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MODIFIED SCAPULAR STABILIZATION BETTER THAN SHOULDER STRENGTHENING IN PECTORALIS MINOR STRETCHING IMPROVING SCAPULAR ALIGNMENT IN TAILORS WITH ROUNDED SHOULDER POSTURE

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ABSTRACT

Rounded shoulder posture is a maladaptive posture with characteristics of shoulder protraction, downward rotation, and elevation with an increase in upper thoracic kyphosis. The purpose of this study was to prove the modified scapular stabilization was better than shoulder strengthening in pectoralis minor stretching to improve scapular alignment in tailors with rounded shoulder posture. This study is a true experimental study with pre and post-test design. The study subject amounted of 24 people who were divided into two groups by simple random sampling. Experimental Group with modified scapular stabilization and pectoralis minor stretching and Control Group with shoulder strengthening and pectoralis minor stretching. Measurements were taken before and after the intervention. Scapular alignment was measured using an L-square ruler. In the Experimental Group, the mean pre 6.32±0.52 and post right scapular alignment was 4.83±0.57, with $p<0.001$ and the mean pre 5.92±0.56 and post left scapular alignment was 4.61±0.52, with $p<0.001$; while in Control Group the mean pre was 6.27±0.58 and post right scapular alignment was 5.22±0.64 with $p<0.001$ and mean pre 5.81±0.77 and post left scapular alignment was 4.79±0.90, with $p<0.001$. This indicated that there was a significant difference in the decrease in scapular alignment before and after the intervention, followed by a different test for the right scapular alignment $p=0.014$ and left scapular $p=0.029$. In conclusion, the intervention of modified scapular stabilization was better in improving scapular alignment than the shoulder strengthening intervention in tailors with rounded shoulder posture.

Keywords: Modified Stabilization, Strengthening, Scapular Alignment

INTRODUCTION

Today the field of fashion is increasingly in demand from different walks of life. This development has an impact on the level of competitiveness of each garment to create clothing products of good quality and a large quantity of quantities in order to obtain a large amount of

profit. The strategy used to achieve this goal, the garment business will focus on the garment workforce. In the process of working, workers must pay attention to work posture in order to support health and prevent body complaints in the workforce, especially tailors.

Tailors are tasked with working on the stitching of a piece of fabric then converted into clothing products such as pants, skirts, shirts, shirts, and others[1]. In doing a job, every worker will require tailors to interact with his work environment. Tailors can experience various complaints such as pain in the neck, back, waist and calves. Sewing activities that are carried out for more than 4 hours and are carried out repeatedly will cause static loading on the muscles and posture adaptation. Therefore, the health and safety of workers is an important factor to pay attention to so that worker productivity is maintained[2]. Musculoskeletal disorder that occurs in tailors that leads to a long period of sitting at the sewing table with the posture of the head and neck tending to lower and the shoulders and back tend to bend. This disorder occurs because the tailor is required to maintain the same posture for a long period of time[3].

Improper posture with a long time can lead to muscle imbalances. Muscle imbalances can affect body alignment and cause various postural abnormalities[4]. Unwitting changes in posture can occur in tailors, one of which is the rounded shoulder posture. Rounded shoulder posture is a maladaptive posture that needs to be corrected. A clearly visible abnormality in the condition of rounded shoulder posture is the shoulder that is seen pointing forward[5]. Rounded shoulder is common in 73% of healthy subjects between the age group of 20 to 50 years and accounts for 60% of shoulder abnormalities. The increase in the occurrence of rounded shoulders is due to poor sitting posture and can cause changes in scapula position, kinematics, and muscle activity[6].

There are physiotherapist interventions that can be given such as stabilization exercise, strengthening exercise, and stretching to correct scapular alignment in rounded shoulder posture. Stabilization exercise can be used to correct abnormal alignment and functional movements and provide stability to the scapula[7]. Strengthening exercise is an intervention given to strengthen the muscles that experience weakness in the muscles of the back of the shoulder[8]. In rounded shoulder posture causes shortening of the front muscles such as pectoralis muscles. The administration of stretching to the front muscles is used to correct abnormal posture and correct sufficient lengthening of the front muscles[9]. Based on this description, researchers want to examine the difference between the addition of modified scapula stabilization interventions with shoulder strengthening in pectoralis minor stretching to the improvement of scapular alignment in tailors with rounded shoulder posture.

METHOD

a) Methodology

Study Design

This research is a true experimental study with the research design used is pre and post-test control group design. The Experimental Group was given modified scapular stabilization and pectoralis minor stretching interventions while the Control Group was given shoulder strengthening and pectoralis minor stretching interventions.

Subjects Recruitment

The population in this study were tailors with rounded shoulder posture in Kecak Garment. The samples in this study were tailors taken from a population that met the inclusion criteria, namely subjects aged 30-45 years, female gender, the subjects were tailors with rounded shoulder posture, had a normal BMI, worked for more than 5 years, were willing to be research subjects from beginning to end and signed a letter of approval willing as a research sample. Exclusion criteria are subjects with a history of trauma or surgery on the scapula area or shoulder area, subjects with spinal abnormalities found in the scapula or shoulder, and subjects with a history of heart disease, asthma, and epilepsy. Drop out criteria if the subject withdrew from the study before reaching 6 weeks of intervention and did not take the post test, if the subject did not come according to a predetermined schedule, and if the subject was unable to continue the study due to sudden illness or injury due to something.

Sampling Technique

The study subject amounted to 24 people who were divided into two groups by simple random sampling. Experimental Group with modified scapular stabilization and pectoralis minor stretching and Control Group with shoulder strengthening and pectoralis minor stretching.

b) Material and Procedure
   i. Researchers conduct subjective (anamnesis) and objective examinations (inspection, palpation, special tests of physiotherapy, BMI and measurement of acromion distance (>2.5cm). Subjects who meet the criteria for inclusion and exclusion of research will be asked for their availability as research samples. Next, researchers conducted a random allocation to divide the subjects into two groups. After the group separation is carried out, a preliminary measurement (pre-test) of scapular alignment is carried out before the intervention of all subjects with a supine lying position on the prepared base. Make sure the subject is in a relaxed shoulder position, legs are straight, and the hands are in a neutral position beside the body.
   ii. The Experimental Group was given a modified scapular stabilization intervention consisting of four movements, namely wall presses, wall slides, isometric low row, and knee push-ups. Each of these movements was performed in 3 sets with 8 reps and before proceeding to the next set was given a 60-second rest break with a combination of pectoralis minor stretching movements performed three times and held for 30 seconds. This exercise was performed 3x a week for 6 weeks while the Control Group was given a shoulder strengthening intervention consisting of three movements, namely retraction, external rotation, and shoulder flexion. Each of these movements was performed in 3 sets with 8 reps and before proceeding to the next set was given a 60-second rest break with a combination of pectoralis minor stretching movements performed three times and held for 30 seconds. This exercise is done 3x a week for 6 weeks.
   iii. After the time for the intervention is completed, which is 6 weeks of research, the final measurement (post-test) of scapular alignment is carried out. All data that has been obtained is processed with statistics using a computer with the SPSS software version 22.0

c) Asessment

Variabel measured in this research were scapular alignment in rounded shoulder posture. Mesured using a L-square ruler.

d) Data Analysis

After data was collected, the processing and analyzing data was done by using IBM SPSS Statistics, Version 22.0

1. Normality test by using Saphiro-Wilk test. p>0,05 which means the data is normaly distributed
2. Homogeneity test by using Levene's test. p>0,05 which means the data is homogeneous.
3. Hypothesis test.
    a. Comparative test to two groups by using Paired Sample T-test to identify the effects of intervention to scapular alignment in before and after 6 weeks of intervention.
    b. Comparative difference result test after 6 weeks of intervention in two groups used Independent Sample T-test.

RESULT

The study has been carried out using a sample that was tailors at Kecak Garment for six weeks. The following is explained a description of the data in the form of characteristics of the research sample in the form of a table.

Table 1. The Characteristics of Research Subject

Characteristc	Experimental Group Mean±SD (n=12)	Control Group Mean±SD (n=12)	p-value
Age (years old)	40,75±2,59	40,33±2,60	0,69
Masa Kerja (years)	16,75±3,74	16,75±4,00	1,00
IMT (kg/m^2)	20,95±1,27	20,88±1,48	0,89

Table 1 shows the characteric data of the study subjects from 24 people, namely the average age, length of service and BMI.

Table 2. Data of Normality and Homogeneity Test of Scapular Alignment Before and After Intervention

		Normality Test[1]				Homogenity Test[2]
		Experimental Group		Control Group		
		Mean±SD	p	Mean±SD	p	p
Right SA (cm)	*Pre-test*	6,32±0,52	0,31	6,27±0,58	0,12	0,43
	Post-test	4,83±0,56	0,81	5,22±0,64	0,06	0,35
Left SA (cm)	*Pre-test*	5,92±0,56	0,82	5,81±0,78	0,52	0,39
	Post-test	4,61±0,52	0,28	4,79±0,90	0,43	0,16

[1]*Shapiro Wilk Test* [2]*Levene's Test*

Based on the data of normality test in Experimental Group and Control Group, it is obtained p>0,05, which can be defined as normally distributed. It is also similar with homogenity test where p=>0,05 and it can be stated that the data is homogeneous.

Table 3. Average Decrease in Scapular Alignment Value Before and After Intervention in Experimental Group and Control Group

	Experimental Group	Control Group

			Mean±SD	p-value	Mean±SD	p-value
Right (cm)	SA	*Pre-test*	6,32±0,52	0,047	6,27±0,58	0,001
		Post-test	4,83±0,57		5,22±0,64	
Left (cm)	SA	*Pre-test*	5,92±0,56	0,001	5,81±0,77	0,001
		Post-test	4,61±0,52		4,79±0,90	

Based on Table 3, the results of different average decreases in the value of scapular alignment were obtained which were analyzed with Paired sample t-tests before and after the intervention was given to each group. Experimental Group with a value of p=0.047 (p<0.05) on the right scapular alignment and a value of p=0.001 (p<0.05) in the left scapular alignment and in the Control Group with a value of p= 0.001 (p<00.05) on the right and left scapular alignment which means that there is a decrease in the scapular alignment value before and after the intervention in both groups.

Table 4. Comparative Test of Scapular Alignment Decreased Before and After Intervention in Both Groups

	Scapular Alignment	Group	Mean±SD	Decreased Percentage	Nilai p
Discrepancies	Right	Experimental Group	1,49±0,50	23,57 %	0,014
		Control Group	1,05±0,28	16,74%	
Discrepancies	Left	Experimental Group	1,32±0,31	22,29 %	0,029
		Control Group	1,02±0,31	17,55 %	

Based on Table 4, the significance analysis by using independent t-test shows the scores of before, after and difference of both groups are p<0,05, it means that between Experimental Group and Control Group are significant difference after the treatment was given. The percentage decrease in the value of the right scapular alignment in the Experimental Group was 23.57% and in the Control Group was 16.74% while the left scapular alignment in the Experimental Group was 22.29% and the Control Group was 17.55%. Thus, it can be said that the addition of modified scapular stabilization interventions is better than shoulder strengthening in pectoralis minor stretching to improve scapular alignment.

DISCUSSION

Characteristic of Research Subject

Based on the results of the study, the study subjects were 24 people with an average age of 40.75±2.59 in the Experimental Group while the Control Group had an average age of 40.33±2.60, the average BMI of the Treatment Group was 20.95±1.27 while in the Control Group had an average BMI of 20.88±1.48, and a sitting time of 8 hours per day. Age range, working posture, and length of work can be found influencing factors on the occurrence of rounded shoulder posture. Working as a tailors often finds problems with upper posture, which is around 73% of the population of healthy subjects[6]. This can be seen in the measurement of scapular alignment before the intervention with an average of more than 6.32±0.52 right in the Experimental Group and 6.27±0.58 right in the Control Group, while 5.92±0.56 the left part in the Experimental Group and 5.81±0.77 in the Left part in the Control Group and showing this figure is greater than 2.5 cm which means that it indicates the presence of rounded shoulder posture.

Rounded shoulder posture is a posture caused by a posture that is usually done when doing an activity in the daily, especially in this case when the tailor's posture has been adapted in carrying out the sewing process. Posture habits that have been applied continuously can have a worse effect if there are strains in the neck muscles that can cause the neck stabilization muscles to experience weakness[10]. Rounded shoulder posture can occur due to tailors who pay little attention to work posture when doing fabric sewing work and already feel comfortable with the posture[5].

The results of the analysis of the characteristics of the study subjects in the two groups did not have any meaningful differences because the subjects had been controlled by age and BMI before the intervention, thus the characteristics of the study subjects which included age and BMI before the intervention in the two groups were not significantly different so as not to affect the results of the study. If after six weeks of intervention there are differences in the results of the two groups, it can be ascertained that this is due to the intervention given to each group.

Addition of Modified Scapular Stabilization Intervention in Pectoralis Minor Stretching can Improve Scapular Alignment in Tailors with Rounded Shoulder Posture

Based on the results of the paired sample t-test conducted in the right Experimental Group, where the average scapular alignment value was obtained before the intervention 6.23±0.52 and after the intervention 4.83±0.57 with $p<0.05$, while on the left, the average scapular alignment value was obtained before the intervention 5.92±0.56 and after the intervention 4.61±0.52 with p <0:05. The p-values on both sides of the shoulder in the Experimental Group showed that there were significant differences in the acromion distance values before and after the addition of modified scapular stabilization interventions in pectoralis minor stretching. The decrease in the value of acromion distance shows that there has been an improvement in the alignment of the scapula by intervening modified scapular stabilization in pectoralis minor stretching in tailors with rounded shoulder posture in the Experimental Group.

The muscles in the scapula are one of the contributors that play an important role in the position of the scapula during the resting position and during the movement of the shoulder. In this

intervention, tailors are given in a standing position and a push-up position by performing various movements such as wall presses, wall slides, isometric low row, and knee push-ups[11]. Modified scapular stabilization intervention is an intervention that focuses on improving the stabilization of the periscapular muscles by means of loading that is given through the body's resistance and the activation of the abdominal muscles. Stabilization exercise is safe to do on patients and healthy subjects because it does not require excessive force from the shoulders. In the condition of rounded shoulder posture, it causes muscle imbalances that have an impact on weakness in the back muscles and shortening of the front muscles of the shoulders[10].

Interventions of modified scapular stabilization in the muscles of the scapula can prevent improper contractions in the muscles, direct movements, and improve posture improvement[12]. When doing modified scapular stabilization will also increase the work on the scapula retractor so that it will increase the strength of the muscle[13]. Meanwhile, the pectoralis minor stretching intervention serves for the lengthening of the pectoralis minor muscle so that it can help improve posture in rounded shoulder posture by stretching the muscles that are experiencing tightness[14].

Addition of Shoulder Strengthening Intervention in Pectoralis Minor Stretching can Improve Scapular Alignment in Tailors with Rounded Shoulder Posture

Based on the results of paired sample t-tests conducted in the right control group, where the average scapular alignment value was obtained before the intervention 6.27±0.58 and after the intervention 5.22±0.64 with $p<0.05$, while on the left, the average scapular alignment value was obtained before the intervention 5.81±0.77 and after the intervention 4.79±0.90 with $p <0.05$. The p-values on both sides of the shoulders in the Control Group indicated that there was a significant difference in the scapular alignment values before and after the addition of shoulder strengthening interventions in pectoralis minor stretching. The decrease in the value of the scapular alignment shows that there has been an improvement in the alignment of the scapula by conducting shoulder strengthening interventions on the pectoralis minor stretching in the tailor with shoulder rounded posture in the Control Group.

The shoulder strengthening intervention serves to strengthen the global posterior shoulder muscles that experience weakness in people with rounded shoulder posture. Strengthening muscles that experience weakness can help restore the body to its normal posture. External movements of rotation, abduction, flexion, retraction coupled with external loading can increase muscle strength so as to improve the performance of the muscle. The provision of strengthening interventions on the shoulders by external loading can make the posterior muscles adapt so that they can fight the counterforce from the work of the antagonist muscles, namely the anterior muscles of the shoulder so that normal alignment of the body can be maintained[8].

The results of this study are supported by research conducted by Hajihoisseini, et al (2014), which states that doing strengthening exercises can cause a significant decrease of around 10% in rounded shoulder posture. The study also stated that the provision of shoulder strengthening is an appropriate, scientific and safe method to correct or correct posture in rounded shoulder posture conditions[8]. Tightness in the minor pectoralis muscle is one of the potential mechanisms in changing the kinematics of the scapula so that it can cause changes in the normal functioning of

the upper limb. Therefore, the administration of pectoralis minor stretching also helps in the improvement of posture carried out by stretching the muscle so that it has an impact on the range of movement that can be produced[15].

Addition of Modified Scapular Stabilization Intervention is better than Shoulder Strengthening in Pectoralis Minor Stretching to Improvement of Scapular Alignment in Tailors with Rounded Shoulder Posture

A statistic comparison of these two interventions shows that the addition of modified scapular stabilization interventions is better than shoulder strengthening in pectoralis minor stretching in improving scapular alignment. The comparison of interventions using the same dose of exercise can be seen from the response of muscle adaptation that occurs so that the difference between the two interventions can be known. Exercise is given for 6 weeks, that is, three times a week, it is based on the one that states that 4 weeks is the minimum time for muscles to be able to adapt[16]. Modified scapular stabilization interventions in improving scapular alignment focus on emphasizing on increasing strength and power, while shoulder strengthening emphasizes on increasing strength and endurance[13]. Thus, the intervention of modified scapular stabilization and shoulder strengthening is able to improve muscle performance needed in improving scapular alignment in rounded shoulder posture. This is because these elements are needed to overcome the problem of muscle work imbalance in a person who experiences rounded shoulder posture[16].

Movement in the body can achieve optimal results when the muscle has good muscle strength and stabilization. The administration of modified scapular stabilization interventions can increase joint propioceptiveness and improve movement accuracy through retraining of motor patterns in scapula. The position of the scapula is influenced by the main stabilizers of the scapula, namely the anterior serratus muscle and the upper trapezius[11]. Activity in the upper trapezius muscles may decrease with the application of the intervention of modified scapular stabilization so that such decreases may lead to the redevelopment of the proper scapulothoracic rhythm and an increase in scapulothoracic alignment[17].

Improvement of scapular alignment occurs after the intervention of modified scapular stabilization is applied through modification of the relationship between length and tension after strengthening of the scapula muscles and an increase in the position of the scapula so as to result in a decrease in tension in the muscles[11]. The application of modified scapular stabilization interventions can also activate the muscles in the abdominal area which can function to maintain posture. In addition, activated abdominal muscles result in the involvement of the anterior serratus muscle as one of the muscles whose important role is in maintaining the alignment of the scapulothoracic[18]. Limitation of this study was based on measurement related to disability to able to see the performance of tailors. However, the intervention on this research can be used from adolescence to adulthood as well as in several types of work that are similar to tailor's work posture.

CONCLUSION

The conclusion of this study was the intervention of modified scapular stabilization was better in improving scapular alignment than the shoulder strengthening intervention in tailors with rounded shoulder posture. In the future, it is hoped there will be research can pay attention to mechanical relationship of other body segments such as neck and hip region and it is hoped that in the next research can follow up to see the long-term of such interventions.

REFERENCES

1. Susanti, L. 2015. Gambaran Keluhan Musculoskeletal Disorders (MSDs) Pada Penjahit di Kota Denpasar, Bali 2014 *(skripsi)*. Universitas Udayana.
2. Chandrasekaran, B., Pesola, A.J., Rao, C.R., Arumugam, A. 2021. Does Breaking Up Prolonged Sitting Improve Congnitive Functions in Sedentary Adults? A Mapping Review and Hypothesis Formulation on the Potential Physiological Mechanism. *BMC Musculoskeletal Disorders.* Vol. 22 (724): 1-16.
3. Mosaad, DM., Aziem, AA., Mohamed, GI., Elaty, EAA., Mohammed, KS. 2020. Effect of Forward Head and Rounded Shoulder Posture on Hand Grip Strength in Asymptomatic Young Adults: A Cross- Sectional Study. *Bulletin of Faculty of Physical Therapy*, 25(5): 1-8.
4. Abdolahzade, Mahsa and Daneshmandi, Hassan. 2019. The Effect of an 8-week NASM Corrective Exercise Program on Upper Crossed Syndrome. *Journal of Sport Biomechanics*, 5(3): 156-167.
5. Kumkuwar, A., Chourasia, S., Mendhe, K., Tankhiwale, A., Kulkarni, I. 2019. Effect of Neck Retraction Taping on Rounded Shoulder Posture in Desk Workers: An Experimental Study. *International Journal of Health Sciences and Research*, 9(3): 42-49.
6. Park, SW and Lee, HS. 2020. Effects of Posture Correction Exercise on Muscle Activity and Onset Time during Arm Elevation in Subject with Forward Head and Rounded Shoulder Posture. *J Korean Soc Phys Med*, 15(3): 29-41.
7. Tang, L., Chen, K., Ma, Y., Huang, L., Liang, J., Ma, Y. 2021. Scapular Stabilization Exercise Based on the Type of Scapular Dyskinesis Versus Traditional Rehabilitation Training in the Treatment of Periarthritis of the Shoulder: Study Protocol for A Randomized Controlled Trial. *BMC Trials*, 22(713): 1-11.
8. Hajihosseini, E., Norasteh, A., Shamsi, A., Daneshmandi, H. 2014. The Effects of Strengthening, Stretching and Comprehensive Exercises on Forward Shoulder Posture Correction. *Physical Treatment*, 4(3): 123-132.
9. Rosa, DP., Borstad, JD., Pogetti, LS., Camargo, PR. 2016. Effects Of a Stretching Protocol for The Pectoralis Minor on Muscle Length, Function, and Scapular Kinematics in Individuals With and Without Shoulder Pain. *Journal of Hand Therapy*, 30(1)*:* 1-9.
10. Moghadam, AN., Rahnama, L., Dehkordi, SN., Abdollahi, S. 2019. Exercise Therapy May Affect Scapular Position and Motion In Individuals With Scapular Dyskinesis: A Systematic Review Of Clinical Trials. *Journal of Shoulder and Elbow Surgery,* 29(1)*:* 1-

8.
11. Shiravi, S., Letafatkar, A., Bertozzi, L., Paolo, Pillastrini., Tazji, MK. 2019. Efficiacy of Abdominal Control Feedback and Scapula Stabilization Exercises in Participants with Forward Head, Rounded Shoulder Postures and Neck Movement Impairment. *Sports Health:* 1-8.
12. Kibler, W.B., Ludewig, P.M, McClure, P.W., Michener, L.A., Bak, K., Sciascia, A.D. 2013. Clinical Implications of Scapular Dyskinesis in Shoulder Injury: The 2013 Consensus Statement from the 'Scapular Summit'. *British Journal of Sports Medicine*, 47: 877–885.
13. Strufy, F., Nijs, J., Mollekens, S., Jeurissen, I., Truijen, S., Mottram, S., Meeusen, R. 2013. Scapular Focus Treatment in Patients with Shoulder Impingement Syndrome: A Randomized Clinical Trial. *Clinical Rheumatology*, Vol.32: 73-85.
14. Ruivo, RM., Correia, PP., Carita, AI. 2017. Effects of a Resistance and Stretching Training Program on Forward Head and Protracted Shoulder Posture in Adolescents. *Journal of manipulative and Physiological Therapeutics*, 40(1): 1-10.
15. Fani, M., Ebrahimi, S., Ghanbari, A. 2020. Evaluation of Scapular Mobilization and Comparison to Pectoralis Minor Stretching in Individuals with Rounded Shoulder Posture: A Randomized Controlled Trial. *Journal of Bodywork and Movement Therapies*, 24(4): 367-372.
16. Kisner, C and Colby, L.A. 2012. *Therapeutic Exercise Foundation and Technique.* 6th ed. USA: F.A. Davis Company, pp.65-110.
17. Fathollahnejad, K., Letafatkar, Amir., Hadadnezhad, Malihe. 2019. The Effect of Manual Therapy and Stabilizing Exercises on Forward Head and Rounded Shoulder Posture: a six week intervention with a One-Month Follow-Up Study. *BMC Musculoskeletal Disorders*. 20(86): 1-8.
18. Ganu, Sneha and Gor, Ushma. 2021. Effects of Abdominal Control Feedback and Scapular Stabilization Exercise on Chronic Neck Pain. *International Journal of Health Sciences and Research*, 11(6): 318-325.