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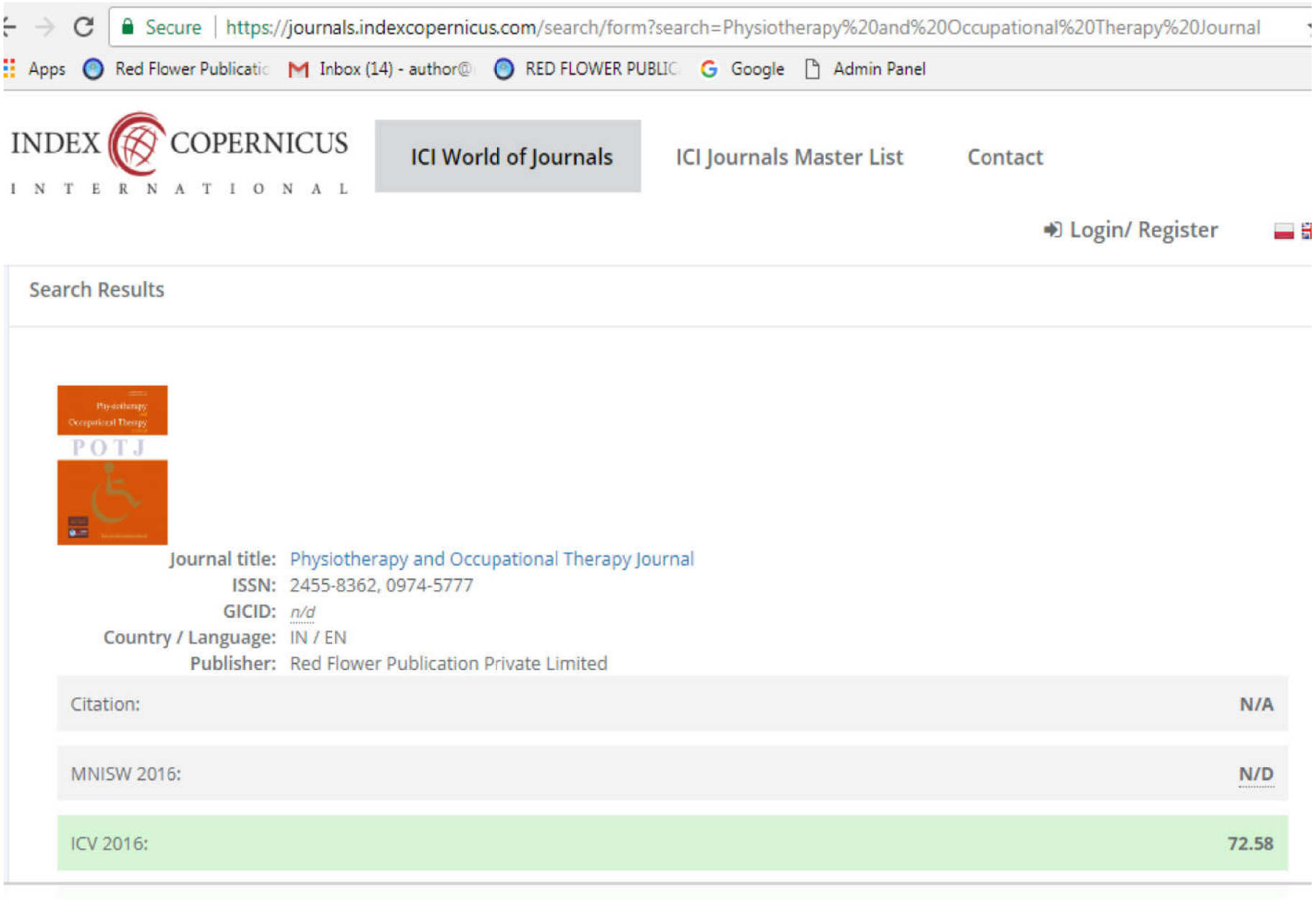
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Original Article

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To Compare the Effectiveness of Cyriax Deep Friction Massage and End Range Mobilization Technique in Adhesive Capsulitis

Dobhal Ashish[1], Khurana Barkha[2], Agarwal Vaibhav[3]

Abstract

Introduction: Adhesive capsulitis is one of the most common cause of shoulder pain and disability in general population. Reeves described three stages of the disease: Stage 1 is freezing phase which is mainly characterized by pain Stage 2 is frozen phase, in which pain gradually subsides, but the stiffness is marked Stage 3 is thawing phase, in which pain resolves and improvement in range of motion (ROM) appears.

Need of Study: There are various studies that shows effectiveness of Cyriax Deep Friction Massage and effectiveness of End Range Mobilization in adhesive capsulitis, but there is no literature available comparison of these two techniques.So the present study is intended to compare these two techniques

Methodology: It is comparative in nature. *Sampling:* Randomized sampling technique was adopted in the present study. *Sample Size:* Total of 60 subjects with adhesive capsulitis were included in the study and then they were grouped into two groups A and B with 30 in each group.

Result: The result of the study suggests that 't' value is highly significant in each pair of both Group A and Group B. Both the groups, Group A and Group B improved in VAS, Active ROM mainly abduction, external and internal rotation of the shoulder joint and SPADI, which reveals that the treatments given to the subjects of both groups are effective.

Discussion: On comparing the result of both the groups, it was found that changes in VAS, SPADI Pain, SPADI Disability and SPADI Total and active range of motion of abduction, external rotation and internal rotation were more significant in Group B than that of Group A. This shows that the treatment given to Group B is more effective than that of Group A. Thus null hypothesis is rejected and alternative hypothesis is accepted.

Conclusion: This study shows that end range mobilization with hot packs provide better results as compared to Cyriax deep friction massage with hot packs.

Keywords: Cyriax Deep Friction Massage; End Range Mobilization Technique; Adhesive Capsulitis.

Introduction

Adhesive capsulitis is one of the most common cause of shoulder pain and disability in general population.

Adhesive capsulitis is also called, frozen shoulder syndrome, periarticular adhesions, pericapsulitis, irritative capsulitis, periarthritis of the shoulder, periarthritis scapulo-humerale, humero scapular fibrositis, bursitis calcerea, Duplay's syndrome, shoulder portion of sholder -hand syndrome and painful and stiff shoulder.

It is a syndrome defined in its purest sense as idiopathic painful restriction of shoulder movements that results in global restriction of the glenohumeral joint. It has also been described as a condition of "unknown etiology" characterized by gradual, progressive painful restriction of all shoulder motion with spontaneous restoration of partial or complete motion over months to years.

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It is a common disorder with an estimated incidence of 3% to 5% of the general population. It is the main cause of shoulder pain and dysfunction in middle aged and elderly population [3]. Adhesive capsulitis was first described by Duplay in 1872 as "periarthritis scapulo-humerale". He termed the clinical entity of frozen shoulder as "periarthritis scapulo-humerale" theorizing the pathologic condition was in periarticular structures.

J.S. Neviaser in 1945 first introduced the term "Adhesive Capsulitis" due to capsular thickening and contracture. He described the condition as a contracted thickened joint capsule that seemed to be drawn tightly around the humeral head with a relative loss of synovial fluid and chronic inflammatory changes within the synovial layer of the capsule.

Reeves described three stages of the disease: Stage 1 is freezing phase which is mainly characterized by pain usually lasting 2-9 months. Stage 2 is frozen phase, in which pain gradually subsides, but the stiffness is marked lasting 4-12 months. Stage 3 is thawing phase, in which pain resolves and improvement in range of motion (ROM) appears.These movements are restricted in capsular pattern with proportionally greater loss of external rotation than abduction and internal rotation.

However, most of the notable loss of ROM is caused by disease in structures outside the synovial capsule of glenohumeral joint, such as the coracohumeral ligament, soft tissues in the rotator interval, the subscapularis muscle and the subacromial bursa.

Cyriax Deep Transverse Friction Massage is a type of connective tissue massage developed in an empirical way by Cyriax. It is applied by the finger (s) directly to the lesion and transverse to the direction of the fibers. Friction is slower in effect but leads to a physically more fundamental resolution, resulting in more permanent cure and less recurrence.

According to Cyriax, Friction also leads to increased destruction of pain provoking metabolites, such as Lewis's substances. This metabolite, if present in too high a concentration, provokes ischemia and pain. According to Cynthia Liesdek et al in 1997, showed good improvement in adhesive capsulitis and stated that it should be applied in every day practice by physiotherapists.

Passive Joint Mobilization is passive skilled manual therapy technique applied to joints and related soft tissues at varying speeds and amplitudes using physiologic or accessory motion for therapeutic purposes. The Deep Friction applies therapeutic movement over only a very small area. The movement is more effective for being so concentrated. Indeed, greater movement may easily be imparted locally by the physiotherapist's finger than could ever have been obtained by any amount of the most strenuous exercises and it moves those very tissues on which manipulation has no effect. On account of its purely local action, deep friction must be applied to the exact site of the lesion.

The principles of Cyriax Deep Friction Massage are as follows:

a. The right spot must be found.
b. The physiotherapist's finger and patient's skin must move as one.
c. The friction must be given across the fibers composing the affected structures.
d. The friction must be given with sufficient sweep.
e. The friction must reach deeply enough.
f. Suitable position for patient.
g. Muscles must be kept relaxed.
h. Tendons sheath must be taut.

Joint glide (mobilization) stretching procedures, as when the translatoric slide component of the bones is used to stretch a tight capsule, are safer.

Joint motion provides sensory input relative to:

- Static position and sense of speed of movement (type I found in superficial joint capsule)
- Change of speed of movement (type II receptors found in deep layers of the joint capsule and articular fat pads)
- Sense of direction of movement (type I and III receptors; type III found in joint ligaments)
- Regulation of muscle tone (type I, II, and III receptors)
- Nociceptive stimuli (type IV receptors found in the fibrous capsule, ligaments, articular fat pads, periosteum, and walls of blood vessels)

Need of Study

There are various studies that show effectiveness of Cyriax Deep Friction Massage and effectiveness of End Range Mobilization in adhesive capsulitis, but there is no literature available comparison of these two techniques. So, the present study is intended to compare the effectiveness of the Cyriax Deep Friction Massage versus End Range Mobilization Technique in Adhesive Capsulitis.

Objectives

1. To evaluate the effectiveness of Cyriax deep friction massage in relation to pain, range of motion and functional activity in adhesive capsulitis.
2. To evaluate the effectiveness of the end range mobilization techniques in relation to pain, range of motion and functional activity in adhesive capsulitis.
3. To compare the effectiveness of Cyriax deep friction massage and end range mobilization in relation to pain, range of motion and functional activity in adhesive capsulitis.

Hypothesis

Null hypothesis

There will be no significant difference between the effectiveness of Cyriax deep friction massage and end range mobilization techniques on pain, range of motion and functional activity in adhesive capsulitis.

Experimental Hypothesis

There will be significant difference between the effectiveness of Cyriax deep friction massage and end range mobilization technique on pain, range of motion and functional activity in adhesive capsulitis.

Methodology

Study Design

It is comparative in nature.

Study Setting

The study was conducted at Dolphin health centre Prayatna physiotherapy and rehabilitation centre, (Dehradun)

Sampling

Randomized sampling technique was adopted in the present study.

Sample Size

Total of 60 subjects with adhesive capsulitis were included in the study and then they were grouped into two groups A and B with 30 in each group.

Inclusion Criteria

1. Age 40 – 60 years, both genders
2. Idiopathic and unilateral adhesive capsulitis cases.
3. Normal radiographic findings.
4. Having painful stiff shoulder for at least 3 months of duration.
5. Having restriction of more than 50% in passive shoulder flexion, abduction and external rotation compared with the opposite side.
6. Subject not received any treatments or exercises for previous 1 month.

Exclusion Criteria

1. Diabetic patients.
2. Painful stiff shoulder after a major trauma.
3. Any neurological deficits affecting shoulder function in activities of daily living.
4. Adhesive capsulitis secondary to shoulder dislocation, fracture, previous surgery on affected shoulder, reflex sympathetic dystrophy, rotator cuff tears and any tumors.
5. Patients refused to stop using NSAID's and corticosteroids throughout treatment.
6. Un co - operative patients.

Instrumentation: Universal Goniometer, hot packs, couch, stool, pillow, towels.

Variables of the Study

Independent Variables

1. Cyriax Deep Friction Massage.
2. End Range Mobilization.

Dependent Variables

1. Pain
2. Range of motion
3. SPADI questionnaire.

Procedure

Group A received Cyriax deep friction massage with hot packs thrice a week for three weeks.

Group B received end range mobilization with hot packs thrice a week for three weeks.

Pre test and post test was done to assess pain, range of motion and functional ability.

Outcome Measures

1. Pain was measured by VAS score.
2. Range of motion was measured by universal goniometer.
3. Functional activity was measured by SPADI questionnaire.

Group A

Before starting the treatment examination of the patient was done, and data was recorded.

Hot Packs

The subject was placed in supine position and then moist heat therapy was given to the affected shoulder wrapped in a towel for 20 minutes.

Cyriax Deep Friction Massage

The friction massage was achieved by frictioning over the surface with the practioner's index finger. Cyriax deep friction massage was given to supraspinatus tendon, infraspinatus tendon, subscapularis tendon, pectoralis major muscle for 20 minutes. The subjects were treated three times a week on alternate days for 3 weeks.

Deep Friction Massage for Supraspinatus Tendon

Patient's posture: The patient bends her elbow to a right angle and puts her forearm behind her back, her elbow well into her side. She then leans back in the half lying position, thus fixing her arm in adduction and medial rotation. In this position of the arm the supraspinatus tendon is bent through a right – angle and lies in the sagittal plane, passing from the base of the coracoid process directly forwards over the head of the humerus to the greater tuberosity, emerging under the anterior edge of the acromian.

Technique: If the patient's right shoulder is to be treated, the physiotherapist must use his right hand; if left shoulder, than left hand. He sits facing shoulder and makes sure that the patient's arm has not moved from the adducted position. He places the tip of his index finger on the patient's tendon, flexing it at the distal joint but keeping it extended at the proximal interphalangeal joint. He reinforces with the middle finger. His thumb is used for counter pressure; in order that it shall be well placed for this purpose, it must be applied as far down the patient's arm as the physiotherapist's span will allow, i.e. as nearly opposite his index finger as possible.

While this posture is held, the anterior edge of the tendon is easily palpable. The physiotherapist finds the right spot, not on the bone of the greater tuberosity, but directly posterior to this point. His finger is made to traverse the tendon from side to side by his alternately flexing and extending wrist, using the thumb both as a fulcrum and to maintain pressure. The sweep is 2 cm from one edge of the tendon to the other.

Deep Friction Massage for Infraspinatus Tendon

Patient's Posture: The lies face downwards, propping herself up on her elbows. The weight of her thorax acting downwards ensures that her scapula lies at right – angles to the humerus; in this position the acromian is drawn away from the greater tuberosity, uncovering it. Slight lateral rotation is maintained by the patient's holding on to the edge of the couch. This combination of flexion and slight lateral rotation brings the tuberosity downwards. The arm is now pushed into slight adduction, which brings the humeral tuberosity out from under the acromian. Running along, just below the most lateral extent of the spine of the scapula, the infraspinatus tendon is easy to feel on its course towards the head of the humerus.

Technique: The physiotherapist sits facing the patient's head and places his fingers on the front of her shoulder. He feels for the tendon with his thumb which he flexes until good pressure is obtained. Alternate abduction and adduction of the thumb now draw it to and fro across the tendon. At the extreme of the adduction movement, he feels the tip of his thumb engage against the posterior acromial edge.

Deep Friction Massage for Subscapularis Tendon

Patient's Posture: The patient adopts the half – lying position on the couch. She holds her arm close to her side and bends her elbow, putting her hand on her thigh.

Technique: The physiotherapist sits at the patient's side facing her. He puts his thumb on the head of her humerus and identifies the bicipital groove, rotating her arm to and fro using the forearm as a lever, to identify the two edges. Immediately medial to the inner edge of the groove lies the subscapular tendon, but it cannot be palpated: it feels as hard as bone. He notes the spot. He then bends his thumb to a right – angle and hooks it round the medial edge of the upper part of the deltoid muscle, and draws the belly laterally, letting the short head of the biceps slip under his finger. He can now apply his thumb to the subscapular tendon without the intervening mass of deltoid belly. He now moves his thumb vertically up and down, applying counter – pressure with his fingers at the back of the shoulder. In this way the transverse friction can be given to the upper or lower part of the tendon.

Deep Friction Massage for Pectoralis Major Muscle

Patient's posture: The patient adopts the half – lying position on the couch. She abducts her arm

somewhat so as to bring the muscle into prominence; her hand may suitably rest on her hip.

Technique: The physiotherapist sits by the patient's side, facing her. He grasps the edge of the muscle, which would otherwise be apt to move as a whole with the physiotherapist's hand. By maintaining his grip and pulling his hand bodily towards himself, he imparts the required friction.

Fig. 1: Ventral Gliding

Fig. 2: Caudal Gliding

Group B

Hot Packs

The subject was placed in supine position and then moist heat therapy was given to the affected shoulder wrapped in a towel for 20 minutes.

End Range Mobilization

Shoulder of the affected extremity was abducted to the available end range and then distraction, anterior, posterior and caudal glides were given as described by Maitland. Three sets of Maitland Mobilization are given and each set consist of 10 – 15 repetitions with 1 minute interval with total duration of 20 minutes. Subjects were treated three times in a week on alternate days for 3 weeks.

GH Joint Distraction

Patient position: Supine with arm in resting position, i.e. 55 degrees of abduction, 30 degrees of horizontal adduction and rotated so that the forearm is in the horizontal plane. Physiotherapist supports the forearm between his trunk and elbow.

Hand placement: Physiotherapist use his hand nearer the part being treated and place it in the patient's axilla with his thumb just distal to the joint margin anteriorly and fingers posteriorly.

Mobilizing force: Physiotherapist move the humerus laterally with the hand in the patient's axilla.

GH Caudal Glide

Patient position: Supine with arm in resting position, i.e. 55 degrees of abduction, 30 degrees of horizontal adduction and rotated so that the forearm is in the horizontal plane. Physiotherapist supports the forearm between his trunk and elbow.

Hand placement: Physiotherapist place one hand in the patient's axilla to provide the grade I distraction. The web space of the physiotherapists other hand is placed just distal to the acromian process.

Mobilizing force: With the superiorly placed hand, physiotherapist glides the humerus in an inferior direction.

GH Joint Anterior Glide

Patient position: prone, with the arm in resting position over the edge of the treatment table, supported on physiotherapist's thigh. Physiotherapist stabilizes the acromian with padding.

Therapist position and hand placement: Physiotherapist stand facing the top of the table with the leg closer to the table in a forward stride position. Physiotherapist supports the patient's arm against his thigh with his outside hand; the arm positioned on physiotherapist's thigh provides a grade I distraction. Physiotherapist places the ulnar border

of his other hand just distal to the posterior angle of the acromian process, with his fingers pointing superiorly; this hand gives the mobilizing force.

Mobilizing force: Physiotherapist glide the humeral head in an anterior and slightly medial direction. Physiotherapist bends his both knees so that the entire arm moves anteriorly.

GH Joint Posterior Glide

Patient position: Supine with the arm in resting position. Therapist position and hand placement: Physiotherapist stands his back to the patient, between the patient's trunk and arm. Physiotherapist supports the arm against his trunk, grasping the distal humerus with his lateral hand. This position provides grade I distraction to the joint.

Physiotherapist places the lateral border of his top hand just distal to the anterior margin of the joint, with his fingers pointing superiorly. This hand gives the mobilizing force.

Mobilizing force: Physiotherapist glide the humeral head posteriorly by moving the entire arm as he bends his knees.

Data Analysis

Statistics were performed by using SPSS 13. Results were calculated by using 0.05 level of significance's, t –test was used

Results

Table 1: Total subjects divided in Group A and Group B

Total Subjects	→ 60
Group A	→ 30
Males	→ 11
Females	→ 19
Group B	→ 30
Males	→ 13
Females	→ 17

Table 2: Comparison of mean value for VAS at Pre and Post interval within Group A and B

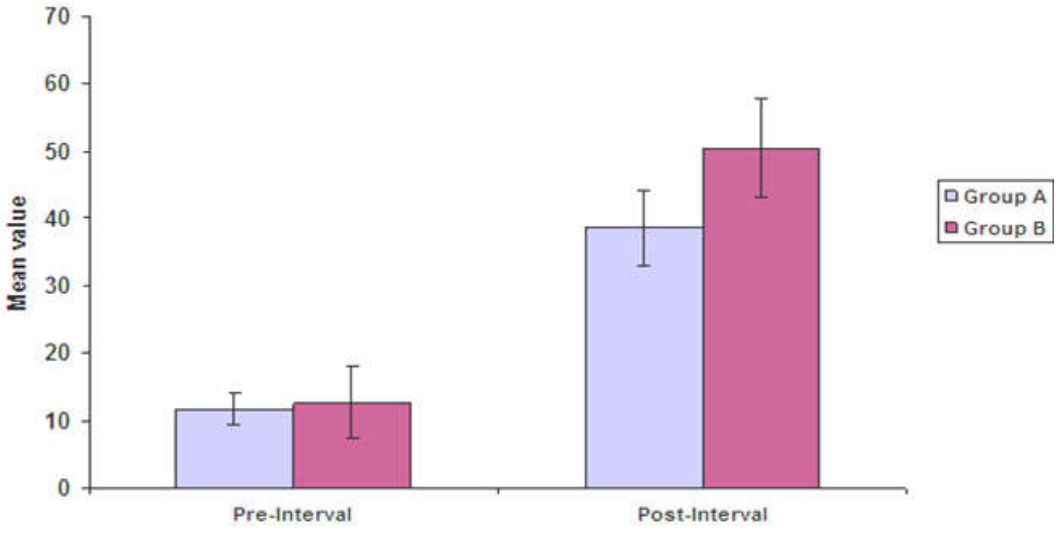
VAS	Group A		Group B	
	t value	P value	t value	P value
PRE Vs Post	27.48	P < 0.05	38.45	P < 0.05

The above table 2 describes paired t test of VAS within (both the Groups) Group A and Group B.

The t values for Group A and Group B are 27.48 ($p < 0.05$) and 38.45 ($p < 0.05$) respectively.

Table 3: Comparison of mean value for Abduction at Pre and Post interval within Group A and B

Abduction	Group A		Group B	
	t value	P value	t value	P value
PRE Vs POST	-54.52	P < 0.05	-31.95	P < 0.05



Graph 1:

The above graph 1 describes mean, the mean difference and standard deviation for group.

Table 4: Mean and SD of Internal Rotation at Pre, Post and Mean diff. (Pre-Post) interval for the subjects of Group A and Group B

Internal Rotation	Group A		Group B	
	Mean	SD	Mean	SD
Pre	25.86	7.47	24.23	5.98
Post	57.50	8.36	64.53	5.40
MD (Pre-Post)	31.63	2.77	40.30	4.33

Table 5: Comparison of mean value for Internal Rotation at Pre and Post interval within Group A and Group B

Internal Rotation	Group A		Group B	
	t value	P value	t value	P value
Pre Vs Post	-62.48	P < 0.05	-50.95	P < 0.05

Comparison between Groups

Table 6: Comparison of mean value for PADI (Total) at Pre, Post and Mean diff. (Pre-Post) interval between Group A and Group B

SPADI (Total)	Group A Vs Group B	
	t value	P value
PRE	0.546	P > 0.05
POST	4.689	P < 0.05
MD (PRE-POST)	-7.517	P < 0.05

Table 7: Comparison of mean value for VAS at Pre, Post and Mean diff. (Pre-Post) interval between Group A and Group B

VAS	Group A Vs Group B	
	t value	P value
Pre	-0.139	P > 0.05
Post	8.077	P < 0.05
MD (PRE-POST)	-11.728	P < 0.05

Table 8: Comparison of mean value for Abduction at Pre, Post and Mean diff. (Pre-Post) interval between Group A and Group B

Abduction	Group A Vs group B	
	t value	P value
Pre	1.120	P > 0.05
Post	-3.169	P < 0.05
MD (PRE-POST)	-8.248	P < 0.05

The above table 7 describes the unpaired t test of VAS between Group A and Group B. The t values are – 0.139 (p > 0.05) and 8.077 (p < 0.05) respectively. The mean difference of VAS between Group A and Group B is – 11.728 (p < 0.05) respectively.

Discussion

The mean and standard deviation of age for Group A was 50.26±7.02 and for Group B was 52.90± 7.15 respectively. In Group A there were 63% of females and 37% of males and in Group B there were 57% of females and 43% of males respectively.

The t value of VAS at pre test between Group A and Group B was – 0.139 (p > 0.05). This shows that there was no significant difference between the subjects of both the groups and the subjects in both groups were homogenous.

The t value of Abduction at pre test between Group A and Group B was 1.120 (p > 0.05). This shows that there was no significant difference between the subjects of both the groups and the subjects in both groups were homogenous.

The t value of External Rotation at pre test between Group A and Group B was – 0.972 (p > 0.05). This shows that there was no significant difference between the subjects of both the groups and the subjects of both groups were homogenous.

The t value of Internal rotation at pre test between Group A and Group B was 0.934 (p > 0.05). This reveals that there was no significant difference between the subjects of both the groups and the subjects of both the groups were homogenous.

The t value of SPADI Pain at pre test between Group A and Group B was – 0.276 (p > 0.05). This reveals that there was no significant difference between the subjects of both the groups and the subjects in both the groups were homogenous.

The t value of SPADI Disability at pre test between Group A and Group B was 1.212 (p > 0.05). This reveals that there was no significant difference between the subjects of both the groups and the subjects in both the groups were homogenous.

The t value of SPADI Total at pre test between Group A and Group B was 0.546 (p > 0.05). This shows that there was no significant difference between the subjects of both the groups and the subjects of both groups were homogenous.

The mean value of VAS for Group A was 2.86± 0.57. The mean values of SPADI Pain, SPADI Disability and SPADI Total for Group A were 19.13± 1.40, 30.13±3.27 and 37.89±2.66 respectively. The mean values of active range of motion of abduction,

external rotation and internal rotation for Group A were 32.80±3.29, 26.83±4.16 and 31.63±2.77 respectively. The t value of VAS for Group A was 27.48 (P < 0.05). The t values of active range of motion of abduction, external rotation and internal rotation were – 54.42 (p < 0.05), – 35.31 (p < 0.05) and – 62.48 (p < 0.05) respectively. The t values of SPADI pain, SPADI Disability and SPADI Total for Group A were 74.46 (p < 0, 05), 50.36 (p < 0.05) and 77.93 (p < 0.05) respectively.

Within Group A, VAS, Active ROM of abduction, external rotation and internal rotation of the shoulder joint and SPADI score in patients with adhesive capsulitis were found to be significant (p < 0.05). The possible explanation could be attributed to the study of Fusun Guler et al in 2004. Cyriax Deep Friction Massage works on the basis of modulation of nociceptive impulses at the spinal cord level. (A system of Orthopaedic Medicine, James Cyriax). Deep Transverse Friction (DTF) leads to destruction of pain provoking metabolites such as lewi's substances.

These Findings are Supported by:

Cynthia Liesdek et al in 1997 found that Cyriax Deep Friction Massage was effective reducing pain in Adhesive capsulitis and inter observer reliability according to Cyriax method might be good under controlled conditions. Deep Friction Massage, Exercise therapy and passive mobilizations were the most frequently applied treatment.

The mean value of VAS for Group B was 4.76± 0.67. The mean values of active range of motion of abduction, external rotation and internal rotation for Group B were 45.56±7.81, 37.76±7.23 and 40.30± 4.33 respectively. The mean values of SPADI Pain, SPADI Disability and SPADI Total for Group B were 22.10± 1.60, 34.80±3.93 and 44.09±3.64 respectively. The t value of VAS for Group B was 38.45 (p < 0.05). The t values of active range of motion of abduction, external rotation and internal rotation were – 31.95 (p<0.05), –28.59 (p<0.05) and – 50.95 (p<0.05) respectively.

Within Group B, SPADI, VAS and AROM of abduction, external rotation and internal rotation of shoulder joint in patients with adhesive capsulitis were found to be significant (p < 0.05). The possible explanation could be attributed to the study of Henricus M Vermulen.

The biomechanical effect of End Range Mobilization technique induces various effects when force is directed towards the tissue resistance. The mechanical changes may include breaking up of adhesions, realigning of collagen or increasing fiber glide, when specific movements stress the specific of the capsular tissue.

Henricus M Vermulen in 2000 "End Range Mobilization technique in adhesive capsulitis of the shoulder joint " found that End Range Mobilization Technique was effective in increasing the ROM of shoulder joint in patients of adhesive capsulitis.

The result of the study suggests that t value is highly significant in each pair of both Group A and Group B. Both the groups, Group A and Group B improved in VAS, Active ROM mainly abduction, external and internal rotation of the shoulder joint and SPADI, which reveals that the treatments given to the subjects of both groups are effective. There is significant improvement in both groups, Group A (Cyriax Deep Friction Massage) and Group B (End Range Mobilization).

On comparing the result of both the groups, it was found that changes in VAS, SPADI Pain, SPADI Disability and SPADI Total and active range of motion of abduction, external rotation and internal rotation were more significant in Group B than that of Group A. This shows that the treatment given to Group B is more effective than that of Group A. Thus null hypothesis is rejected and alternative hypothesis is accepted.

Limitation

1. Study was conducted over a short period of time.
2. Sample size was small.
3. There was no follow up of the patients.
4. Availability of patients.

Conclusion

This study shows that end range mobilization with hot packs provide better results as compared to Cyriax deep friction massage with hot packs for treating adhesive capsulitis in terms of pain reduction and improvement in active range of motion and functional ability.

Future Study

1. Same study can be done with adequate follow up and large sample size.
2. Further study can also be done in case of secondary adhesive capsulitis.
3. Further studies can be done to see the time course of the effect of the treatment techniques used.

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Indian Journal of Legal Medicine	Semiannual				
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Indian Journal of Medical & Health Sciences	Semiannual	7000	6500	547	508
Indian Journal of Obstetrics and Gynecology	Bi-monthly	9500	9000	742	703
Indian Journal of Pathology: Research and Practice	Monthly	12000	11500	938	898
Indian Journal of Plant and Soil	Semiannual	65500	65000	5117	5078
Indian Journal of Preventive Medicine	Semiannual	7000	6500	547	508
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International Journal of Food, Nutrition & Dietetics	Triannual	5500	5000	430	391
International Journal of Neurology and Neurosurgery	Quarterly	10500	10000	820	781
International Journal of Pediatric Nursing	Triannual	5500	5000	430	391
International Journal of Political Science	Semiannual	6000	5500	450	413
International Journal of Practical Nursing	Triannual	5500	5000	430	391
International Physiology	Triannual	7500	7000	586	547
Journal of Animal Feed Science and Technology	Semiannual	78500	78000	6133	6094
Journal of Cardiovascular Medicine and Surgery	Quarterly	10000	9500	781	742
Journal of Forensic Chemistry and Toxicology	Semiannual	9500	9000	742	703
Journal of Geriatric Nursing	Semiannual	5500	5000	430	391
Journal of Global Public Health	Semiannual				
Journal of Microbiology and Related Research	Semiannual	8500	8000	664	625
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Journal of Organ Transplantation	Semiannual	26400	25900	2063	2023
Journal of Orthopaedic Education	Triannual	5500	5000	430	391
Journal of Pharmaceutical and Medicinal Chemistry	Semiannual	16500	16000	1289	1250
Journal of Practical Biochemistry and Biophysics	Semiannual	7000	6500	547	508
Journal of Psychiatric Nursing	Triannual	5500	5000	430	391
Journal of Social Welfare and Management	Triannual	7500	7000	586	547
New Indian Journal of Surgery	Bi-monthly	8000	7500	625	586
Ophthalmology and Allied Sciences	Triannual	6000	5500	469	430
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Physiotherapy and Occupational Therapy Journal	Quarterly	9000	8500	703	664
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Efficacy of Swiss Ball Exercises versus Floor Exercises in Mechanical Low Back Pain: A Comparitive Study

Uzma Khan[1], Shefali Pushp[2], R.K. Meena[3]

Abstract

Aim: The aim of study was to find out the efficacy of swiss ball exercises versus floor exercises in mechanical low back pain patients.

Methodology: The number of subjects was 30 (n=30) with both males and females and randomly divided into 2 groups (group A & group B). *Intervention*: Both the experimental groups (group A & group B) received a moist heat pack prior to the treatment with ergonomics care and strengthening exercises one group on swiss ball and another on floor for 4 weeks (3 days/week). *Outcome measures*: The pre & post readings of outcome measures Visual Analogue Scale (VAS), Oswestry Disabilty Index (ODI), Dynamic Extension Endurance Test (DEET), Dynamic Abdominal Endurance Test (DAET) & Multifidus Test (MT) was taken to find out the improvement in both the groups.

Result: Comparison of values of both the groups showed a highly significant improvement in low back pain, endurance and decreasing in disability but there is no significant difference between both the groups.

Conclusion: It is concluded that both the exercises (Swiss ball & Floor) are equally effective in reduction of low back pain, disability and increasing endurance.

Keywords: Mechanical Low Back Pain; Visual Analogue Scale (VAS); Oswestry Disability Index (ODI); Dynamic Abdominal Endurance Test (DAET); Dynamic Extension Endurance Test (DEET); Multifidus Test (MT).

Introduction

In this present scenario low back pain is a most frequent musculoskeletal problem that is seen in practices affect all range of population. The Low back pain is may be defined as a pain, discomfort, aching, localized below the area of costal margins and the gluteal folds with or without leg pain (sciatica) (Omokhodion et al 2002) [1] Or as pain limited to the region between the glutei fold with or without leg pain (Manek and Macgregor 2005) [2]. Although acute low back pain is very commoner but 10-15% of patient of acute low back pain develops into chronic low back pain.

"Mechanical or non-specific low back" pain may be defined as a unknown pathology or unknown cause or unilateral pain with no referral below the knee may be caused by injury to muscles(strain) or ligaments (sprain), the facet joint, or in some cases, the sacroiliac joints [3]. According to its duration, low back pain may be:-

a. Acute (less 6 weeks) – acute low back pain is usually define as a duration of an episode of low back pain persistent less than 6 weeks.
b. Sub-acute (6-12 weeks) - low back pain which persist for 6 to 12 weeks.
c. Chronic (12 weeks and more) - long term or low back pain which persisting for 12 weeks or more [4].

Whereas the Core stability plays an important part in rehabilitation of low back pain. Core included the

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abdominals, trunk, pelvic floor muscles. Core stability may also be defined as a strengthening of the corset muscles surrounding the back and abdomen. Non specific low back pain caused by the mechanical factors. The "Bradford Hill" criteria includes the occupational sitting, awkward postures, standing & walking, pushing & bending and twisting, lifting and carrying were independently causative for low back pain in the population of workers [5].

Need of Study

Back pain is a leading cause of disability interfering with quality of life and work performances. As many studies have been done to overcome the low back pain by mean of various physiotherapy intervention like heat therapy, electrical modalities & exercise therapy but none of the researcher have compared these two exercises to decease pain, disability & endurance so that the need of study is:-

- Own Interest of the Researcher
- For the further prevention/recurrence of the Low back pain.
- There is less empirical data available to support the efficacy of Swiss ball training.
- As lifestyle is changes, chances of low back pain may occur through the strengthening exercises and ergonomics we can decrease the chances.

Operational Definitions

Strengthening Excercises: Strength training or strengthening exercises is defined as a systematic procedure of a muscle or muscle group lifting, lowering or controlling heavy loads (resistance) for a relatively low number of repetitions or over a short period of time [6].

Swiss Ball: Swiss ball is an versatile piece of exercise equipment available to help people with back pain. swiss ball improves the strength of abs, back muscles, in balance, co-ordination & ROM of the joints [7].

Oswestry Disability Index: Oswestry disability index is a good functional scale because it deals with activity of daily living & therefore is based on the patient response and concerns affecting daily life. It is used to measured patient perceived functional disability. It is most commonly used functional back scale. It is calculated by dividing the total score (1-6) by number of section answered and multiplying by 100 [8].

Visual Analog Scale: The visual analog scale is one of the most basic pain measurement tools. It consists of a 10cm line. The clinician can measure the place on the line & convert into it a score between 0 to 10 where 0 is no pain at all and 10 is pain as bad as it could be [9].

Dynamic Abdominal Endurance Test: This test checks the endurance of the abdominals. The patient will be in crook lying position or in supine with hip 45 degree and knees is at 90 degree and hands at a side. This test may also be done as an isometrics test by assuming the end position & holding it. The grading for this isometrics abdominal test would be dividing into 5 grades [10].

Dynamic Extensors Endurance Test: The test is designed to test the strength of erector spinae & multifidus. The patient will be in prone lying with arm at a side .The test may also be done isometrically and the examiner note the times how long the patient can hold the contrctions without pelvis & spinal movements. The test would be divided into 5 grades [11].

Multifidus Test: Check the ability of lumbar rotators & multifidus to stabilize the trunk during dynamic extremity movement. The patients assume in quadrupeds position and is asked to hold the neutral pelvis position and breathe normally. This also be divided into 5 grades [12].

Materials and Methodology

Ethical approval was obtained from the board of studies of Jyoti Rao Phule Subharti College of Physiotherapy, Swami Vivekananda Subharti University, Meerut, Uttar-Pradesh (U.P), India.

A written informed consent was taken from all the participants and allocated into 2 groups on randomly selection. Both of experimental groups i.e., group A and group B have 15 participants in each. The pain, disability and endurance in mechanical low back pain were assessed with a help of Visual analog scale (VAS), Oswestry disability index (ODI), Dynamic abdominal endurance test (DAET), Dynamic extension endurance test (DEET) and Multifidus test (MT) respectively. All the patients were assessed using a similar assessment performa. Both males & females with mechanical low back pain of duration less than 6 weeks (acute) and age between 20 to 30 were included in the study. Subjects with any congenital causes, Traumatic causes, Inflammatory causes, Neoplastic causes, any Radiculopathy, Any spinal surgery, Gynecological

causes, Athletics & gymnastics were excluded for the study. A Swiss ball of 85cm in diameter was used in this study. An appropriate reading of VAS, ODI, DAET, DEET and MT was taken on first day (day 1) and last day (day 28th). The treatment plan of

Group A: Moist Heat Pack + Swiss ball exercises.

Group B: Moist Heat Pack + floor exercises.

Procedure

Group A:

Swiss ball used in this study were provided in size of 85cm in diameter according to the height of subjects, to provide a better grip on the ball.

Crunches

Position of Therapist: At the side of a patient.

Position of Patient: The patient is lie on the ball with hip and lower torso above the ball or your middle back resting on top, with hip is at 0 degree and knee is at 90 degree of flexion & arms straight at the side with feet flat on the ground. Then therapist is asked to lift your chest off the ball bringing your shoulder up or curl your upper body forwardly keep your arm straight throughout the exercise and focus straight up the ceiling instead of looking down would cause unnecessary sprain in your neck & return shoulder to ball. 2 to 3 sets of 8 to 12 repetitions [13].

Back Extension

Position of Therapist: At the side of a therapist.

Position of Patient: Put the exercise ball in the area. You should have plenty of space to move around, and all sharp/heavy objects should be removed so as to minimize the potential for the accidents. Lean forward so that your mid section rests on the ball. Straight your legs out behind you. Keep your feet's & toes on the contact of ground. Don't touch the ground with any other part of your body. Once you have fully extended your legs, the hands are placed on your lower back. Ask to inhale & lift your torso up or raise the chest/stomach from the waist up so that the chest from the waist up so that the entire body forms a straight line, imagine that someone holding a ruler next to your body and you are trying to align with it. Stop once you have reached a comfortable position and hold it for 10 to 15 seconds and 2 to 3 sets and 8 to 12 repetitions for each legs/arm [13].

Multifidus

Position of Therapist: At the side of patient.

Position of Patient: Firstly put the exercise ball in plenty of area, the patient is in prone kneeling position or in quadruped position above the ball so that the patient mid-section rests on the ball. The trunk is horizontal, supported under the shoulder by the arms and the pelvis by the thighs, and must be held vertical. The head is held in line with the trunk.

Instruction to Patient: Ask the patient that trunk is remain horizontal, supported under the ball & hands are under the shoulder.

Ask the patient to raise or lift the opposite arm and opposite leg (left arm and right leg) a hold then returning back to starting position and hold it for 10 to 15 sec.

Group- B (on floor)

Crunches

Position of Therapist: At the side of a couch.

Position of Patient: The patient is in crook lying or lying on back on feet flat on the ground with knee bent at 90 degree, the hip at 45 degree with arms at the side. Ask the patient raise the chest or to curl up with arm at the side or using your abdominal and by reaching both of your arms straight out in front of you and then return slowly to the start position.

Back Extension

Position of Therapist: At the side of a couch.

Position of Patient: The patient is lie in prone position with forearm and elbow supported on couch. Ask a patient to slowly raise your trunk in extension in a pain free range and your elbow joint and shoulder joint are lie in a same line by leaning on the forearm and curling of shoulders and upper back and hold it and then returning to a start position and 10 to 15 seconds hold.

Multifidus

Position of Therapist: At the side of a couch.

Position of Patient: The patient is in quadruped position, before you start the exercise make sure that your hands are under your shoulders and knees are under your hip, without arching back and keeping head in line with spine. Ask the patient to lift or raise the opposite arm and leg similar to superman, but they are executed from an all four positions. Steadily raise your left arm straight in front of your body, and extend your right leg straight behind you. After holding your arm and leg returning to starting position and repeat on your other side and hold for 10 to 15 sec.

Ergonomic Advices

The ergonomic advices are given in both the group A & group B.

Statistical Analysis

All result analysis were obtained using SPSS version 20.0. The dependent variables for the statistical analysis were VAS, ODI, DAET, DEET and MT. A base line data was taken at the beginning of the study (pre test values) and after the completion of the treatment (post test values). Results were summarized as mean± standard deviation and t-test. A level of 0.05 was used to determine the statistical significance.

Result

Table 1: Mean & Standard Deviation of Pre & Post Scores of ODI & VAS in Group A & Group B.

S. No.	Groups	Age (in Years)	Pre Scores (Mean ± S.D.) ODI	Pre Scores (Mean ± S.D.) VAS	Post Scores (Mean ± S.D.) ODI	Post Scores (Mean ± S.D.) VAS
1	Group A	23.13±2.10	45.67±4.17	5.67±.89	18.6±1.24	.2±.5606
2	Group B	21.8±2.04	43.2±2.81	5.33±.81	18.87±1.60	.6±.633

Table 2: Mean & Standard Deviation of Pre & Post Scores of Dynamic Abdominal Endurance Test, Dynamic Extensors Endurance Test and Multifidus Test in Group A & Group B.

S. No.	Groups	Dynamic Abdominal Endurance Test		Dynamic Extensors Endurance Test		Multifidus Test	
		Pre Scores	Post Scores	Pre Scores	Post Scores	Pre Scores	Post Scores
1	Group A	2±0	3.13±.3519	2.2±.414	3.2±.414	2.73±.458	3.87±.3519
2	Group B	2±0	3±0	2.33±.488	3.4±.507	2.8±.414	3.73±.458

Table 3: % Mean & Standard Deviation of difference b/w Pre to Post Scores of ODI & VAS in Group A & Group B

S. No.	Groups	% Mean difference b/w pre to post scores in ODI	VAS
1	Group A	58.6±3.52	96.22±10.90
2	Group B	56.2±4.54	89±11.44

Table 4: %Mean & Standard Deviation of difference b/w Pre to Post Scores of Dynamic Abdominal Endurance Test, Dynamic Extensors Endurance Test and Multifidus Test in Group A & Group B

S. No.	Groups	%Mean difference b/w pre to post scores in Dynamic Abdominal Endurance Test	Dynamic Extensors Endurance Test	Multifidus Test
1	Group A	35.56±5.86	30±16.90	28.89±12.94
2	Group B	33.33±0	31.67±6.46	24.44±11.98

Table 5: Comparsion b/w Pre to Post Scores for ODI & VAS in Group A & Group B (by paired "t" test)

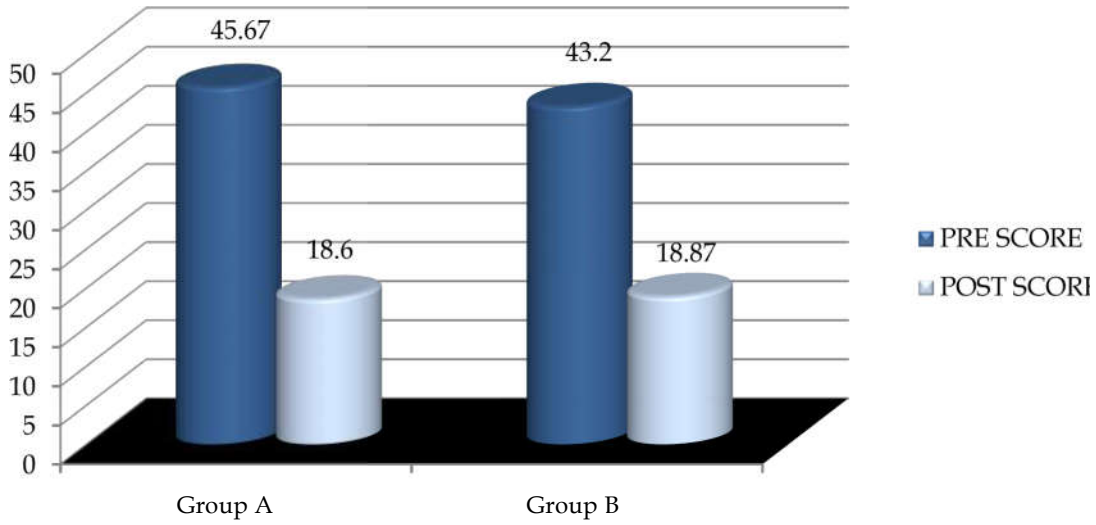
S. No.	Groups	Probability of paired't" test b/w pre to post scores for ODI	VAS
1	Group A	.0000* (P<.05) SIGNIFICANT	.0000* (P<.05) SIGNIFICANT
2	Group B	.0000* (P<.05) SIGNIFICANT	.0000* (P<.05) SIGNIFICANT

* Shows a significant difference AT .05 level of significance. I.E. P<.05

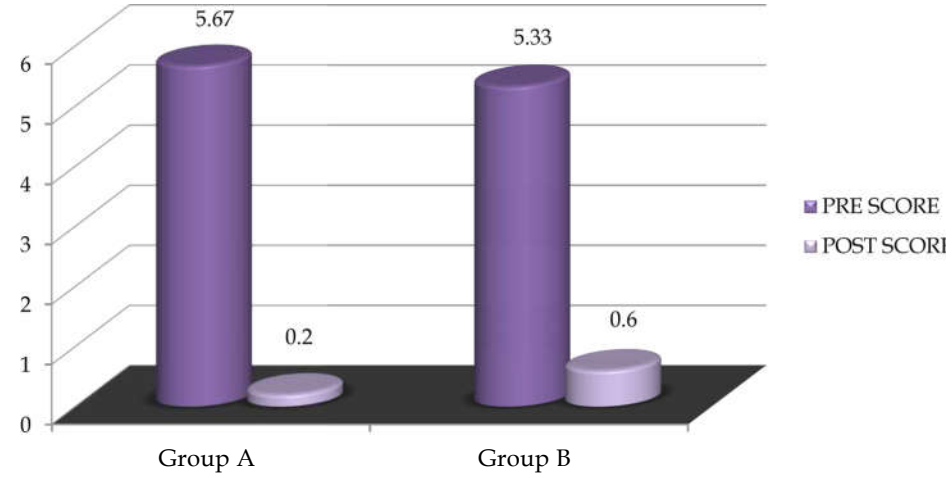
Table 6: Comparsion b/w Pre to Post Scores for Dynamic Abdominal Endurance Test, Dynamic Extensors Endurance Test and Multifidus Test in Group A & Group B (by paired"t" test)

S. No.	Groups	Probability of paired't" test b/w pre to post scores for Dynamic Abdominal Endurance Test	Dynamic Extensors Endurance Test	Multifidus Test
1	Group A	.0000* (P<.05) Significant	.0000* (P<.05) Significant	.0000* (P<.05) Significant
2	Group B	.0000* (P<.05) Significant	.0000* (P<.05) Significant	.0000* (P<.05) Significant

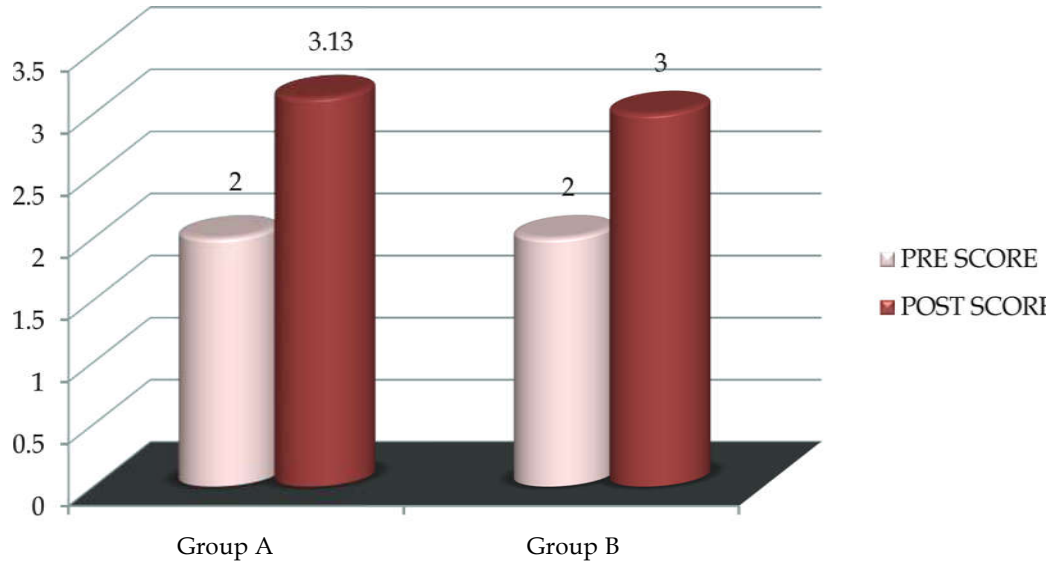
* Shows a significant difference at .05 level of significance .i.e. p<.05



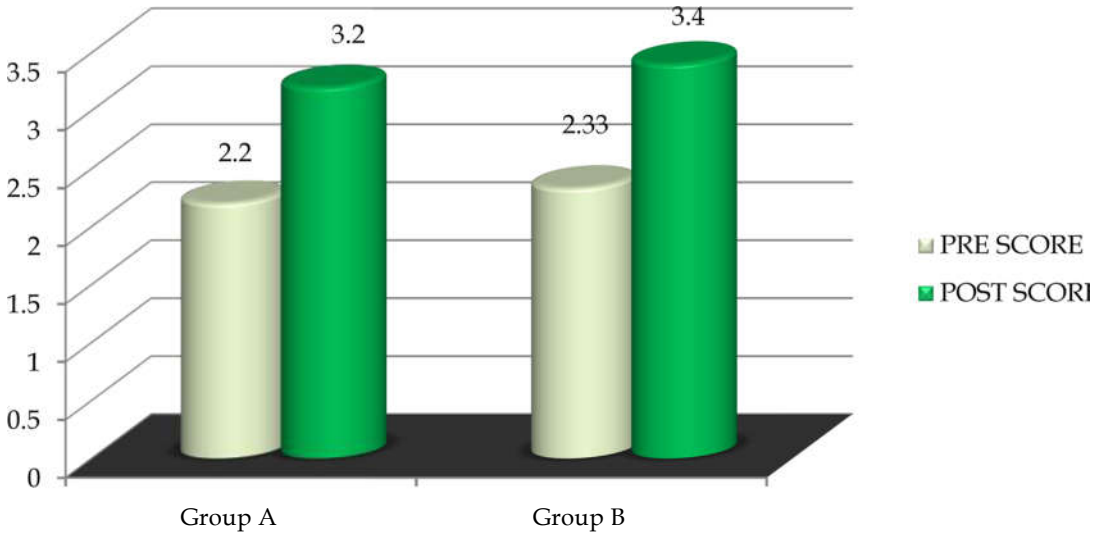
Graph 1: The Bar Chart of Average Pre ODI & Post ODI Scores in two Groups



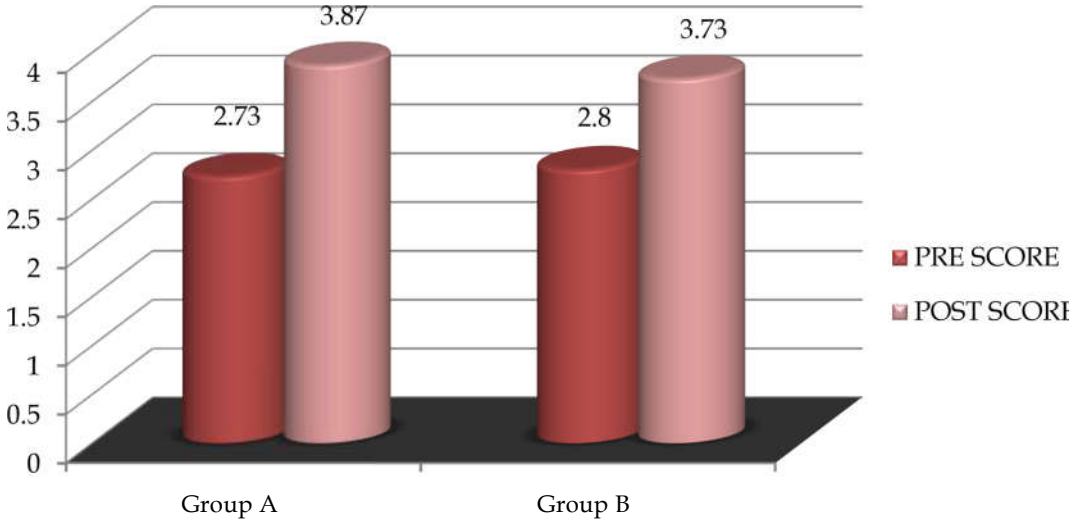
Graph 2: The Bar Chart Diagram of Average Pre VAS & Post VAS Scores in two Groups



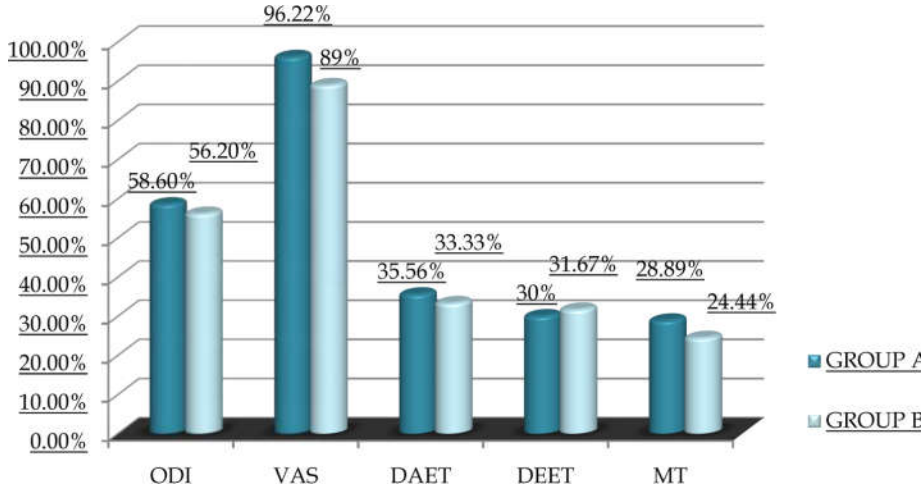
Graph 3: The Bar Chart of Average Pre DAET & Post DAET Scores in two Groups



Graph 4: The Bar Chart of Average Pre DEET & Post DEET Scores in two Groups



Graph 5: The Bar Chart of Average Pre MT & Post MT scores in two Groups



Graph 6: The Bar Chart of Average Percentage Difference in Pre to Post Scores in two Groups for ODI, VAS, DAET, DEET & MT respectively

The Paired t-test was applied to find out the significance difference between pre and post values of VAS, ODI, DAET, DEET and MT in group A and B respectively, which shows a significant difference in both the groups separately at 5% level of significance ($p<0.05$) (In Table 5 & 6).

Results were analyzed using student t- test (paired and unpaired) by using SPSS version 20.0. The entire group A and B completed all 12 training session for 4 weeks. Before the exercise protocol were started the pre-readings were measured, and post-readings were (day 28) also noted down.

The Table 3 & 4 shows a mean and SD values of VAS & ODI, DAET, DEET & MT, Table 5 & 6 shows a % mean & SD difference between the group A and B for VAS & ODI, DAET, DEET & MT.

The table 7 & 8 shows a pre to post scores of group A & B for ODI (0.0000), VAS (0.0000), DAET (0.0000), DEET (0.0000) & MT (0.0000), respectively and shows a significance difference of pre to post in each groups i.e., $p<0.05$ and shows a no significance difference between the groups.

The statistical analysis shows no significant difference for VAS, ODI, DAET, DEET and MT in group A and group B but shows a significant difference in pre to post values of VAS, ODI, DAET, DEET and MT.

The Barchart 1 shows a Average Pre & Post ODI scores for Group A and Group B (45.67 & 18.6) and (43.2 & 18.87) respectively.

The Barchart 2 shows a Average Pre & Post VAS scores for Group A and Group B (5.67& 0.2) and (5.33& 0.6) respectively.

The Barchart 3 shows a Average Pre & Post DAET scores for Group A and Group B (2 & 3.13) and (2& 3) repectively.

The Barchart 4 shows a Average Pre & Post DEET scores for Group A and Group B (2.2 & 3.2) and (2.33 & 3.4) respectively.

The Barchart 5 shows a Average Pre & Post MT scores for Group A and Group B (2.73 & 3.87) and (2.8 & 3.73) respectively whereas the percentile difference shown in Barchart 6 for group A and group B ODI (58.60% & 56.20%), VAS (96.22% & 89%), DAET (35.56% & 33.33%), DEET (30% & 31%) & MT (28.89% & 24.44%).

Disscussion

The result of this study revealed that Swiss ball exercises and Floor exercises are equally effective in increasing the endurance of muscles and improving the pain and decreasing the disability. This is in accordance with the study by *Bala K, Gakhar et al* which also stated that reduction of pain is may be due to increased endurance of abdominal muscles and Trunk muscles and the lumbar Multifidus.

The 4 weeks training programme on Swiss ball resulted in significance increase in endurance of abdominal muscles and in lumbar multifidus.

Thus the Swiss ball exercises resulting more increase in endurance, reduction of disability and pain are supported to *Behm G et al*, study showed that there is evidence exercises performed on unstable (Swiss Ball) surface stressed the musculature and activated the propioception activity & gain the Stability [14].

Many literatures also concluded that the exercises performed on Swiss ball have more muscles work or activity on Swiss ball compared than other [15,16].

The result of our study are in accordance with the previous study *Jorgensen K et al* studied in their studies that trunk endurance training has been recommended as means of increase fatigue threshold and improving performance and reducing disability [17].

Petersen et al concluded that reduction of pain is due to strengthening exercises in patient with Mechanical low back pain [18].

Future Scope

1. The strengthening of lower rectus abdominal muscles may be done for further study.
2. MMT or Sorensen test may be used as primary outcome measure to check the strength of abdominal and trunk muscles.
3. May be done on gender base.
4. Strengthening done on Swiss ball longer duration.

Conclusion

The study compared the efficacy of Swiss ball exercises & Floor exercises to decrease the pain, improves endurance (abdominals, trunk, Multifidus), and to decrease the functional disability in patients of mechanical low back pain. It is concluded that both Group A & Group B are equally effective in reduction of pain, increases the endurance and decreasing the disability. But the result revealed a significant difference in pre to post readings of dependent variables in both the groups i.e., Group A & Group B.

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Original Article

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Effect of Deep Neck Flexor Activation and Ergonomics Education on Work related Neck Pain in Bank Workers in Loni

Mrunal Baxi[1], Deepali Hande[2]

Abstract

Background: Bank workers are subjected to work on computers, deal with customers for on average 8 hours a day with minimum rest period. Most of the time work is performed in awkward postures. Neck pain was found to be most prevalent problem amongst bank workers. Reasons contributing to causes of neck pain can be attributed to awkward posture, sedentary work, maintaining static activity for typing data, handling mouse etc. Decreased activity of deep cervical flexors and increased activity of superficial cervical flexors was found to be the pathophysiology for the neck pain.

Methodology: This experimental study consists of 55 subjects with the age 19 to 50 years were selected as per inclusion and exclusion criteria. Group 'A' received deep cervical flexor activation along with ergonomic education. Group 'B' received ergonomic education only. In group A stretching to neck muscles, deep cervical flexor training using pressure biofeedback and ergonomic education was given. Group B received ergonomic education. Participants received intervention for 3 weeks, 5 days in a week. Outcome measure was NPRS, NDI and Cervical ROM measured before and after intervention. RULA was used to evaluate ergonomic posture.

Results: The participants in group A showed highly significant improvement in NPRS (2.72±1.24 to 0.909 ± 1.151), NDI (9.59±3.305 to 3.00±2.600) and cervical flexion (43.63±2.969 to 46.54±2.738), cervical extension (54.83±2.55 to 57.045±2.171), this was observed in comparison with group B.

Conclusion: Deep neck flexor activation is suitable to treat neck pain in bank workers reducing pain, disability and improving range of motion.

Keywords: Bank Workers; WMSDs; NDI; CCFT; Deep Cervical Flexion Activation; Ergonomic Education.

Introduction

Musculoskeletal conditions are prevalent and their impact is pervasive. They are the most common cause of severe long-term pain and physical disability affecting the psychosocial status of affected people as well as their families and carers [1]. Along with back pain, neck pain is one of the most common musculoskeletal complaints related to work [2]. The prevalence increases with longer prevalence periods and generally women (18%) have more neck pain than men (11%) [3,4]. Causes of non specific neck pain are multifactorial [5]. A systemic review done on epidemiology of neck pain showed estimated that higher incidence of neck pain was seen in office and computer workers. The overall prevalence of neck pain in the general population ranges between 0.4% to 86.8% (mean: 23.1%) [6]. Work related Musculoskeletal disorders (WMSDs) rank first affecting the quality of life among other health problems [7].

A study done amongst Kuwaiti bank workers reported that the most affected body parts were the neck (53.5%), lower back (51.1%) shoulders (49.2%) and upper back (38.4%) suggesting the neck pain was most prevalent among bank workers [8].

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In the banking sector, banker' works involve the use of computer for data collection, processing and programming; hence the risk of developing musculoskeletal disorders inherent in computing industries [9]. Bank Managers are responsible for planning and defining targets for local branches; monitoring achievements; making decisions and attending special clients. These tasks are carried out using personal computers and telephone, in daily 8 to 10 hour shifts. The managers' work involved sitting job for most of the time. Cashiers' tasks include dealing with deposits and withdrawals, receiving a wide range of payments and selling branch products for clients. These tasks are performed with the worker sitting through their 8 hour shifts involving intensive use of personal computers for typing data and the stamping of many documents (using heavy wooden stamps). The tasks performed by the clerks vary according to the branches' sectors to which they were allocated. They are included in liaising with personal and business clients in person and by telephone, a range of administrative activities such as preparing and monitoring contracts for loans and concessions, and checking and typing information. Their job involves nearly continuous use of personal computers and telephones often simultaneously, although their daily routine varies according to the clients' demands. Compared to the cashiers their computer use is less extensive [10].

The intensive computer work requires repetitive movements of the upper limbs, such as typing with the keyboard and handling the mouse, but also static muscle activity while keeping the arms and neck in a stable position. The computer work also overloads the neck, shoulder, and upper limb muscles and joints to maintain it into static position [11]. Evidence has shown impaired cervical flexor muscle motor control and strength in individuals with neck pain disorders. Recent research, investigating deep and superficial cervical muscle coordination, has shown that in a low load Cranio cervical flexion (CCF) task the Deep Cervical flexors (DCFs) such as longuscapitis and longuscolli are specifically targeted [12]. Ergonomics has broad application that can be used at every workplace. If specific problems are found during worksite evaluation, it must be corrected by basic principles of ergonomics [13,14].

Based upon the job, a bank employee has to spend on average 8 hrs. daily at the workplace with only 30-45 minutes of the break. Most of the time of the work is spent in front of the computer. The computer work will also overload the neck, shoulder, and upper limb muscles and joints. Often working in the same position for a prolonged time and prolonged neck flexion are significantly associated with neck pain [4]. It causes stress over posterior muscles, lengthening weakness of cervical flexor muscles, causing excessive stress and leverage over cervical spine. So it is important to overcome these physiological changes to avoid further degeneration in cervical spine. DCF activation which is achieved by CCF training has advantageous effect on improving posture and by decreasing the activity of SCM and Anterior Scalenae and increasing the activation of DCFs. Hence the purpose of this study is to find out the effectiveness of DCF muscle activation and ergonomic education in patients with work related neck pain [12].

Method

The study received ethical approval from institutional ethical committee (Ref no. PIMS/CPT/IEC/2016/16558) design of the study is pretest-posttest study. The study was conducted in the Pravara Sahakari Bank Ltd.,and Central Bank of India, Loni. Inclusion criteria was males and females of age between 19 to 50 years with self-reported neck pain and performing poor on CCF test, having work experience more than 1 year of work and worked on computer for minimum 4 to 6 hrs. Exclusion criteria were staffs of the bank that are not bankers. Participants having systemic illness, previous trauma, pregnant women and having Neck Disability Index (NDI) more than 15 as well as participants who had cervical spine surgery, neurological signs in upper limb and participants who had participated in neck exercise program in past 12 months. Numeric Pain Rating Scale (NPRS), NDI, Cervical Range of motion (ROM) were outcome measures. After screening and receiving written

Fig. 1: Participant Perfrming Deep Neck Flexor Activation.

informed consent total 46 participants were divided in group A and group B. Group A received the Deep neck flexor activation and ergonomic advice. While group B received only ergonomic advice. Deep neck flexor activation was performed by the participants in supine lying with the pressure sensor kept behind the neck and feedback unit held by subjects.

Baseline pressure was set at 20 mmHg and subject told to perform nodding movement to increase pressure gradually by 2 mmHg. Warm up in form of stretching of neck was given.

Result

Very significant difference was observed for pain measured in NPRS between group A (0.9090±1.151) and group B (1.9545±1.046) (p=0.003). a self rated disability, measured on NDI also showed highly significant difference between group A (3.00±2.60) and group B (7.9545±2.716) (p<0.001). very significant difference was seen in cervical flexion range of motion of group A (46.54±2.73) and group B (46.54±2.73) (p=0.0012) for cervical extension Range of motion highly significant difference was seen between group A (57.045±2.171) and group B (53.90±1.925) (p<0.001).

Discussion

It stated that cranio-cervical flexion training directly activates the deep cervical flexor musculature and decreases stresses placed on the joints and other structure of the cervical region. Joint stresses may alter firing of cervical afferents with resultant changes in proprioceptive function. Other reason explained was SCM and scalene muscle activity is reduced and deep cervical muscle activity is increased following CCF training and this may alter cervical intersegmental kinematics leading to improved acuity for cervical movement [15]. Repeated activation of deep cervical flexors muscles may induce neuroplastic changes which in turn lead to improved recruitment of the trained muscle during complex functional tasks. (16) Afferent from these muscles cause endogenous options to be released and also the beta-endorphins from the pituitary gland. These secretions may cause both peripheral and central pain to be blocked. Neck exercises may allow the musculotendinous proprioceptorrs to downgrade their stretch reflex responses using operant conditioning techniques and multiple practices sessions. The intrafusal fibres may be reset, discontinuing the cycle of muscle tension, impaired circulation with metabolite accumulation and pain associated with myogenic (myofascial pain) [17].

CCF targets the DCF muscles and retraining these muscles was shown to reduce the neck symptoms and improve the ability in maintaining an upright posture of the cervical spine which in turn lead to improvement in functional status and decrease in disability [8].

Stretching of neck muscle in form of warm up may be responsible for the increase in ROM [19].

Conclusion

On the basis of present study, it can be concluded that deep neck flexor activation using pressure bio-feedback unit is suitable to treat neck pain in bank workers in reducing pain, reducing the disability and improving range of motion of participants.

Limitations to the Study

In the present study, the duration of the intervention was short. Activities of daily living and recreational activities of participants were not taken into account.

List of abbreviations:

WMSDs- Work related Musculoskeletal Disorders

CCF- Cranio-cervical flexion

DCF- Deep Cervical flexors

SCM- Sternocleidomastoid

NPRS- Numeric Pain rating scale

NDI- Neck disability index

ROM- Range of motion

Competing Interest: None

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