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Original Research Article

RIGID TAPE VERSUS KINESIO TAPE ON SCAPULAR ROTATION AND FORWARD HEAD ANGLE IN SUBACROMIAL IMPINGEMENT SYNDROME

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ABSTRACT

Background: Rigid and kinesio taping is commonly used in the rehabilitation and prevention of subacromial impingement syndrome (SIS). It is proposed to have positive effects on shoulder function and scapular kinematics. However, there is a paucity of literature regarding the effectiveness of rigid versus elastic taping on scapular upward rotation and forward head posture (FHP), which is commonly adopted in SIS.

Purpose: This study was designed to investigate the effect of taping with postural correction on the scapular kinematics and forward head angle (FHA) in patients with SIS when two different taping materials are used: rigid versus a kinesio tape application.

Methods: Eleven female patients with SIS participated in this study. Their age, weight and height ranged from 30 to 60 years, 56 to 90 kg and 155 to 175 cm, respectively. The participants were randomly assigned to Group I (Kinesio tape (KT), n=6) and Group II (Rigid tape (RT), n=5). Thoracic and scapular taping with posture correction was applied to both groups. Scapular upward rotation at 0°, 60°, 90° and 120° and FHA were measured before and immediately after the taping.

Results: Both taping materials significantly increased the scapular upward rotation at 90° and 120° shoulder elevation. Additionally, there was a significant decrease in the FHA in the RT group.

Conclusion: Both tapings are effective in restoring scapular kinematics. The corrective effect of rigid taping on FHA is substantiated.

KEYWORDS: Subacromial Impingement Syndrome, Scapular Kinematics, Posture, Taping.

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INTRODUCTION

Subacromial impingement syndrome (SIS) is the most frequently diagnosed shoulder disorder, representing 44-65% of all recorded shoulder problems in clinical settings [1-3]. SIS is defined as an impingement of the rotator cuff tendons and the subacromial bursa within the subacromial space [4,5]. Clinically, it is characterized by shoulder pain that is aggravated with arm abduction (painful arc) and overhead activities, though it can also be felt at night [4,6,7]. Decreased active range of motion (ROM), functional loss and disability are the main consequences of SIS [7,8]. The high prevalence of SIS is particularly evident among the population aged 40-50 years, and with its

persistent symptoms, it poses a significant socioeconomic burden [9].

Previous studies stated that SIS could be attributed to various factors, such as anatomic disturbance, overuse, the loss of gleno-humeral joint stability and postural abnormalities [1, 10]. Moreover, researchers have paid attention to the role of scapular control in the development of SIS. The scapula is considered to be the key link between the upper extremity and the axial skeleton, where scapular musculature provides the proximal stability to the upper limb activities [1,11].

Decreased upward rotation, increased internal rotation and decreased posterior tilting are abnormal scapular patterns, termed scapular dyskinesis, which have been identified in patients with SIS [1,3,11,12]. Thus, the normalization of scapular control should be accounted for in rehabilitation programs for SIS [13].

Abnormal spinal alignment is proposed to disturb scapular kinematics and shoulder girdle function [1,13-15]. Physical examination revealed that patients with SIS present with postural deviations including a forward head, rounded shoulders, increased thoracic kyphosis and trunk inclination to the symptomatic side [16-18]. It is speculated that early postural mal-alignment in SIS is an adaptive strategy aiming to reduce pain, and it is reversible if properly treated [19].

Two main lines of treating SIS have been reported: operative and conservative treatments [20-22]. The non-operative treatments include subacromial corticosteroid injection, NSAIDs (non-steroidal anti-inflammatory drugs) and rest [8,22,23]. In addition to the previously mentioned conservative treatments, physical therapy remains the most commonly adopted method in treating patients with SIS. Physical therapy approaches include strengthening exercises for the rotator cuff and scapular stabilizers [24,25], stretching the posterior joint capsule [26], manipulative treatments [27,28], electrotherapy modalities [29,30] and taping [31,32].

The application of taping is a promising modality in physical therapy practice [32]. It is commonly used for both treatment and prevention in musculoskeletal disorders [33-35]. Two types of tape have been used in shoulder rehabilitation: rigid and elastic tapes. Previous studies have examined the clinical effects of taping patients with SIS using rigid tape. They found beneficial effects of taping in reducing the electrical activity of the upper fibers of the trapezius [36], relieving pain and improving shoulder function [31,32], limiting abnormal joint movements or supporting joint structure [37]. On the other hand, some negative effects as a result of using rigid tape include skin irritation and the restriction of upper extremity movement [38].

Due to the drawbacks of rigid tape, kinesio tape (KT) was introduced by Kenzo Kase in 1980 [39, 40]. It is elastic, latex-free, quick drying and is designed to resemble the properties of human skin [41]. It can be stretched up to 130-140% of its elastic resting length, thus allowing free movement of the taped muscle or joint [42]. Despite its popularity in physical therapy practice, there is minimal evidence regarding the underlying mechanisms of the therapeutic effects of KT [43]. Kase and Wallis [39] and Kase et al. [40] claimed that KT works by modulating some physiological processes including the improvement of local circulation, pain relief through gate control, supporting weakened muscles and restoring joint alignment.

Previous studies have examined the effects of KT in shoulder disorders. It has been demonstrated that KT effectively reduced pain and discomfort and increased shoulder ROM [40,43,44]. With the mechanical support it creates, KT can alter joint stability and movement biomechanics [40]. Furthermore, the administration of KT with an exercise program has been shown to be more effective than exercise alone in the rehabilitation of SIS [31,44,45]. Taping patients with SIS in combination with posture correction has been found to acutely improve shoulder ROM [46], increase shoulder isometric muscle strength [47], restore scapular kinematics [48] and decrease shoulder pain and disability [47,48].

However, there is a paucity of literature regarding the effect of taping patients with SIS with different taping materials on the scapular kinematics and forward head posture (FHP). Thus, the aim of this study was to investigate

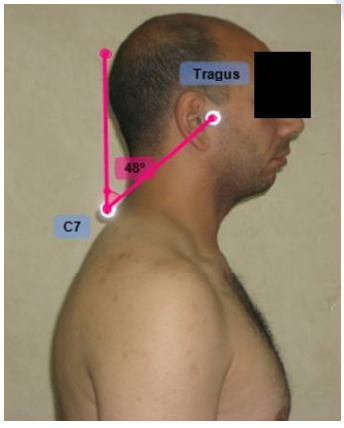
the effects of taping with postural correction on the scapular upward rotation and forward head angle (FHA) in patients with SIS when two different taping materials are used: a rigid tape and an elastic tape.

METHODOLOGY

Participants: We conducted a randomized, single-blinded, placebo-controlled study in the Motion Analysis Lab at the Faculty of Physical Therapy, Cairo University; Egypt. Eleven female patients with clinically diagnosed SIS participated in the study. They were referred by an orthopedist, who was informed of the patient inclusion and exclusion criteria. They were randomly assigned to two groups: kinesio-tape (group I, n=6) and rigid tape (group II, n=5). Their age ranged from 30 to 60 years, their weight ranged from 56 to 90 kg and their height ranged from 155 to 175 cm. Patients with shoulder pain for more than one month were included if they showed positive signs in two or more of the following SIS tests: (1) the Neer and Walsh test, (2) the Hawkins-Kennedy test, (3) the presence of a painful arc between 60°-120° (4) Jobe's test (the empty can test) and (5) pain when palpating the greater tuberosity of the humerus. Patients were excluded if they had a history of shoulder dislocation, shoulder surgery, reproduction of shoulder pain with cervical movement, known allergies to taping or were athletes.

Instrumentation: A digital protractor (inclinometer) (13-770-3SPI Electronic Protractor, China) was used to assess the static positions of the scapular upward rotation during humeral elevation trials. Excellent intra-rater reliability ($ICC_{3,1}$ = 0.89-0.96) using this device was established by Johnson et al. [49] The digital inclinometer was modified to make contact with the scapular spine and to prevent anterior-posterior tilting of the instrument around an axis parallel to the spine of the scapula as described by Johnson et al., [49].

Fig. 1: The measurement of FHA using Kinovea software. The forward head angle was determined by measuring the angle between a line drawn from the tragus to the C7 spinous process and a vertical plumb line through C7.



Kinovea 0.8.15 software was used to compute the FHA (figure 1). Kinovea is an open-source software (www.kinovea.org) that uses a digital goniometer to compute joint angles and has been used previously in a few studies [50,51].

Procedures: Initially, each patient was given an orientation session about the nature of the study and its aims. Written informed consent was obtained from all patients prior to starting the study, which was approved by the local ethical committee. For assessing the scapular position and orientation, the patients' whole backs were kept bare and their hair was bound up. Then, the Scapular Dyskinesis Test (SDT) and Lateral Scapular Slide Test (LSST) were performed. The SDT was described by Kibler et al. [52] to categorize abnormal scapular movement patterns. In this test, the bilateral scapular motion during repeated shoulder elevations and lowerings is observed. Participants were asked to elevate their arms in the scapular plane for three trials while the therapist observed the medial and superior scapular borders and then recorded the type of scapular motion pattern as one of the following types: Type 1: prominence of the inferior angle, Type 2: prominence of the medial border, Type 3: excessive elevation of the superior border, and Type 4: normal scapular motion. Additionally, the lateral scapular slide test (LSST) was designed by Kibler et al. [53] to measure scapular asymmetry. Participants were instructed to stand in a neutral relaxed posture. Measurements were taken in 3 positions that place the shoulder joint in 0° (rest), 45° (hands on hips) and 90° of abduction with maximum internal rotation. In each position, the distance was measured bilaterally between the inferior angle of the scapula and the corresponding thoracic spinous process by a measuring tape. All measurements of scapular distance were taken three times. Asymmetry equal to 1.5 cm was considered as a threshold for an abnormal

scapular position.

Scapular upward rotation was measured in four positions, namely 0°, 60°, 90° and 120° of elevation in the scaption plane. In the current study, shoulder elevation in the scaption plane was chosen because it is the most functional plane for arm elevation that is commonly used in activities of daily living [54,55]. To ensure that shoulder elevation was maintained in the scaption plane, an adhesive tape was used to determine a path for scapular plane elevation on the floor and wall. Two strips of adhesive tape were marked on the floor; one was placed parallel to the frontal plane, and another one was angled 30° to the frontal plane. Participants were asked to stand in a relaxed position beside the first adhesive strip and then to elevate their arms in the scaption plane at 60°, 90° and 120° as determined by a universal goniometer and marked on the wall.

To measure the FHP angle, reflective markers (9 mm) were placed over the tragus and C_7 spinous process. A lateral view photograph was taken by a digital camera (Canon Power Shot SD1100 IS ELPH, US). The camera was mounted on a tripod and was placed 2 m from the participants. The FHA is defined as the angle of the head in the sagittal plane measured from a line connecting the tragus and C_7 markers with respect to the vertical line. Forward head posture was defined as a FHA equal to or greater than 46° [15].

Following postural evaluation, the tape was applied. Two different taping materials commonly used in SIS were applied with the same technique: Group I received Kinesio tape (KT) (5 cm in width, cotton, porous, adhesive and latex-free elastic tape 3NSTex –Nst-05001), while Group II received Rigid tape (RT) (Steroplast^R zinc oxide adhesive tape). To determine the group assignments, randomization was performed by asking each patient to choose a paper from a box containing 11 papers. These papers were labeled I or II, and each patient was allocated to the group associated with the letter she chose.

Before the application of real taping, all participants received a placebo tape (Transpore^{TM}1527-2M, 5-cm width) applied using the same application technique as the real tape but without posture correction. Following the removal of the placebo tape, the real tape was applied bilaterally from the first to the twelfth thoracic vertebra as participants placed their thoracic spine in a neutral position. Then, the participants were asked to retract and depress the scapulae as demonstrated by the physiotherapist. The movement was demonstrated to each patient, and the patients were allowed to practice it once before the application of the real tape. The real tape was applied diagonally from the middle of the scapular spine to the twelfth thoracic vertebra; this was also applied bilaterally [46] (figure 2). Participants were not required to actively maintain the posture correction, as the aim of the tape is to hold each subject in the new position. The placebo taping was not pre-tensioned and was included in the protocol to determine if any observed changes in the dependent variables had occurred as a result of the postural change and not as a result of another effect of the tape [46]. All taping was applied by a single trained physiotherapist. Scapular upward rotation at 0°, 60°, 90° and 120° of humeral elevation in the scaption plane and FHA were measured before and after each taping condition (placebo and real taping).

Fig. 2: Thoracic and scapular Kinesio tape was applied bilaterally following postural correction.

Statistical Analysis: The data are presented as the mean and standard deviation (SD) values. The data were explored for normality by checking data distribution, calculating the mean, median and standard deviation (SD) values and finally

by using the Shapiro-Wilk test. Once data were found not to violate these assumptions, parametric analyses were conducted. SPSS (Inc., Chicago, IL) version 20 was used for the statistical analyses. Rigid and Kinesio taping effects were tested for statistical significance using a mixed-model 3-way MANOVA. Scapular upward rotation and FHA were analyzed in the two taping conditions (the placebo and real taping) across four time periods (within-subject variables), with the study group introduced as a between-subject variable. If a significant interaction was identified, Bonferoni-adjusted pairwise comparisons were performed to examine differences between the independent variables. The alpha level of significance was set at 0.05.

RESULTS

The descriptive statistics revealed that the mean ±SD of age, weight and height were 43.8 ±7.7 vs 45.8 ±9.4 years, 83.3 ±8.2 vs 85 ±8.2 kg and 162.3 ±4.5 vs 164.7±7 cm for group I vs group II. The unpaired t-tests revealed that there were no statistically significant differences in the mean age (P = 0.39), weight (P = .89) and height (P = .90) between both groups.

There was a 3-way interaction effect on scapular upward rotation at 90° shoulder elevation in the real taping condition compared to the placebo taping condition immediately after the application of tape in both groups: the KT and RT groups improved during real taping by a mean difference of 1.91° (P = .011) and 1.95° (P = .015), respectively. Additionally, both groups showed significant increases in scapular upward rotation at 90° and 120° of shoulder elevation immediately after taping, compared to pre-taping, in real taping condition by a mean difference of 1.25° (P=.03) and 1.67°(P=.007) respectively in the KT group, and 1.7° (P=.012) and 1.41°(P=.025) respectively in the RT group. Concerning scapular upward rotation at 60° of shoulder elevation, the improvement in the KT group approached acceptable levels of statistical significance (P=.054) during real taping condition when after taping was compared to the before.

Moreover, there was a 3-way interaction effect on FHA in the RT group due to lower mean FHA values in the real taping condition compared to the placebo taping condition immediately after the tape application by a mean difference of 8.2° (P = .005). On another regard, FHA did not reach a statistical significance (P=.06) in the RT group during real taping condition when after taping was compared to the before. Concerning the in between difference, 3-Way Mixed-model MANOVA did not show significant differences between both groups for any of the tested variables.

Tables (1-4) present the descriptive statistics and multiple pairwise comparison tests for the tested variables.

Measure	Time of measurement	KT group		RT group	
0°	Pre	Placebo	3.02(2.49)	Placebo	3.01 (2.106)
		Real	2.51 (2.17)	Real	3.36 (1.86)
	Post	Placebo	2.76 (2.25)	Placebo	3.36 (1.88)
		Real	2.87 (2.24)	Real	3.51 (1.61)
60°	Pre	Placebo	10.60 (2.61)	Placebo	9.75 (1.35)
		Real	11.09 (3.43)	Real	9.55 (1.41)
	Post	Placebo	10.49 (1.88)	Placebo	9.78 (1.26)
		Real	12.97 (3.86)	Real	11.05 (2.17)
90°	Pre	Placebo	18.25 (3.70)	Placebo	16.67 (4.22)
		Real	18.40 (4.36)	Real	16.87 (4.39)
	Post	Placebo	17.74 (3.88)	Placebo	16.62 (4.26)
		Real	19.66 (4.82)	Real	18.57 (3.87)
120°	Pre	Placebo	25.17 (4.38)	Placebo	27.45 (5.04)
		Real	24.32 (2.64)	Real	27.45 (4.31)
	Post	Placebo	24.78 (4.54)	Placebo	28.28 (5.10)
		Real	25.99 (3.81)	Real	28.87 (3.90)
FHA (°)	Pre	Placebo	56.33 (9.70)	Placebo	53 (4.41)
		Real	56.5 (11.89)	Real	51.4 (8.41)
	Post	Placebo	55.66 (8.59)	Placebo	55.2 (12.25)
		Real	54.16 (9.74)	Real	47 (8.94)

Table 1: Descriptive statistics of the scapular upward rotation angle at 0°, 60°, 90° and 120° of shoulder elevation and FHA.

KT: Kinesio tape group
RT: Rigid tape group
FHA: forward head angle

Table 2: Multiple pairwise comparison between the placebo and real taping conditions for the scapular upward rotation angle at 0°, 60°, 90° and 120° of shoulder elevation and FHA pre- and post-taping in the KT and RT groups.

Measure	Group	Time of Measurement	(I)	(J)	Mean Difference	Sig.	95% Confidence Interval for Difference	
			Taping condition	Taping condition	(I-J)		Lower Bound	Upper Bound
0°	1	1	1	2	0.507	0.094	-0.106	1.119
		2	1	2	-0.112	0.781	-0.992	0.769
	2	1	1	2	-0.354	0.263	-1.025	0.317
		2	1	2	-0.15	0.733	-1.115	0.815
60°	1	1	1	2	-0.485	0.39	-1.699	0.729
		2	1	2	-2.48	0.083	-5.356	0.396
	2	1	1	2	0.204	0.737	-1.126	1.534
		2	1	2	-1.274	0.384	-4.425	1.877
90°	1	1	1	2	-0.155	0.564	-0.74	0.43
		2	1	2	**-1.917***	**.011***	-3.265	-0.569
	2	1	1	2	-0.2	0.498	-0.841	0.441
		2	1	2	**-1.950****	**.015***	-3.427	-3.427
120°	1	1	1	2	0.853	0.289	-0.858	2.565
		2	1	2	-1.212	0.096	-2.686	0.263
	2	1	1	2	-0.006	0.994	-1.881	1.869
		2	1	2	-0.588	0.432	-2.203	1.027
FHA(°)	1	1	1	2	-0.167	0.923	-3.962	3.629
		2	1	2	1.5	480	-3.11	6.11
	2	1	1	2	1.6	0.407	-2.558	5.758
		2	1	2	**8.200***	**.005***	3.15	13.25

Table 3: Multiple pairwise comparison between pre- and post-taping times for the scapular upward rotation angle at 0°, 60°, 90° and 120° of shoulder elevation and FHA in the placebo and real taping conditions within the KT and RT groups.

Measure	Group	Taping Condition	(I)	(J)	Mean Difference	Sig.	95% Confidence Interval for Difference	
			Pre-taping	Post-taping	(I-J)		Lower Bound	Upper Bound
0°	1	1	1	2	0.257	0.235	-0.199	0.712
		2	1	2	-0.362	0.379	-1.247	0.523
	2	1	1	2	-0.358	0.139	-0.857	0.141
		2	1	2	-0.154	0.728	-1.123	0.815
60°	1	1	1	2	0.117	0.797	-0.881	1.114
		2	1	2	-1.878	0.054	-3.795	0.039
	2	1	1	2	-0.028	0.955	-1.121	1.065
		2	1	2	-1.506	0.139	-3.606	0.594
90°	1	1	1	2	0.507	0.139	-0.2	1.214
		2	1	2	**-1.255***	**0.031**	**-2.367**	**-0.143**
	2	1	1	2	0.048	0.892	-0.727	0.823
		2	1	2	**-1.702***	**0.012**	**-2.92**	**-0.484**
120°	1	1	1	2	0.387	0.353	-0.506	1.28
		2	1	2	**-1.678***	**0.007**	**-2.771**	**-0.586**
	2	1	1	2	-0.834	0.086	-1.812	0.144
		2	1	2	**-1.416***	**0.025**	**-2.612**	**-0.22**
FHA(°)	1	1	1	2	0.667	0.784	-4.684	6.018
		2	1	2	2.333	0.243	-1.894	6.56
	2	1	1	2	-2.2	0.418	-8.062	3.662
		2	1	2	4.4	0.06	-0.23	9.03

Table 4: Multiple pairwise comparison between the KT and RT groups for the scapular upward rotation angle at 0°, 60°, 90° and 120° of shoulder elevation and FHA in the_placebo and real taping conditions during pre- and post-taping times.

Measure	Time	Taping Condition	(I)	(J)	Mean Difference	Sig.	95% Confidence Interval for Difference	
			Kinesio-tape Group	Rigid tape Group	(I-J)		Lower Bound	Upper Bound
0°	1	1	1	2	0.01	0.994	-3.179	3.199
		2	1	2	-0.851	0.51	-3.653	1.951
	2	1	1	2	-0.605	0.646	-3.479	2.27
		2	1	2	-0.643	0.607	-3.375	2.089
60°	1	1	1	2	0.851	0.53	-2.092	3.794
		2	1	2	1.54	0.376	-2.201	5.28
	2	1	1	2	0.706	0.494	-1.535	2.947
		2	1	2	1.912	0.353	-2.507	6.331
90°	1	1	1	2	1.577	0.525	-3.824	6.979
		2	1	2	1.532	0.577	-4.461	7.526
	2	1	1	2	1.119	0.66	-4.439	6.676
		2	1	2	1.085	0.695	-4.98	7.151
120°	1	1	1	2	-2.277	0.443	-8.698	4.145
		2	1	2	-3.136	0.172	-7.918	1.646
	2	1	1	2	-3.497	0.26	-10.073	3.078
		2	1	2	-2.874	0.25	-8.159	2.412
FHA(°)	1	1	1	2	3.333	0.499	-7.368	14.035
		2	1	2	5.1	0.443	-9.272	19.472
	2	1	1	2	0.467	0.942	-13.755	14.688
		2	1	2	7.167	0.24	-20.04	5.706

DISCUSSION

The primary purpose of this study was to investigate the effects of rigid versus kinesio-tape, compared to the placebo-tape condition, on the scapular upward rotation and FHA in a group of patients with SIS. The findings of the current study revealed that the two taping materials improved the scapular upward rotation at the mid (90°) and the final (120°) angles of shoulder elevation in the scapular plane. The change in the measured angles indicates that both postural taping materials have a corrective effect on scapular kinematics.

The contribution of the scapula is maximized in the mid-range (90°-120°) of arm elevation because of the larger moment arm of the scapular rotators compared to the shoulder rotators, which promotes a mechanical advantage for the scapula [56,57]. It is hypothesized that taping works by providing sensorimotor feedback, correcting joint alignment during dynamic movements [38,58] and restoring normal length-tension relationships in the exercising muscles [59].

Host [60] believed that scapular taping in the resting position allows for better alignment of the scapula and accordingly helps to increase the subacromial space. He stated that one possible explanation of the improvement seen after tape application could be attributed to the prolonged stretching force exerted by the tape on the tight structures around the shoulder, which possibly enables other muscles to function properly. In addition, taping might alter the activation level of the scapular muscles to control scapular motion [47,61,62]. Scapular taping has been found to decrease the activity of the upper trapezius and to increase the activity of the lower trapezius, serratus anterior, and infraspinatus muscles [62]. The authors of the current study concluded that although scapular electromyography was not recorded in this study, the evidence of altered activation levels of the scapular muscles in patients with SIS can be inferred from the results.

Furthermore, in this study thoracic and scapular taping was applied with active postural correction, and the patients were instructed to retract and depress the scapulae before the tape was applied. Shoulder retraction has been found to be associated with posterior tilting of the scapula, a movement that leads to widening of

the subacromial space in contrast to shoulder protraction [17]. Thus, our findings suggest that postural taping may assist in restoring abnormal scapular movement patterns.

Our results are consistent with those of van Herzeele et al. [61] who found increased scapular upward rotation at 30°, 60° and 90° of shoulder abduction after the application of kinesio taping in asymptomatic handball players. A similar corrective effect has been reported by Hsu et al. [63], who used kinesio taping to envelop the lower trapezius with the purpose of correcting the scapular position in a group of baseball players with SIS. In contrast to the results of this study, Shaheen et al. [48] found that the two taping materials have no effect on upward rotation, although both rigid and elastic taping techniques externally rotated the scapula in sagittal plane movements.

Concerning the FHA, the findings revealed a significant decrease in the mean value of FHA in the real taping condition compared to the placebo taping condition immediately after the application of tape in the RT group. The decrease in the measured angle indicates that rigid taping with posture correction has a substantial corrective effect on the forward head posture (FHP) in SIS.

FHP is a mal-alignment of the cervical spine and is considered to be an etiological factor in the development of SIS [18,64]. It is associated with a downwardly rotated, anteriorly tilted, and protracted scapula leading to altered force couples and scapular motions that result in increased compression of the subacromial space during arm elevation [1,13,18]. Accordingly, the underlying mechanism of the observed re-alignment of the upper body posture could be attributed to the combined effect of the mechanical postural correction of the position of the shoulder girdle and the enhanced proprioceptive stimulation from the tape.

Our finding is in agreement with the results presented by Lewis et al. [46], who found that rigid postural taping had less FHA, forward shoulder angle (FSA) and smaller kyphosis in patients with SIS compared to placebo taping. In contrast to our results, Cole et al. [59] studied the effect of a scapular stabilization brace on posture and scapular muscle activity in healthy overhead athletes with poor posture. They concluded that scapular bracing reduced FSA, but no alteration was observed in the FHA.

Regarding the differences between the two taping materials, the between-subject effect showed no significant differences between the KT and the RT taping groups for any of the tested variables, which could be attributed to the small sample size. This study is limited by our inability to generalize the findings to both genders, as we included female participants only. Additionally, the forward shoulder angle was not measured in this study and we recommend that it should be included in future studies.

CONCLUSION

Both taping materials with postural correction are beneficial in increasing the scapular upward rotation in SIS patients. Furthermore, rigid taping is effective in reducing the FHA. Thus, postural taping might play a role in the restoration of normal postural alignment, which may facilitate the effectiveness of other therapeutic strategies in the rehabilitation programs for SIS associated with scapular dyskinesia.

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