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ORIGINAL ARTICLE

Effects of Kinesiotape® taping on plantar pressure and impact acceleration during walking

Effet du Kinesiotape® sur la pression plantaire et la cinématique de la marche au moment de l'impact

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KEYWORDS
Kinesio Tape®;
Plantar pressure;
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Summary
Objectives. — The aim of this study was to analyse the plantar pressure pattern, contact time, stride rate and impact acceleration in the shank during walking with and without Kinesio Tape (KT®) placed on two muscle groups: peroneus and triceps surae.
Methods. — Among the subjects, 29 (12 men, 17 women) participated in the study. KT® was placed on the triceps surae and peroneus and participants walked at two different speeds (V1: 0.73 m/s; V2: 1.30 m/s) with and without KT®. The pedobarographic system Biofoot IBV® 6.0 was used to analyse plantar pressure (mean peak pressure [kPa]) in 5 foot areas and the kinematic variables of the study (contact time [s]; stride rate [steps/second]). One uni-axial accelerometer (Sportmetrics®) was placed on the shank for the impact loading analysis.
Results. — No significant difference was observed on plantar pressure ($P > 0.05$), and kinematics variables ($P > 0.05$) with and without KT®. However, results revealed a relationship of dependence between speed and plantar pressure and kinematics parameters, especially under the rearfoot and the medial part of the foot ($P < 0.005$).
Conclusion. — The results suggest that application of KT® on peroneus and triceps surae does not have a direct effect on impact accelerations and plantar pressure pattern of healthy individuals during walking.

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MOTS CLÉS
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Résumé
Objectifs. — L'objectif de cette étude était d'analyser la pression plantaire, le temps de contact, le rythme de foulée et l'accélération du tibia au moment de l'impact lors de la marche avec et sans Kinesio Tape (KT®).
Méthodes. — Parmi les sujets, 29 (12 hommes, 17 femmes) ont participé à l'étude. KT® a été appliqué sur le triceps sural et le péronier. Les participants ont marché à deux vitesses (V1 : 0,73 m/s ; V2 : 1,30 m/s), avec et sans KT®. Le système pedobarographic Biofoot IBV® 6.0 a été utilisé pour analyser les pressions plantaires (pression maximale moyenne [kPa]) à cinq endroits sous le pied, et les variables relatives à la cinématique (temps de contact [s] ; rythme de foulée [des étapes/min]). Un accéléromètre uni-axial (Sportmetrics®) a été placé sur le tibia pour l'analyse des impacts.
Résultats. — Aucune différence significative entre les conditions avec et sans Kinesio Tape® n'a été observée au niveau de la pression plantaire ($p > 0,05$) et des variables cinématiques ($p > 0,05$). Cependant, les résultats ont révélé une association entre la vitesse, la pression plantaire et les paramètres cinématiques, en particulier sous l'arrière-pied et la partie médiale du pied ($p < 0,005$).
Conclusions. — Les résultats suggèrent que l'application de Kinesio Tape® sur le péronier et le triceps sural n'a pas un effet direct sur la cinématique de la marche de personnes en parfaite santé.

1. Introduction

Kinesio Tape® (KT) is a novel, thin and more elastic tape compared to the traditional rigid tape, which allows for 120—140% elongation of its original length and therefore leads to less mechanic constraints [1]. The fabric of KT® is air permeable and water resistant, allowing the individual to wear it for several days without interfering with the daily health care habits [2,3]. This type of taping is being widely used in different areas including sports performance and physical rehabilitation as a result of the numerous properties that have been associated with their use. It is believed that KT® positively influences proprioception and the muscular, lymphatic and articular systems through its action on proprioceptors and exteroceptors [4—6]. In this sense, the application of KT® has been useful in sports such as football, basketball, tennis, badminton or baseball as well as in the rehabilitation of muscular injuries and proprioception [7—9]. However, KT® research is limited and the results are inconsistent, what requires further analysis in order to better comprehend how KT® can influence human locomotion [10,11].

Lower extremity and foot function during walking have been analysed from many perspectives [12]. In this sense, through the use of pressurometry techniques [13], plantar pressure has been analysed in different activities such as walking, running, gymnastics, tennis, soccer or nordic walking [14—19].

Taping is a practice commonly used by physiotherapists and podiatrists to treat or prevent lower extremity injuries [12,20,21,31]. However, due to the great amount of related benefits, the use of KT® has increased in recent years compared to the use of other traditional techniques such as the low dye [1,22—25] or the high dye [26,27]. The low dye is a less elastic tape, which restricts the range of motion and inhibits muscle movement of the ankle [22,28]. This type of tape has been previously used to treat lower extremity symptoms related to an altered or excessive pronation [20]. Several studies showed how the use of Low dye in the lower extremities results in pain reduction in patients with fasciitis plantar [25], plantar pressure reduction under the forefoot and plantar pressure increase under the midfoot and rearfoot [22—24,26,29].

Similar to the aforementioned purposes of the low dye, the aim of the high dye taping (which embraces more surface than the low dye) is to offer support to the ankle joint and to counteract the medial forces associated with excessive pronation [27,30]. The high dye elevates the longitudinal arch and therefore can be considered as an anti-pronation strategy both during standing and during dynamic locomotion such as walking and running [30].

In the case of KT®, evidence of its possible effects on lower extremity dynamics and plantar pressure is scarce. As a consequence, the aims of the present study were:

- to analyse the plantar pressure pattern, contact time and the stride rate during walking with and without KT® placed on two muscle groups: peroneus and triceps surae;
- and to examine the effect of KT® placed on peroneus and triceps surae on the impact acceleration registered in the shank.

Two hypotheses were established for the present study: the use of KT® would result in:

- a modification of the individuals' plantar pressure pattern;
- and a reduction of the impact acceleration values registered in the shank.