

Long Abstract

EFFECTS OF KINESIO TAPING ON THE STRENGTH PRODUCTION AND PROPRIOCEPTION IN ATHLETES OF FOOTBALL

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SUMMARY

Kinesio taping (KT) is used for the prevention and treatment of sports injuries. The aim of this study was to evaluate the influence of the KT on quadriceps strength production and joint position sense of the knee. 9 professional football players from a local football club participated of this study. The application technique involved attaching 25 and 20 cm lengths of tape, with 50% elongation, over the *rectus femoris* and *vastus medialis*, respectively. Muscle function was assessed using an isokinetic dynamometer. Each athlete subjected to the protocol underwent three different assessment sets, each one involving a different intervention: KT; the placebo tape; and no intervention. Each set consisted of one series of 5 concentric and 5 maximum eccentric contractions of the quadriceps at a speed of 60°/s. The subjects were asked to position the knee joint at 30°, 60° and 90° angles of flexion without visual aid. Repeated measures ANOVA was used with LSD *post hoc*. Two-way ANOVA was used for the knee joint positioning test. There was no difference between the interventions, when comparing the concentric torque ($p = 0.296$) and the eccentric torque values ($p = 0.955$) and no significant differences were found in relation to the sense positioning test at the three angles (30°, $p = 0.419$; 60°, $p = 0.808$; 90°, $p = 0.204$). The results showed that the tactile afferent stimulus provided by the KT was probably insufficient to change the neuromuscular control, reflex activity and proprioception. Further studies are necessary in this field.

INTRODUCTION

Taping techniques has long been used for both prevention and treatment of sports injuries [1], and are classified into two types: elastic and rigid [2]. After the use of taping in the Olympic Games in 1988, it attained great popularity. [3] The elastic tape and their application forms are called Kinesio Taping (KT) [4]. The therapeutic effects of the KT depends on the percentage of stretch, direction and application technique [5,6]. Kenzo Kase, creator of the technique, described several benefits, among them, the normalization of muscle function [3]. Some authors try to correlate the use of KT with increased or decreased muscle strength [7]. It could occur when the KT is applied toward the fascia, acting biomechanically on the fascia or through proprioceptive mechanisms, resulting in increased muscle strength [7,8,9]. In sports, the muscle strength evaluation is done through the isokinetic dynamometer [9]. Studies have shown interesting results in the assessment of muscle strength and proprioception with KT, but so controversial results were found.

Sprains are caused by an impaired awareness of joint position, resulting in the failure of defense. These deficits are also found in the knees with injuries of the anterior cruciate ligament [12]. Robbins and colleagues (1995) showed that rigid bracing enhances the sense of positioning the ankle. Seeking to understand the effects of KT on the

musculoskeletal system, the purpose of this study was to evaluate the effect of this technique on the production capacity in quadriceps strength and joint position sense of the knee professional footballers.

METHODS

The sample was a convenience sample consisting of 9 professional soccer players from a local football club (*Cerâmica Athletic Club -RS*). The mean age, height and weight were 21.89 ± 2.20 years, 180.78 ± 5.09 cm and 78.16 ± 5.05 kg, respectively. The application technique involved attaching 25 and 20 cm lengths of tape, with 50% elongation, to skin over the *rectus femoris* and *vastus medialis* muscles, respectively. As a placebo, shorter lengths of tape (10 cm) were applied to the same area with no specific method. Muscle function was assessed using an isokinetic dynamometer (Biodex Medical Systems, Shirley - NY, USA). Each athlete subjected to the protocol underwent three different assessment sets, each one involving a different intervention: Kinesio Taping; the placebo tape; and no intervention. Each set consisted of one series of five concentric and 5 maximum eccentric contractions of the quadriceps at a speed of 60°/s. The interval between the sets was 5 minutes and the subjects received verbal encouragement. The trial was randomized and at the beginning and end of each set, the subjects were asked to position the knee joint at 30°, 60° and 90° angles of flexion without visual aid. The range of motion was measured from 0° extension to 90° of knee flexion.

For statistical analysis, the Maximum Concentric and Eccentric Peak Torques were considered. Were also considered for calculating the values obtained in tests of proprioception conscious for angles of 30°, 60° and 90° pre-and post-battery with two types of bandages and without intervention.

Data normality was verified using the Shapiro-Wilk test and sphericity with Mauchly. Repeated measures ANOVA was used with LSD *post hoc*. Regarding the positioning of the knee joint was applied a two-way ANOVA (time x position).

RESULTS AND DISCUSSION

There was no significant difference between placebo, KT, and without intervention on quadriceps strength during isokinetic exercise as well as the perception of joint positioning. When comparing the concentric torque values of different interventions, no significant differences were observed ($p = 0.296$), as well as to verify if eccentric torque values ($p = 0.955$). When comparing interventions and situations (pre and post batteries) during the position sense of the three angles (30°, 60° and 90°) was not observed any significant difference: 30° ($p = 0.419$), 60° ($p = 0.808$), 90° ($p = 0.204$). However, there were significant differences between the situations in angulation of 30° ($p = 0.038$), regardless of the intervention. The results of this study are in

agreement with those obtained in other studies, such as by Fu and colleagues (2008) that investigated changes in quadriceps and hamstring strength in athletes immediately and after 12 hours of use of elastic bandage. In this study, no significant change in muscle strength assessed. Nevertheless, Vithoulka and colleagues (2010), with similar protocol to the present study, observed a tendency of increase in torque by using of KT in healthy women. Despite the effects of KT about the muscular strength are still unknown, authors suggest the involvement of proprioceptive mechanisms [8]. A relationship between cutaneous afferent stimulation and excitability of motor units has been reported [7]. Although there is need for further information about this mechanism, possibly differences between gender and athletes and non-athletes are responsible for the different results. Increased tactile stimulation occurs with the application of KT with moderate or full tension, increasing the stimulus in mechanoreceptors [4]. It is possible that to use a higher tension on KT, a greater stimulus provoke different results. In the current study there were no significant differences in the perception of the position of the knee in isokinetic dynamometer, corroborating studies that evaluated the effect of KT on proprioception of ankle and concluded that there was no difference in the sense position in healthy subjects. However, several studies indicate a positive influence of bracing on proprioception. Robbins and colleagues (1995) using a rigid tape, showed that influences the sense of positioning the ankle and Morrisey (2000) identified that KT showed a facilitation of ankle proprioceptive stimulation. In our study may not have been differences in position sense due to the protocol used, because identify knee positions seems easy for football athletes. Maybe if there was used a sutil difference between the knee positions, could have been found different results.

CONCLUSIONS

The application of Kinesio Taping on quadriceps of professional football players did not alter significantly the capacity of isokinetic torque and did not influence the position sense of the knee of athletes. The data collected and analyzed in this study do not support the hypothesis that KT can influence the dependent variables. Due to conflicting results from various studies, more research should be done in this direction, using more volunteers, other populations and exploring different techniques of KT.

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