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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/20193
DOI URL: http://dx.doi.org/10.21474/IJAR01/20193

RESEARCH ARTICLE

TO COMPARE THE EFFICACY OF TWO DIFFERENT SOFT TISSUE RELEASE TECHNIQUES IN TREATING INDIVIDUALS WITH TERMINAL SHOULDER FLEXION DYSFUNCTION: A PILOT STUDY

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Manuscript Info

Manuscript History
Received: 06 November 2024
Final Accepted: 10 December 2024
Published: January 2025

Key words:-
Osteopathy, Soft Tissue Release, Manual Therapy, Myofascial Release

Abstract

This pilot study aimed to compare the efficacy of two soft tissue release techniques—visceral mobilization of liver ligaments and myofascial release of the pectoralis minor muscle—on terminal shoulder flexion dysfunction. Thirty participants aged 20-40 years with shoulder dysfunction for over three months were randomly assigned to three groups: Group A (control group), Group B (visceral mobilization), and Group C (myofascial release). All groups received conservative physiotherapy. Pre- and post-intervention assessments included pain intensity, range of motion (ROM), pectoralis minor length, and QuickDASH scores. The results demonstrated significant improvements in all outcome measures across all groups ($p < 0.05$). However, participants in Group B exhibited superior improvement in ROM and functional disability compared to Group C. Both intervention groups outperformed the control group in reducing pain and improving terminal shoulder flexion. The findings highlight that incorporating soft tissue release techniques, particularly visceral mobilization of liver ligaments, enhances the effectiveness of conservative physiotherapy for terminal shoulder dysfunction. Further studies are recommended to validate these findings in larger populations.

Introduction:-

Pain in the shoulder region is generally felt in anterior and posterior shoulder complex region. It excludes pain in the spinal region and in the central anterior thoracic region [1]. Shoulder pain has been reported commonly throughout the developing world, with prevalence's of 7% to 26% among the adult population [2]. There has been consistent difficulty in accomplishing activities of daily living, at work station, at home and some of the leisure activities. This often creates of a situation that puts significant social liability and economic burden on both the individual and the society as a whole. Though the health caring cost and productivity loss that is associated with the pain in the shoulder is limited, the burden is thought to be substantial [3]. People seek health services only when they are experiencing high levels of pain intensities and due to their negligence [4]. It is very unfortunate that most of the problems related to the shoulder are not self-limiting but still around 40% of people complain to their clinicians that the particular problem has been persistent for more than one year [5]. In most of the cases pain in

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shoulder that does not have a clearly defined underlying pathology or shows any physical signs of injury are termed as "non-specific shoulder pain [6]."

Non-specific pain is generally considered to be musculoskeletal dysfunction that typically shows signs of pain in certain structures that are not related to any disease or modification of anatomical structures [7]. This dysfunction leads to loss of productivity, health care and work at every level of an organization.

Recent studies are pointing out to the fact that there is increase in the muscular tension with subsequent decrease in the threshold levels of pain with respect to visceral disturbances. This mechanism is still understood poorly and requires more research but a possible cause can be related to innervations by the same corresponding spinal segment levels through the viscera-somatic reflexes [8]. When dysfunctional, liver is thought to have a negative impact on the left and right shoulder girdles. A liver with lack in mobility can cause increase in the mechanical load that is placed upon the shoulder girdle musculature through the fascial attachments of left coronary ligament and gastrophrenic ligament [9].

Visceral mobilization or manipulation (VM) developed by French osteopath Jean-Pierre Barral is primarily used in treatment of soft tissue restrictions which arise due to minimal mobility and motility of certain specific organs inside the body by mobilsing the fascia surrounding them. One of the possible explanation can be that as liver is innervated by the phrenic nerve, which transmits the afferent information cranially into the spinal cord. There, the information is processed at the segmental level and is also responded to segmentally in the form of an efferent information flow: the segmental muscles respond with hypertonicity. Hypertonicity of one or several of these muscles has a considerable impact on the biomechanics in the shoulder joint. These restrictions if left untreated can lead to various functional dysfunctions. Therefore, if there is restricted movement of the human viscera then it may lead to restriction in musculoskeletal system and also increase the levels of pain severity in the tissue which are being supplied by the corresponding spinal level nerve through the viscera-somatic reflexes. [10].

Shoulder pain has been associated with the reduction of subacromial space which in turn causes pain due to the compression of the soft tissues present in the subacromial space [11]. One probable mechanism that may lead to decrease in the kinematics of the subacromial space can be stated as an altered motion of the scapular bone with respect to the thoracic cage, when the arm is taken into elevated position. During elevation or forward raising of the humerus in asymptomatic individuals there is accompanied upward rotation of the scapula which is achieved alongwith the backward or posterior tipping of the bone [12, 13].

In healthy individuals who do not have any known history, the pectoralis muscle is in its lengthened position during raising of the arm in forward direction [14]. Therefore, when the muscle is in shortened position it would restrict and limit the normal scapulothoracic movements, therefore causing decrease in subacromial space and hence leading to development of shoulder pathology [15]. Thus it is very important to stretch the pectoralis minor muscle in those individuals who develop forward shoulder posture as a result of poor alignment and movement of the scapular bone with respect to the thoracic cage [16].

Materials and Methods:-

The study was a pre-post comparative study with a total of 30 subjects. The subjects were allocated to three groups (A, B, C) using sealed envelopes. Treatment allocations were randomly generated by the therapist and placed in equal-sized envelopes. When a subject entered the trial, an envelope was opened, and the allocated intervention was given. The study took place in the OPD of Physiotherapy at Prem Physiotherapy and Rehabilitation College, Panipat, Haryana. Ethical clearance was obtained from the Institutional Ethical Committee and written informed consent was obtained from the subjects before the intervention.

Inclusion criteria:

Both males and females aged between 20-40 years with terminal shoulder dysfunction for the past three months were included in the study.

Exclusion criteria:

Subjects who were suffering from disorders or dysfunctions that are contraindicated to soft tissue release, Subject who has undertaken the manipulative therapy treatment in the past six months, Subjects having serious cardiovascular or metabolic disease, Patients diagnosed for malignant tumors.

Sample size calculation:
A total of 30 subjects aged between 20-40 years were included in the study. The sample size was calculated using Z-power.

Study Procedure
The study was conducted on 30 subjects were randomly allocated to the three groups namely Group A, Group B and Group C.

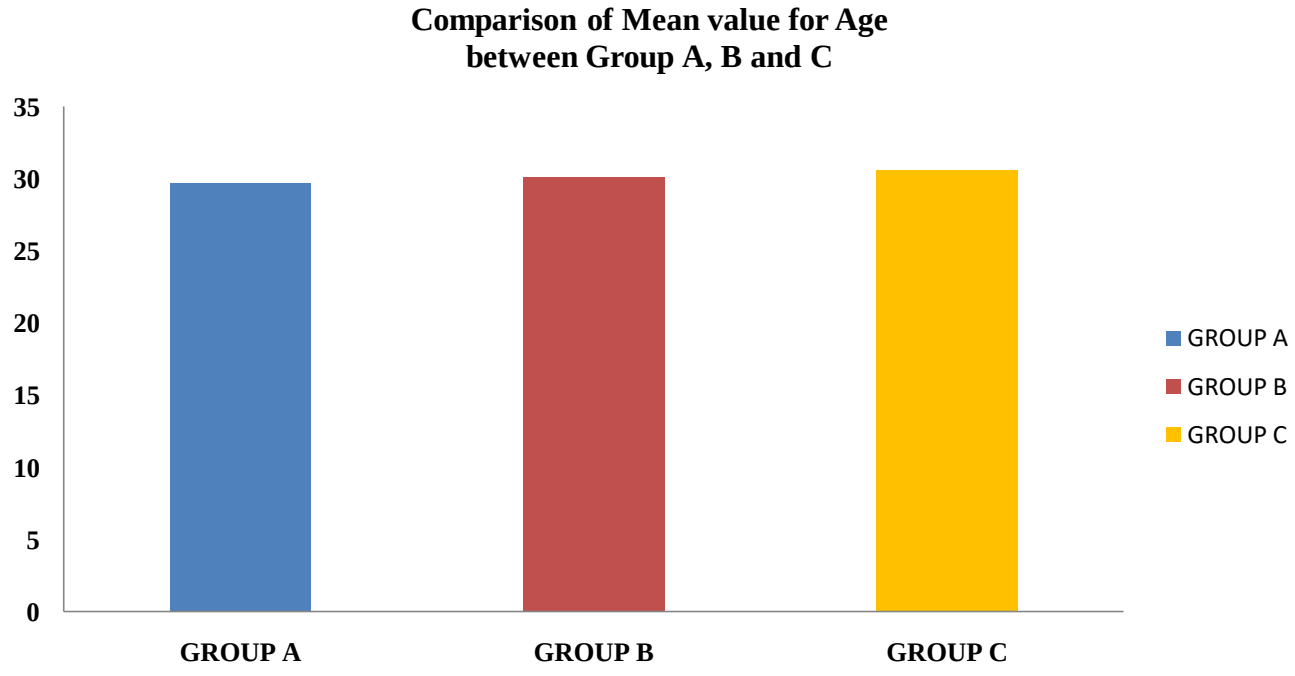
Pretest and posttest measurements related to functional disability, pain, pectoralis minor length and range of motion were taken for all the participants.

Participants designated to Group A which was the control group received conservative physiotherapy management approach to shoulder pain in the form of transcutaneous electrical nerve stimulation [17], hot packs for 20 minutes and range of motion exercises in the form of pendular exercises daily for 3 minutes in all planes [18]. Participants of Group B received soft tissue release to the ligamentous attachments of liver alongwith the conservative physiotherapy management. Direct treatment method of visceral mobilisation as advocated by Barral was incorporated for following liver ligaments [19]. Participants of Group C received myofascial release of pectoralis minor muscle alongwith the conservative physiotherapy management. In this the patient was positioned supine with shoulder flexed to 90 to 120 degrees [20]. The treatment session was delivered twice in a week for three weeks [21].

Outcome measures
- Terminal Shoulder Flexion range
- Pain.
- QuickDASH questionnaire
- Pectoralis minor length

Data Analysis

Description	GROUP A		GROUP B		GROUP C	
	Mean	SD	Mean	SD	Mean	SD
AGE	29.70	6.80	30.10	5.51	30.60	3.84



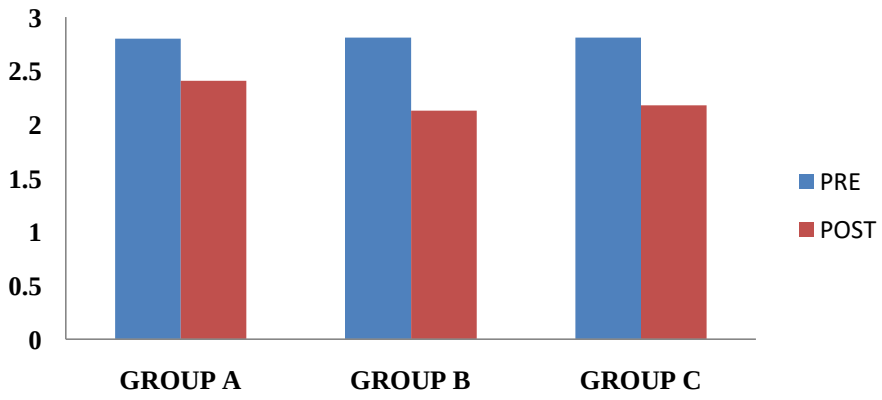
Linear Distance

Description	GROUP A		GROUP B		GROUP C	
	Mean	SD	Mean	SD	Mean	SD
PRE LD	2.80	0.12	2.81	0.12	2.81	0.12
POST LD	2.41	0.11	2.13	0.07	2.18	0.08
MD LD	**0.39**	0.13	**0.68**	0.13	**0.63**	0.13

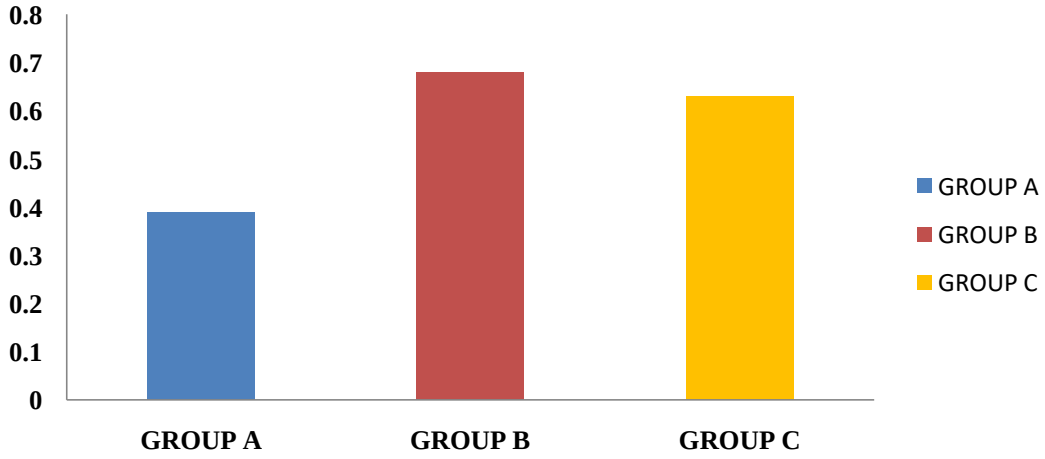
LD	GROUP A		GROUP B		GROUP C	
	T value	P value	T value	P value	T value	P value
PRE Vs Post	9.585	**P < 0.05**	16.333	**P < 0.05**	14.895	**P < 0.05**

Description	GROUP A GROUP B VS GROUP C	
	F Value	P value
PRE LD	0.023	P > 0.05
POST LD	29.228	**P < 0.05**
MD LD	13.925	**P < 0.05**

Comparison on Mean value for Linear Distance at Pre and Post interval within Group A, B and C



Comparison of improvement for Linear Distance between Group A, B and C



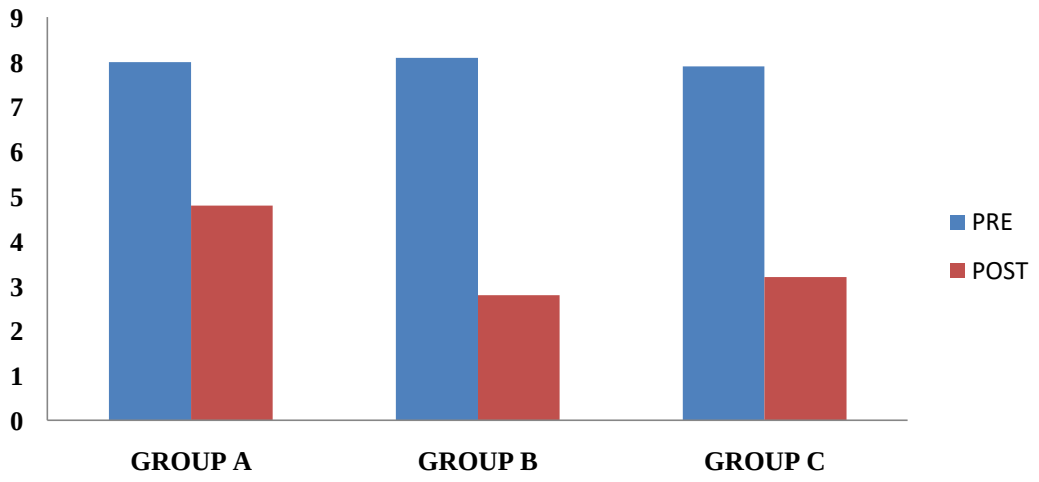
Pain

Description	GROUP A		GROUP B		GROUP C	
	Mean	SD	Mean	SD	Mean	SD
PRE PAIN	8.00	1.05	8.10	0.74	7.90	0.99
POST PAIN	4.80	1.03	2.80	0.63	3.20	0.92
MD PAIN	**3.20**	1.23	**5.30**	0.82	**4.70**	1.49

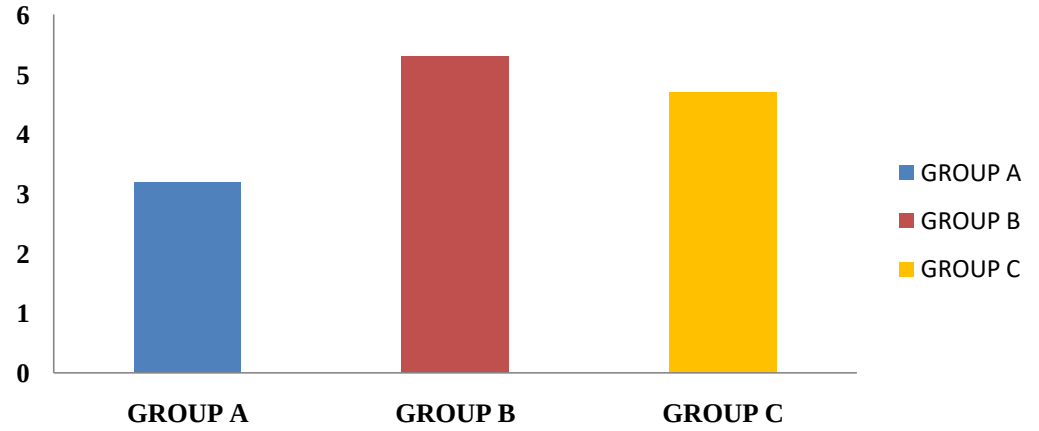
PAIN	GROUP A		GROUP B		GROUP C	
	T value	P value	T value	P value	T value	P value
PRE Vs Post	8.232	**P < 0.05**	20.358	**P < 0.05**	9.945	**P < 0.05**

Description	GROUP A GROUP B VS GROUP C	
	F Value	P value
PRE PAIN	0.113	P > 0.05
POST PAIN	14.538	**P < 0.05**
MD PAIN	7.937	**P < 0.05**

Comparison on Mean value for Pain at Pre and Post interval within Group A, B and C



Comparison of improvement for Pain between Group A, B and C



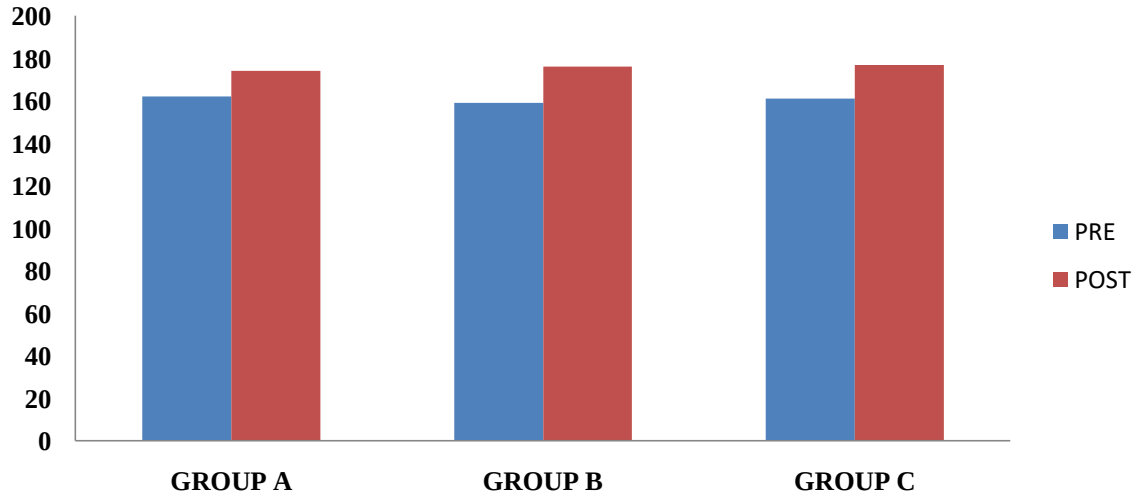
Range Of Motion

Description	GROUP A		GROUP B		GROUP C	
	Mean	SD	Mean	SD	Mean	SD
PRE ROM	162.10	7.75	159.20	4.21	161.00	6.50
POST ROM	174.10	3.54	176.20	2.04	177.00	1.41
MD ROM	**12.00**	4.99	**17.00**	4.19	**16.00**	6.55

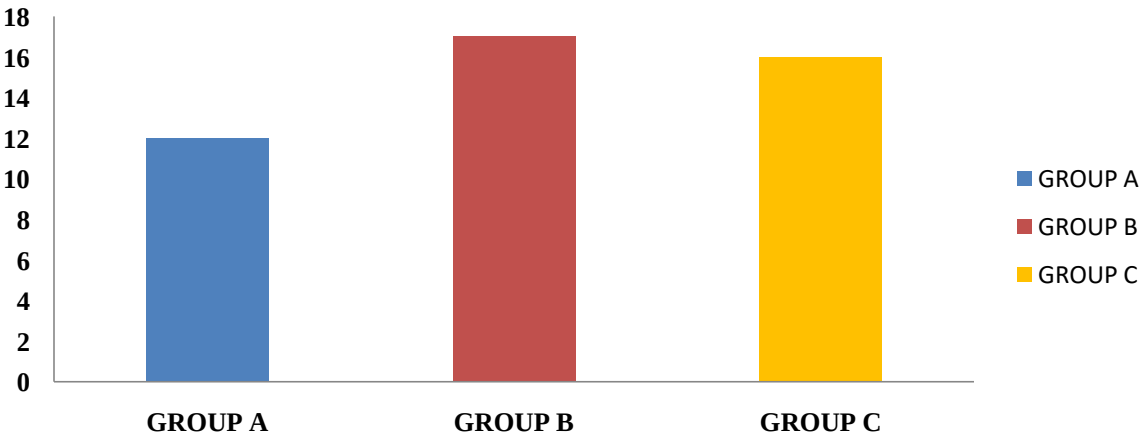
ROM	GROUP A		GROUP B		GROUP C	
	T value	P value	T value	P value	T value	P value
PRE Vs Post	-7.606	**P < 0.05**	-12.830	**P < 0.05**	-7.726	**P < 0.05**

Description	GROUP A GROUP B VS GROUP C	
	F Value	P value
PRE ROM	0.536	P > 0.05
POST ROM	3.595	**P < 0.05**
MD ROM	2.461	P > 0.05

Comparison on Mean value for ROM at Pre and Post interval within Group A, B and C



Comparison of improvement for ROM between Group A, B and C



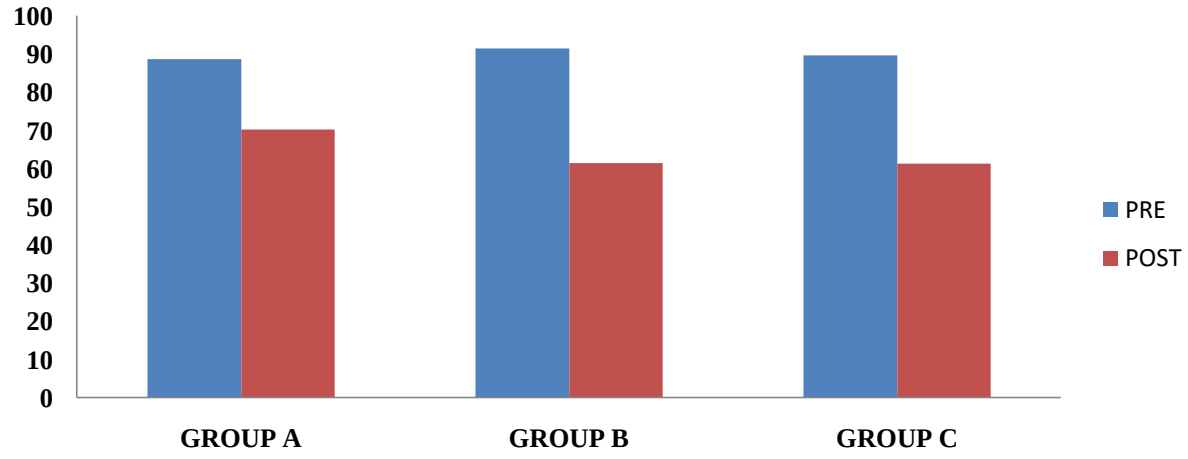
QuickDASH

Description	GROUP A		GROUP B		GROUP C	
	Mean	SD	Mean	SD	Mean	SD
PRE QuickDASH	88.70	4.55	91.50	5.48	89.60	4.99
POST QuickDASH	70.20	5.94	61.40	3.10	61.30	3.65
MD QuickDASH	**18.50**	7.20	**30.10**	6.31	**28.30**	5.52

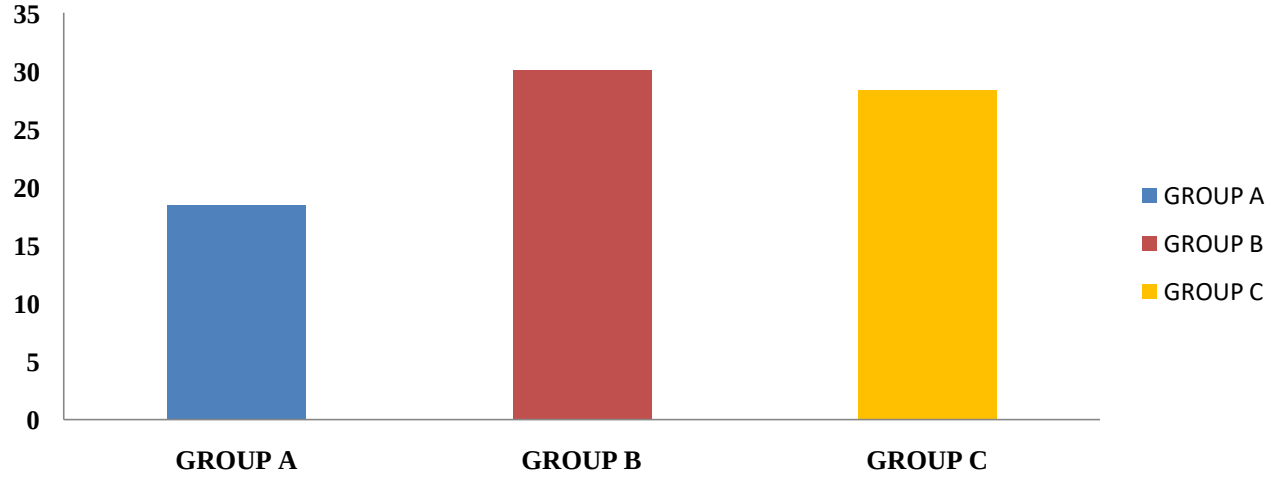
QuickDASH	GROUP A		GROUP B		GROUP C	
	T value	P value	T value	P value	T value	P value
PRE Vs Post	8.126	**P < 0.05**	15.073	**P < 0.05**	16.216	**P < 0.05**

Description	GROUP A GROUP B VS GROUP C	
	F Value	P value
PRE QuickDASH	0.810	P > 0.05
POST QuickDASH	13.451	**P < 0.05**
MD QuickDASH	9.571	**P < 0.05**

Comparison on Mean value for *Quick*DASH at Pre and Post interval within Group A, B and C



Comparison of improvement for for *Quick*DASH between Group A, B and C



Statistical Analysis

The data were statistically analysed using Microsoft Excel (MS) and the Statistical Package for the Social Sciences (SPSS) version 24.0. The paired t-test was used to compare the means of measurements within the groups. ANOVA was used to compare the differences between the three groups. The Confidence Interval (CI) was set at 99%, and a p-value greater than 0.05 was considered the threshold level for significance.

Results:-

In the present study, 40 eligible subjects initially participated, but 30 participants were eventually included. Group A consisted of 10 subjects receiving conservative physiotherapy, Group B had 10 participants receiving soft tissue release of liver, and Group C included 10 participants receiving myofascial release of pectoralis minor muscle. There were no statistically significant differences in baseline measurements among the three groups. The t-value for linear distance among Group A, Group B and Group C was 9.585, 16.333 and 14.895 respectively with p-value at $P<0.05$. The t-value for pain among Group A, Group B and Group C was 8.232, 20.358, 9.945 respectively with p-value at $P<0.05$. The t-value for shoulder flexion among Group A, Group B and Group C was -7.606, -12.830, -7.726 respectively with p-value at $P<0.05$. The t-value for QuickDASH among Group A, Group B and Group C was 8.126, 15.073, 16.216 respectively with p-value at $P<0.05$. F-value in all three groups suggests that both forms of soft tissue releases are more effective when compared, with the soft tissue release of liver slightly more effective than the myofascial release of the pectoralis minor muscle.

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