

THE EFFECT OF KINESIO TAPING ON KNEE INSTABILITY OF FEMALE RUGBY PLAYERS

BROASCĂ ALEXANDRA-ANDREEA^{1*}, POP NICOLAE HORĂȚIU²

ABSTRACT. Background: The study aims to demonstrate the influence of physical exercises and the Kinesio Taping method over the knee's stability. The purpose of this study was to investigate the effect of Kinesio Tape on knee joint, during balance tests. We hypothesized that using Kinesio Taping we will obtain better assessment results in comparison with the assessment results in the lack of Taping. **Methods:** The study involved five adult female subjects. Four of the subjects were healthy, and one had recent ACL surgical intervention, with mean age for 20 ± 21 years old and body weight $55,5 \pm 78$ kg. Two different training programs were given to the subjects during two months, with a frequency of three times per week, each one lasting approximately 50 minutes. The first training program contained isometric and dynamic exercises. As to the second training program, it consisted of dynamic exercises and an agility drill. Each subject trained the same way. The subjects were assessed three times: prior to starting the first training program, after finishing it, and, finally, after finishing the second training program. At each assessment, there were two testing conditions: the first without Taping and the second with Kinesio Taping (applied). Dynamic balance was assessed with the Star Excursion Balance Test, while for static balance we used the NetForce platform. With the help of the SPSS statistics program's Student's t-test, we performed the statistical analysis of the results. **Results:** Kinesio Taping techniques applied in this research, have seen significant changes in pain amelioration, edema reduction and regaining full knee extension in the acute postoperative period. Kinesio Taping also positively influences the dynamic equilibrium necessary both during training and official meetings.

Keywords: *Kinesio Taping, instability, knee, rugby*

¹ *Barticești Medical Center*

² *Babeș-Bolyai University of Cluj-Napoca, Faculty of Physical Education and Sport*

* *Corresponding author: andreea.broasca@yahoo.com*

REZUMAT. *Efectul metodei Kinesio Taping asupra instabilității genunchiului la jucătoarele de rugby.* **Introducere:** Studiul urmărește influența exercițiilor fizice și metodei Kinesio Taping asupra stabilității genunchiului la jucătoarele de rugby. **Ipoteză:** Scopul acestui studiu a fost de a investiga efectul Kinesio Taping pe articulația genunchiului, în timpul testărilor de echilibru. **Materiale și metode:** La studiu au participat cinci subiecți adulți de sex feminin dintre care - 4 sănătoase, iar una suferind o recentă intervenție chirurgicală a LIA, cu o vârstă medie de 20 ± 21 ani și o masă corporală de $55,5 \pm 78$ kg. Două programe de antrenament au fost aplicate timp de două luni, cu o frecvență de 3 ori pe săptămână, fiecare cu o durată de aproximativ 50 minute. Primul program de antrenament a fost format din exerciții izometrice și dinamice. În ceea ce privește al doilea program de exerciții, a fost compus din exerciții dinamice, dar și un traseu de agilitate. Subiecții au fost evaluați de trei ori: înainte de a începe primul program de antrenament, după terminarea acestuia, și după aplicarea celui de-al doilea program de antrenament. Pentru fiecare evaluare au existat două condiții de testare: prima, fără Taping și a doua cu Kinesio Taping. Echilibrul dinamic a fost evaluat prin intermediul Star Excursion Balance Test, iar pentru echilibrul static am folosit platforma NetForce. Cu ajutorul programului de statistică SPSS am aplicat Student t-test, pentru prelucrarea și analiza statistică a datelor culese în urma testărilor. **Rezultate:** Tehnicile Kinesio Taping aplicate în această cercetare, au înregistrat modificări semnificative în sensul ameliorării durerii, reducerii edemului și recăștigării extensiei genunchiului în perioada acută post-operatorie. De asemenea Kinesio Taping, influențează pozitiv echilibrul dinamic, important în jocul de rugby atât în timpul antrenamentelor cât și în timpul întâlnirilor oficiale.

Cuvinte cheie: *Kinesio Taping, instabilitate, genunchi, rugby*

Introduction

The knee is the most important joint of the body. By his position, through its role in the static and dynamic biomechanics of the lower limb, and also by its covering with soft tissue, it is particularly susceptible and vulnerable to both direct and indirect trauma. Balance is one of the most important factors in sports. A deficitary balance was identified as being an important risk factor regarding the knee joint.

Rugby is a contact sport by its specificity, which by default will cause diverse and quite frequent trauma.

Current research conducted by Kaplan, Goodwill, Strauss & Rosen (2008) has found that the leg is the most prone area in terms of anatomical injuries in rugby, regardless of the experience level, that being from 42% to 55% of the total injury rate .

In a study conducted by the International Rugby Board (Fuller & Taylor, 2013) on the rate of injuries in women's rugby 7 women during 2011-2013, showed that lesions in the knee joint were ranked on second, with a percentage of 17.6% for lesions located in the posterior area and 26.7% for lesions located in the anterior area.

The Kinesio Taping Method has been used for a long time for the prevention and treatment of sports injuries, even for supporting the joint or muscle during movement. Kinesio Taping can improve the proprioception which is considered to play an important role in the prevention of acute injuries and also during chronic injuries as well (Kase & Wallis, 2003).

According to Williams, Whatman, Hume & Sheerin (2012), on a set of 10 articles that included the use of this method in sports, has discovered that it allows a wider range of moving and compared to a normal dressing, it can be worn over a longer period of time without reapplying. Also in this study, from 10 articles only one had significant results statistically reported regarding pain amelioration and proprioception, 4 articles were found to be significant in enhancing stimulation of muscle contraction. By applying Kinesio Taping bandages it is aimed at a better muscle contraction in the bandaged area, of the 10 articles, 2 had significant results statistically reported and the others presented a substantial change in muscle activity.

Another article, which involves tracking the effects of two types of dressing: Kinesio Taping and Athletic Tape in the functional performance for basketball players with ankle sprains, found that following the performance tests there were statistically significant differences between the two test conditions. Athletic Tape (Strap) showed a significant decrease in performance, while Kinesio Taping did not limited the functional performance (Bicici, Karatas & Baltac, 2012).

Objectives

The study aims to demonstrate the influence of physical exercises and the Kinesio Taping method over the knee's stability. The purpose of this study was to investigate the effect of Kinesio Tape on knee joint, during balance tests. We hypothesized that using Kinesio Taping we will obtain better assessment results in comparison with the assessment results in the lack of Taping.

Participants

The study involved five female adult subjects selected from the female rugby team "U" Cluj, out of which - 4 healthy, and one who suffered a recent surgery of ACL, with a mean age of 20 ± 21 years and a body weight of 55.5 ± 78 kg.

Experimental design

All subjects took part in the study after signing the informed consent needed.

The research period was of six months of recovery and training. To reach the same level of stability with the other participants, the subject having had ACL surgery followed a rehabilitation program for a period of four months.

After the recovery period, all subjects followed two training programs designed to increase the stability of the knee joint. The first program included isometric and dynamic exercises, and the second program consisted of dynamic exercises, and a agility trail. Each program was conducted over a period of 1 month, with a frequency of 3 times / week, lasting about 50 min.

Data recording

To highlight the results, the subjects were evaluated three times: before starting the first workout, after its completion and after the application of the second workout.

The Star Excursion Balance Test (SEBT) was used to assess the dynamic balance; it is a functional dynamic test that requires strength, flexibility and proprioception (Abbasi, 2012).

Ground Reaction Forces (GFR) were measured using a balance platform (model AMTI BP400600-2000 Hz, with size 400x600x83 mm), collected and stored with an AMTI NetForce software at 2000 Hz. All data was analyzed using the software developed in Matlab, managing to highlight the static equilibrium. During all balance tests, subjects had their eyes open and they were ordered to keep looking straight ahead. During the test, subjects were instructed to place the measured leg (barefoot) on the middle of the platform, the other member being at 90 ° flexion of the knee joint. Before starting the test and data collection, subjects were allowed a sampling evaluation from each condition to perceive the position and to accommodate with the equipment. When subjects were ready, they were asked to say "Ready!" in order to start the testing. Testing under each condition was performed three times (initial, intermediate and final), each test lasting 15s. If subjects lost balance and touched the platform with the other foot, the test was repeated after a 3 minutes break.

The evaluation of postural control by this means of assessment was shown to be a reliable and valid way to determine the ability of static equilibrium (Lyytinen et al., 2010; Qu, 2010; Harring et al., 2008; Hoffman, Schrader & Koceja, 1999; Williams et al., 1997).

Test Conditions

For each evaluation there were two test conditions: first, without Kinesio Taping and second, with Kinesio Taping.

Kinesio-Taping Techniques used to support the knee joint were: ligamentous technique and the correction technique according to the Sijmonsma Kinesio taping manual (Sijmonsma, 2013).

Data analysis

For the statistical interpretation of numerical data we used the SPSS statistical analysis program, whereby we applied Paired Sample T-Test. Statistical significance was set at $p < 0.05$ (Huang, Hsieh, Lu & Su, 2011).

Results

After the dynamic balance test (SEBT) for the right leg by comparing the final statistical results in two conditions: without Taping and with the applications of the Kinesio Taping bandages it shows that there is a statistically significant difference between condition Mean. The first condition (EffDr) ($M = 1.01$, $SD = 9.41$) and the second condition (EfTDr) ($M = 1.06$, $SD = 7.28$) resulted in: $t(4) = -2.924$ and $p = 0.043$. For the left leg, there were no statistically significant differences from the statistical analysis.

As regarding the results of the static equilibrium of the right leg for the initial evaluation of the two conditions, only the standard deviation of the center of pressure on the x(SDx) axis recorded differences in statistical terms; $SDxF$ ($M = 0.79$, $SD = 0.23$) and $SDxT$ ($M = 0.97$, $SD = 0.14$) resulted $t(4) = -3.076$, $p = 0.037$. At the lower left limb, there were significant statistical differences regarding the displacement average of the center of pressure (ARD). $ARDF$ ($M = 0.74$, $SD = 0.09$) and $ARDT$ ($M = 0.83$, $SD = 0.08$) indicated $t(4) = -8.374$, $p = 0.001$.

Discussions

For the multitude of dynamic exercises applied, the dynamic balance was much better developed, although good records were obtained during the evaluation of the static equilibrium.

Kinesio taping with small degrees of elasticity, causes similar effects to a more rigid bandaging. Specifically, the taping influences the stability, supports the muscles, but restricts the joint movement to a small extent. So when we applied SEBT, in certain directions the knee joint was prevented to reach the maximum score so, during the official meetings, Kinesio Taping helps to protect the joint and does not allow it to slide during pivoting.

The differences between legs significantly decreased from the first evaluation. By using Kinesio Taping techniques on some subjects, the difference between the left leg and right leg is almost nonexistent.

Conclusions

Kinesio Taping techniques applied in this research, have seen significant changes in pain amelioration, edema reduction and regaining full knee extension in the acute postoperative period.

Kinesio Taping also positively influences the dynamic equilibrium necessary both during training and official meetings.

REFERENCES

- Abbasi, R.B. (2012). Evaluation of Static and Dynamic Balance and Knee Proprioception in Young Professional Soccer Players. *Scholars Research Library*, 3(6), 2867-2873.
- Bicici, S., Karatas, N. & Baltaci, G. (2012). Effect of Athletic Taping and KinesioTaping on measurements of functional performance in basketball players with chronic inversion ankle sprains. *The International Journal of Sports Physical Therapy*, 7(2), 154-166.
- Fuller, C. & Taylor, A. (2013). *Women`s Sevens Challenge Cup. Women`s Sevens World Series. Rugby World Cup Sevens (Women)*. International Rugby Board, 1-9.
- Huang, C.Y., Hsieh, F.H., Lu, S.C. & Su, F.C. (2011). Effect of the Kinesio Tape to muscle activity and vertical jump performance in healthy inactive people. *BioMedical Engineering OnLine*, 10:70.
- Hoffman, M., Schrader, J. & Koceja, D. (1999). An Investigation of Postural Control in Postoperative Anterior Cruciate Ligament Reconstruction Patients. *Journal of Athletic Training*, 34(2): 130-136.
- Kaplan, K., Goodwillie, A., Strauss, E.J. & Rosen, J.E. (2008). Rugby Injuries. A review of Concepts and Current Literature. *Bulletin of NYU Hospital for Joint Diseases*, 66 (2), 86-93.
- Kase, K., Wallis, J. & Kase, T. (2003). *Clinical Therapeutic applications of the Kinesio Taping*. Tokyo: Ken Ikai Co.
- Lyytinen, T. et al. (2010). Postural control and thigh muscle activity in men with knee osteoarthritis. *Journal of Electromyography and kinesiology*, 20, 1066-1074.
- Qu, X. (2010). Low-level noise affects balance control differently when applied at different body parts. *Journal of Biomechanics*, 43, 2936-2940.
- Sijmonsma, J. (2013). *Conceptul medical de bandajare neuromusculară (CMB)*. Hof van Twente: Fysionair (pp. 9, 11).
- Williams, S., Whatman, C., Humme, P.A. & Sheerin, K. (2012). Kinesio Taping in treatment and prevention of Sports injuries. *Sports Med*, 42(2), 153-164.