

Effectiveness of Kinesio Taping in pain and scapular dyskinesia in athletes with shoulder impingement syndrome*

Efeito do Kinesio Taping na dor e discinesia escapular em atletas com síndrome do impacto do ombro

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ABSTRACT

BACKGROUND AND OBJECTIVES: Shoulder impingement syndrome (SIS) is characterized by pain and functional limitation being frequent in people practicing physical activities involving repeated movements of upper limbs above the head. This study aimed at evaluating the effectiveness of Kinesio Taping (KT) for pain and scapular dyskinesia and at checking whether there is association between pain and scapular dyskinesia in people with SIS and practicing physical activities.

METHOD: Fifteen amateur male athletes with SIS were evaluated. Slide Scapular Lateral Test was used to evaluate scapular dyskinesia and visual numerical scale (VNS) was used to evaluate pain at rest, during activities and at effort. KT was placed after tests. All patients were evaluated before and two weeks after KT. Chi-square and t paired tests were used for statistical analysis with significance of $p < 0.05$.

RESULTS: There have been significant differences in VNS scores for pain at rest ($p = 0.03$), at daily activities ($p = 0.001$) and at effort ($p = 0.001$) before and after KT. There has also been statistical difference in scapular dyskinesia at re-evaluation ($p = 0.001$). There has been no statistically significant association between pain and dyskinesia.

CONCLUSION: KT has improved scapular dyskinesia and pain scores of people practicing physical activities with SIS, however there has been no association between pain and dyskinesia.

Keywords: Athletic tape, Pain, Shoulder impingement syndrome.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A síndrome do impacto do ombro (SIO) caracteriza-se por dor e limitação funcional sendo frequente em praticantes de atividade física que envolva movimentos repetidos do membro superior acima da cabeça. O objetivo deste estudo foi avaliar os efeitos do *Kinesio Taping* (KT) na dor e discinesia escapular e verificar se há associação entre dor e discinesia escapular em praticantes de atividade física com SIO.

MÉTODO: Foram avaliados 15 atletas amadores com SIO, sexo masculino, praticantes de atividade física. Utilizou-se o *Slide Scapular Lateral Test* para avaliação da discinesia escapular e a escala visual numérica (EVN) para avaliação da dor no repouso, durante atividades e ao esforço. Após os testes foi feita a colocação do KT. Todas as avaliações foram realizadas antes e duas semanas após a aplicação do KT. Para análise estatística foram utilizados os testes de Qui-quadrado e t pareado, com significância estatística de $p < 0,05$.

RESULTADOS: Foram observadas diferenças significantes nos escores na EVN para dor no repouso ($p = 0,03$), nas atividades diárias ($p = 0,001$) e no esforço ($p = 0,001$) antes e após o uso do KT. Também foi observada diferença estatística na discinesia escapular na reavaliação ($p = 0,001$). Em relação à associação entre dor e discinesia não foi verificada associação estatisticamente significativa.

CONCLUSÃO: O uso do KT proporcionou melhora na discinesia escapular e nos escores de dor dos praticantes de atividade física com SIO, no entanto não foi verificada associação entre dor e discinesia.

Descritores: Dor, Fita atléctica, Síndrome de colisão do ombro.

INTRODUCTION

Scapular dyskinesia is defined by changes in scapular position and movement, resulting from the activation imbalance between scapula stabilizing muscles, especially serratus anterior and trapezius muscles. These changes impair the scapular humeral rhythm and may contribute for the presence of shoulder painful conditions^{1,2}, such as shoulder impingement syndrome (SIS).

SIS is one of the major reasons for shoulder pain, being frequent in practitioners of physical activities involving elevating the arm above the head³. Major associated symptoms are movement amplitude restriction (MA) and consequent limitation of daily life activities and sports practice⁴. So, the adequate management of

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symptoms and the correction of possible factors related to SIS are critical to reestablish shoulder function and return to activities².

Kinesio Taping (KT) has been used as therapeutic proposal both in prevention and in directly acting on sports injury symptoms and on injuries affecting the shoulder. It is believed that such technique improves circulation and decreases local edema, as well as sensory stimulation offering stability and proprioception during movements^{5,6}. In addition, it also promotes pain relief since it stimulates central nervous system sensory pathways increasing afferent feedback and decreasing direct pressure on subcutaneous nociceptors⁷.

KT has been investigated both by research and the clinical practice, especially with regard to its effects on pain; however, results to date are not yet well established. While some authors have observed pain relief after KT⁴, others have not observed differences in pain scores, although observing improvement in shoulder MA of athletes with SIS⁸.

In addition, it is important to stress that since SIS is related to muscle imbalance of scapular stabilizers, KT could provide benefits for the correction of position changes and scapular movement, thus contributing to decrease pain. So, pain improvement would be related to the effects on nociceptors, being result of the adequate positioning and consequent stability provided by KT⁷. However, there are no studies to date investigating the effects of KT on SIS scapular dyskinesia.

Due to the broad use of KT in clinical practices and to the high incidence of pain and scapular dyskinesia in SIS patients, added to the scarcity of studies about the effects of KT in both situations, the need for further studies on the subject is justified.

This study aimed at evaluating the effects of KT on pain and scapular dyskinesia and to check whether there is association between these conditions in physical activity practitioners with SIS.

METHOD

This is a study with 15 male volunteers, mean age of 22.00 ± 3.87 years, body mass of 73.37 ± 8.57 kg and height of 1.76 ± 0.08 m, amateur athletes of the city of Petrolina, PE, practitioners of activities involving repetitive arm movements above the head for at least six months, with minimum frequency of four times a week and more than six training hours per week.

Inclusion criteria were: presence of signs, symptoms and confirmed diagnosis of SIS; shoulder pain for at least six weeks, presence of pain at palpation and positivity of at least two of the applied tests (Neer, Hawkins-Keneddy and Jobe)⁹. Exclusion criteria were volunteers with history of surgeries, fractures and degenerative joint diseases in scapular girdle, shoulder and cervical spine. It is worth stressing that participated in this study only individuals who for at least six months had been not submitted to physical therapy or drug therapy (use of anti-inflammatory drugs). All volunteers have signed the Free and Informed Consent Term (FICT).

Initially, history was taken to collect personal and anthropometric data, and physical exam. Clinical tests were performed to confirm SIS and a verbal numeric scale (VNS) was applied to evaluate pain scores. VNS is a unidimensional scale made up of a ruler with numbers from zero to 10 cm, being zero no pain and ten unbearable pain¹⁰. Pain was evaluated at rest (arm pending along the body),

during daily activities (eating, dressing and bathing) and during effort activities (reaching, raising, pushing, pulling, throwing an object).

Then, to evaluate the presence of scapular dyskinesia, Slide Lateral Scapular Test was performed, which consists in measuring the distance between the lower scapular angle to the corresponding spinous process. To perform the test, volunteers were positioned in orthostasis and the shoulder was abducted in the frontal plane in 0° , 45° e 90° angles (Figure 1). The test is positive when differences between left and right measures are higher than 15 millimeters³.

After pain and dyskinesia evaluation, KT was fixed on the region of the coracoid process and positioned on the scapula with tensioning toward the fibers of lower trapezius muscle (Figure 2). All volunteers used KT for two weeks. During this period, the tape was replaced as needed. After this period, all volunteers were re-evaluated.

Programs SPSS version 16.0 and GraphPad Prism version 5.0 were used for statistical analysis. Data normality was checked with Shapiro-Wilk test. To evaluate the association between pain and dys-

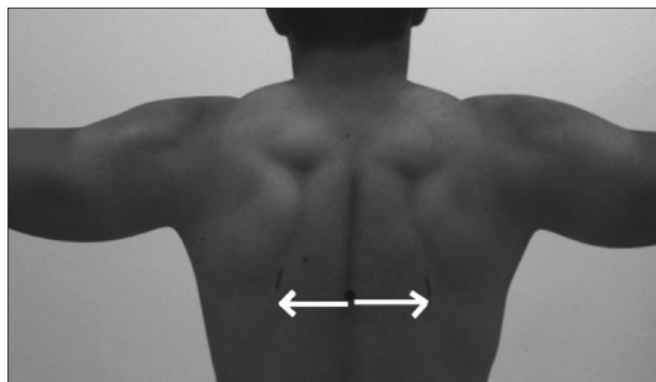


Figure 1 – Slide scapular lateral test.



Figure 2 – Application of Kinesio Taping.

kinesia, Chi-square test with Yates correction was used and a logistic regression model was applied with odds ratio (OR) calculation and Woolf association when frequencies were equal to zero. To compare pain scores and the presence of scapular dyskinesia before and after KT, paired Student's t and Chi-square were used, respectively. All with significance level of 5%. Quantitative variables were expressed by mean and standard deviation and qualitative variables were described in absolute and relative frequencies.

This study was approved by the Research Ethics Committee, University of Pernambuco, protocol 274/2010.

RESULTS

As shown in table 1, there has been significant VNS pain scores decrease in the three situations evaluated after the use of KT: rest ($p = 0.03$), daily activities ($p = 0.001$) and effort ($p = 0.001$). As to scapular dyskinesia, there has also been statistically significant difference at reevaluation ($p = 0.001$).

With regard to the association between scapular dyskinesia and pain, no statistically significant results were found, as shown in table 2.

DISCUSSION

KT effects have been investigated in pain scores of musculoskeletal shoulder injuries, however, the effects of this therapeutic measure on scapular dyskinesia of SIS individuals have not been evaluated to date. Our study has observed significant difference in lower pain scores at rest, daily activities and effort; presence of scapular dys-

kinesia in physical activity practitioners with SIS in the period of two weeks after TK application.

It is believed that KT effects on pain scores are related to supposed benefits such as joint realignment, muscle facilitation or inhibition, as well as increasing proprioception by stimulating skin mechanoreceptors may contribute to pain improvement and consequent improvement of limb functionality¹¹.

A study⁸ has compared the effects of KT and a placebo tape on MA and pain scores of individuals with shoulder pain, by the visual analog scale (VAS) and the Shoulder Pain and Disability Index (SPADI). For such, measurements were taken before application and in the 1st, 3rd and 6th day after KT application, being observed statistically significant difference only in the first 24 hours after application.

However, when comparing KT associated to physical therapy for disability and pain in SIS individuals during two weeks, Kaya, Zinnuroglu and Tugcu¹² have observed that there has been decrease in VAS scores for pain at night, at rest and during activity only after the first week of intervention. In this sense, our study is in line with the results of above-mentioned studies with regard to pain relief, fact which may reinforce the hypothesis that the pain gate theory is

Table 1 – Absolute and relative frequency of scapular dyskinesia and mean pain scores in the numeric visual scale at evaluation and reevaluation.

	Pain		
	Evaluation	Reevaluation	p value
Pain at rest	1.53 (2.29)	0.53 (0.99)	0.03*
Pain during DLA	2.66 (2.16)	1.13 (1.24)	0.001*
Pain at effort	5.46 (2.03)	3.06 (1.57)	0.001*
Scapular Dyskinesia			
	Evaluation	Reevaluation	p value
Present	14 (93.3%)	4 (26.6%)	0.001*
Absent	1 (6.7%)	11 (73.4%)	

*Statistically significant difference ($p < 0.05$)

Pain during DLA = pain during daily life activities.

Table 2 – Distribution and association between presence of scapular dyskinesia and the presence of pain at rest and during daily life activities and sports practice.

	Dyskinesia		Odds Ratio		p value*
	Presence	Absence	OR	CI 95%	
Pain at rest					
Presence	5 (33%)	0 (0%)	1.74	0.06 - 50.47	0.536
Absence	9 (60%)	1 (7%)			
Pain during DLA					
Presence	12 (80%)	0 (0%)	15.00	0.46 - 485.73	0.438
Absence	2 (13%)	1 (7%)			
Pain at effort					
Presence	14	1	1.00	0.06 - 17.634	1.00
Absence	14	1			

* Chi-square test.

Pain during DLA = pain during daily life activities.

controlled by afferent stimulation provided by KT^{8,12}.

On the other hand, while these authors^{8,12} have stated that KT has only short term effects, corresponding to the maximum period of one week, our study has observed positive effects after two weeks of application. This result is relevant with regard to late KT effects on pain. A possible hypothesis for the late effect would be the constant information about joint correction and proprioception given to the individual, which may improve joint positioning during activities generating further mechanical advantage to joint and decompression of subacromial space structures⁷.

In addition to the effects on muscle activity, KT may also have proprioceptive and psychological effects. Smith et al.¹³ have reported electromyographic changes after the use of KT and volunteers have also reported more safety, comfort and easiness when performing movements. Although this study has not used subjective data, this information is important for future studies evaluating pain perception and function after KT.

Shoulder KT associated to kinesiotherapy and thermotherapy has shown positive effects on pain and function of a series of developed cases¹⁴. In their study, Frazier, Whitman and Smith¹⁴ have used both objective measures (VAS scores) and subjective measures (perception of improvement) and in both evaluations the KT associated to physical therapy group has shown better results. So, they suggest that this may be an additional measure to other therapeutic modalities aiming at muscle reeducation.

Our study has observed improved scapular dyskinesia after KT, which reinforces that this therapeutic measure has contributed to restore scapular stability allowing pain-free glenohumeral movements. In addition, KT may have influenced joint positioning, since the corrective technique may promote an adaptation of the segment due to constant stimulation provided by the tape¹⁵. However, the inexistence of studies evaluating KT effects on scapular dyskinesia makes difficult the comparison of results found.

Although it is believed that scapular dyskinesia may be related to the presence or absence of pain, our study has not observed association between dyskinesia and shoulder pain, although there has been improvement both in pain scores and scapular dyskinesia during reevaluation.

In spite of study limitations, such as small sample size and the lack of a control or placebo group, results of our study are relevant because it was observed that KT was able to separately promote changes in pain levels and dyskinesia of amateur athletes with SIS. In addition, the study has brought data hitherto not observed by the literature, since it has evaluated KT effects on scapular dyskinesia and its association with pain. So, we suggest further studies with larger sample size, with more accurate techniques to evaluate

scapular positioning and movement, in addition to studies with control or placebo groups, as well as follow up studies for the analysis of long term KT effects.

CONCLUSION

Our study has observed improvement in scapular dyskinesia and pain scores after KT. However, no association was seen between dyskinesia and pain. So, it is suggested that KT may be applied as additional therapeutic measure during rehabilitation of SIS individuals.

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