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To compare the efficacy of two different soft tissue release techniques in treating individuals with terminal shoulder flexion dysfunction: A Critical Review

Dr. Ravindra Sharma, PhD Scholar, SBS University, Dehradun
Dr. Maneesh Arora, Professor & Dean, SBS University, Dehradun
Dr. Dharam P Pandey, HOD, Manipal Hospital, New Delhi

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ABSTRACT

This review aimed to explore the current literature on effect of liver soft tissue release technique and myofascial release of pectoralis minor muscle on the flexion movement of the shoulder. The studies published in the English language between 2007 and 2022 were included based on a search of the databases PEDro, PubMed, and Google Scholar. Studies that examined the length of pectoralis minor muscle due to altered biomechanics, visceral manipulation techniques, transcutaneous electrical nerve stimulation studies on shoulder pathologies and myofascial release techniques were included in this literature review. We found a total of 39 studies that were describing the interventions included in this literature review. Osteopathic interventions have been found to have positive outcomes in 18 studies whereas 11 studies suggest that the altered length of the pectoralis minor muscle plays an important role in causing dysfunction in and around the shoulder.

However, there is a scarcity of studies on the effect of liver soft tissue release techniques on the shoulder and structures around it. There is scope for future research to demonstrate the effect of liver soft tissue release on the functionality of the structures around the shoulder.

Categories: Physical Medicine & Rehabilitation

Keywords: Osteopathy, Soft tissue release, Manual therapy, Myofascial Release

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 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 [6]. 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 [7]. 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 [8].

REVIEW

Borstad JD (2022) conducted a two group comparative study on 50 subjects without shoulder pain to compare the scapular kinematics during arm elevation between groups distinguished by pectoralis minor resting length. The volunteers were divided into long or short groups according to normalized pectoralis minor resting length. Both the groups were compared for 3-dimensional scapular orientation relative to the trunk at arm elevation angles of 30°, 60°, 90°, and 120°. They concluded that an adaptively short pectoralis minor may influence scapular kinematics and is therefore a potential mechanism for subacromial impingement.

Nijal M Parmar et al (2022) conducted a Correlational in healthy college going students to study association of pulmonary function test with pectoralis minor tightness and forward head posture. A total of 120 subjects of age group 18-25 years were included in the study. Before data collection, Pre-evaluation of the subject was done by using Flexi-ruler for kyphotic & lordotic curve, Pectoralis minor tightness test by measure tape in both upper limb and Inter-scapular distance. The procedure includes a pulmonary function test in which measurements include FEV1, FVC, MVV, FEV1/FVC & MVV*40/FEV1 by using a computerised spirometer for diagnostic spirometry. The result shows a poor but positive correlation between Inter-scapular distances, Flexi curve angle, and all pulmonary function test measurements between interscapular and pulmonary function test. They concluded that pulmonary function parameters show poor correlation which means the respiratory mechanism is not being impaired due to tightness of pectoralis minor muscle & forward head posture of healthy individuals aged 18 to 25 years.

Salem YS (2022) conducted a study to check the effect of visceral manipulation on liver enzymes children. The aim of the study was to reduce the abnormal ratio of liver enzymes in cerebral palsy children by osteopathic approach. He conducted his study on two children aiming to reduce their liver enzymes as they were on abnormal value as a cause of anti-epileptic drug with the use of visceral manipulation techniques especially liver technique and by investigation using liver enzymes as Alanine Aminotransferase (ALT) and Aspartate Aminotransferase (AST). They concluded that there was dropping of the values to normal ratio by the use of visceral manipulation.

Alshami et al (2021) conducted a single blind randomized clinical trial on forty participants to check the effects of mobilisation with movement in patients with neck pain and scapular

dyskinesis in adjunct to corrective exercises and taping. The subjects were given scapulothoracic mobilization with movement in the three study protocol. Subjects were randomly assigned to two groups. First group was experimental group that received scapulothoracic mobilization with movement in adjunct to corrective exercises and taping. Second group was the comparison group that received only corrective exercises in adjunct to taping. They measured VAS, ROM and Neck disability index both pretest and posttest. They concluded that there were no significant differences in the outcomes of both the groups.

Auger K (2021) conducted a study to check the effects of osteopathic manipulative treatment and bio-electromagnetic energy regulation therapy on lower back pain in adults. They conducted the study on 40 employees and students at a medical college by email. Participants were randomly assigned to four treatment groups: an osteopathic manipulative treatment only, bio-electromagnetic energy regulation therapy only, osteopathic manipulative treatment alongwith bio-electromagnetic energy regulation therapy or control (light touch and sham). Treatments were given regularly over a 3 week period. Data on LBP and quality of life were collected through the visual analog scale, short form 12 item health surveys and Oswestry Low Back Pain Questionnaire/Oswestry Disability Index prior to treatment and immediately after the 3 week intervention protocol. They concluded that the data from this study shows additive potential effects of combination therapy for management of low back pain.

Farra FD et al (2021) conducted a systematic review and meta analysis of effectiveness of osteopathic interventions in the management of non specific chronic low back pain for pain and functional status. They searched six databases for randomized controlled trials. Each study was assessed using the Cochrane risk of bias. The effect size was calculated after the treatment for 12 weeks and follow up. 10 articles were included. Studies investigated osteopathic manipulative treatment (OMT, n = 6), myofascial release (MFR, n =2), craniosacral treatment (CST, n = 1) and osteopathic visceral manipulation (OVM, n = 1). They concluded that osteopathy is effective in pain levels and functional status improvements in non specific chronic low back pain patients. MFR reported better level of evidence for pain reduction if compared to other interventions.

Francesca et al (2021) conducted a retrospective review of patients treated at a single physical therapy centre in 2019. The 126 patient records were divided into two groups: one treated with manipulative techniques of the fascia with thrust movement and another who were treated without thrust movement. With the help of high resolution ultrasound, kidney mobility scores were analyzed after one month of follow up. They concluded that manual treatments for nonspecific LBP associated with UTI resulted in improved mobility and symptoms for patients in this retrospective study, including a significant increase in kidney mobility.

Hill N Cl et al (2021) conducted a study to check the effects of osteopathic manipulation on gait asymmetry. Forty-two healthy adults (20 males, 22 females) aged between 18 – 35 years were recruited and osteopathic manipulation on the patterns of Zink method were performed targeting somatic dysfunctions identified in the screening exam. They utilized muscle energy for pelvic dysfunctions, high-velocity low-amplitude for the spine, articulatory for rib dysfunctions, and facilitated positional release for sacral dysfunctions. They concluded that osteopathic structural examinations and treatment of somatic dysfunctions may improve gait symmetry even in asymptomatic individuals and even aid in recovery after surgery.

Mariyam Farzana S et al (2021) conducted a study on 100 aged between 18-25 years participants to find out the prevalence of pectoralis minor muscle tightness among students having neck pain. Participants were categorized into symptomatic and asymptomatic group. Neck pain was assessed by NORTHWICK PARK neck pain questionnaire. The pectoralis minor muscle length

was measured using a rigid standard transparent right angle (height of 12 cm and base of 8 cam) for both symptomatic and asymptomatic group and were correlated with the neck pain score. After analysis they concluded that neck pain has influence on the pectoralis muscle length.

Rotter G (2021) conducted an observational trial with follow-up in 40 patients to assess the data on pain, functioning, and quality of life in patients suffering from neck pain, chronic low back pain, chronic shoulder pain, or chronic knee pain who were given osteopathic medicine treatment alongwith the German physician routine care setting. After 26 weeks, they observed that there was an improvement in the VAS pain score in the whole population and these changes persisted through 52 weeks. They concluded that osteopathic medicine treatment gave beneficial changes along and after in addition to routine care. They also suggested that more randomized controlled trials are strongly needed to compare the effectiveness of osteopathic medicine and standard care interventions in treating chronic musculoskeletal pain diseases.

Patel C et al (2020) conducted a study on presence of pectoralis minor tightness in healthy collegiate individuals. The aim of this study was to assess the presence of pectoralis minor tightness in healthy collegiate individuals. Fifty three healthy male collegiate individuals aged between 18 to 22 years were taken. The tightness for the pectoralis minor muscle was evaluated by using the pectoralis minor length test. Measurements were made in supine position where the linear distance from the treatment table to the posterior aspect of the acromion was measured by protractor. A distance greater than 2.6 cm would suggest the muscle head shortened. Measurements were also made with a digital vernier calliper. Range of motion measurements and demographic information of the students were also recorded. They concluded that there is presence of pectoralis minor tightness in healthy collegiate individuals.

Da Silva WB (2020) conducted a systematic research study to check the efficacy of osteopathy in patients with type 2 diabetes. The visceral techniques of osteopathic manipulation were performed with the sole objective of acting on the mobility and visceral motility were administered twice a week for eight weeks. They concluded that visceral osteopathy technique was effective in controlling blood glucose indices in the individual treated.

Ghillodia (2020) had conducted a study on fourteen subjects who were suffering from right shoulder adhesive capsulitis in order to evaluate effects of visceral manipulation in adhesive capsulitis. After receiving placebo visceral manipulation of liver for the first two weeks, the subjects were administered visceral manipulation of the liver for the next two weeks. Outcome measures were measured on the basis of readings of shoulder pain and disability index and modified sphygmomanometer. They concluded that two sessions of liver manipulations might be beneficial in improving the shoulder pain and mobility in patients with adhesive capsulitis.

Kalyani et al (2020) conducted a randomized controlled trial study on 76 patients to check the effects of transcutaneous electrical nerve stimulation on pain and disability among the patients of rotator cuff disease. After enumerative sampling and block randomization the patients were allocated to two groups. Group A, the experimental group received transcutaneous electrical nerve stimulation alongwith the standard regime of shoulder range of motion exercises. Group B, received standard regime of shoulder range of motion exercises alongwith medication. They concluded that transcutaneous electrical nerve stimulation is efficient in rotator cuff disease.

Laudner et al (2020) conducted a randomized controlled trial study on 21 physically active college volunteers without any shoulder pain to evaluate the effects of self myofascial release technique in adjunct to pectoralis minor muscle movement technique. All participants were allocated to two groups. The intervention group received one application of self soft tissue mobilization for the pectoralis minor muscle. The placebo group received the same protocol as

intervention group but with less pressure. They concluded that self myofascial release with movement was effective in improving the glenohumeral joint range of motion and pectoralis minor length and it may help in rehabilitation of forward scapular posture.

Muhle A et al (2020) conducted a study on Pectoralis minor length measurements in three different scapula positions. A total of 144 participants of age group 18-24 years were included in the study. The scapular measurements were made in resting position, in tilting position (both anterior tilt and posterior tilt). They concluded that the significant differences between the active and posterior tilt positions suggested that optimal muscle length of PM was affected by the inner range strength of the lower fibres of Trapezius.

Rehman et al (2020) conducted a systematic review to evaluate the quality of evidence documenting the effectiveness of osteopathic manual therapy for patients with chronic non cancer pain using the Grading of Recommendations Assessment, Development, and Evaluation approach, and to evaluate the efficacy of osteopathic manual therapy in patients with chronic non cancer pain through a meta-analysis of pooled data from previous studies. Sixteen randomized controlled trials were eligible for data extraction. They concluded that osteopathic manual therapy is effective for chronic non cancer pain patients and there was a significant association between visceral osteopathic manual therapy reduced pain severity and disability.

Saeed MM Z et al (2020) conducted a systematic review to evaluate the impact of visceral mobilization or manipulation in improving low back pain through standard protocols. They searched literature electronically on various databases between 2011 and 2019. The studies that were included were randomized controlled trials that investigated the effectiveness of visceral manipulation or mobilization, wether in comparison with different modalities or alongwith sham/placebo treatment. They concluded that there is significant and strong effectiveness of visceral manipulation and mobilization. However, more studies should be conducted in future due to scarcity of literature in domains.

Tramontano et al (2020) conducted a randomized controlled single blinded study with a follow up of 2 months on 35 participants who were suffering from somatic dysfunction alongwith patellofemoral pain syndrome. They investigated the effects of osteopathic manipulative therapy on the pain reduction. The subjects were grouped into Group A was osteopathic manipulative group and Group B was placebo group. Both groups received interventions for 4 sessions. They concluded that due to vast difference in the VAS, osteopathic manipulative therapy can cause decrease in patellofemoral pain.

Zago et al (2020) conducted a study on 24 healthy males with a mean age of 22 years in order to check effects of fatigue induced scapular dyskinesis in overhead athletes. The athletes performed three different movements of the girdle such as elevation of upper limb, abduction in scapular plane and rotation. All the three movements were performed before and after the fatigue protocol on isokinetic exerciser. They concluded that due to fatigue there is alteration in the scapulohumeral rhythm and range of motion when the movements are performed outside the scapular plane.

Eguaras N et al (2019) conducted a randomized, double-blind placebo-controlled trial to assess the effect of an osteopathic manual technique for the lower esophageal sphincter on GERD symptoms, cervical mobility and on the C4 spinous process pressure pain threshold (PPTs). Sixty subjects suffering from GERD were randomly assigned to either an experimental group who received the osteopathic technique for the lower esophageal sphincter, or to a control group that received a manual contact, which mimicked the osteopathic technique without exerting any

therapeutic force. They concluded that osteopathic treatment is useful for improving symptoms of GERD.

Gurudut P (2019) conducted a study on 18 subjects to evaluate the combined effect of Myofascial release technique in adjunct with Maitland mobilization and conventional treatment on frozen shoulder subjects. The subjects were randomly allocated into the control group and the Experimental group. Control group was administered interventions such as hot moist pack and Maitland's mobilization for shoulder joint. The experimental group received Myofascial release in adjunct with the control group interventions. Interventions were given for 5 sessions consecutively. They concluded that addition of Myofascial release technique treatment as an adjunct to conventional treatment will have better benefits and faster recovery in patients with frozen shoulder.

Paramdeep et al (2019) conducted a study on thirty patients to compare the effectiveness of myofascial release in adjunct with strengthening and stretching exercises in adjunct with strengthening to improve the rounded shoulder posture. The subjects were divided equally among two groups by convenient sampling. Group A received myofascial release with strengthening exercises and group B received stretching with strengthening exercises. Treatment was given for 10 days in 2 weeks. From the results they concluded that myofascial release with strengthening was more effective than stretching with strengthening in improving rounded shoulder posture.

Ashiyat K. et al (2018) conducted a correlation study on seventy seven physiotherapy undergraduates for smartphone addiction, craniovertebral angle, scapular dyskinesis, and selected arthropometric variables. The subjects were selected on the basis of purposive sampling technique. The addiction level for smartphone use was assessed using the Smartphone Addiction Scale. Photographic method was used for assessment of craniovertebral angle and scapular dyskinesis. They concluded that a high level of smartphone addiction reduces the craniovertebral angle and increases scapular dyskinesis.

Guillaud et al (2018) conducted a systematic review to check out the reliability of diagnosis alongwith the clinical efficacy of visceral osteopathy. They searched the databases from online resources through December 2017 and included only those studies that were randomized control studies or crossover studies on unhealthy subjects. Out of all the databases only 08 studies on reliability and 06 studies on efficacy of visceral osteopathy were included. They concluded that there is a need for less availability of well-conducted and sound evidence on the reliability and the efficacy of techniques in visceral osteopathy.

Fernandes WVB (2018) conducted An assessor-blinded, two-arm, randomized, placebo-controlled trial on 76 individuals aged between 18-65 years to analyze the effects of a six-week osteopathic visceral manipulation program on the flexion-relaxation phenomenon in individuals with non-specific chronic low back pain and functional constipation. The participants were randomly grouped into two groups. First group received osteopathic visceral manipulation whereas the second group received sham osteopathic visceral manipulation for three months. They concluded that this would be the first trial to analyze the clinical response and electromyographic signals during the flexion relaxation phenomenon after OVM.

Katana et al (2018) conducted a study on 277 patients having shoulder pain due to different pathologies such as adhesive capsulitis, frozen shoulder, calcific tendinitis etc to check efficiency of conventional physical treatment and Mulligan mobilization in adjunct with acupuncture. The patients were grouped into two groups on the basis of selection criteria. One group received conventional physiotherapy protocol for ten days whereas the other group received conventional

physiotherapy alongwith Mulligan joint mobilization in adjunct to acupuncture. Treatment efficiency was checked on WAADL scale. They concluded that conventional physiotherapy in addition to Mulligan mobilization with adjunct to acupuncture resulted in shorter treatment durations and high WAADL scores.

Silva et al (2018) had conducted a randomized double blind placebo controlled electromyographic study on 28 patients to check the effects of osteopathic visceral manipulation of stomach and liver on pain, cervical range of motion and activity of upper trapezius in patients suffering from non specific neck pain and dyspepsia. The patients were divided into two groups and the effects were evaluated immediately and after 7 days of osteopathic visceral manipulation. They concluded that single session of osteopathic visceral manipulation showed decrease in pain and increase in the electromyographic amplitude of upper trapezius.

Hodgins JL (2017) conducted a cross sectional study on forty nine healthy adolescent baseball players to examine the scapulothoracic region in throwing and non throwing shoulder, especially the pectoralis minor length as malposition of the scapula is commonly associated with the rotational deficits and hence risk of injury in overhead athletes. Pectoralis minor length were conducted while players were supine with arms at rest, sitting with arms at rest, and in sitting alongwith shoulders positioned in external rotation. The measurements were recorded by using a digital caliper for measuring the table-to-acromion distance. Measurements related to static position of the scapula and their ranges of motion were recorded. They concluded that there is significant difference in the pectoralis minor length when compared to non throwing shoulder and hence routine stretching of the pectoralis minor should be encouraged in the overhead athletes.

Sil-ah Choi (2017) conducted a study on relationship between rounded shoulder posture and the biceps brachii length, elbow joint angle (EJA), pectoralis muscle length, humeral head anterior translation (HHAT), glenohumeral range of motion. Twelve subjects with rounded shoulder posture were recruited who had a distance of ≥ 2.5 cm from the posterior aspect of the acromion to the table in the supine position. The examiner measured each of the following parameters twice: rounded shoulder posture, biceps brachii length, elbow joint angle, pectoralis minor length, pectoralis major length, humeral head anterior translation, glenohumeral internal rotation, external rotation. Pearson's correlation coefficient(r) was used to assess the correlation between rounded shoulder posture and all the variables. They concluded that the biceps brachii length, pectoralis minor length, and humeral head anterior translation could be used to evaluate patients with rounded shoulder posture. Better understanding of the correlation between these factors and rounded shoulder posture could help in the development of effective methods to treat patients with this condition in clinical management.

Tamer S et al (2016) conducted a study on 39 patients to check the addition of osteopathic manipulation technique to osteopathic visceral mobilisation in patients with chronic non-specific low back pain. The patients were divided into two groups. The first group received soft-tissue mobilization, muscle energy techniques, and mobilization for lumbar segment procedures. The visceral group received the visceral mobilisation in addition to thoracic lymphatic pump, liver pump, pelvic floor, and respiratory diaphragm procedures. Each patient received treatment twice per week for 5 weeks. The outcome measures were visual analog scale for pain intensity and the Short Form-36 for quality of life. They concluded that the visceral procedures improved blood circulation throughout the body and eliminated congesting bodily fluids. They also stated that these findings demonstrate the need for further examination of viscerosomatic interactions in musculoskeletal disorders.

Boruah et al (2015) conducted a study to check the effects of joint mobilization in adhesive capsulitis on fifty subjects who were randomly allocated to two groups. First group received mobilization with movement along with conventional physiotherapy in the form of hot packs and pendular exercises. Second group received scapular mobilization along with the conventional physiotherapy. After the completion of protocol of 3 weeks assessment using SPADI and range of motion was taken. They concluded that both mobilization with movement and scapular mobilization technique were effective in reducing pain and functional disability but the mobilization with movement fared better than the scapular mobilization technique.

Don Mo Choi (2015) conducted a randomized controlled trial on 30 subjects to elucidate the effects of release of the thoracolumbar fascia on pain and disability in patients with shoulder pain. The subjects were randomly allocated into two groups. The first group received thoracolumbar fascia release whereas the other group received manual physical therapy. Shoulder pain and disability index and the score on the visual analogue scale were measured before the fascia release and after the fascia release. They concluded that thoracolumbar fascia release was effective in reducing shoulder pain.

Otoshi K (2015) conducted a study on 223 juvenile baseball players aged 9-12 years, to determine the occurrence rate of scapular asymmetry in these juvenile players and its association with development of shoulder injuries. After physical assessment and radiographic assessment of the scapula a questionnaire was filled by the players. After the analysis of the questionnaire he concluded that about seventy five percent players under the age of 12 years had scapular asymmetry and twenty four percent players had associated shoulder mainly arising due to tightness of pectoralis minor muscle.

Schwerla et al (2015) conducted a randomized controlled trial in order to evaluate the effects of osteopathic manipulative therapy in women with persistent LBP and functional disability after childbirth. 80 Female participants aged between 23 and 42 years were divided into two groups. Group A received osteopathic manipulative therapy 4 times at intervals of 2 weeks, with a follow-up after 12 weeks whereas group B was a control group. The main outcome measures were pain intensity and Oswestry Disability Index. They concluded that during 8 weeks, osteopathic manipulative therapy applied 4 times led to clinically relevant positive changes in pain intensity and functional disability in women with postpartum low back pain.

Setoo N Jain (2013) conducted an observational study on fifty patients suffering from periarthritis of the shoulder in order to find out the intra rater reliability and concurrent validity for two different measurements approaches to check the tightness of the pectoralis minor muscle. They concluded that both the methods a) calculating the linear distance between the posterior acromion and the table and b) pectoralis minor length test were equally reliable and valid but the linear distance between the posterior acromion and the table method was more reliable to measure the tightness.

Orrock PJ (2013) conducted a systematic literature review on clinical research on chronic non specific low back pain. Various databases were searched using various terms in combinations. They searched 809 papers and after the exclusion criteria was checked only 37 full text articles. With further detailed analysis of the full text articles 35 articles were excluded and hence only 02 articles on the basis of primary outcomes, duration of treatment, number of treatment sessions and follow up. They concluded that there were only two studies that assessed the the effect of the manual therapy intervention and hence trials need include an appropriate control and utilize an intervention that reflects actual practice.

McSweeney TP (2012) conducted a single blinded randomized, within subjects, repeated measures design on 15 asymptomatic subjects to investigate the immediate effects of osteopathic visceral mobilization on pressure pain thresholds which were measured at the first lumbar paraspinal musculature and first dorsal interossei before the osteopathic visceral mobilisation and after osteopathic visceral mobilisation of the sigmoid colon. There were significant improvements in pressure pain threshold immediately after the intervention. They concluded that this study provides new experimental evidence that visceral manual therapy can produce immediate hypoalgesia in somatic structures segmentally related to the organ being mobilized, in asymptomatic subjects.

Jeremy S Lewis (2007) conducted a study on forty five subjects with shoulder pain and forty five subjects without pain in order to evaluate an intra rater reliability and accuracy in making diagnosis regarding the pectoralis minor length testing. They made the measurements by making the patient lie in supine lying position. In supine position the linear distance from the examination couch to the posterior aspect of the acromion was measured on two occasions with a difference of thirty minutes time interval by one rater. They concluded that although this length test demonstrates acceptable clinical reliability but lacks clinical reasoning process.

Conclusions

In our review, 11 studies suggest that length of the pectoralis minor muscle plays a vital role in and around the shoulder as its tightness often results in altered movements of shoulder and associated areas. Myofascial release has shown significant improvements in treating the soft tissue structures of the body. Very few studies have revealed the positive effects of soft tissue release of liver on the shoulder and the structures around especially on the right side. There is scope for future research to analyze the significant effect of liver soft tissue on other parameters of neck, shoulder and trunk. Studies with larger sample sizes and homogenous groups along with a clear elaboration of controlling sympathetic parameters strategies should be conducted to gain deeper insights into the topic.

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