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An Comparative Study On The Effectiveness Of Interferential Therapy And Wax Therapy With Combination Of Maitland Exercise Technique In Freezing Stage Of Frozen Shoulder

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Abstract:
Background: *Frozen shoulder is also known as adhesive capsulitis that can common in musculoskeletal disorder characterized by an pain and progressive restriction of shoulder joint motion, which can affect in age group of 40 to 60 which predominantly affect the shoulder range of motion. Typically it has three stages as freezing, frozen, and thrawing. In freezing stage it also painful stage during this stage pain have in worsened at night with movement and typically non specific leading to progressive limitation in both active and passive range of motion. Electro modality were used to treat the pain which one of the modality is interferential therapy used to treat pain at foremost while in superficially the wax therapy were infiltrate the heat into the tissue level to subsidy pain and helps to loosen up tissue adhesion, to improve the joint range of motion, Maitland exercise were get performed according the grade, which had upto grade 5.*
Methods: *The study design was a convenient sampling, 30 patients were selected from Aarupadai Veedu Medical College and Hospital, Pondicherry. They were Allocated randomly into two groups, Group A(N=15) Interferential therapy with Maitland exercise. Group B(N=15) Wax therapy with Maitland exercise. The outcome measure VAS and SPADI were measured in Pre and Post test for 8-week period.*
Result: *Data Analysis was done according to paired 't' test between the groups A & B calculating with 5% of significance. The statistical interpretation of mean and standard deviation shows the improvement in the Interferential therapy with Maitland exercise in patient with frozen shoulder.*
Conclusion: *This Study concludes that The Interferential therapy with Maitland exercise for Group A shows more significant improvement in patients with frozen shoulder in freezing stagethan Group B.*
Keywords: *Interferential therapy, Wax therapy, Maitland exercise, Frozen shoulder, Visual Analogue Scale, Shoulder Pain Disability Index.*

INTRODUCTION:

Frozen shoulder (or adhesive capsulitis) that can affect 2-5% of population, usually found in age between 40-60 years and approximately 20% of people were suffer from shoulder pain. [1] and usually occur in the shoulder joint result of pain, decreased range of motion, joint movement restriction and muscle weaknesslaterly. Mostly can cause difficulty in ADL activity that may leads to disability.Prevalence with indicating of frequency of 7-20% among the adult general population. Pathologically shoulder joint that includes synovial inflammation, joint capsule hyperatropy, and a resulting developing of fibrous structures

Physiologically shoulder movement were most restricted by to external rotation. Mainly joint stiffness has complaint and gradually problem get worsen which movement restriction increase pain and cause atrophy, resulting increased stiffness. It can be divided as primary or secondary type. The term primary indicates an idiopathic condition. Secondary disease may be linked with trauma, cardiovascular disease,

hemiparesis, surgical procedures or diabetes [2]. That the Pathogenesis are provoked by chronic inflammation in musculotendinous or synovial tissue such as rotator cuff, biceps tendon or joint capsule. Which may develops and the capsule which surround the joint were become contracted and movement gets painful. [3]

The stages of the Frozen shoulder had divided into three stages that they are severe pain, gradual restrictions in ROM accompanied by pain, and resolution and ROM recovery. At initially the disease causes slowly increasing pain and gradually decreasing ROM, creating difficulty in daily activity. At result clinically causes loss of passive and active ROM specifically external rotation of shoulder joint.

By the Maitland exercise it can applies a passive oscillatory technique, which has classified into Grade 1-5with respective intensity, Grade 1 is refers to intensity of small amplitude that is applied at the beginning of the point ROM,Grade2 refers to an intensity of slightly larger amplitude applied from the beginning of the joint ROM to middle. Grade 3 is applied at a large amplitude from the middle of the joint ROM to beginning of restriction. Grade 4 is applied against the tissue resistance at a small amplitude to the restricted part of the joint. [7]

MATERIALS AND METHODOLOGY:

The study design was a Convenient sampling method,30 patients were selected from Aarupadai Veedu Medical college and Hospital (Kirumampakkam Pondicherry). They were allocated into two group, Group A(N=15) Interferential therapy with Maitland exercise, Group B(N=15) Wax therapy with Maitland exercise. The Treatment duration is about 4 days/week for 8 weeks, the outcome measure VAS and SPADI were measured in pre and Post test for 8-week period.

Study design:Convenient sampling

Study location: Aarupadai Veedu Medical college and Hospital

Study duration: 8 weeks

Sampling size: 30 participants

Sample size calculation:Group A[n=15]: Interferential therapy with Maitland exercise

Group B[n=15]: Wax therapy with Maitland exercise

Subjects & Selection Method: The study design design was a Convenient sampling, 30 patients were selected from Aarupadai Veedu Medical college and Hospital (KirumampakkamPomdicherry). They were allocated into two group, Group A(N=15) Interferential therapy with Maitland exercise, Group B(N=15) Wax therapy with Maitland exercise. The Treatment duration is about 4days/week for 8 weeks, the outcome measure VAS and SPADI were measured in pre and post test for 8 week period.

Inclusion Criteria:

1. Age 40-60
2. Both male and female
3. Diabetic person
4. Joint stiffness & tenderness

Exclusion Criteria:

1. Shoulder trauma
2. Implant on the joint
3. Fracture
4. Osteomyelitis
5. Frequent surgery
6. Open wound in shoulder region
7. Hypotension

Procedure:

The subject whowere fulfilled the inclusion criteria were participated in the study. Such eligible subjects were selected in this study after obtaining informed consent. The subject will be assessed before the treatment and at the end of 8-week by using Visual Analogue Scale and Shoulder Pain Disability Index. The tool of 30 subject will be divided equally into 2 group. GROUP A(n=15) and GROUP B(n=15). GROUP A will receive Interferential therapy with Maitland exerciseand GROUP B will receive Wax Therapywith Maitland exercise.

Group A	Group B
Number of participants: 15 **Intervention:** Interferential therapy combined with Maitland exercise for 8 weeks **Duration: 4** days per week.	**Number of participants:** 15 **Intervention:** Wax therapy combined with Maitland exercise for 8 weeks **Duration: 4** days per week.

Group A
Interferential therapy (IFT)
Position of the patient: supine / High sitting
Position of the therapist: standing
Duration of the treatment: 10-15min
The site of treatment area should be cleaned and dry. Place the lead in cross method with channel 1 and channel 2, in between the separation of the both channel will be 2-5cm distance and cover the area, duration of the treatment is 10-15 minutes.

Group B
Wax therapy
Position of the patient: High sitting
Position of the therapist: standing / sitting
Duration of the treatment: 10-15min
Patient should be in comfortable position, the wax modality should be as much as near to the therapist. Clean the area of treatment in patient and the temperature should be 36 - 40 degree methods of applying wax will apply, duration in 10-15 min.
Maitland exercise:
The technique of Maitland exercise are done after the treatment of electro modalities. Inferior Gliding and posterior gliding were apply on the shoulder to increase the ROM which has been given for 10 – 15 minutes.
Post treatment assessment
After 8 weeks of treatment with IFT and Wax therapy, each patient is again assessed by visual analogue scale and SPADI.
Statistical analysis & results:
Table-1 The table shows mean value, mean difference, standard deviation and paired 't' value between pre-test and post-test scores of pain among Group A.

Measurement	Mean	Mean difference	Standard deviation	Paired "t" value
Pre-test	7.33			
Post-test	3.53	3.80	0.41	35.546

In Group A for pain the calculated paired "t" value is 35.546 and "p" value is 0.0001 level. it shows that there is significant difference in pain following Interferential therapy with maitland exercise in frozen shoulder.

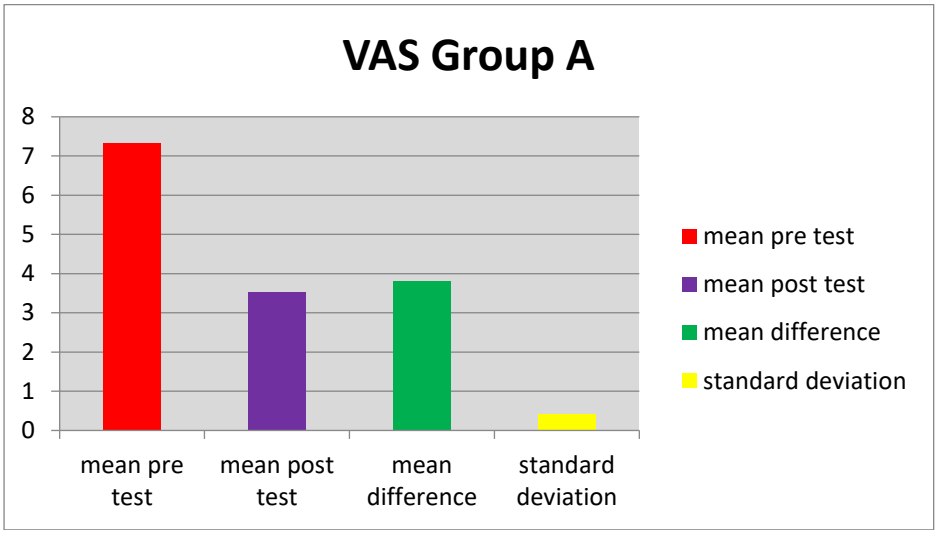

Figure 5: Shows graphical representation of pre and post-test mean values of pain among Group A

Table-2 The table shows mean value, mean difference, standard deviation, and paired "t" value between pre-test and post-test scores of pain among Group B.

Measurement	Mean	Mean difference	Standard deviation	Paired 't' value
Pre-test	7.2	5.13	0.99	20.073
Post-test	2.07			

In Group B for pain the calculated paired "t" value is 20.073 and "p" value is 0.0001 levels. it shows that there is significant difference in pain following Wax therapy with Maitland exercise in frozen shoulder.

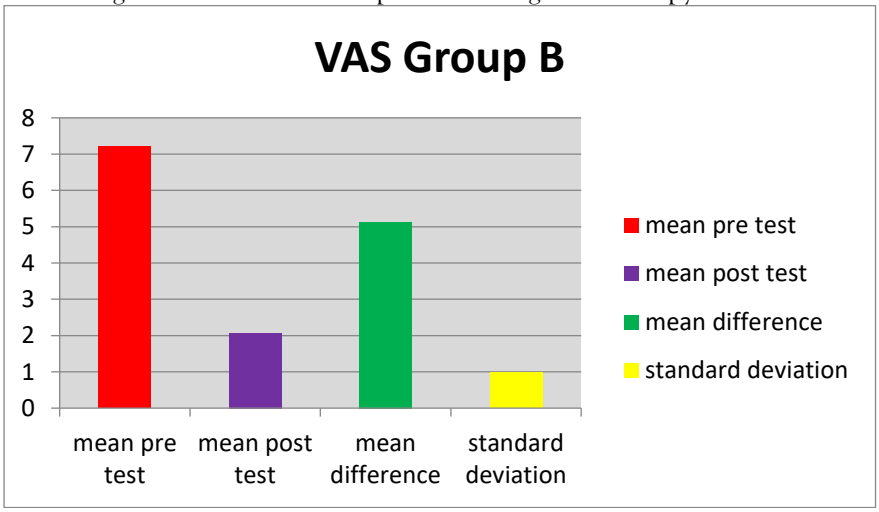

Figure 6: Shows graphical representation of pre and post-test mean values of pain among Group B.

Table-3 The table shows mean values, mean difference, standard deviation and unpaired "t" value between pre and post-test scores of pain between Group-A and Group-B.

Groups	Mean difference	Standard deviation	Unpaired "t" value
GROUP-A	1.33	0.899	5.73
GROUP-B			

In Group A and Group B for pain the calculated unpaired "t" value is 5.73 and "p" table value is at 0.0001 level. it shows that there is significant difference between in pain following Interferential therapy with maitland exercise and wax therapy with maitland exercise in frozen shoulder.

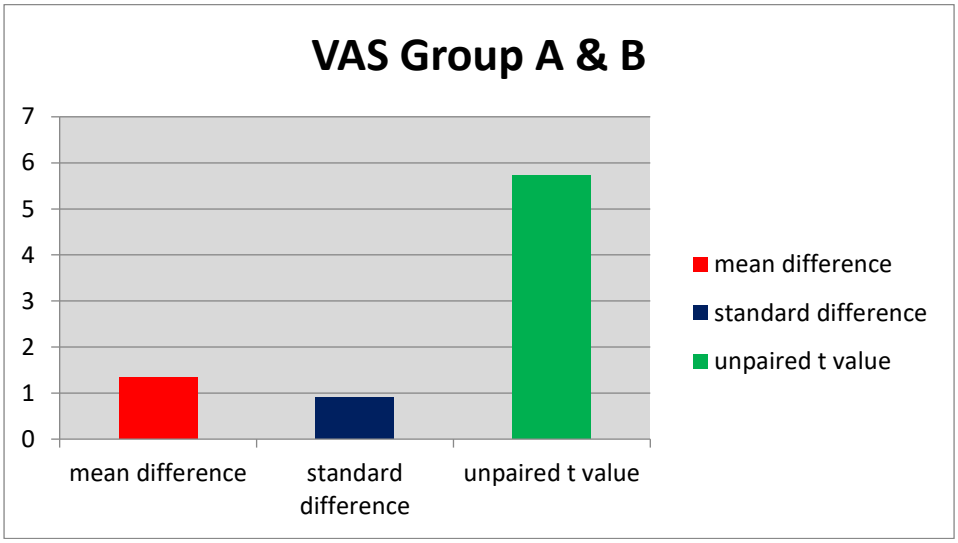

Figure 7:Shows graphical representation of un-paired "t"value of pain between Group A and Group B.

Table-4 The table shows mean value, mean difference, standard deviation, and paired "t" value between pre-test and post-test scores of SPADI among Group A.

Measurement	Mean	Mean difference	Standard deviation	Paired "t" value
Pre-test	73.07			
Post-test	20.13	52.93	3.83	53.584

In Group A for shoulder disability the calculated paired "t" value is 53.584 and "p" value is 0.0001 level. it shows that there is significant difference between in shoulder disability following Interferential therapy with Maitland exercise in frozen shoulder.

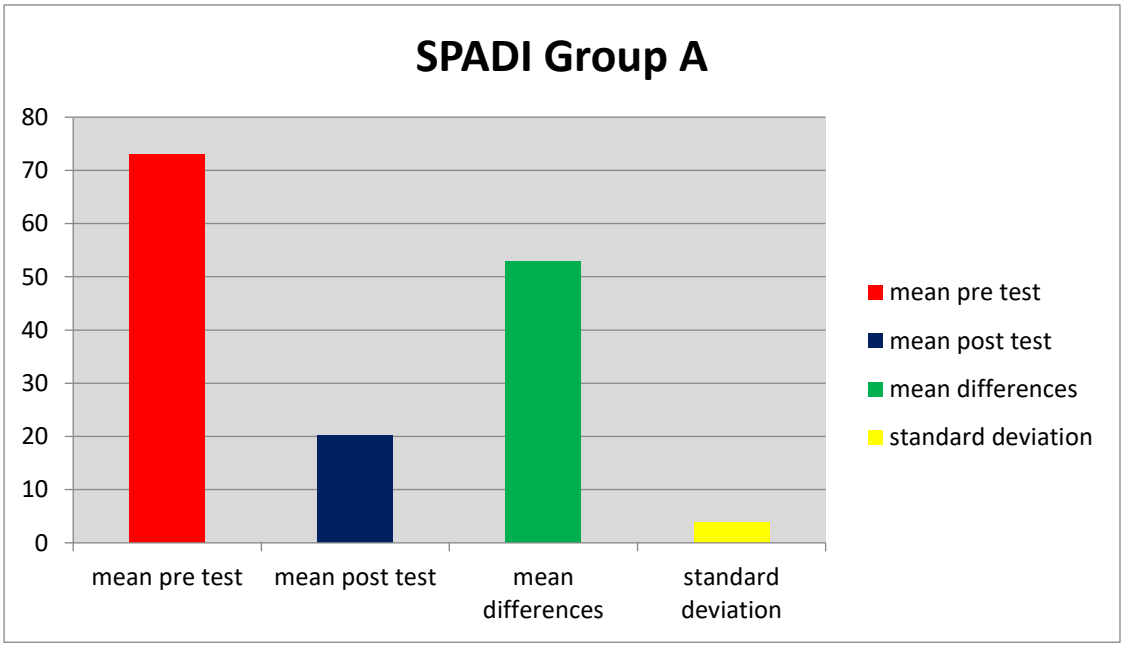

Figure8: Shows graphical representation of pre and post-test mean values of SPADI among Group A

Table-5 The table shows mean value, mean difference, standard deviation, and paired "t" value between pre-test and post-test scores of SPADI among Group B.

Measurement	Mean	Mean difference	Standard deviation	Paired "t" value
Pre-test	74.33			
Post-test	42.33	32	2.54	48.881

In Group B for shoulder disability the calculated paired "t" value is 48.881 and "p" value is 0.0001 level. it shows that there is significant difference between in shoulder disability wax therapy with Maitland exercise in frozen shoulder.

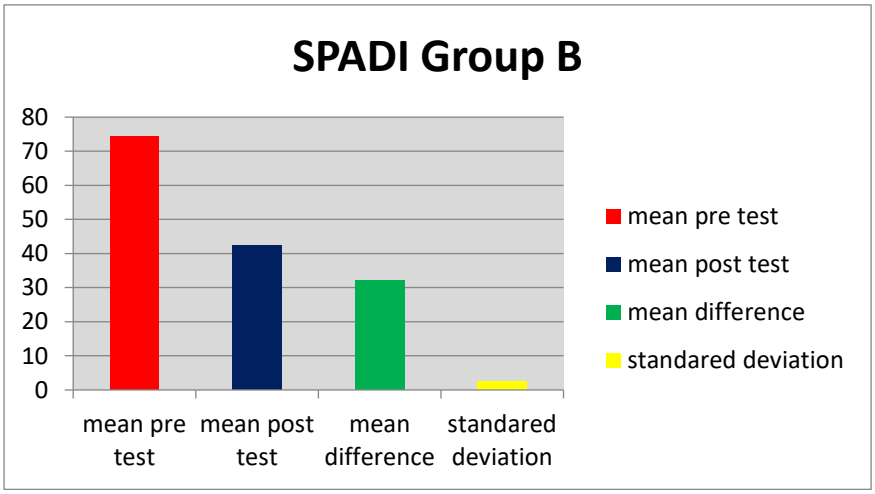

Figure9: Shows graphical representation of pre and post-test mean values of SPADI among Group B

Table-6 The table shows mean values, mean difference, standard deviation and unpaired "t" value between pre and post-test scores of SPADI between Group-A and Group-B.

Groups	Mean difference	Standard deviation	Unpaired "t" value
GROUP-A			
GROUP-B	20.93	3.75	21.617

In Group A and Group B for shoulder disability the calculated unpaired "t" value is 21.617 and "p" table value is at 0.0001 level. it shows that there is significant difference between in shoulder disability following Interferential therapy with Maitland exercise and wax therapy with Maitland exercise in frozen shoulder.

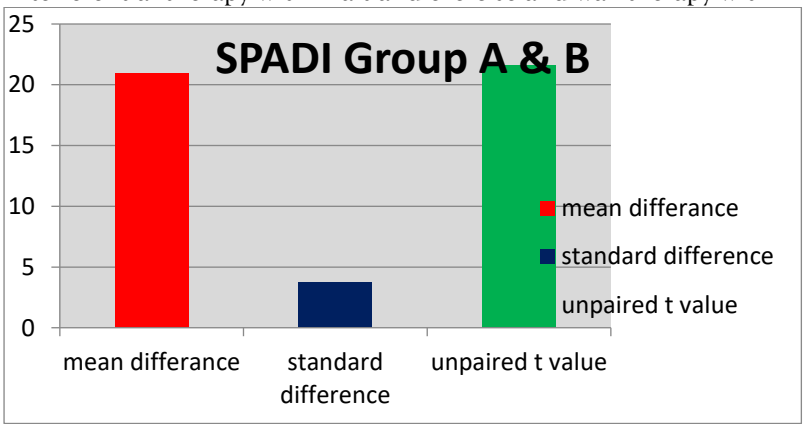

Figure 10: shows graphical representation of un-paired "t" value of SPADI between Group A and Group B.

DATAS OF PAIN SCORES USING VAS:

Pre and Post-test values of pain in group A

Group A				
SL.NO.	Age	Gender	PRE TEST	POST TEST
1	40	Female	7	3
2	41	Male	8	4
3	55	Female	7	3
4	49	Female	8	4
5	41	Male	8	5
6	48	Male	7	3
7	43	Female	6	2
8	59	Female	7	3
9	47	Male	6	3
10	51	Female	8	4
11	48	Male	9	5
12	44	Female	6	3
13	56	Male	8	4
14	52	Female	7	3
15	47	Female	8	4

Pre and Post-test values of pain of group B

Group B				
SL.NO.	Age	Gender	PRE TEST	POST TEST
1	40	Male	9	3
2	41	Male	7	2
3	55	Female	8	1
4	45	Female	7	3
5	43	Male	7	2
6	49	Female	8	1
7	46	Male	6	1
8	51	Male	7	2
9	58	Female	8	4
10	57	Male	7	3
11	52	Female	7	2
12	42	Female	6	2
13	44	Male	8	3
14	52	Female	7	2
15	46	Male	6	0

DATA'S OF SPADI

Pre and Post-test values of SPADI in group A

Group A				
SL.NO	Age	Gender	PRE-TEST	POST-TEST
1	45	Male	71	22
2	40	Female	61	11
3	44	Female	74	26
4	49	Male	65	10
5	42	Male	78	24
6	48	Female	89	31

7	52	Male	68	12
8	57	Female	69	24
9	56	Male	77	24
10	55	Female	76	22
11	53	Male	68	12
12	50	Female	80	23
13	48	Male	71	22
14	46	Female	68	12
15	50	Male	81	27

Pre and Post-test values of SPADI in group B

Group B				
SL.NO.	Age	Gender	PRE-TEST	POST-TEST
1	43	Female	79	45
2	53	Male	81	50
3	42	Female	71	40
4	47	Male	66	30
5	51	Female	80	44
6	58	Male	75	43
7	44	Female	68	32
8	42	Male	81	53
9	53	Female	66	35
10	55	Male	73	41
11	59	Female	74	42
12	41	Male	65	34
13	46	Female	75	44
14	52	Male	80	49
15	48	Male	81	53

RESULTS

30 patients of frozen shoulder subjects were selected for the study. The subjects were randomly divided into 2 equal groups, Group A and Group B. For Group A, Interferential therapy with Maitland exercisewas given. For Group B, wax therapy with Maitland exercise was given.

Analysis of Dependent variable pain in Group A:

The calculated paired "t" value is 35.546 and "p" value is 0.0001 level. it shows that there is significant difference in pain following Interferential therapy with Maitland exercise in frozen shoulder.

Analysis of Dependent variable pain in Group B:

The calculated paired "t" value is 20.073 and "p" value is 0.0001 levels. it shows that there is significat difference in pain following Wax therapy with Maitland exercise in frozen shoulder.

Analysis of Dependent variable pain between Group A and Group B:

The calculated unpaired "t" value is 5.73 and "p" table value is at 0.0001 level. it shows that there is significant difference between in pain following Interferential therapy with Maitland exercise and wax therapy with Maitland exercise in frozen shoulder.

When comparing the mean values of Group A and Group B, Group A subjects those were treated with exercise. Hence it is conclude that IFT along with Maitland exercise is more effective than Wax therapy in reducing pain among frozen IFT with Maitland exercise shows more difference than Group B treated with Wax therapy with Maitland shoulder.

Analysis of Dependent variable SPADI in Group A:

The calculated paired "t" value is 53.584 and "p" value is 0.0001 level. it shows that there is significant difference between in shoulder disability following Interferential therapy with Maitland exercise in frozen shoulder.

Analysis of Dependent variable SPADI in Group B:
The calculated paired "t" value is 48.881 and "p" value is 0.0001 level. it shows that there is significant difference between in shoulder disability wax therapy with Maitland exercise in frozen shoulder.
Analysis of Dependent variable symptom inSPADI Group A and Group B:
The calculated unpaired "t" value is 21.617 and "p" table value is at 0.0001 level. it shows that there is significant difference between in shoulder disability following Interferential therapy with Maitland exercise and wax therapy with Maitland exercise in frozen shoulder.

When comparing the mean values of Group A and Group B, Group A subjects those were treated with IFT with Maitland exercise shows more difference than Group B treated with Wax therapy with Maitland exercise. Hence it is conclude that IFT along with Maitland exercise is more effective than Wax therapy in reducing symptom shoulder disability among frozen shoulder patients.

DISCUSSION

This study was selected for the purpose to find out the efficacy of Interferential therapy and wax therapy with combination of Maitland exercise on frozen shoulder. This present study is based on Gladys L Y Cheing et al, conducted a study on effectiveness of interferential therapy treatment and study was a convenient sampling. The study concluded that interferential therapy with Maitland exercise seems to be most appropriate option to reduce the pain in shoulder joint.

In this study analysed that 30 patient of frozen shoulder were taken for the study and the subjects were divided into two groups; Group A and Group B of 15 subjects in each group.

- Group A received Interferential therapy with Maitland exercise
- Group B received Wax therapy with Maitland exercise

The interferential therapy with Maitland exercise evaluated in the study aim to improve ADL activity and reduce pain, the comparison of these study of interferential therapy with Maitland exercise and wax therapy with Maitland exercise between two groups showed that there is statically significant ($p<0.0001$). That study concluded interferential therapy with Maitland exercise is more effective than wax therapy with Maitland exercise in frozen shoulder.
The group A is found more effective than group B

LIMITATIONS

- Number of subjects are small
- Short term study

CONCLUSION

A comparative study was concluded to investigate the effectiveness of Interferential therapy with Maitland exercise and wax therapy with Maitland exercise that to under the patient frozen shoulder. 30 subjects were included in this study and were randomly divided into two groups.
Group A was treated with Interferential Therapy with Maitland exercise
Group B was treated with wax therapy with Maitland exercise
From the statistical results, it can be concluded that there is significant difference in reduction of pain, and improving shoulder disability in both groups but when comparing the mean value, it is found out that the group treated with Interferential therapy with Maitland exercise is more effectivethan Wax therapy with Maitland exercise in patient frozen shoulder.

SUGGESTIONS

- Similar study can be carried out for larger sample size
- Study can be carried out with Goniometer experiment
- The study can be carried out for long term period

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