

How to Cite:

Ramadan, D., Serry, Z., & Ghallab, M. A. (2022). Comparison between effect of reflexology and Maitland mobilization in treatment of frozen shoulder of diabetic patients type II. *International Journal of Health Sciences*, 6(S1), 1661-1668.
<https://doi.org/10.53730/ijhs.v6nS1.4922>

Comparison between Effect of Reflexology and Maitland Mobilization in Treatment of Frozen Shoulder of Diabetic Patients Type II

Douaa Ramadan

Physiotherapist at Qoudorat rehabilitation and wellness center, B.Sc. of Physical Therapy, Cairo University, Egypt

Zahraa Serry

Professor of Physical Therapy for Cardiovascular Respiratory Disorder and Geriatrics, Faculty of Physical Therapy, Cairo University, Egypt

Mona A. Ghallab

Lecturer of Physical Therapy for Cardiovascular Respiratory Disorder and Geriatrics Faculty of Physical Therapy, Cairo University, Egypt

Abstract--Diabetes metabolic disorders can lead to changes in connective tissue and adhesive capsulitis (AC) is one of the most common complications that occur with diabetes where it is defined as pain restriction in the glenohumeral joint capsule that causes limitation in ROM of shoulder. Physiotherapy has many modalities that proved their role in improving symptoms of AC and so this study was aiming to know which is more effective in improving symptoms: ROM (flexion, abduction, external rotation, internal rotation) and Shoulder pain, Reflexology, or Maitland mobilization in treatment of type II diabetic patients. Thirty patients from both genders with age ranged from 50-60 years were recruited for this study. They were divided randomly into two groups of equal number (Group A – Maitland mobilization) and (Group B – Reflexology). Data obtained from both groups before and after 8 successive weeks of intervention was statistically treated to analyze the scores of visual analogue scale (score), shoulder flexion ROM (angle), shoulder abduction ROM (angle), shoulder internal rotation ROM (angle) and shoulder external rotation ROM (angle) to determine which is more effective. At the end of the study duration, ROM and VAS score of both groups were compared. Groups A and B both showed significant increase in ROM and VAS score ($p \leq 0.05$). However, there is a more significant increase in ROM, and a significant decrease in pain on VAS scale by Maitland mobilization treatment group comparing to the reflexology treatment

group. Conclusion: Maitland mobilization are more effective than reflexology in improving ROM and pain in patients of diabetes type II with adhesive capsulitis.

Keywords---adhesive capsulitis, ROM, diabetes type II, reflexology, maitland mobilization.

Introduction

Adhesive capsulitis

Diabetes is a general term for heterogeneous metabolic disorders and its main finding is chronic hyperglycemia. The reason is impaired insulin secretion or impaired insulin action, or both. Type 2 diabetes can range from severe insulin resistance and relative insulin deficiency to general secretion defects and insulin resistance. It is often associated with other problems called metabolic syndrome (Thong et al., 2020).

In this condition, the optimum therapeutic approach is mostly many operational and non-operative approaches; the operative ones are the the procedure of arthroscopic capsular release and is believed to be safe. Manipulation under anesthesia (MUA) is regarded an effective treatment for symptoms that improve quickly. Iatrogenic injury risks include fractures, brachial plexus injuries, rotator cuff tears, labral tears, dislocation of the glenohumeral joint (Lluch-Girbés et al., 2019).

Maitland mobilization

The concept of Maitland was defined as a set of procedures examination, diagnosis, and treatment manipulative musculoskeletal disorder therapy. Oscillations are used in this notion. Provided to the joint in a physiological context range. I and II Maitland's grades the primary goal of mobilisation is to reduce the pain. constant stimulation of pain Blocking noiceception mechanoreceptors at the level of the spinal cord, where The third and fourth grades are mostly used for stretch and increasing range of motion (Hengeveld & Banks, 2013).

When all patients with adhesive capsulitis were treated with manual therapy versus conventional therapy, the results showed that manual therapy improved the patient's condition, with pain being reduced and ROM increasing more in manual treatment than in traditional treatment.

Reflexology

Reflexology is one of the methods that can interrupt the repetitive stress patterns that people often encounter according to people's lifestyles. They will work more effectively with reflexology, because the first application will interfere with the pressure operation, and the subsequent treatments will improve the physical

condition. In addition, reflexology can also relieve the body from any stress in daily life (Kliegel, 2018).

Subject and Methods

Sample and randomization

Sample: 30 diabetic type II patients who have adhesive capsulitis were included in this study, aged from 40 to 60 years old and subdivided randomly into 2 groups A and B. Each one has 15 patients.

Randomization: it is Pre-test, post-test randomized (1:1) controlled, clinical trial where Group (A) had manual mobilization while, group (B) receive reflexology. The reflexology and manual mobilization will by 3 sessions weekly (every other day) for 8 weeks. The current study was conducted in physical therapy outpatient clinic at Qoudrat center in Cairo, Egypt from August 2020 to may 2021. The study was approved by research ethical committee of faculty of physical therapy, Cairo University in (P.T.REC/012/06)

Inclusion criteria

Patients fulfilled the following criteria were included:

- Type 2 diabetes mellitus for ≥ 4 years
- Mean postprandial blood glucose ≥ 290 mg/dl
- Age range of 40-50 years old
- Frozen shoulder for 2-7 months.

Exclusion criteria

Patients were excluded if they had:

- Mental disorders
- Developing cancer
- Cardiopulmonary diseases
- Uncontrolled hypertension
- Neurological disorders.

Evaluation procedures

All participants were given a full explanation of assessment and treatment procedures, and informed consent form had been signed before participating in the study. All patients were subjected to the following assessment before beginning of the treatment and after ending it:

- Weight and height was measured by weight and height scale to calculate BMI.

$$\text{BMI} = \frac{\text{body weight (kg)}}{\text{height (m}^2\text{)}}$$
- Shoulder joint ROM of each patient was recorded pre-treatment and at 4 and 8 weeks post-treatment using a goniometer

1. Forward Flexion: the normal range is from 160 to 180 degree
2. Abduction: the normal range is from 150 to 160 degree.
3. Internal rotation: the normal range of between 70 to 90.
4. External rotation: the normal range of internal rotation ranges from 80 to 90.
 - A Visual Analogue Scale (VAS)
It is often used in epidemiologic and clinical research to measure the intensity or frequency of pain. For example, the amount of pain that a patient feels ranges across a continuum from none to an extreme amount of pain. From the patient's perspective, this spectrum appears continuous $\pm$ their pain does not take discrete jumps, as a categorization of none, mild, moderate and severe would

Intervention

30 patients of both sexes with proven Type 2 diabetes and frozen shoulder who were selected from the outpatient clinic of Qodorat Rehabilitation center, were assessed for ROM and VAS score then, included in the study and randomly divided into group A and B where;

- Group A (Manual mobilization): Maitland mobilisation of posterior glide were given with the patient in supine position and the therapist grasped the head of the humerus with one hand for movements and clavicular region with other hand for stabilization. The therapist was in a standing position to give the glides. The scapula of the patient was further stabilised by putting a towel under it to prevent the protraction of scapula so that the glides of the scapula would be smoother. When there is no reactivity but capsular hypomobility, Grade 3 or 4 accessory motions were applied to increase range of motion while on a reactive joint, Grade 1 or 2 were given then progressed to higher grades. Each mobilization were applied for 30 seconds at a rate of 1 mobilization per 1 or 2 seconds followed with resting period of 30 seconds. Total 3 sets of 30 repetitions were given followed by active ROM exercises and educating engaging patient to a home program exercise.
- Group B (reflexology): Patients received reflexology in the form of thumb walk for 15 minutes in upward, downward and diagonal directions over the shoulder area on the bottom of the foot under the little toe. Followed by educating and engaging patient to a home program exercise.

The sessions were applied 3 times per week for 8 weeks, where the patients asked to apply home program of therapeutic exercises including:

- Codman or pendulum exercise: by leaning slightly forward and keeping the back straight while the sound limb is supported over a table. the patient is ordered to swing the affected limb in all pain free maximum possible range , forward backward ,towards and away from the body and in circular movement.
- forward flexion exercise by using weight : this exercise is carried out by holding a dumbly and moving the arm forward from the neutral position of the arm towards the maximum pain free possible point while the patient is fully supine over the plinth. The target of this exercise is to increase the strength of the muscles and improving flexion ROM.

- External rotation of shoulder strengthening: This exercise is carried out by the patient is sideling on the sound side while the affected limb is relaxed on a pillow with elbow flexed 90 degree. The patient is asked to hold the dumbly from this position and moving it away fro the body.
- vi. Cross over arm stretch: Carried out by pulling the affected arm by the sound one step by step within pain limit across the body. it makes stretch to the posterior compartment of the shoulder joint.

Statistical analysis:

- Statistical analysis was conducted using SPSS for windows, version 26 (SPSS, Inc., Chicago, IL).
- Prior to final analysis, data were screened for normality assumption, homogeneity of variance, and presence of extreme scores. This exploration was done as a pre-requisite for parametric calculations of the analysis of difference.
- Preliminary assumption checking revealed that data was normally distributed for all measured variables, as assessed by Shapiro-Wilk test ($p > 0.05$). There was homogeneity of variances ($p > 0.05$) and covariance's ($p > 0.05$), as assessed by Levene's test of homogeneity of variances. Accordingly, parametric statistics were used.
- The independent sample t-test was used to compare whether there is a difference in the dependent variable for the two independent groups. While, dependent sample t-test was used to compare whether there is a difference within the same group. Unpaired t-test was used to compare whether there is a difference pre-treatment in the demographic characteristics for the two study groups. The alpha level was set at 0.05.

Results

Demographic and clinical characteristics of participants

The baseline characteristics of the participants showed that no statistically significant differences existed between both the groups ($P > 0.05$), as shown in Table 1. There was also, no significant difference between both groups by gender, the χ^2 value was 1.292 ($P > 0.05$).

- Pretreatment comparison between both the groups
No statistically significant differences were noticed regarding the pretreatment between the two groups in all measured variables ($P > 0.05$), as shown in Table 2.
- Pretreatment and post-treatment comparison in each group
A significant improvement in all measured variables ($P < 0.05$) in both groups, as shown in Table 2.
- Post-treatment comparison between both the groups
There was a highly statistically significant improvement in all measured variables between both groups ($P > 0.05$) in favor to group A ($P < 0.05$), as shown in Table 2.

Table 1
Comparison between both groups in all measured variables

P-Value	Group B $\bar{x} \pm SD$	Group A $\bar{x} \pm SD$	Time	Variable
0.955	6.93 $\pm$ 1.03	7.06 $\pm$ 1.43	Before	VAS (score)
0.042*	3.6 $\pm$ 1.18	4.46 $\pm$ 1.06	After	
	0.0001*	0.0001*	P Value	
0.446	↓ 48.05 %	↓ 36.82 %	% of change	Shoulder flexion ROM (angle)
	86.26 $\pm$ 7.10	88.13 $\pm$ 6.08	Before	
	105.66 $\pm$ 15.19	124.4 $\pm$ 17.77	After	
0.004*	0.0001*	0.00001*	P Value	Shoulder flexion ROM (angle)
	↑ 22.49 %	↑ 41.15 %	% of change	
0.852	72.46 $\pm$ 14.01	71.46 $\pm$ 15.0	Before	Shoulder Abduction ROM (angle)
0.001*	92.06 $\pm$ 8.58	104.73 $\pm$ 9.3	After	
	0.0001*	0.00001*	P Value	
0.425	↑ 27.04 %	↑ 46.55 %	% of change	Shoulder internal rotation ROM (angle)
	19.73 $\pm$ 2.86	18.86 $\pm$ 2.99	Before	
	29.66 $\pm$ 4.25	39.93 $\pm$ 2.98	After	
0.0001*	0.0001*	0.00001*	P Value	Shoulder internal rotation ROM (angle)
	↑ 50.32 %	↑ 111.71 %	% of change	
0.607	26.06 $\pm$ 3.01	25.46 $\pm$ 3.29	Before	Shoulder external rotation ROM (angle)
0.0001*	36.33 $\pm$ 7.10	44.93 $\pm$ 3.86	After	
	0.0001*	0.00001*	P Value	
	↑ 72.4 %	↑ 76.47 %	% of change	

$\bar{x}$: Mean; SD: Standard deviation P-value: probability value; *Significant at P<0.05

Discussion

It was proved that there is a strong link between the incidence of DM and AC certainly among many other musculoskeletal problems that occurs as a complication to DM. for example DM obviously causes glycosylation of proteins, micro vascular anomalies involving blood vessel and nerve damage, as well as collagen buildup in the skin and Changes in the connective tissue are caused by periarticular structures (John et al., 2018).

Many techniques and convictional methods are used in management of AC other than the medical and surgical methods. But these methods need more studies to determine the more effective method that saves more time and effort. It was proven by previous studies that manual therapy one of the more effective methods

in improving both ROM and pain at the same time reflexology proved an effect in improving the symptoms with safe and relaxing way to the patient without any side effects as pain or uncomfortable sensation during application of the treatment. This study was carried out to know which of the two methods are more effective. By comparing the results of the 2 groups, both groups showed improvement in the ROM and pain scale. The Maitland group showed a significant improvement in abduction and external rotation ROM. Also significant improvement of pain in group A than group B.

Maitland mobilization obviously decreased the pain and there is a theory that explains this. Mobilization initiates 2 mechanisms that decrease pain, the local physiological mechanism and the central mechanism. The local physiological mechanism by the small amplitude oscillatory movement that stimulates the mechanoreceptors and inhibits the proprioception of pain inside the joint capsule. The central mechanism assumed to be achieved by respectively stimulating the mechanoreceptors which is associated with myelinated alpha beta and alpha delta fibers at the level of spinal cord and the brain stem. These unstretching movements decreased the pain.

The ROM assumed to be improved through the elongation of the connective tissues by the effect of manipulation or the end range oscillatory mobilization which have mechanical effect by increasing the fiber glide and improving the collagen realignment and helping the breaking down of the adhesions. Another effect of mobilization is restoration of the interstitial fluid to near normal levels by the effect of the frictional resistance between the bundles and the near connective tissues structures, these improve the ROM (Sathe et al., 2020).

On the other hand patients in group of reflexology showed improvement in week 4 in both ROM and pain scale. The reflexology is widely accepted by the general public due to its relaxing massage and complementary non-medicinal nature. Till now there is no clear explanation on how reflexology works to improve pain. There are many theories that may explain its effect one of them assumes that reflexology relieves the daily stress that is considered as a main cause in the musculoskeletal disorders. Other theory points to the physiological effect of reflexology in correcting the body dysfunction and establishing the organ homeostasis. Also it improves the microcirculation and increases the oxygen and nutrient supply to the targeted organ by the treatment and respectively improved healing of the injured and inflamed tissue. These decrease the pain and improve the function of the targeted organ by the treatment (Kerautret & Carole, 2020).

Conclusion

Based on the findings of this study, Maitland mobilization is more effective in treatment of AC than reflexology.

Acknowledgment

The authors received no financial support for this article.

References

- Thong, E.P., Codner, E., Laven, J.S. and Teede, H., (2020): Diabetes: a metabolic and reproductive disorder in women. *The Lancet Diabetes & Endocrinology*, Vol.8(2), pp.134-149.
- Lluch-Girbés, E., Dueñas, L., Mena-del Horno, S., Luque-Suarez, A., Navarro-Ledesma, S. and Louw, A., (2019). A central nervous system-focused treatment approach for people with frozen shoulder: protocol for a randomized clinical trial. *Trials*, Vol.20(1), pp.1-10.
- Hengeveld, E. and K. Banks.,(2013). *Maitland's Vertebral Manipulation E-Book: Management of Neuromusculoskeletal Disorders*, Elsevier Health Sciences, Vol. 1.
- Kliegel, E. (2018). *Holistic Reflexology: Essential Oils and Crystal Massage in Reflex Zone Therapy*, Simon and Schuster.
- John B., D. J., Wexler, A.T., P.R., G.M., C.M., David., D'Alessio & M.J.D.,(2018):Management of hyperglycaemia in type 2 diabetes. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetologia* Vol.61(12): 2461-2498.
- Sathe, S., Khurana, S.K., Damke, U. and Agrawal, P.V., (2020):To Compare the Effects of Maitland Mobilization with Conventional Physiotherapy in Adhesive Capsulitis. *Int J Cur Res Rev* | Vol, 12(14).
- Kerautret, Y.,F.D.R.,Carole & A.G., (2020). Selective effects of manual massage and foam rolling on perceived recovery and performance: current knowledge and future directions toward robotic massages. *Frontiers in physiology*.,vol.11(1) ,p.1567.