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The Effectiveness of the Combination of Neuromuscular Taping (NMT) and Codman Pendulum Exercise to Improve the Functional Ability of the Shoulder in Patients with Frozen Shoulders

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Abstract:- The primary symptoms of frozen shoulder, one of the most prevalent disorders or complaints affecting the shoulder joint, are pain and restricted range of motion. Several conditions, including diabetes and hyperthyroidism, are thought to be connected to the development of frozen shoulder. Other causes of frozen shoulder include degeneration or stiffness of the shoulder joint capsule tissue.

The goal of this study is to determine how well patients with frozen shoulder may improve their shoulder's functional capacities by combining the use of Neuromuscular Taping (NMT) and Codman Pendulum Exercise technique. This study aims to prove the effectiveness of Neuromuscular Taping (NMT) and Codman Pendulum Exercise as a physiotherapeutic approach in managing to improve shoulder functional ability in frozen shoulder. Quasi-experimental research with pre and post tests but no control group design is the methodology employed. Research shows a value P = 0.000 (P<0.05) with a mean value of 13.227±4.995, which means that the intervention of Neuromuscular Taping (NMT) and Codman Pendulum Exercise was significant for improving shoulder functional ability in frozen shoulder.

Keywords:- *Frozen Shoulder, Physiotherapy, Neuromuscular Taping, Codman Pendulum Exercise.*

I. INTRODUCTION

Active and passive shoulder movement are functionally restricted in people with frozen shoulder [1]. Pain, stiffness, and a progressive loss of motion are indications of frozen shoulder (FS), which develops suddenly. It sometimes, but not always, manifests as a fibrotic state with capsule and ligament involvement as well as inflammation-based contractures that shorten the shoulder's range of motion [2].

Frozen Shoulder (FS) is a disease caused by tissue degeneration, thickening of the joint capsule, and reduced volume of the glenoid cavity. It is one of the most frequently observed shoulder diseases in clinical management that has various aetiologies such as degenerative changes in periarticular tissues, synovial joint thickening, articular surface adhesions, etc [3], and is associated with prolonged and often marked disability of the shoulder with severe pain, loss of movement, and sleep disturbance [4].

Frozen Shoulder (FS) is a common shoulder disease that has a progressive loss of shoulder motion and affects 2-5% of the general population [5]. The prevalence among the diabetic population and those with thyroid gland pathologies, particularly hypothyroidism, may increase to 10 to 38% [2].

The incidence among women is 1.6 to 4 times higher than that of men. Blacks/African Americans and Hispanics/Latinos also show a higher prevalence [2]. The peak age is 56 years, and the condition occurs slightly more frequently in women than men. This condition is rare before the age of 35 and is uncommon in patients over 70 years of age [1].

Arthroscopic and imaging studies have shown that the capsular tissue of the glenohumeral joint including the rotator interval is the main pathological part [6]. For those who have shoulder pain, aches or stiffness, there is a significant proportion that has been detected as a risk factor for idiopathic frozen shoulder, such as diabetes, thyroid dysfunction, hypercholesterolemia, and hypertension [1].

The exact pathophysiological mechanism is unknown, but is thought to be a chronic inflammatory process of the synovium and soft tissue followed by a fibrotic picture similar to Dupuytren's disease, due to increased collagen formation, myofibroblasts and fibroplasia. Several arthroscopic and histological studies have shown that this condition is caused by contractures of the glenohumeral capsule, particularly the coracohumeral ligaments in the rotator interval [7].

Codman Pendular Exercises are known as Codman exercises. This exercise is used to passively mobilize the glenohumeral joint. This exercise involves the patient to perform movements such as moving the hands or arms without contracting [8].

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Pendulum exercises, known as Codman exercises, have been used extensively for decades with the intention of passively mobilizing the glenohumeral (GH) joint without harm to recently injured or repaired tissue. Using this technique, the arms can be moved back and forth, side to side or in a circular motion. These exercises have become an integral part of many rehabilitation protocols. [9]

When Neuromuscular Taping (NMT) is administered appropriately, it can alleviate pain and make it easier for lymphatic fluid to pass through skin folds. It is a procedure that includes putting elastic adhesive tape to the skin. As the tape is put on, the skin becomes wrinkled as the body moves. These folds enhance posture, lymphatic drainage, blood flow, pain relief, and muscle and joint action [10].

II. RESEARCH METHOD

In order to compare the effectiveness of Neuromuscular Taping (NMT) and the Codman Pendulum Exercise before and after the intervention, a Quasi experimental research with a single group treatment was used in this study. Before and after receiving therapy eight times in one month, the Shoulder Pain and Disability Index (SPADI) was used to measure the functional abilities of the shoulder. The implementation period from January 9 to February 4, 2023, has ended.

III. RESULT S AND DISCUSSION

Tables 1 and 2 provide a description of the characteristics of the research sample subjects, including information on their age (years), weight (kg), and height (cm), as well as the results of a descriptive analysis performed using SPSS.

Table 1: Distribution of Samples Based on Descriptive Data

Variables	N	Mean	Std. Deviation
Age	22	57.55	6.780
Height	22	158.45	4.329
Weight	22	76.00	4.771
SPADI Index Score Before	22	72.05	5.305
SPADI Index Score After	22	58.82	8.045

According to their age (years), weight (kg), height (cm), and SPADI Score, respondents are listed in Table 1. 22 persons made up the study's sample size (n = 22), and it was discovered that their average ages were 57.55±67.80, their average heights were 158.45±4.329, and their average weights were 76.00±4.771.

Table 2: Normality Test

Samples (n = 22)	Shapiro Wilk Normality Test	
	SPADI Index Score	
	Mean±SD	P
Before	72.05±5.305	0.921
After	58.82±8.045	0.415

The findings of the Shapiro-Wilk test-based Normality test is presented in Table 2. The average SPADI Index Score value before treatment was 72.05±5.305 with a P value of 0.921, whereas the average value after treatment was 58.828.045 with a P value of 0.415. As P> 0.05 indicated that the data was normally distributed, the Paired Sample T-Test was applied to this treatment group.

Table 3: Shoulder Pain and Disability Index (SPADI) Value Before and After Intervention Neuromuscular Taping (NMT) and Codman Pendulum Exercise

Samples (n = 22)	Mean±SD	P
Before and after	13.227±4.995	0.000

With a significant value of P = 0.000 (P0.05) and a mean value of 13.227±4.995, Table 3 details the outcomes of the variations before and after the intervention.

Research by Kimberi [11], who explains that patients with frozen shoulder can be successfully treated with physiotherapy, but that the combination of neuromuscular taping with stretching exercises leads to better outcomes in rehabilitation of patients with frozen shoulder, supports the findings of this study.

Another study conducted by Bintang [8] on 14 people who suffer from frozen shoulder who come to the Physiotherapy Unit at Grandmed Lubuk Pakam Hospital shows that there is an effect of giving Codman Pendular Exercises and Mulligan Mobilization with Movement to Increasing the Range of Motion in Patients with Frozen Shoulder because the movement from the Codman Pendulum Exercise being able to provide mobilization movements with active movements of the patient will restore mobility and function of the shoulder by eliminating pain which will provide relaxation so that ROM limitations occur in the shoulder joint (glenonohumeral, sternoclavicular, acromeoclavicular, scapulothoracal) reduced.

IV. CONCLUSION

The value of P = 0.000 (P 0.05) indicates that there is a significant difference in the value before and after the intervention of neuromuscular taping (NMT) and Codman Pendulum Exercise based on hypothesis testing utilising the sample paired sample test. It demonstrates that the Shoulder Pain and Disability Index (SPADI) Score has improved as a result of the Codman Pendulum Exercise and Neuromuscular Taping (NMT) interventions.

REFERENCES

[1]. S. P. Brun, “Idiopathic frozen shoulder,” *Aust. J. Gen. Pract.*, vol. 48, no. 11, pp. 757–761, 2019.
[2]. D. de la Serna, S. Navarro-Ledesma, F. Alayón, E. López, and L. Pruimboom, “A Comprehensive View of Frozen Shoulder: A Mystery Syndrome,” *Front. Med.*, vol. 8, no. May, pp. 1–10, 2021, doi: 10.3389/fmed.2021.663703.

[3]. G. Do Moon, J. Y. Lim, D. Y. Kim, and T. H. Kim, "Comparison of Maitland and Kaltenborn mobilization techniques for 1. Moon G Do, Lim JY, Kim DY, Kim TH. Comparison of Maitland and Kaltenborn mobilization techniques for improving shoulder pain and range of motion in frozen shoulders. J Phys Ther Sci. 201," *J. Phys. Ther. Sci.*, vol. 27, no. 5, pp. 1391–1395, 2015.

[4]. C. Minns Lowe, E. Barrett, K. McCreesh, N. De Búrca, and J. Lewis, "Clinical effectiveness of non-surgical interventions for primary frozen shoulder: A systematic review," *J. Rehabil. Med.*, vol. 51, no. 8, pp. 539–556, 2019, doi: 10.2340/16501977-2578.

[5]. C. H. Cho, K. C. Bae, and D. H. Kim, "Treatment strategy for frozen shoulder," *CiOS Clin. Orthop. Surg.*, vol. 11, no. 3, pp. 249–257, 2019, doi: 10.4055/cios.2019.11.3.249.

[6]. C. H. Cho, K. S. Song, B. S. Kim, D. H. Kim, and Y. M. Lho, "Biological Aspect of Pathophysiology for Frozen Shoulder," *Biomed Res. Int.*, vol. 2018, 2018, doi: 10.1155/2018/7274517.

[7]. E. Cavalleri, A. Servadio, A. Berardi, M. Tofani, and G. Galeoto, "The effectiveness of physiotherapy in idiopathic or primary frozen shoulder: A systematic review and meta-analysis," *Muscles. Ligaments Tendons J.*, vol. 10, no. 1, pp. 24–39, 2020, doi: 10.32098/mltj.01.2020.04.

[8]. S. S. B. S. Bintang, S. Berampu, M. Saleha, M. Zannah, S. Sinuhaji, and L. S. Silaban, "Seminar Pemberian Codman Pendular Exercise Terhadap Peningkatan Lingkup Gerak Sendi Penderita Frozen Shoulder Di Rumah Sakit Grandmed Lubuk Pakam," *J. Pengmas Kestra*, vol. 1, no. 1, pp. 163–167, 2021, doi: 10.35451/jpk.v1i1.759.

[9]. G. Cunningham, C. Charbonnier, A. Lädermann, S. Chagué, and D. H. Sonnabend, "Shoulder Motion Analysis During Codman Pendulum Exercises," *Arthrosc. Sport. Med. Rehabil.*, vol. 2, no. 4, pp. e333–e339, 2020, doi: 10.1016/j.asmr.2020.04.013.

[10]. D. Blow, *NeuroMuscular Taping: From Theory to Practice*, English Ed. Milan: Edi-Ermes Medical Publisher, 2012.

[11]. F. Kamberi, "THE EFFECTS OF TAPING NEUROMUSCULAR COMPARE TO PHYSICAL THERAPIES MODALITIES IN PATIENTS WITH ADHESIVE CAPSULITIS OF THE SHOULDER Enkeleda Sinaj , PhD Student Vjollca Ndreu , PhD Student Ermir Sinaj , MsC Student Tatjana Nurka (Cina), Ass / Prof," *Eur. Sci. J.*, vol. 2, no. February, pp. 181–188, 2015.