<0.001 respectively.

Table 3. Pre and post-tests within groups paired t-tests

Study group	Outcomes	Descriptive		Paired differences Mean diff (SD)	Statistics		
		Mean (SD)	Std. Error Mean		t-value	df	p-value
Experimental (n=16)	NPRS Pre-test	7.13 (0.81)	0.2	6.5 (1.03)	25.17	15	<0.001***
	NPRS Post-test	0.63 (0.96)	0.24				
	NDI % Pre-test	24 (4.1)	1.02	23.19 (4.51)	20.59	15	<0.001***
	NDI % Post-test	0.81 (1.11)	0.28				
Control (n=16)	NPRS Pre-test	6.88 (0.96)	0.24	5 (1.63)	12.25	15	<0.001***
	NPRS Post-test	1.88 (0.96)	0.24				
	NDI % Pre-test	23.06 (4.39)	1.1	17.94 (4.39)	16.35	15	<0.001***
	NDI % Post-test	5.13 (1.71)	0.43				

Abbreviations: NPRS=Numerical Pain Rating Scale; NDI=Neck Disability Index; SD=Standard deviation , df=degrees of freedom. *** Statistically significant at p<0.001

Independent t tests

The independent t-tests show that the MFR, STM experimental group improved more significantly ($p < 0.001$) than the IFT plus exercises control group. Therefore, the experimental group was favoured over the control group on neck pain and disability scores (Table 4).

Table 4. Between-group comparison at the end of the intervention

Outcome	Experimental group (n=16)	Control group (n=16)	Statistics		
	Mean diff (SD)	Mean (SD)	t-value	df	p-value
NPRS	0.63 (0.96)	1.88 (0.96)	-3.693	30	-0.001**
NDI (%)	0.81 (1.11)	5.13 (1.71)	-8.472	30	<0.001**

Abbreviations: NPRS= Numerical Pain Rating Scale; NDI= Neck Disability Index; SD= standard deviation; df= degrees of freedom. **statistically very significant

Discussion

The present study observed the effects of MFR and STM with IFT and conventional exercises on neck muscles related syndromes and found that both interventions were beneficial to both groups but intervention group effects were favored compared to its control counterpart. The findings show that the intervention group improved more remarkably than the control group regarding pain and improved function, and the immediate pain relief effects after STM and MFR were significantly higher compared to IFT counterparts. Regarding the long-term functional and activity performance benefits, MFR and STM registered higher improvement than the IFT.

The study results are consistent with the Ottawa panel evidence based guidelines which indicate that MFR and STM are among the recommended therapies in clinical practice.[9] On the other hand, a systematic review done by Ezzo and colleagues, discussed that effects were uncertain regarding MFR therapies reported in various studies done in previous decades. [9,15,16]

Our findings show that the experimental group showed substantial improvements with the use of MFR and or STM after 6 weeks program of follow-up, and the authors believe and agree with the findings from Kong and colleagues ,[5] which concluded that soft tissue manipulations may influence neural activity, thereby modulating

pain relief in corticospinal tracts resulting in reduced pain perception. The agreement with the present results may be due to similarity in intervention techniques and methodologies used. In contrast to the current findings, a review supported active therapies or exercise based interventions over passive or non-exercise based therapies but other literature reports that non-active therapies are not promising in the long-term effects perspective.[5,15]

The present findings observed that the manipulative techniques can have better improvements than the conventional approaches which are not well dosed or quantified and focus on electrotherapy modalities including IFT. Gauns and Gurudut [16] in their study, found that MFR/STM has a higher rate of recovery in the management of mechanical neck pains than other therapy approaches. Our results showed that also combined therapy of myofascial release and STM have a superior effect than the conventional approaches used in physical therapy.

Limitations

Some limitations of the present study include the uneven gender and age demographics representation. Secondly, due to the nature of the trial, which was conducted in the Outpatient Department, there was a single blinding method whereby only the patients were blinded throughout the study which may affect the quality of the trial including the generalizability of the findings. However, the study has yielded useful insight in

the way the conditions can be improved based upon which further studies can be designed and implemented.

Conclusion and Recommendations

In summary, there is a significant effect on pain and disability favoring MFR and STM over IFT and conventional exercises among patients with neck muscular related syndromes. The combined techniques therapy has significant impact than a single therapy approach. Based on these findings we recommend the use of MFR and STM with postural correction exercises as priority treatment in patients with neck related muscular complaints. As in the IFT control group there was improvement reported as well; so, we recommend the use of IFT as an adjuvant therapy in neck related muscle syndromes for patient assurance, comfort and overall satisfaction, along with other therapeutic approaches.

With the new evidence, a multidisciplinary approach to the management of musculoskeletal disorders for better and quicker outcomes is recommended. Therefore, physiotherapy assessment should be improved in all aspects of care from the day of referral by the doctors. This aims to identify impairments and disabilities standard physiotherapy assessment and valid and reliable quick tests for specific conditions.

Further large-scale studies such as longitudinal studies and RCTs with bigger samples are recommended to explore more approaches in the management of neck-related syndromes.

Conflict of interest

The authors declare that there is no conflict of interest for the study

Authors' contributions

CCN, AJ and RR designed the study and were involved in all aspects of the work. EB, TM, MH, JN, AN, JMVS, JDR and JG contributed to the manuscript scientific review and provided intellectual inputs.

Acknowledgements

The authors wish to acknowledge SRM Institute of Technology for the approval to conduct this study. We thank SRM Hospital and Research Centre that allowed the researchers to successfully complete the study.

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