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The efficacy of kinesiotaping combined with shoulder strengthening and pectoralis minor stretching for improving scapular alignment in tailors with rounded shoulder posture

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ABSTRACT

Background: Rounded shoulder posture is marked by forward displacement of the shoulders from their neutral position, commonly caused by prolonged poor sitting habits. Clinically, it manifests as shoulder or scapular pain, restricted range of motion, and increased stiffness of the pectoralis minor. This study aimed to compare the effectiveness of adding kinesiotaping to a shoulder strengthening and pectoralis minor stretching program with that of a conventional exercise therapy protocol commonly used as standard treatment.

Methods: This experimental study used a pretest-posttest two-group design involving 42 respondents selected through purposive sampling. The sample was divided into intervention (shoulder strengthening and pectoralis minor stretching exercises + kinesiotaping) and control (shoulder strengthening and pectoralis minor stretching exercises) groups, and the data were analyzed using an independent sample t-test.

Results: Paired sample *t*-test analysis in the kinesiotaping and strengthening group showed a significant result (p=0.000). Independent sample *t*-test revealed significant differences between groups for right scapular alignment (p=0.000) and left scapular alignment (p=0.035), indicating that adding kinesiotaping significantly improved scapular alignment compared to strengthening and pectoralis minor stretching alone.

Conclusion: Both intervention and control groups improved scapular alignment in tailors. However, the intervention group showed a greater effect than control group.

Keywords: exercise therapy, kinesiotaping, rounded shoulder posture, strengthening, stretching.
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INTRODUCTION

Proper body posture is essential during work activities.[1] One common postural disorder is rounded shoulder posture, a maladaptive condition requiring correction. It is marked by the forward displacement of the shoulders from their neutral position.[2] Rounded shoulder posture affects up to 73% of healthy individuals aged 20 to 50 years and accounts for 60% of shoulder abnormalities. This condition is mainly linked to poor sitting habits, which can disrupt scapular positioning, movement mechanics, and muscle function. Moreover, studies report that 78% of individuals with work-related pain exhibit shoulder protraction.[3]

The high prevalence of rounded shoulder posture is linked to poor sitting habits, leading to changes in scapular alignment, kinematics, and muscle activation. Tailors, in particular, work under repetitive, monotonous conditions that require sustained concentration and precision, often in a seated position with a forward-flexed head and neck.[4] Clinically, rounded shoulder posture presents as shoulder or scapular pain, limited range of motion, and increased stiffness, particularly in the pectoralis minor. Scapular malposition, along with changes in the glenohumeral joint and cervical spine, disrupts the muscle force–length relationship, reducing strength and impairing shoulder biomechanics.[5]

Rounded shoulder posture can cause complications such as subacromial impingement, trigger points, neuropathies, and thoracic outlet syndrome. Muscle imbalances associated with this condition may also lead to bursitis, shoulder pain, impingement, and tendonitis. Considering its high prevalence, effective management is crucial to prevent these complications from worsening.[6]

Exercise therapy for rounded shoulder posture aims to correct scapular misalignment, reduce pain, and enhance functional capacity. Muscle imbalance often occurs due to weakness in the posterior shoulder muscles. Strengthening programs have been shown to effectively improve scapular alignment in such cases.[7] In recent decades, physiotherapy interventions emphasizing scapular strengthening exercises have been widely

used to correct postural disorders, particularly rounded shoulder posture.[8] This condition, marked by forward shoulder positioning, is linked to muscle imbalances and weakness in the scapular stabilizers. Although strengthening exercises have shown positive effects on posture, research specifically exploring shoulder and scapular muscle activation in rounded shoulder posture remains limited.[9]

From a biomechanical perspective, dysfunction of the shoulder and scapular muscles is closely linked to the development of rounded shoulder posture. However, comprehensive studies combining multiple intervention methods remain limited.[10] Kinesiotaping shows promise as a complementary approach to strengthening exercises by enhancing muscle activation, providing proprioceptive feedback, and supporting dynamic postural correction. Despite its potential, research on the combined effectiveness of kinesiotaping and scapular strengthening exercises for managing rounded shoulder posture is still insufficient.[11]

Based on this rationale, the author conducted a study to evaluate the effectiveness of adding kinesiotaping to scapular strengthening and pectoralis minor stretching, compared to conventional exercise therapy. The study also aimed to assess the impact of kinesiotaping on pain reduction and scapular alignment improvement in individuals with rounded shoulder posture.

METHODS

This randomized controlled trial with a pretest-posttest design included 42 female garment workers with rounded shoulder posture, selected from 54 potential participants. Twelve individuals were excluded, seven for not meeting the inclusion criteria and five who declined to participate. The eligible participants were randomly allocated into two groups of 21 each. Intervention group received kinesiotaping in addition to shoulder strengthening and pectoralis minor stretching exercises, while control group received only the standard exercise therapy of shoulder strengthening and pectoralis minor stretching. Both groups completed 12 intervention sessions over the course of one month, followed by post-test measurements after all interventions were completed (Figure 1).

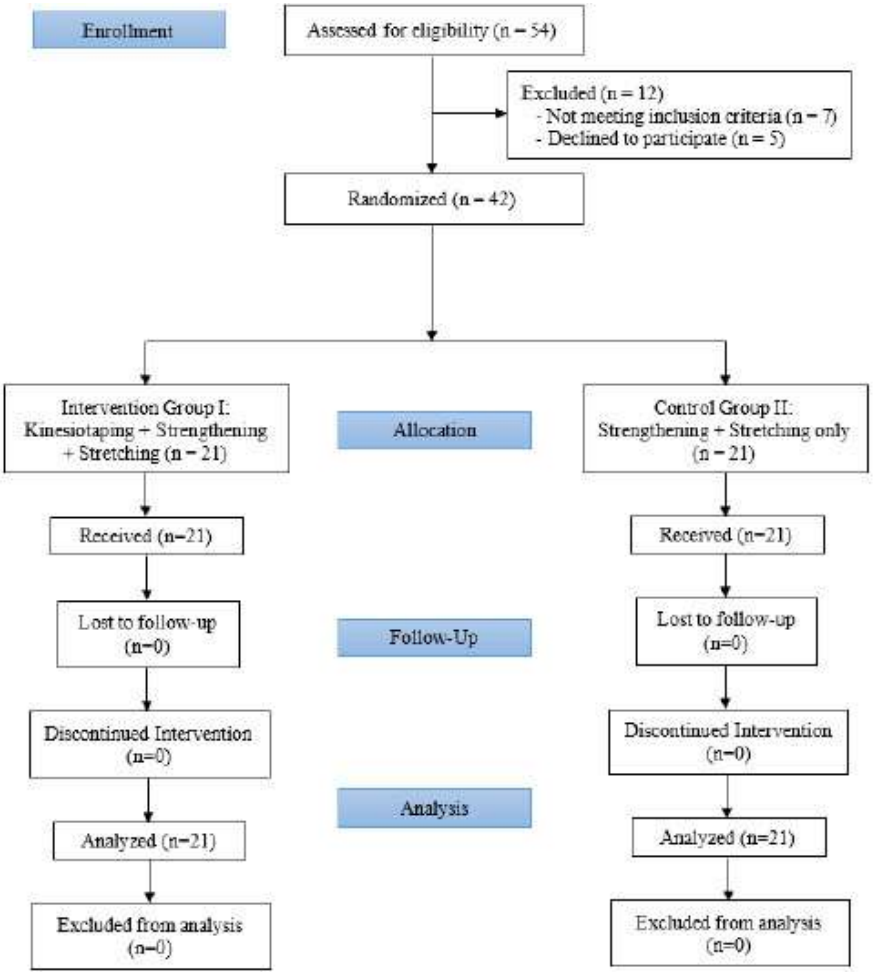

Figure 1. Consolidated standards of reporting trails flow diagram.

The study was conducted on female workers with rounded shoulder posture at Sovana Bali Garment. The research protocol was reviewed and approved by the Ethics Committee of Universitas Udayana (Ref: B-10371/UN40.A1.1/TD.07/2024), and all participants provided written informed consent. Participant confidentiality was strictly maintained throughout the study.

Subjects met inclusion criteria: diagnosed rounded shoulder posture confirmed by measurement, female gender, aged 30–50 years, at least five years of work experience, acromion distance greater than 2.5 cm, and a normal BMI (18.5–24.9 kg/m^2). Exclusion criteria included a history of trauma, surgery, or spinal abnormalities affecting the scapular or shoulder region.

Scapular alignment was measured using the acromion distance method, with a high reliability (ICC = 0.97). The Shapiro-Wilk test was used to assess data normality, and Levene's test evaluated the equality of variances, both at a significance level of $\alpha = 0.05$. After these assumptions were confirmed, paired sample t-tests were performed to analyze within-group differences, and independent sample t-tests were used to compare between-group differences in scapular alignment changes before and after intervention.

RESULTS

Based on Table 1, the mean age of tailors in intervention group was 41.67 ± 2.74 years and 41.05 ± 2.87 years in control group. The average work duration was comparable between groups (16.33 ± 3.13 years in intervention group and 16.24 ± 3.49 years in control group), as was the mean BMI (20.21 ± 1.26 and 20.21 ± 1.20, respectively). These characteristics suggest

that age, work posture, and length of employment may contribute to the risk of developing rounded shoulder posture.

The Shapiro-Wilk test indicated that scapular alignment data were normally distributed ($p > 0.05$), and Levene's test confirmed homogeneity between groups (Table 2). Paired sample t-tests showed a significant reduction in scapular alignment scores after intervention in both groups ($p = 0.000$ for both sides; $p < 0.05$) (Table 3). Independent sample t-tests revealed that intervention group (with kinesiotaping) had a greater percentage decrease in right scapular alignment (24.64%) compared to control group (15.53%), and similarly for the left scapula (21.22% vs. 17.05%) (Table 4). These findings suggest that kinesiotaping combined with exercise is more effective than exercise alone in improving scapular alignment.

DISCUSSION

The shoulder strengthening intervention targets the posterior shoulder muscles, which are often weak in individuals with rounded shoulder posture. Strengthening these muscles helps restore optimal postural alignment.[12] External loading stimulates the posterior musculature to increase its force capacity, counteracting the dominance of hypertonic anterior muscles such as the pectoralis major and minor. This adaptation promotes biomechanical balance and proper posture.[13]

The results of this study align with Hajihoisseini et al. (2014), who reported that shoulder strengthening exercises led to a significant 10% improvement in individuals with rounded shoulder posture. Their study concluded that such exercises are an effective, evidence-based, and safe method for correcting postural deviations.[14] Tightness of the pectoralis minor is a key biomechanical factor contributing to rounded shoulder posture, as it disrupts scapular kinematics and impairs upper limb function. Therefore, incorporating pectoralis minor stretching into rehabilitation protocols may further enhance postural correction by improving muscle length and range of motion.[15]

The application of kinesiotaping in the treatment group resulted in greater improvement in scapular alignment among tailors with rounded shoulder posture. This technique, based on proprioceptive principles, modulates neuromuscular activity by facilitating or inhibiting specific muscle groups according to therapeutic goals.[16] Kinesiotaping stimulates cutaneous mechanoreceptors, enhancing sensorimotor feedback to support postural correction and improve movement patterns. Harput et al. (2017) reported that kinesiotaping not only improves joint and muscle function but also enhances muscular endurance, increases skin blood flow, and promotes lymphatic drainage, helping to reduce localized edema and

Table 1. Characteristics of 42 female workers with rounded shoulder

Characteristics	Intervention group Mean ± SD (n=21)	Control group Mean ± SD (n=21)
Age	41.67 ± 2.74	41.05 ± 2.87
Working Period	16.33 ± 3.13	16.24 ± 3.49
Body Mass Index	20.21 ± 1.26	20.21 ± 1.20

Table 2. Normality and homogeneity test of scapular alignment decrease before and after intervention

Data Group		Normality Test[1]			Homogeneity Test[2]
		Intervention group Mean ± SD	Control group Mean ± SD	*P*-value	*P*-value
Right SA	Pre-test	6.41 ± 0.41	6.18 ± 0.55	0.06	t0.13
	Post-test	4.82 ± 0.48	5.21 ± 0.59	0.07	
Left SA	Pre-test	5.89 ± 0.61	5.98 ± 0.76	0.20	0.68
	Post-test	4.64 ± 0.67	4.96 ± 0.90	0.18	

1, *Shapiro Wilk Test; 2, Levene's Test*

Table 3. Average decrease in scapular alignment values before and after intervention in intervention and control groups

Data Group		Intervention group		Control group	
		Mean ± SD	*P*-value	Mean ± SD	*P*-value
Right SA	Pre-test	6.41 ± 0.41	0.000	6.18 ± 0.55	0.000
	Post-test	4.82 ± 0.48		5.21 ± 0.59	
Left SA	Pre-test	5.89 ± 0.61	0.000	5.98 ± 0.75	0.000
	Post-test	4.64 ± 0.67		4.96 ± 0.90	

SA, scapular alignment

Table 4. Comparative test of scapular alignment before and after intervention in both groups

Scapular alignment		Group	Mean ± SD	Percentage Decrease	*P*-value
Difference	Right	Intervention group	1.58 ± 0.52	24.64 %	0.000
		Control group	0.96 ± 0.30	15.53%	
Difference	Left	Intervention group	1.25 ± 0.38	21.22 %	0.035
		Control group	1.02 ± 0.29	17.05 %	

inflammation.[17]

Kinesiotape is typically applied along the length of the target muscle, from origin to insertion, to support muscle function and alignment without causing discomfort or limiting range of motion. The functional correction technique is especially effective in promoting biomechanically optimal posture and encouraging efficient movement patterns. When integrated into a rehabilitation program, kinesiotaping can aid in improving scapular positioning and correcting musculoskeletal imbalances associated with rounded shoulder posture.[18]

The results of this study demonstrate that combining shoulder strengthening exercises with kinesiotaping produces greater improvements in scapular alignment among individuals with rounded shoulder posture. This supports previous findings by Hajihoisseini et al. (2014), which highlighted the effectiveness of strengthening interventions in correcting postural deviations. Kinesiotaping provides mechanical and proprioceptive support that enhances muscular strengthening and postural control.[14] When applied from the coracoid process to the upper and lower trapezius with approximately 40% tension, the tape promotes posterior tilt and upward rotation of the scapula, counteracting the anterior pull characteristic of rounded shoulder posture.[19] Its elasticity assists in maintaining shoulder retraction, contributing to improved scapular alignment.[20]

The functional correction technique of kinesiotaping effectively stimulates proprioceptive input via cutaneous mechanoreceptors, enhancing neuromuscular awareness and promoting postural re-education. Yun et al. (2020) demonstrated that this stimulation encourages the body to adopt more biomechanically optimal positions, which is especially beneficial for individuals with habitual postural imbalances, such as tailors who maintain prolonged forward-flexed postures.[21] Similarly, Werasirirat et al. (2018) reported that applying kinesiotape with 50% tension from the acromion to the T10 vertebra over three weeks significantly reduced forward shoulder posture (FSP) compared to tape without tension. The tape's tension activates cutaneous mechanoreceptors, providing sensory feedback when the shoulder deviates from proper alignment. This proprioceptive biofeedback enhances positional awareness, helping to correct posture and reduce the severity of FSP symptoms.[22] These findings suggest that adding kinesiotaping to postural correction programs offers both immediate mechanical support and long-term neuromuscular re-education, providing a comprehensive approach for managing rounded shoulder posture.[23]

This study has several limitations. The sample was restricted to female garment workers aged 30–50 years, limiting the generalizability of the findings to other populations, such as males or individuals in different occupations. The short intervention period (one month) may not reflect long-term effects, and the use of a single measurement method (acromion distance) may not fully capture scapular kinematics. Future studies should involve a more diverse population, include longer follow-up periods to assess the sustainability of outcomes, and utilize additional assessment tools such as 3D motion analysis or electromyography to provide a more comprehensive evaluation of scapular function.

CONCLUSION

This study demonstrated that adding kinesiotaping to a rehabilitation program of shoulder strengthening and pectoralis minor stretching significantly improves scapular alignment in individuals with rounded shoulder posture. These results support kinesiotaping as an effective adjunct to conventional therapy for optimizing scapular positioning in clinical practice.

ETHICAL CONSIDERATION

The Ethics Committee of Universitas Udayana reviewed and approved the research protocol with number 2344/UN14.2.2.VII.14/LT/2024.

CONFLICT OF INTEREST

This study contains no conflicts of interest.

FUNDING

The study received no funding from any institution.

AUTHOR CONTRIBUTIONS

IDGAK concepted the study design, collects data, and wrote the manuscript; YP, W, and AAIFA searched the literatures and revised the manuscript.

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