

Effect of Cryoflow Versus Ultrasound in Acute Trapezitis on Pain, Range of Motion and Quality of Life: A Comparative Interventional Study

Prakashbhai Kanjibhai Rathva¹, Dr.Yagna Unmesh Shukla²

¹MPT (Orthopedic Conditions)

²MPT [Musculoskeletal], PhD, Principal of Government Physiotherapy College and Spine Institute, Civil Hospital, Ahmedabad

Corresponding Author: Prakashbhai Kanjibhai Rathva

DOI: <https://doi.org/10.52403/ijhsr.20231225>

ABSTRACT

INTRODUCTION: Trapezitis is defined as inflammation of trapezius muscle. Neck pain prevalence varies widely on different studies with a mean point prevalence of 13% (range 5.9%-38.7%) and mean lifetime prevalence of 50% (range 14.2% - 71.0%). Cryoflow therapy is a relatively new modality in the physical therapy field that ensures a constant temperature on the treatment area. It cools down surrounding air for cryotherapy, which is suggested to be used for local anesthesia (analgesia) for pain relief and rehabilitation, motor effects to improve mobility, and for anti-inflammation by a combination of cold and compression with powerful cold airflow. Therapeutic Ultrasound is a modality which involves the generation of high frequency sound waves and their transmission through the skin to the structures desired to be affected. It is a non-invasive method which consists of piezoelectric crystals that convert electrical energy to mechanical oscillation energy using high-frequency alternating current. So need of study is to compare the effect of cryoflow and ultrasound on pain, cervical range of motion and Quality of life in acute trapezitis.

METHODOLOGY: Approval of Ethical Committee will be taken. After taking informed written consent from the subject, demographic data will be collected. As per inclusion and exclusion criteria all patient with Acute Trapezitis will be included. Once selected, Participants will be randomly allocated into two intervention and control group. Pre-intervention pain and function assessment will be done by NPRS, Cervical range of motion and Neck Disability index functional scale respectively. first Interventional group will receive conventional physiotherapy treatment plus Cryotherapy. Second Interventional group will receive conventional physiotherapy plus Ultrasound and Control Group will receive only Conventional Physiotherapy treatment. All 3 groups will receive treatment for 7 sessions. After 7 sessions, follow up would be taken and post-intervention pain, function assessment and range of motion will be done and results will be analysed.

RESULTS: All the three groups (GROUP A, GROUP B GROUP C) individually shows significant improvement in decreasing pain intensity, improving the cervical range of motion and quality of life. No significant difference was found between Group A (cryoflow) & Group B (ultrasound) in decreasing pain intensity, improving the cervical range of motion and quality of life. But significant results found when group A (cryoflow) and group B (ultrasound) compared with group C (control).

CONCLUSION: The study concluded that ultrasound therapy and cryoflow with conventional exercises is statistically and clinically equally effective in reducing pain, improving cervical ROM and Quality of life in Acute Trapezitis.

KEYWORDS: Acute Trapezitis, ultrasound, cryoflow, NPRS (numerical pain rating scale), cervical range of motion, neck disability index, MTPs (myofascial trigger points).

INTRODUCTION

Trapezitis is most common musculoskeletal disorder. It is common in age group of 18-30 years. It is described as the trapezius muscle inflaming and producing tension pain that is evident while at rest and made worse by movement¹.

The work environment and posture that people adopt during the day determine the percentage of the Indian population who have neck pain. Male to female prevalence in India is 1:10, and 3-5% of the global population is affected. More women than men are impacted. According to various research, the prevalence of neck discomfort varies greatly, with a mean point prevalence of 13% (range: 5.9%-38.7%) and a mean lifetime prevalence of 50% (range: 14.2%-71.0%).²

The upper trapezius muscle is classified as a postural neck muscle and is extremely vulnerable to overuse³. It mostly causes a headache or tension headache in the temples, pain behind the eyes, a stiff neck, a limited range of motion, and an intolerance to weight on your shoulder. Professionals who spend a lot of time at desks and computers, or people who drive for extended periods of time, are more likely to have this condition⁴. The load moment on the neck is increased three to four times in working positions when the neck is in excessive flexion, which causes neck muscle spasm⁵. Even in the absence of a history of trauma or favorable radiographic findings, neck discomfort is a common clinical condition⁶. Neck extension causes pain, which is brought on by bad posture while walking, prolonged television viewing, and phone use⁷.

Simons described criteria for identification of taut band - the taut band is a tender spot, referred pain or altered sensation at least 2 cm beyond the spot, elicited by needle penetration or pressure held for 10 seconds; and restricted ROM in the joint. when pressure is applied to TrP's (Trigger point), a "jump sign" is elicited or patient reacts with facial grimacing or verbal response⁸. Less oxygen, glucose, and nutrients are delivered to the areas of strained soft tissue, which

causes them to accumulate more metabolic waste products⁹.

Trigger points have been associated with hyperalgesia, Limited range of motion and therefore restrict functional activities¹⁰. Signs that may include the presence of a tender taut band in skeletal muscle, a palpable or visible local twitch response upon palpation, the presence of a typical referred pain pattern and restricted ROM of the affected tissues¹¹.

Physiotherapy interventions for trapezitis includes massage, IFT, TENS, heat, cryotherapy, to the exercise therapy in addition to positional release techniques. Exercises have proved to be very important for neck pain¹². Exercises strengthen the muscle, muscle fibres, help in increasing the range of motion, and improve mobility thus reducing the chance of recurrence of trapezitis. Neck isometric exercises cause contraction and relaxation of the neck muscles thus massaging all the toxins which are responsible for causing inflammation. Neck muscle exercises if given thus will prove to be beneficial in improving stability of the neck muscle¹³.

Numerous studies using Therapeutic ultrasound along with other manual techniques such as myofascial release, positional release therapy, ischemic compression etc. which have shown improvement in relieving pain and improving function in trapezitis. However, there is paucity in literature which tends to compare the effectiveness of ultrasound therapy and cryoflow along with conventional exercises².

Ultrasound (US) treatment is one of the most important physical treatment modalities in MTPt treatment which is used for heating deep tissues⁷. Cryoflow therapy is a relatively new modality in the physical therapy field that ensures a constant temperature on the treatment area. It cools down surrounding air for cryotherapy, which is suggested to be used for local anesthesia (analgesia) for pain relief and rehabilitation, motor effects to improve mobility, and for anti-inflammation by a combination of cold

and compression with powerful cold airflow¹⁴. The Neck Disability Index (NDI) was designed by Vernon and Mion to assess how neck pain affects the activities of daily living. It has sufficient support and usefulness to retain its current status as the most commonly used self-report measure for neck pain¹⁵.

The NPRS is a self-reported, or clinician administered, measurement tool consisting of a numerical point scale with extreme anchors of 'no pain' to 'extreme pain'¹⁶.

MATERIALS & METHODS

RESEARCH METHOD:

- **STUDY DESIGN:** A Comparative interventional study
- **STUDY SETTING:** Physiotherapy college
- **SAMPLING TECHNIQUE:** Consecutive sampling technique
- **STUDY DURATION:** One year
- **TREATMENT DURATION:** 7 sessions
- **SAMPLE SIZE:** 72 patients, each group contains 24 participants, but with the assumption that there is any dropout in the patients enrolled, I have assumed a 10% dropout rate and total size of sample is taken as 72, calculated using g-power analysis software.

GROUP A: 24 patients [Cryoflow + Conventional exercise]¹⁴

GROUP B: 24 patients [Ultrasound + Conventional exercise]⁷

GROUP C: 24 patients [Conventional exercise]²⁰

INCLUSION CRITERIA:

- Subjects willing to participate in the study.
- Subjects with the age group above 18 years.
- Both male and female were included.
- Palpable tender point over trapezius muscle.
- Pain of at least 3 on numerical pain rating scale

EXCLUSION CRITERIA:

- Any red flags of musculoskeletal conditions
- Subjects contraindicated for ultrasound and cryoflow

MATERIALS USED IN THE STUDY:

- Cryoflow machine
- Ultrasound machine, coupling medium (gel)
- Universal goniometer
- Plinth, chair, couch
- Pen, pencil, paper
- Assessment form
- Consent form Gujarat version
- Neck disability index scale (NDI) Gujarati version
- Numerical pain rating scale (NPRS)



Figure 1: Material used for the study



Figure 2



Figure 3

Figure 2 & 3: Material used for the study

OUTCOME MEASURE:

- 1] Numerical pain rating scale¹⁷ (intraclass correlation coefficient for NPRS = 0.67)
- 2] Neck disability index (NDI)¹⁸ (intra-class correlation = 0.93)
- 3] Cervical range of motion universal goniometer¹⁹ (ICC = 0.79 to 0.97)

1. Numerical pain rating scale [NPRS]

The NPRS for pain is a uni-dimensional measure of pain intensity in adults. Similar to visual analogue scale, the NPRS anchored by terms describing pain severity scores.

Pain intensity is measured on 11- point pain intensity numeric rating scale, the number that the respondent indicates on the scale to rate their pain intensity is recorded. Score range from 0-10, where 0 = no pain and 10 = worst possible pain. Validity: for construct validity, the NPRS was shown to be highly correlated to the VAS in patients with rheumatic and other chronic pain condition (pain >6 months); correlation range from 0.86 to 0.95

Reliability: test -retest reliability observed in both literature and illiterate patients with rheumatoid arthritis was $r=0.96$ and 0.95

2. Neck disability index [NDI]

The NDI was developed in 1989 by Howard Vernon and has become a

standard instrument for measuring self-related disability due to neck pain. It was developed from the Oswestry index for back pain and the pain disability index.

The neck disability index score which is functional disability index comprising 10 sections in the form of activities of daily living with each item scoring from 0-5 where 0 is no difficulty in performing that activity and 5 is inability to do that activity. Sections include pain intensity, personal care, lifting, reading, headache, concentration, work, driving, sleeping and recreation. The maximum score is therefore 50.

The total score is given out of 50, where 0-4: no disability, 5-14: mild disability, 15-24: moderate disability. 25-34 severe disability and more than 35: complete disability. Scoring for all the 10 items is done by asking the subject his/her ability to perform each of the ten activities. The NDI has been found to have a high degree of reliability and internal consistency as compared to other sickness impact profiles in various conditions of neck pain.

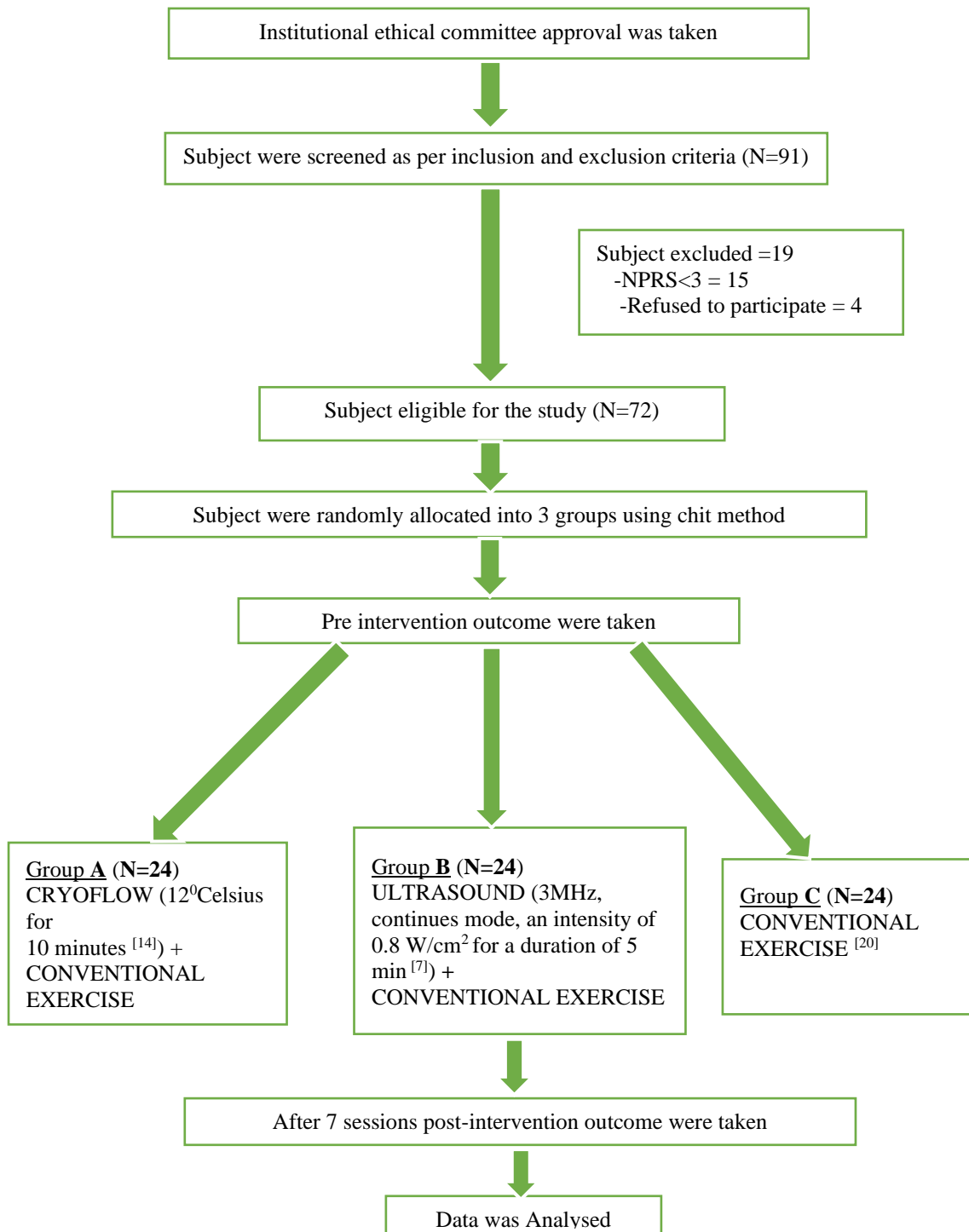
3. Cervical range of motion

Cervical range of motion (ROM) is often used as an outcome measure in the clinical setting and is now considered a

standard of practice. It can be a predictive tool for acute or chronic neck-pain-related conditions. Furthermore, goniometer is an affordable tool for clinics when compared to more sophisticated motion analysis

systems. Among cervical problems frequently reported are ones that emerge from work or activities that involve repetitive movements and static postures such as those used when working with a computer.

FLOW CHART OF THE STUDY PROCEDURE



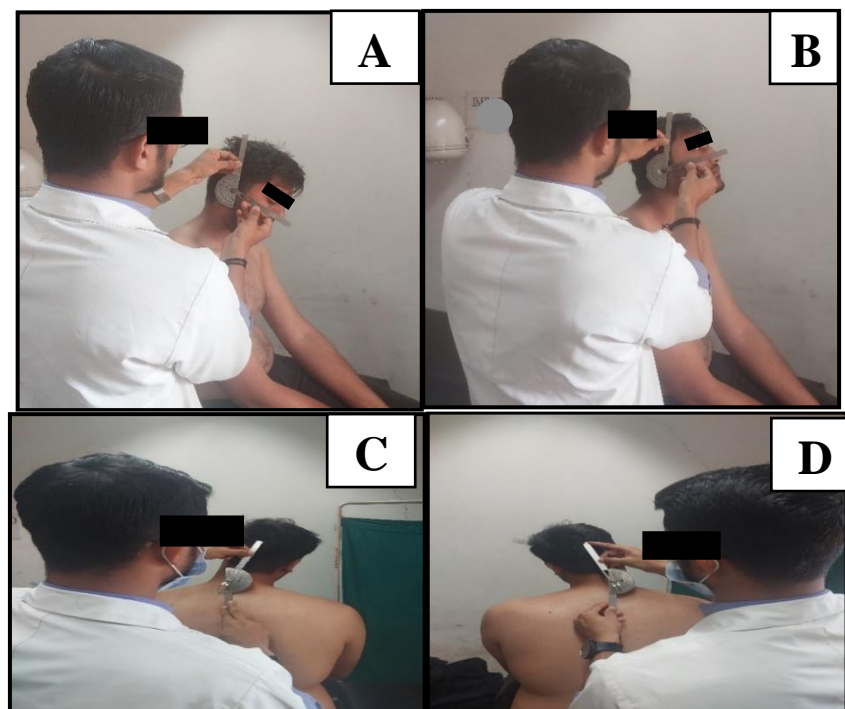
METHODOLOGY

After taking informed written consent from the subject, demographic data will be collected. As per inclusion and exclusion criteria all patient with Acute Trapezitis will be included. The study procedure will be explained to all participants information sheet will be given to them. Written informed consent will be taken. Once selected, Participants will be randomly allocated into two intervention and control group. Pre-intervention pain and functional assessment will be done by numerical pain rating scale, Cervical range of motion and Neck Disability index functional scale respectively. Group A (Cryoflow) will receive conventional physiotherapy treatment plus Cryotherapy.

Group B (Ultrasound therapy) will receive conventional physiotherapy plus Ultrasound and Group C (Control Group) will receive only Conventional Physiotherapy treatment. All 3 groups will receive treatment for 7 sessions. After 7 sessions, follow up would be taken and post-intervention pain, function assessment and range of motion will be done and results will be analysed. The study participants are allowed to continue normal activities and avoid other forms of the treatment of the trapezitis during the duration of the study (7 sessions). Study participants will not be permitted to administer any other forms of electrotherapy or other techniques (tapping, cupping, or dry needling) during the intervention period.



Figure 4: Participant filling neck disability index scale



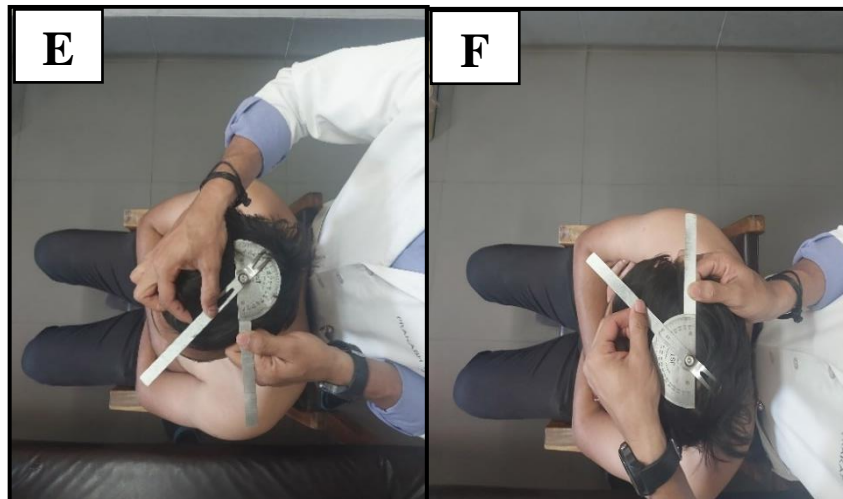


Figure 5: (A)cervical flexion (B)extension, (C)right side flexion, (D)left side flexion (E) left cervical rotation, (F) right cervical rotation

TECHNIQUE OF APPLICATION OF INTERVENTION

1. GROUP A: CRYOFLOW + CONVENTIONAL EXERCISE [14]

Subjects received 7 sessions given in one week treatment of cryoflow along with conventional exercises.

Cryoflow protocol -

- FREQUENCY: 7 Sessions
- INTENSITY-according to patient tolerance

- TEMPERATURE: 12⁰Celsius
- TIME: 10 minutes

Conventional Exercises:

- Frequency: 7 Sessions
- Intensity: 2 Set × 10 Repetitions With 5 Sec Hold
- Time: 15 Minutes
- Type: Scapular Protraction, Retraction, Elevation and Depression and Active Neck Exercise



Figure 6: Cryoflow therapy treatment session

2. GROUP B: ULTRASOUND + CONVENTIONAL EXERCISE [7]

Subjects received 7 sessions given in one week treatment of ultrasound along with conventional exercises.
ultrasound protocol –

- FREQUENCY: 3 MHz
- INTENSITY-0.8 W/cm²
- TIME: 5 minutes
- TYPE: continuous mode
- DURATION: 7 sessions

Conventional Exercises:

- Frequency: 7 Sessions
- Intensity: 2 Set \times 10 Repetitions With 5 Sec Hold
- Time: 15 Minutes
- Type: Scapular Protraction, Retraction, Elevation and Depression and Active Neck Exercise



Figure 7: Ultrasound therapy treatment session

3. GROUP C: CONVENTIONAL EXERCISE [20]

Subjects received 7 sessions given in one week treatment of ultrasound along with conventional exercises.

CONVENTIONAL EXERCISE protocol -

- Frequency: 7 Sessions
- Intensity: 2 Set \times 10 Repetitions With 5 Sec Hold
- Time: 15 Minutes
- Type: Scapular elevation, depression, protraction, retraction And Active Neck Exercise

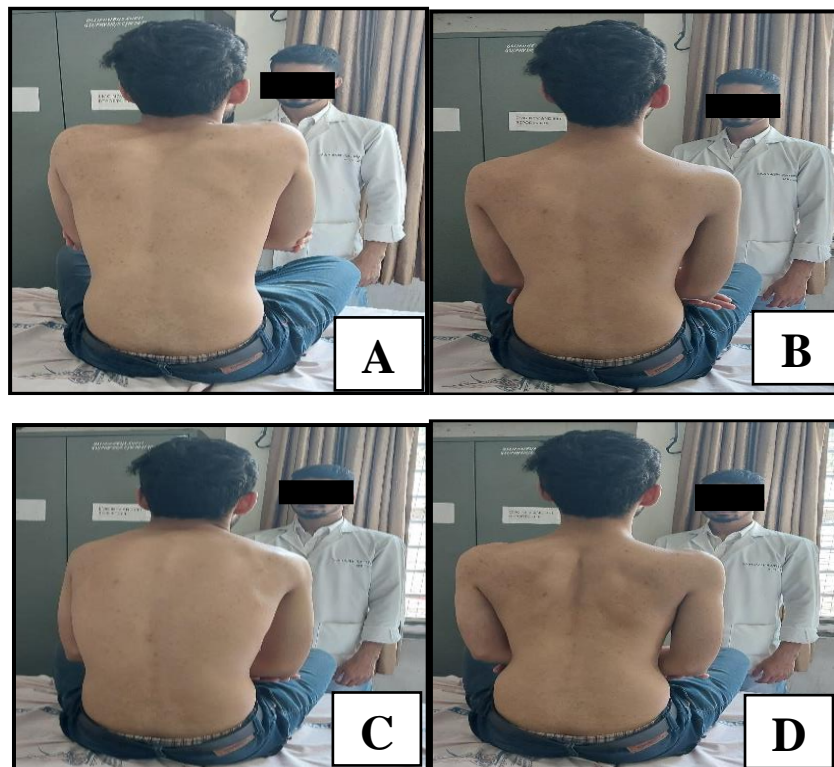


Figure 8: (A)scapular elevation, (B) depression, (C) protraction, (D) retraction

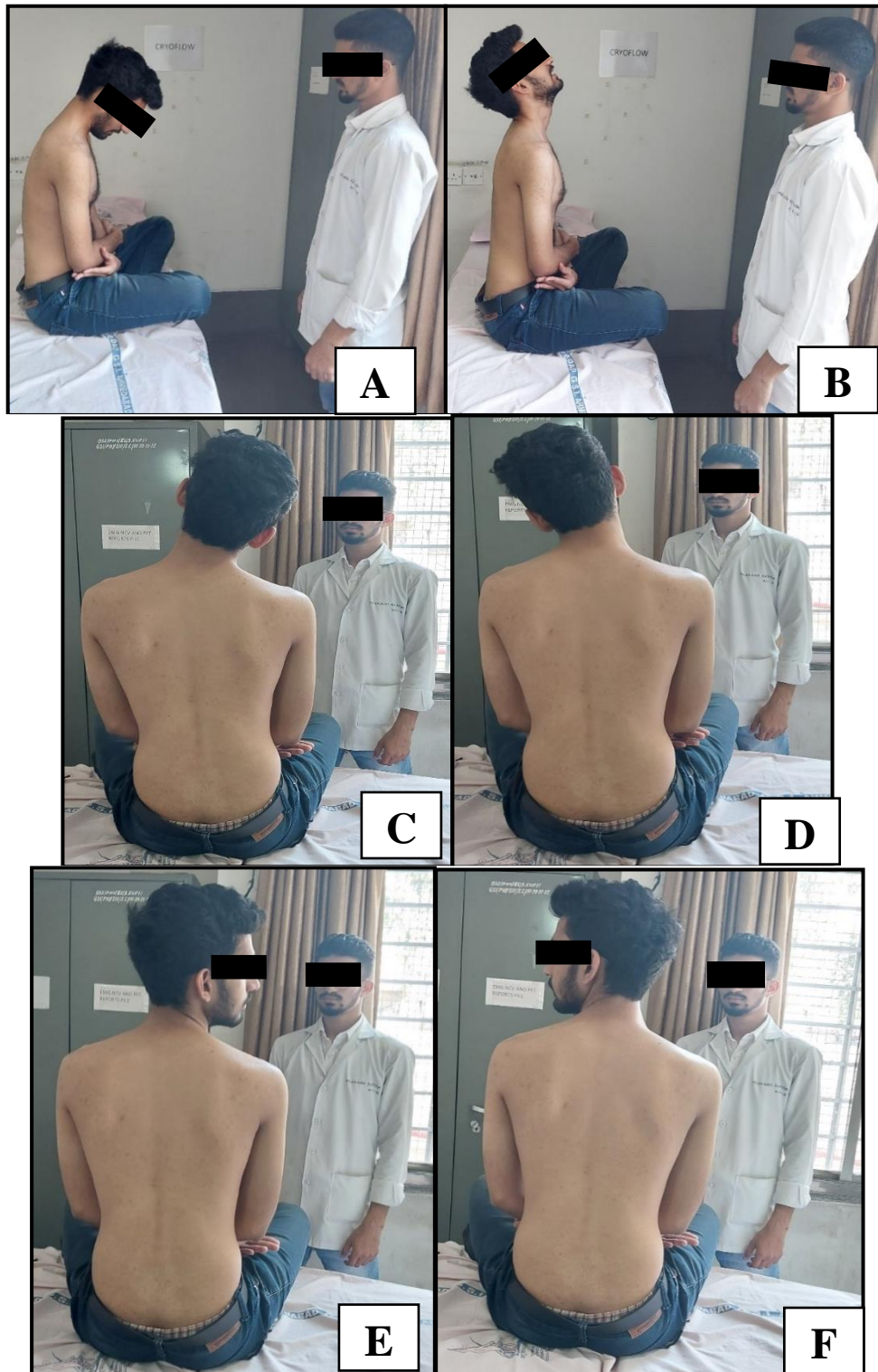


Figure 9: Neck movements (A) flexion, (B) extension, (C) right side flexion, (D) left side flexion (E) right side rotation (F) left side rotation

RESULT

Data of total 72 patients were analysed using SPSS version 20.

Total 72 patients were included in the study, as per inclusion and exclusion criteria, 24 subjects were given cryoflow and

conventional exercise, 24 subjects were given ultrasound and conventional exercise and 24 subjects were given only conventional exercise protocol.

Data analysis was performed on the following outcome measures:

1. Numerical pain rating scale
2. Neck disability index
3. Cervical range of motion

Data were analysed at baseline and after 7 sessions of treatment. Confidence interval was kept at 95% and level of significance was kept at 0.05.

Table 1 Shows the Mean Age of Participants in Both the Groups.

GROUP	MEAN AGE (IN YEARS)	STANDARAD DEVIATION
GROUP A	28.41	8.84
GROUP B	29.54	11.8
GROUP C	30.95	6.51

Table 2 shows gender distribution of patients in the both groups, there was a female predominance in both the groups. Gender distribution in % for both the groups.

GENDER	GROUP A	GROUP B	GROUP C
MALE COUNT %	13(54.66)	8(33.33)	10(41.66)
FEMALE COUNT %	11(43.34)	16(66.67)	14(58.33)
TOTAL	24	24	24

Table 3 Baseline characteristics:

Variable	F VALUE	P value (<0.05, Significant)
Age	0.34	0.70
Gender	0.61	0.54
NPRS (at rest)	8.02	0.73
NPRS (at activity)	1.96	0.14
Cervical flexion	0.11	0.89
Cervical extension	1.13	0.32
Cervical right rotation	1.34	0.26
Cervical left rotation	0.93	0.39
Cervical right-side flexion	1.54	0.22
Cervical left side flexion	1.72	0.18
NDI	1.19	0.30

WITHIN GROUP ANALYSIS

Within Group Analysis of NPRS At Rest NPRS At Activity,Cervical Range Of Motion And NDI Were Done Using Paired

T-Test as Data Was Normally Distributed. There Was satistically significant (P<0.05) Results Found Between Pre-Post intervention.

1)NPRS AT REST

Table 4 shows the pre-post mean of NPRS AT REST within group A group B,group C.

GROUPS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	CONFIDENCE INTERVAL (CI)
	Mean	SD	Mean	SD			
Group A	4.29	1.16	0.29	0.46	2.05	0.04	0.01-1.56
Group B	4.16	0.81	0.16	0.38	2.04	0.04	0.014-1.61
Group C	3.29	0.80	1.45	0.97	3.60	0.0001	0.38-1.36

2)NPRS AT ACTIVITY

Table 5 shows the pre-post mean of NPRS AT ACTIVITY within group A, group B, group C.

GROUPS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	CONFIDANCE INTERVAL
	Mean	SD	Mean	SD			
Group A	6.25	0.73	1.25	0.79	4.98	0.0001	1.34-3.15
Group B	5.79	0.83	0.54	0.58	3.56	0.001	0.72-2.60
Group C	6.41	0.82	3.16	1.41	9.34	0.0001	35-2.58

3) NDI

Table 6 shows the pre-post mean of NDI within group A,group B,group C.

GROUPS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	CONFIDANCE INTERVAL
	Mean	SD	Mean	SD			
Group A	23.95	5.48	11.75	2.65	14.30	0.0001	14.05-18.65

Group B	27.16	7.39	13.37	4.15	13.62	0.0001	15.99-21.54
Group C	26.08	3.34	15	3.88	18.62	0.0001	16.98-21.09

4) CERVICAL FLEXION

Table 7 shows the pre-post mean of CERVICAL FLEXION within group A, group B, group C.

GROUPS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	CONFIDANCE INTERVAL
	Mean	SD	Mean	SD			
Group A	27.29	5.70	35.62	3.98	33.91	0.0001	28.18-31.73
Group B	27.29	5.31	33.54	4.53	36.02	0.0001	27.30-30.53
Group C	28.12	5.47	37.08	3.58	12.17	0.0001	7.43-10.48

5) CERVICAL EXTENSION

Table 8 shows the pre-post mean of CERVICAL EXTENSION within group A, group B, group C.

GROUPS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	CONFIDANCE INTERVAL
	Mean	SD	Mean	SD			
Group A	31.25	5.36	36.66	3.50	44.39	0.001	31-39.44
Group B	30.41	5.69	35	4.66	39.61	0.0001	29.62-32.79
Group C	27.91	4.87	36.04	3.60	10.34	0.0001	6.49-9.75

6) CERVICAL RIGHT SIDE ROTATION

Table 9 shows the pre-post mean of CERVICAL RIGHT ROTATION within group A, group B, group C.

GROUPS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	CONFIDANCE INTERVAL
	Mean	SD	Mean	SD			
Group A	32.5	6.75	37.50	4.89	37.58	0.0001	31.70-35.29
Group B	31.87	6.72	37.70	3.89	38.69	0.0001	31.56-35.02
Group C	35.62	3.06	45	4.66	11.79	0.0001	7.55-10.77

7) CERVICAL LEFT SIDE ROTATION

Table 10 shows the pre-post mean of CERVICAL LEFT ROTATION within group A, group B, group C.

GROUPS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	CONFIDANCE INTERVAL
	Mean	SD	Mean	SD			
Group A	33.33	7.32	38.75	4.48	37.34	0.0001	32.68-36.40
Group B	32.5	7.07	38.54	4.03	37.78	0.0001	32.20-35.83
Group C	35.83	2.82	45.62	5.17	11.89	0.0001	8.08-11.49

8) CERVICAL RIGHT SIDE FLEXION

Table 11 shows the pre-post mean of CERVICAL RIGHT SIDE FLEXION within group A, group B, group C.

GROUPS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	CONFIDANCE INTERVAL
	Mean	SD	Mean	SD			
Group A	19	2.85	20.50	2.06	50.99	0.0001	17.52-18.97
Group B	17.29	3.60	20.20	1.02	42.76	0.0001	16.43-18.06
Group C	19.37	1.68	22.70	2.54	5.78	0.0001	2.14-4.52

9) CERVICAL LEFT SIDE FLEXION

Table 12 shows the pre-post mean of CERVICAL LEFT SIDE FLEXION within group A, group B, group C.

GROUPS	PRE TREATMENT		POST TREATMENT		T VALUE	P VALUE	CONFIDANCE INTERVAL
	Mean	SD	Mean	SD			
Group A	19.33	2.92	20.70	2.25	49.48	0.0001	17.76-19.27
Group B	17.29	3.60	20.20	1.02	42.76	0.0001	16.43-18.06
Group C	19.37	1.68	22.91	2.51	6.30	0.0001	2.38-4.70

BETWEEN GROUP ANALYSIS

Between groups analysis of NPRS At Rest, NPRS At Activity, Cervical Range Of Motion And NDI were done by using one-

way ANOVA (Analysis of Variance) test. There was statistically significant difference found between GROUP A, GROUP B AND

GROUP C (P<0.05) in reducing pain and improving cervical range of motion.

1. NPRS

Table 13 shows the pre-post, mean difference of NPRS between group A, B and C.

Pre-post mean difference + SD	OUTCOME MEASURE	GROUP A	GROUP B	GROUP C	F VALUE	P VALUE
	NPRS AT REST	5 + 1.25	4 + 0.83	1.83 + 1.43	43.68	0.0001
	NPRS AT ACTIVITY	5+1.25	5.25+1.03	3.25+1.32	19.47	0.0001

2. NDI

Table 14 shows the pre-post, mean difference of NDI between group A, B and C

Pre-post mean difference + SD	OUTCOME MEASURE	GROUP A	GROUP B	GROUP C	F VALUE	P VALUE
	NDI	12.20+3.34	13.79+4.37	11.08+1.24	4.17	0.09

3. CERVICAL RANGE OF MOTION

Table 15 shows the pre-post, mean difference of CERVICAL ROM between group A, B and C

Pre-post mean difference + SD	OUTCOME MEASURE	GROUP A	GROUP B	GROUP C	F VAULE	P VALUE
	CERVICAL FLEXION	8.95+3.60	8.33+3.80	6.25+3.37	3.722	0.029
	CERVICAL EXTENSION	5.41+4.40	5.68+3.84	3.41+4.40	4.608	0.013
	CERVICAL RIGHT SIDE ROTATION	6.25+3.96	5.83+4.08	3.37+3.70	5.846	0.005
	CERVICAL LEFT SIDE ROTATION	5.41+4.14	6.04+4.16	3.79+4.03	7.933	0.001
	CERVICAL RIGHT SIDE FLEXION	3.33+2.82	2.91+2.91	1.50+2.41	2.494	0.003
	CERVICAL LEFT SIDE FLEXION	3.54+2.75	2.91+3.58	1.37+2.22	3.530	0.035

Table 16 shows Multiple comparison test (post hoc analysis) for cervical range of motion (FLEXION & EXTENSION).

OUTCOME MEASUREE	COMPARISON	P VALUE
CERVICAL FLEXION	BETWEEN GROUP A&B	0.184
	BETWEEN GROUP A&C	0.001
	BETWEEN GROUP B&C	0.01
CERVICAL EXTENSION	BETWEEN GROUP A&B	0.318
	BETWEEN GROUP A&C	0.01
	BETWEEN GROUP B&C	0.01

Multiple comparisons of CERVICAL FLEXION AND EXTENSION was done by using tukeys multiple comparison test. The p value of CERVICAL FLEXION for group A and group B was >0.05. for group A and C

was <0.05, and for group B and C was <0.01. while for CERVICAL EXTENSION, p value for group A AND GROUP B was >0.05, for group A AND C WAS<0.05, and for group B AND C was <0.05.

Table 17 shows Multiple comparison test (post hoc analysis) for cervical range of motion (RIGHT ROTATION & LEFT ROTATION)

OUTCOME MEASUREE	COMPARISON	P VALUE
CERVICAL RIGHT SIDE ROTATION	BETWEEN GROUP A&B	0.986
	BETWEEN GROUP A&C	0.0001
	BETWEEN GROUP B&C	0.0001
CERVICAL LEFT SIDE ROTATION	BETWEEN GROUP A&B	0.986
	BETWEEN GROUP A&C	0.0001
	BETWEEN GROUP B&C	0.0001

Multiple comparisons of CERVICAL ROTATION ROM were done by using

tukeys multiple comparison test. The p value of CERVICAL right-side rotation for

group A and group B was >0.05 . for group A and C was <0.0001 , and for group B and C was <0.0001 .while for CERVICAL left rotation ROM, p value for group A AND

GROUP B was >0.05 , for group A AND C WAS <0.0001 , and for group B AND C was <0.0001 .

Table 18 shows Multiple comparison test (post hoc analysis) for cervical range of motion(RIGHT SIDE FLEXION & LEFT SIDE FLEXION)

OUTCOME MEASUREE	COMPARISON	P VALUE
CERVICAL RIGHT SIDE FLEXION	BETWEEN GROUP A&B	0.867
	BETWEEN GROUP A&C	0.001
	BETWEEN GROUP B&C	0.0001
CERVICAL LEFT SIDE FLEXION	BETWEEN GROUP A&B	0.674
	BETWEEN GROUP A&C	0.001
	BETWEEN GROUP B&C	0.0001

Multiple comparisons of CERVICAL ROTATION ROM were done by using Tukeys multiple comparison test. The p value of cervical Rt. side flexion for group A and group B was >0.05 . For group A and C

was <0.0001 , and for group B and C was <0.0001 .while for CERVICAL LT. side ROM, p value for group A AND GROUP B was >0.05 , for group A AND C WAS <0.0001 , and for group B AND C was <0.0001 .

EFFECT SIZE IN THE INTERVENTION GROUP:

TABLE 19: EFFECT SIZE OF VARIOUS OUTCOMES

OUTCOME MEASURE	EFFECT SIZE	COHENS STANDARD
NPRS AT REST	0.3	MEDIUM
NPRS AT ACTIVITY	1.0	LARGE
NDI	0.4	MEDIUM
CERVICAL FLEXION	0.4	MEDIUM
CERVICAL EXTENSION	0.4	MEDIUM
CERVICAL RIGHT SIDE FLEXION	0.3	MEDIUM
CERVICAL LEFT SIDE FLEXION	0.3	MEDIUM
CERVICAL RIGHT ROTATION	0.4	MEDIUM
CERVICAL LEFT ROTATION	0.4	MEDIUM

DISCUSSION

There was increased intensity of pain, reduced cervical range of motion and quality of life among the individuals with acute trapezitis. After the interventions of 1-week, present study showed that there was statistically significant improvement found within three groups, Group A (Cryoflow), Group B (Ultrasound), And Group C (Control) in reducing the intensity of pain (Both at rest ($P<0.05$) and activity($P<0.05$)), improving cervical range of motion ($p<0.05$) and quality of life ($p<0.05$). There was also significant difference of NPRS (at rest and activity) between group A & C ($P<0.0001$) and group B & C ($P<0.0001$), but there was no statistically significant difference of NPRS (at rest and activity) between group A ($P>0.791$) and group B ($P>0.454$) as well as no significant difference of NDI ($P>0.09$)

between all the three groups. There was significant difference between Group B & C ($P<0.001$) and Group A&C ($P<0.001$) in improving cervical flexion and cervical extension. There was significant difference between group A & C ($P<0.0001$) and group B & C ($P<0.0001$) in improving cervical rotation and cervical side flexion. No significant difference was found between group A & B in improving cervical flexion, extension, cervical rotation and cervical side flexion.

There was significant difference found between ultrasound and conventional exercise compared to conventional exercises alone in reducing pain intensity both at rest and activity, improving cervical range of motion. Similarly, there was significant improvement found between cryoflow and conventional exercises compared to

conventional exercises alone in reducing pain intensity both at rest and activity, improving cervical range of motion.

According to the present study there was no significant difference found between ultrasound and cryoflow therapy along with conventional exercises in reducing pain intensity at rest and activity and improved functions among individuals with acute trapezitis. A similar study conducted on lateral epicondylitis showed that both ultrasound and cryoflow were effective in reducing pain intensity and improved functional in patients by Heena Rathva et.al²¹.

Present study found that cryoflow along with conventional exercises showed improvement in reducing pain, and functional ability which is supported with a study by Manmitkaur A. Gill et.al found that conventional physiotherapy along with moist hot pack and conventional physiotherapy along with cryoflow (IR guided), both are individually effective in relieving pain, improving range of motion and functional ability in patients with frozen shoulder²². The mechanism behind reduction of pain were Lewis hunting reaction, decreased metabolic activity at cellular level and decreased necrotic enzymatic activity thereby improving healing and recover function in patient. it is because of infrared guided cooling effect of Cryoflow therapy²¹.

The present study showed that the treatment interventions that is ultrasound along with conventional exercises and conventional exercises alone individually have proved to be effective in reducing pain and reducing neck disability in subjects with acute trapezitis. Similarly, a study conducted on Effectiveness of elastic resistance band exercises versus conventional exercises which includes therapeutic ultrasound on cases of trapezitis found by Dr Divya Khare et.al showed effective results with both the interventions.

But then present study showed the better effect when used the ultrasound therapy along with conventional exercises than conventional exercises alone. Mechanism

behind reduction of pain was non thermal effects of ultrasound therapy like micro massage, cavitations and acoustic streaming. These effects increase vascularity at treatment site and enhanced proliferation of fibroblasts. The reparative process is enhanced by acoustic streaming and cavitations by increase diffusion of ions and metabolic across the cell membrane. Change in calcium permeability enhances the tissue healing and increase permeability of sodium may reduce the pain and spasm by altering neural activity²¹. Strengthening and stretching both are the main component of exercise programs, because tendons must have flexibility along with the strength. Lengthening of tendon unit by stretching and strengthening exercises²¹. Similarly a study by Brite Sagaya Raina et.al on comparative effect of TENS and ultrasound which shows the more effective treatment with ultrasound therapy along with conventional exercises in upper trapezitis²³.

Conventional exercises used in our study have shown improvement in subjects as they neurologically inhibit pain or involuntary muscle contraction long enough to allow movement past the barrier with isometric neck contraction, there is a stimulation of muscle proprioceptors which may produce pain relief according to the pain gate theory where in the mechanoreceptor afferents carried by the large diameter axon inhibits nociceptor afferents at the dorsal horn of spinal cord²⁴.

In the present study we have also used Cervical Range of motion as one of the outcome measures and have found clinical significance with the same and hence both the treatment interventions are effective in treatment of acute trapezitis and none of the treatment intervention is superior to the other.

CONCLUSION

The study concluded that ultrasound therapy and cryoflow with conventional exercises is statistically and clinically equally effective in reducing pain, improving cervical ROM and Quality of life in Acute Trapezitis.

Clinical Implication

- As per present study either ultrasound or cryoflow along with conventional exercises can be a choice of treatment in reducing pain, improving cervical range of motion and quality of life in Acute Trapezitis.

Limitation

- Cryoflow machine is not affordable for every physiotherapy institute.

Future Recommendation

- Long term follow up can be taken.
- Study can be done with ice application.

Declaration by Authors

Ethical Approval: Approved for the present study was taken from the institutional ethical committee. Registration No: (GSIIESC/39/22)

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Patel JP, Purohit A. Prevalence of Scapular Dyskinesia in Young Adults with Trapezitis- A Cross-Sectional Study.
2. Naik V, Mascarenhas J, Mutkekar N, Fogueri S. 5 Days Comparative Study To Evaluate The Effectiveness Of Therapeutic Ultrasound And Elastic Resistance Band Exercises Versus Therapeutic Ultrasound And Conventional Exercises In Acute Trapezitis: A Randomized Clinical Trial. *International Journal of Therapies and Rehabilitation Research*. 2015;4(3):1.
3. A. kumaresan G. Deepthi, Vaiyapuri Anandh, S. Prathap. Effectiveness of Positional Release Therapy in treatment of Trapezitis. *International Journal of Pharmaceutical Science and Health care*. 2012; 1(2):71-8.
4. Ravish V.N, Shridhar, Sneha Helen: To Compare The Effectiveness Of Myofascial Release Technique Versus Positional Release Technique With Laser In Patients With Unilateral Trapezitis .2014, vol3,9,2161-2166.
5. Buschbacher R , Braddom R. Practical Guide to Musculoskeletal Disorders Diagnosis and Rehabilitation 2nd ed. Butterworth-Heinemann; 2002:13
6. Pragnya Ravichandran, H. Karthika Ponni, P Antony Leo Asser (april 2016) Effectiveness of ischaemic compression on trapezius myofascial trigger points in neck pain.
7. Kannan P. Management of myofascial pain of upper trapezius: a three group comparison study. *Global journal of health science*. 2012 Sep;4(5):46.
8. Simons DG. Clinical and etiological update of myofascial pain from trigger points. *Journal of musculoskeletal pain*. 1996 Jan 1;4(1-2):93-122.
9. Kahl C, Cleland JA. Visual analogue scale, numeric pain rating scale and the McGill Pain Questionnaire: an overview of psychometric properties. *Physical therapy reviews*. 2005 Jun 1;10(2):123-8.
10. Amit V. Nagrale , Paul Glynn, Aakanksha Joshi, Gopichand Ramteke. The efficacy of an integrated neuromuscular inhibitory technique on upper trapezius trigger points in subjects with non- specific neck pain: a randomized controlled trail. *J Man Manip Ther*. 2010; 18 (1): 37-43.
11. Jyothirmai, M. B., Kumar, D. K. S., Raghavkrishna, D., & Madhavi, D. K. (2015). Effectiveness Of Integrated Neuromuscular Inhibitory Technique (Init) With Specific Strength Training Exercises In Subjects With Upper Trapezius Trigger Points. *International Journal of Physiotherapy*, 2(5), 759–764. <https://doi.org/10.15621/ijphy/2015/v2i5/78231>
12. Levoska S, Keinanen — Kukaanniemi S. Active or passive physiotherapy for occupational cervicobrachial disorders. A comparison of two treatment methods with a 1 years follow up. *Arch Phys Med Rehabil* 1993; 74: 425-430.
13. Andersen LL, Andersen CH, Sundstrup E, Jakobsen MD, Mortensen OS, Zebis MK. Central adaptation of pain perception in response to rehabilitation of musculoskeletal pain: randomized controlled trial. *Pain Physician*. 2012 Sep-Oct;15(5):385-94. PMID: 22996850.
14. Elsayed SE, Raouf NA, Abdallah NS. Efficacy of cryoflow therapy in induced muscle soreness: a randomized trial. *Bulletin*

- of Faculty of Physical Therapy. 2015 Dec;20(2):137-45.
15. Aslan E, Karaduman A, Yakut Y, Aras B, Simsek IE, Yagly N. The cultural adaptation, reliability and validity of neck disability index in patients with neck pain: a Turkish version study. *Spine*. 2008 May 15;33(11):E362-5
 16. Childs JD, Piva SR, Fritz JM. Responsiveness of the numeric pain rating scale in patients with low back pain. *Spine*. 2005 Jun 1;30(11):1331-4.
 17. Young IA, Dunning J, Butts R, Mourad F, Cleland JA. Reliability, construct validity, and responsiveness of the neck disability index and numeric pain rating scale in patients with mechanical neck pain without upper extremity symptoms. *Physiotherapy theory and practice*. 2019 Dec 2;35(12):1328-35.
 18. Neck Disability Index. (Modified from Vernon H, Mior S: The neck disability index: a study of reliability and validity, *J Manip Physiol Ther*14:411, 1991.)
 19. Farooq MN, Bandpei MA, Ali M, Khan GA. Reliability of the universal goniometer for assessing active cervical range of motion in asymptomatic healthy persons. *Pakistan journal of medical sciences*. 2016 Mar; 32(2):457.
 20. Hanten WP, Olson SL, Butts NL, Nowicki AL. Effectiveness of a home program of ischemic pressure followed by sustained stretch for treatment of myofascial trigger points. *Physical therapy*. 2000 Oct 1;80(10):997-1003.
 21. Rathwa HR, Shukla Y. Effect of Cryotherapy versus Ultrasound Therapy in Lateral Epicondylitis: A Comparative Study. *Int J Sci Healthcare Res*. 2020;5(1):261-7.
 22. Gill MA, Soni NC. Effect of cryoflow (IR guided) and moist hot pack on pain and function in frozen shoulder: a comparative study (pilot study). *Executive Editor*. 2019 Apr;13(2):82.
 23. Raina BS, Manhas A, Jothilingam M. Comparison of Ultrasound Therapy & Transcutaneous Electrical Nerve Stimulation in the Treatment of Upper Trapezitis. *Annals of the Romanian Society for Cell Biology*. 2021 May 17;25(6):1121-31.
 24. Rodríguez-Huguet M, Gil-Salú JL, Rodríguez-Huguet P, Cabrera-Afonso JR, Lomas-Vega R. Effects of Myofascial Release on Pressure Pain Thresholds in Patients With Neck Pain: A Single-Blind Randomized Controlled Trial. *Am J Phys Med Rehabil*. 2018 Jan;97(1):16-22.

How to cite this article: Prakashbhai Kanjibhai Rathva, Yagna Unmesh Shukla. Effect of cryoflow versus ultrasound in acute Trapezitis on pain, range of motion and quality of life: a comparative interventional study. *Int J Health Sci Res*. 2023; 13(12):199-214. DOI: <https://doi.org/10.52403/ijhsr.20231225>
