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Effect of Visceral Manipulation in Obese Older Adults with Frozen Shoulder

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Abstract

BACKGROUND

Clinically frozen shoulder syndrome is defined as painful restrictions of both active & passive shoulder movements, particularly external rotation a diagnostic feature. Visceral manipulation (VM) is a fascial mobilization technique based on the body's natural motion that targets specific organs. Any restriction in tissues & organs leading to vascular, neural, musculoskeletal, or pulmonary dysfunction. Therefore, the musculoskeletal system limits the worsening as a result of visceral restrictions which will help reduces the intensity of the discomfort. The main physiotherapy protocol consists of electrotherapy, mobilization, and myofascial release are also physiotherapy treatments for frozen shoulder.

OBJECTIVES

To see the efficacy of visceral manipulation in the frozen shoulder in older obese subjects to reduce pain and a change in increased range of motion.

OUTCOME MEASURE

Disabilities of the arm shoulder and hand (DASH) was taken as the primary outcome in accordance with the BMI index, Manual muscle testing, and Numerical pain rating scale. The secondary outcome measure is the range of motion.

RESULT

In our study, it was found that Pain was reduced in both PVM and VM, the Range of motion for shoulder flexion and abduction was improved after VM, and Abduction along with Internal rotation improved through PVM.

CONCLUSION

Our study concludes that Visceral Manipulation is an effective mode of rehabilitation for patients with frozen shoulder as it decreases the intensity of pain with a significant change in the Range of Motion.

Keywords- Frozen shoulder, visceral manipulation, older adults.

INTRODUCTION

Adhesive capsulitis, typically referred to as frozen shoulder, is a pathological state where the bodywork emerges causing stiffness, a rapid increase in the amount of scar tissue or adhesions around the glenohumeral joint leading to discomfort, and dysfunction (1). It is widely recognized that Simon-Emmanuel Duplay was the foremost physician to introduce this form of arthritis, which was termed "scapulohumeral periarthritis." A painful shoulder condition called periarteritis in distinction from arthritis by overall radiological preservation of the joint (2). Patients with frozen shoulder are often diagnosed in their sixth decade of life, and the beginning of symptoms at the age of 40 is quite rare. In women, the condition is a little more prevalent than in men, and the peak age is 56 years. When the primary shoulder has been cured, the contra side of the shoulder affects 6–17% of individuals, within five years (3). Adhesive capsulitis is clinically represented in three stages named freezing stage, adhesive stage, and resolution phase (4). The initial stage lasts between 10 to 30 weeks and is characterized by shoulder discomfort and stiffness without any prior impairment. In the second stage, the stiffness lasts for four to twelve months while the sensation of pain progressively lessens. Significantly less lateral rotation and a considerable decrease in glenohumeral motions. In the last stage, between 12 and 42 months, the range of motion improves on its own (4). Both fundamental and secondary factors might contribute to a frozen shoulder. There is no specific trauma or inciting incident necessary for the basic or idiopathic reason to manifest its own development for adhesive capsulitis. The non-dominant extremity is commonly impacted by the idiopathic frozen shoulder. Post periarticular fracture along with dislocation of the glenohumeral joint or other serious articular trauma to the shoulder, an aftereffect called frozen shoulder is frequently seen (5). It might be a leading cause after surgical procedures such as arthroscopy of the shoulder, rotator cuff repair & shoulder arthroplasty (6).

The prevalence of frozen shoulder is between 3% and 5% in the common people, while it is 20% in individuals with diabetes. Up to 40% to 50% of cases have indicated bilateral involvement (7). According to estimates, women constitute 70% of frozen shoulder than men, age over 40 years, prior trauma, HLA-B27 positive, and glenohumeral joint immobilization are risk factors for frozen shoulder (8). Patients with cerebrovascular conditions are more likely to develop frozen shoulder, particularly those who have undergone surgical treatment after suffering from subarachnoid hemorrhage (9).

The anatomical changes occurring in the patients diagnosed with frozen shoulder consist of deterioration of the synovial layer of the capsule, and a thickened Coracohumeral ligament (CHL) is considered an important finding (10,11). Maximal outward rotation puts the CHL ligaments under strain. The histology of impacted specimens predominantly reveals fibroblasts combined with type 1 & 3 collagen, which has led to the theory that a frozen shoulder is a primary fibrotic condition akin to Dupuytren's disease (12). These fibroblasts were seen to change into myofibroblasts, which are thought to be in charge of capsular contractility (13). It is now well acknowledged that both an inflammatory and a fibrotic process contribute to the development of adhesive capsulitis (14).

An organ-specific fascial mobilization technique based on the body's typical motion is known as visceral manipulation (VM). Viscerosomatic reflexes reduce the intensity of pain and visceral limitations to the tissues supplied by the relative spinal level, which enhances musculoskeletal restrictions. As a result, afferent fibers have an impact on the sympathetic or motor nerve (15). By diagnosing and treating structural and fascial dysfunction, visceral manipulation improves proprioception within the body and alleviates pain and dysfunctional symptoms. The impact of visceral manipulation on right shoulder discomfort, mobility, and functional impairment in people with adhesive capsulitis is supported by research. Local segmental responses including excitation, facilitation, and reflex actions are produced by sensory nerves when they enter the spinal cord and exit locally in the grey matter. In this approach, an excitatory or inhibitory interneuron might act as a bridge between sensory stimulation and a motor or sympathetic nerve (16,17). Visceral manipulation theory includes Motricity (passive adjustments in the location of the organs brought on by arbitrary locomotor activity) (18), Mobility (the ability to move one or more organs or structures within the musculoskeletal system), Motility (slow-frequency, low-amplitude internal movement of the organs). Reduced mobility and motility are caused by adhesion over the fascia or within the joint

(19). Joints, muscles that cause viscerospasm, loss of ligament laxity, and other structures that have adhesive properties may vary substantially.

Based on mobility and motricity, movement physiology for visceral manipulation is discussed. The frontal, sagittal, and transverse planes are used to characterize the movement of the liver (20). The diaphragm directs the lateral portions of the liver inferiorly to medially during inhalation in the frontal plane. The liver rotates in the opposite direction as the clock. The left triangular ligament serves as the movement's sagittotransverse axis. The liver moves the caudal edge posteriorly while tilting anteriorly with the cranial components in the sagittal plane. The coronary ligament roughly intersects the front transverse axis of movement. The inferior vena cava serves as an approximative anatomic reference for the left side rotation of the liver's final transverse plane along a front-sagittal axis (anticlockwise rotation). The movements of motility match the movements of mobility in terms of axis and direction (20).

AIM

The aim of this research is to determine how visceral manipulation affects obese older patients with frozen shoulder.

OBJECTIVES

1. To see the effect of visceral manipulation in the frozen shoulder in older obese subjects to decrease pain, and increase range of motion.

2. To see the effect of placebo visceral manipulation in the frozen shoulder in older obese subjects to decrease pain, and increase range of motion.

3. To see if either visceral manipulation or placebo manipulation is effective.

METHODS

STUDY DESIGN: Correlational Research Design

SAMPLING TECHNIQUE: Survey method

STUDY SUBJECTS: The study's population includes 23 obese participants with a right frozen shoulder as a convenience sample.

STUDY SETTING: Aurangabad district, Maharashtra

INSTRUMENTS USED: Universal goniometer, Inch tape, Weighing machine

INCLUSION CRITERIA

- Age > 60 years old.
- Both males and Female with right frozen shoulder.
- Restricted ROM > 3months
- Obesity: Class I and Class II obese patients.

EXCLUSION CRITERIA:

- History of recent trauma to the neck.
- Recently diagnosed tumors.
- Chronic liver disease (fatty liver).

INTERVENTION

Only with the Institutional Ethical Committee's approval was the study able to get started. The research will be conducted at Sambhaji Nagar. The subjects were screened based on inclusion and exclusion criteria from which 23 participants were taken for data analysis. The patient and their relatives will clearly explain the study's purpose and nature in the language they can understand. The participants were encouraged to clarify any queries regarding the study. Subjects were included in the study only after obtaining a written informed consent form from them or their guardians. The demographic data will be obtained and a detailed assessment was done. All information pertaining to participants admitted to the study such as their age, the surgical notes, and assessment for the frozen shoulder was taken prior to the study.

SR NO	**TECHNIQUE**	**METHOD**	**RATIONALE**
1	Placebo Visceral Manipulation (PVIM)	**Subject position**: supine with abdomen area exposed. **Therapist position**: standing on right side of the subject facing head. **Hand placement**: At right epigastric region or hepatic region, fingertips above sterno-xiphoid line with no tissue movement.	10 minutes, once a week, for two weeks.
2	Visceral Manipulations (VM) are based on three planes. First transverse plane.	**Subject position**: Side-lying position with right side up & both legs bent towards chest. **Therapist position**: Standing on the right side of the subject. **Hand placement:** Therapist's left hand over the right epigastric region (between fifth/tenth rib) & right hand behind the left on the top of the right costal arch (ventrolaterally) **Technique**: The therapist will place her hand to load fascia & connect the liver behind the ribs and follow movement (medial/lateral rolling) of liver in a direction of ease	once a week for 15 minutes, three cycles are repeated.
3	Visceral Manipulations (VM) are based on three planes. Second coronal plane.	**Subject position**: Supine lying **Therapist position**: Standing on the right side of the patient towards the head side. **Hand placement**: The therapist will place her right hand over the $5^{th}/6^{th}$ ribs (fingers pointing towards umbilicus) & left hand below her right hand over the right costal area.	once a week for 15 minutes, three cycles are repeated.

		Technique: The therapist will place her hand such that it will load the fascia to connect the liver behind the rib and follow movement inferiorly (towards the pelvis) & superiorly (towards the right shoulder) of the liver in the direction of ease.	
4	Visceral Manipulations (VM) are based on three planes. Third sagittal plane.	**Subject position**: Side-lying position with right side up and both legs bent towards chest. **Therapist position**: Standing behind the patient towards the head side. **Hand placement**: Left hand vertically on the posterior side of $5^{th}/6^{th}$ rib at the right costal arch and right hand vertically on the anterior side of the right costal arch, whereas both thumbs pointing towards the right shoulder. **Technique**: The therapist will be placing hands such that fascia will be loaded that will connect the liver & follow movement (anterior/posterior rolling) of the liver in a direction of ease.	once a week for 15 minutes, three cycles are repeated.

Placebo manipulation technique

Visceral manipulation in frontal

Visceral manipulation in transversal plane **Visceral manipulation in saggital plane**

OUTCOME MEASURES

Disabilities of the arm, shoulder, and hand (DASH), the BMI index, manual muscle testing, and the numerical pain rating scale are the primary outcome measure, and range of motion is a secondary outcome measure.

1. DASH QUESTIONNAIRE

The DASH's major components are a 30-item disability/symptom scale based on the patient's health state. The items inquire about the difficulty in performing various physical activities due to the arm, shoulder, or hand problem (21 items), the severity of each symptom of pain, activity-related pain, tingling, weakness, and stiffness (5 items), and the impact of the problem on social activities, work, sleep, and self-image (4 items). There were five response possibilities for each item. The total of all item scores is then used to compute a scale score ranging from 0 (no impairment) to 100 (extreme disability). The disability/symptom scale is known as the DASH score.

2. BODY MASS INDEX

The possibility of getting health issues increases with BMI. A BMI of 18.5 or less is considered underweight by the World Health Organization (WHO), whereas a BMI of 25 or above is considered overweight.

3. MANUAL MUSCLE TESTING:

It is used to assess weakness and can distinguish between actual weakness and imbalance or inappropriate endurance. It is also referred to as motor testing, muscle strength grading. It can be assessed manually, functionally, and mechanically.

RESULTS

The present study was conducted to determine the effectiveness of the visceral manipulation technique in the form of improvement in pain using NPRS, increasing ROM using a universal goniometer, manual muscle testing to assess strength, and a DASH questionnaire to see physical, social, and functional items. The paired T-Test was used in the statistical analysis, and the information has been determined in Microsoft Excel 2007.

The demographic details of the participants are mentioned in (Table 1).

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Table 1 Demographic characteristics

Age (mean ± Sd)	71.86 ± 5.68
Gender M/F	10/13
Weight (mean ± Sd)	89.38 ± 9.28
Height (mean ± Sd)	1.64 ± 0.09
BMI (mean ± Sd)	32.93 ± 2.63

M-Male, F-Female, BMI- Body Mass Index

NPRS

Mean± Sd for pre-NPRS was 8.95 ± 0.67 and in week 2 was 6.73 ± 1.74 value for comparison of change between pre-treatment and week 2 was 0.005, which is statistically significant (Table 2). Mean± Sd for Week 2 NPRS was 6.73 ± 1.74 and in Week 4 was 1.91 ± 0.99. The p value for the comparison of change between week 2 and week 4 was 0.0014, which is statistically significant.

Table 2 NPRS Score between pre and post-for shoulder joint

Mean	***Pre***	***week2***	***week 4***
Variance	8.956521739	6.739130435	1.913043478
Observations	0.679841897	1.747035573	0.992094862
Pooled Variance	23	23	23
Hypothesized Mean Difference	1.213438735	1.369565217	
Df	0	0	
t Stat	44	44	
P(T<=t) one-tail	6.826252257	13.9846855	
t Critical one-tail	1.02791E-08	4.23711E-18	
P(T<=t) two-tail	1.680229977	1.680229977	
t Critical two-tail	**0.005**	**0.0014**	

Range Of Motion

Mean± Sd for ROM Flexion pre was 43.69 ± 6.5 and in week 2 was 49.65 ± 8.61. The p value for comparison of change between pre and week 2 was 0.005, which is statistically significant. Mean± Sd for Week 2 Shoulder Flexion was 49.65 ± 8+61 and in Week 4 was 145.26 ± 23.29. P value for comparison of change between week 2 and week 4 was 0.00145, which is statistically significant (Table No.3)

Table 3 ROM flexion pre and post score for shoulder joint

Mean	***Pre***	***week2***	***week 4***
Variance	43.69565217	49.65217391	145.2608696
Observations	6.5	8.614624506	23.29288538
Pooled Variance	23	23	23
Hypothesized Mean Difference	58.59288538	307.0375494	
Df	0	0	
t Stat	44	44	
P(T<=t) one-tail	1.63887737	-18.5033587	
t Critical one-tail	0.005730202	1.11E+12	
P(T<=t) two-tail	1.680229977	1.680229977	
t Critical two-tail	**0.0114**	**0.000145**	

Shoulder abduction

Mean± Sd for ROM Shoulder Abduction pre was 49.17 ± 4.56 and in week 2 was 55 ± 4.56. The p value for comparison of change between pre and week 2 was 0.00, which is statistically significant. Mean± Sd for Week 2 Shoulder Abduction was 55 ± 5.32 and in week 4 was 143.04 ± 21.4. P value for comparison of change between week 2 and week 4 was 0.0001, which is

statistically significant. (Table 4).

Table 4 Shoulder Abduction pre and post-score for shoulder joint

	Pre	***week2***	***week 4***
Variance	49.173913	55	143.04348
Observations	4.5674704	5.3236364	21.434783
Pooled Variance	23	23	23
Hypothesized Mean Difference	24.620553	245.20356	
Df	0	0	
t Stat	44	44	
P(T<=t) one-tail	4.9817774	-19.067016	
t Critical one-tail	0.0001264	3.41E+13	

P(T<=t) two-tail	1.68023	1.68023
t Critical two-tail	**0.0002**	**0.0001**

Manual muscle testing

Mean± Sd for MMT Shoulder Flexion pre was 1.43 ± 0.50 and in week 2 was 1.73 ± 0.44. P value for comparison of change between pre and week 2 was 0.03, which is not statistically significant. Mean± Sd for Week 2 Shoulder Flexion was 1.73 ± 0.44 and in week 4 was 4.26 ± 1.28. P value for comparison of change between week 2 and week 4 was 2.33, which is not statistically significant. (Table 5)

Table 5 MMT flexion pre and post-score for shoulder joint

Mean	***Pre***	***week2***	***week 4***
Variance	1.4347826	1.7391304	4.2608696
Observations	0.506917	0.441581	1.2861265
Pooled Variance	23	23	23
Hypothesized Mean Difference	0.229249	0.9288538	
Df	0	0	
t Stat	44	44	
P(T<=t) one-tail	-2.1555862	-8.8731006	
t Critical one-tail	0.0183129	1.17E-11	
P(T<=t) two-tail	1.68023	1.68023	
t Critical two-tail	**0.036626**	0.9288538	

DASH Questionnaire

Mean± Sd for DASH pre was 61.47 ± 14.9 and in week 2 was 59.99 ± 7.0. P value for comparison of change between pre and week 2 was 0.006, which is statistically significant. Mean± Sd for Week 2 DASH was 59.99 ± 7.0 and in week 4 was 34.93 ± 6.64. P value for comparison of change between week 2 and week 4 was 0.005, which is statistically significant. (Table 6)

Table 6 DASH Questionnaire score

Mean	**Week 1**	***week2***	***week 4***
Variance	61.475217	59.991304	34.932174
Observations	14.942896	7.0804846	6.6455854

Pooled Variance	23	23	23
Hypothesized Mean Difference	136.30472	47.168169	
Df	0	0	
t Stat	44	44	
P(T<=t) one-tail	0.4310245	12.373439	
t Critical one-tail	0.3342775	3.17E-16	
P(T<=t) two-tail	1.68023	1.68023	
t Critical two-tail	**0.006**	**0.005**	

DISCUSSION

In our study, we observed that pain was decreased following both PVM and VM manipulation methods. VM enhanced the range of motion for shoulder flexion and abduction, whereas PVM increased abduction and internal rotation. Finally, the DASH score improved in pre-and post-treatment ways. In contrast, after two weeks of the visceral manipulation, was an increase in flexion, exterior rotation, and interior rotation of the right shoulder as recorded through the goniometer, as well as a significant improvement in shoulder activity levels and pain as calculated by (SPADI) score (21).

Similar studies by Silva et al. on the relationship between neck discomfort, neck range of motion, and trapezius muscle activity indicated a relationship between a decrease in pain and an increase in upper trapezius activity. The changes in the range of motion brought on by visceral manipulation may be related to the tension release mechanism in the membrane that supports the visceral and muscular systems. enhancing internal proprioceptive transmission, which reduces pain and dysfunctional symptoms (22).

Several studies have found favorable outcomes after mobilization of the shoulder alone or in combination with active exercises or local steroid injections. In those studies, improved ROM of the shoulder, reduction in shoulder pain, along with improvement in shoulder function were reported (23).

Although there is growing interest in visceral manipulation techniques, so we have tried to establish the effect in our research group.

CONCLUSION

The Study concludes that Visceral Manipulation is effective in reducing pain and results in a significant increase in the Range of Motion in Obese Patients with Frozen shoulders. It thus proves to be effective and can be applied in subjects with a limited range of motion and those in pain and stiffness. Also, further studies can be conducted with a larger sample size, and thus manipulations can be applied to different shoulder conditions as well.

LIMITATION

The study can be analyzed with the controlled group as in our study there was no controlled group present. In our study the Sample Size was less, however, a larger sample size could have been generated for a greater result. Placebo effect or spontaneous resolution cannot be dissociated from the treatment effect. No follow-up Data was collected, so it was impossible to determine the treatment's long-term effect.

CONFLICT OF INTEREST - There is no conflict of interest.

SOURCE OF FUNDING – None.

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