Original Article

Effect of Revulsive Compress on Pain and Range of Motion in Periarthritis of the Shoulder: A Study Protocol for a Quasi-Experimental Study

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ABSTRACT

Periarthritis shoulder is an inflammatory painful musculoskeletal condition of the shoulder characterised by pain, stiffness and significant restriction of both active and passive range of motion particularly external rotation, abduction and flexion. Its prevalence is 2% to 5% in the general population. Its incidence is up to 20% in people with diabetes. Revulsive compress is a treatment modality which involves alternate application of hot (98-104°F) / (36-40°C) immediately followed by cold (55-65°F)/ (12-18°C). Revulsive compress seems to be effective in reducing pain and improving range of motion in periarthritis shoulder. Hence, we have designed this study to evaluate the effect of revulsive compress on pain and range of motion in periarthritis shoulder. Quasi experimental study design have been adopted. A total of 40 subjects between 40 and 65 years will be recruited. Subjects will be given revulsive compress for a period of 15 days. Baseline and post intervention assessments will be done for all subjects. Outcome variables are VAS Scale, SPADI and assessment of range of motion with goniometer. Data will be analysed using the Statistical Package for Social Sciences, Version 16. In this study, we will consider the p (probability) value of 0.05 to be statistically significant. If this study provides significant changes, then revulsive compress may be used as an adjuvant therapy in the management of periarthritis shoulder. Ethical clearance was obtained (IEC-IIYNMS/Approval/037/2023) and registered in a clinical trial (CTRI/2024/06/069038).

Key words: Periarthritis shoulder, Revulsive compress, Hydrotherapy, Yoga and Naturopathy

An inflammatory painful musculoskeletal condition of the shoulder, Periarthritis shoulder is referred as a painful stiff shoulder, adhesive capsulitis, and frozen shoulder characterized by pain, stiffness, and marked restriction of active and passive range of motion, especially external rotation, flexion, and abduction. The overall population shows 2% to 5% of prevalence, with peaks in the age group of 40 to 60. In those with diabetes, its incidence can reach 20% [1-5]. It affects women more frequently than men [6]. Either a primary or secondary condition may exist. The primary cause is typically idiopathic and manifests as increased pain and stiffness. It is frequently linked to hypertriglyceridemia, thyroid conditions, and diabetes mellitus. However, secondary factors could include a shoulder surgical history, a trauma or fracture, or extended immobilization. Numerous ailments, including diabetes, thyroid disorders, Dupuytren's contracture, and Parkinson's illnesses, have been identified as risk factors for its development [3].

Generally, there are three stages. First is the painful phase, which lasts for about 2-9 months and is marked by gradually decreasing range of motion and increasing pain at night. The second stage is called the frozen stage, which lasts for twelve months and during which stiffness gets worse. The third stage is called the thawing stage, in which the symptom tends to go away and lasts for two years [6, 7]. The condition is typically characterized by pain that progresses to stiffness, which indicates the transformation of inflammation into fibrosis [8]. The primary hallmark of this condition is stiffness caused by cytokine-mediated synovial inflammation with fibroblastic proliferation, which characterizes the pathogenesis of this condition [7]. NSAIDs, oral corticosteroids, intra-articular steroid injection, hydro dilatation, and surgical procedures such as open and arthroscopic capsular release are the standard conventional therapies [3].

Naturopathy is a drugless medical approach that promotes the body's natural ability to heal itself [9, 10]. Water is used internally and externally (as steam, ice, or water) in hydrotherapy, one of the naturopathic treatment methods, to treat and enhance health, and as make therapeutic use of its physical properties [11]. Revulsive compress is a treatment modality that involves alternate application of hot (98-104°F) /

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(36-40°C) immediately followed by cold (55-65°F)/ (12-18°C) [12]. A revulsive, non-excitant analgesic effect is produced by this therapy [9]. Additionally, by increasing circulation, it eliminates the waste products of metabolism along with toxins, and inflammatory byproducts, thereby lessening pain, oedema, inflammation, and aiding in connective tissue strengthening [13, 14]. By making collagen-rich tissues more extensible, it is known to increase the range of motion [9]. Revulsive compress has been shown in a study to be effective in treating pain disorders, leading to decreased pain and increased range of motion. Since an intense literature search, no prior research is conducted, hence we have designed this study to investigate the impact of revulsive compress in periarthritis shoulder.

MATERIALS AND METHODS

Study Setting

The study design used in this investigation will be quasi-experimental. 40 Subjects will be recruited from the out-patient department of the International Institute of Yoga and Naturopathy Medical Sciences, Chengalpattu. The research project commenced in June of 2024. Institutional Ethical Committee (IEC) approval has been taken, vide letter numbers Ref N0.446/ME-II/2023. The Clinical Trial registration number is CTRI/2024/06/069038. Subjects aged between 40 to 65 years with pain getting aggravated at night and interscapular scratch test tested as positive with appreciable restriction of both active and passive range of motion especially external rotation, abduction, and flexion. Subject with a history of major shoulder injury or surgery, shoulder dislocation, underlying fracture associated with inflammatory arthritis, subacromial impingement, malignancy, and under drugs such as NSAIDs or other painkillers. Subjects with Painful arcs between 60° and 120° abductions indicative of rotator cuff disease are also excluded.

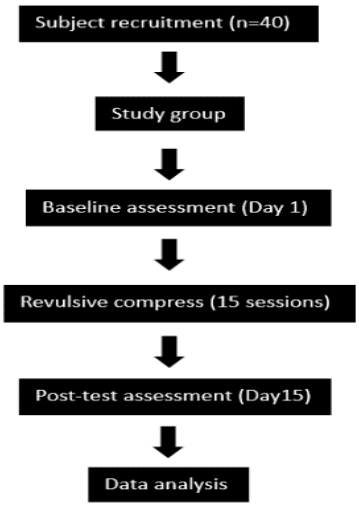

Figure 1: Trial profile

Intervention: Subjects will be given a revulsive compress in which a hot fomentation bag will be given for 4 minutes and cold compress for 1 minute for 15 minutes once a day for 15 days over the shoulder joint. The water temperature will be maintained at (98-104°F) / (36-40°C) for hot and for cold (55-65°F)/ (12-18°C) will be checked with a digital water thermometer.

Outcome Measures: The primary and secondary outcome variable will be assessed before and after intervention i.e., on day 1 and day 15.

The primary outcome variable

The pain and its restriction will be assessed using VAS scale and SPADI.

VAS Scale: The visual analogue scale consists of a 10 cm line of 0-10 labelled “no pain” at point 0 and “severe pain” at point 10, and patients will be explained about this to mark a point corresponding to their pain. A higher score indicates greater pain intensity.

SPADI: The shoulder pain along with its disability was measured using the Shoulder Pain and Disability Index (SPADI), which has two domains with 13 items in total. Five of which are on subscale to measure pain, while 8 measures the disability subscale. The subscale is transformed by summing to a score out of 100. Then the mean is calculated as a total score out of 100, with higher scores reflecting greater disability and impairment.

The secondary outcome variable

Range of motion will be assessed with the help of a goniometer.

Range of motion: A standard Goniometer kristeel model-3278 will be used to measure the active range of motion, especially shoulder flexion, abduction and external rotation**.**

The subjects will be assessed on day 1 and day 15.

Shoulder flexion: The motion of the shoulder when raising the arm in front of the body over the head is known as shoulder flexion or forward flexion. With the arm and side of the body straight, range of motion is measured. The point at which the subject can raise the arm above the head is measured from the index- neutral. 180 degrees is the typical range of motion.

Shoulder abduction: A lateral migration of the parts away from the body is called abduction. In the case of the shoulder joint, the arm swings out at the side of the body in a motion known as "arm-flapping." When measuring range of motion, the arm is held straight and the palm is facing to the sides from the body. From neutral, with the arm hanging near the body to the side of the thigh, it is measured to the highest point at which the arm may be raised.180 degrees is the typical range of motion.

External Rotation: When measured in a neutral position with the forearm parallel to the ground, the elbow flexed at a right angle, and the shoulder adducted, external rotation also known as lateral rotation is measured. The ROM of external rotation

of the shoulder joint was defined as the angle formed by the long axis of the forearm and the sagittal plane of the trunk. 90 degrees is the typical normal range of motion.

DISCUSSION

Revulsive compress causes a reaction in the circulatory system involving alternate vasoconstriction and vasodilation without inducing a thermic reaction. This will tone up the smooth muscles and vascular permeability of the endothelium and create tissue oncotic pressure, which will draw water into circulation and reduce oedema. This would assist in lessening inflammation, which is the primary source of pain [13]. The revulsive compress's hot application causes thermal stress, which modifies the architecture of collagen by partially breaking down the intermolecular connections, increasing the extensibility of collagen-rich tissues corresponding to an increase in range of motion. Heat application is also known to produce excessive peptides of opioids, which alter pain thresholds (analgesic effect) and also exhibit anti-inflammatory effects as they enhance cortisol and catecholamine output [12, 15].

Heat also increases the impulses transmitted by type II fibres of the Golgi tendon organs and decreases the impulses transmitted through type II muscle spindle afferents and gamma efferents. These eventually cause the alpha motor neuron to fire less frequently to the extrafusal muscle fibre, which leads to muscle relaxation and improvement in joint movement [12]. These data provide further credence to the postulated mechanism of revulsive compress application for the management of periarthritis shoulder. Previous literature suggests that revulsive compress is effective in reducing pain in case of low back pain and osteoarthritis of the knee. The effect of revulsive compress in periarthritis shoulder is being investigated for the first time in this study.

CONCLUSION

The results of this investigation will provide clinical evidence on the effect of revulsive compress on pain and range of motion in periarthritis shoulder. If the study's observations show promising outcomes, it might be suggested as adjuvant therapy for periarthritis shoulder.

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