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EFFECT OF KINESIO TAPING ON PERFORMANCE IN COUNTER-MOVEMENT JUMP

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The purpose of this study was to identify the influence of taping with a flexible tape on jumping performance and its effects on the impulse in a stretch-shortening cycle movement. 23 subjects were divided in control group and intervention group. The subjects participated in two trials of vertical counter-movement jumps. In the trial, the knee extensors of the subjects in the intervention group were taped with an activating taping technique. Reaction forces of the jump were measured with an AMTI-force plate. Results showed no significant differences (ANOVA, $p<0.05$) between the two groups in both trials. Mean jumping height in Trial 1 was 0.38 ± 0.11 m (control) and 0.33 ± 0.05 m (intervention) compared to 0.35 ± 0.10 m (control) and 0.33 ± 0.05 m (intervention) in Trial 2. No improvements in jumping performance could be detected.

KEYWORDS: Kinesio tape, flexible taping, counter-movement jump, stretch-shortening cycle.

INTRODUCTION: In recent years the treatment of muscular and tendon injuries by flexible taping interventions (Kinesio tape) became popular in sports medicine and physiotherapy. An improvement of muscular strength and performance in sports was postulated by the producers of the tapes. There are some studies, which tried to investigate the effects of Kinesio taping on muscular activity (Janwantanakul & Gaogasigam 2005, Alexander et al. 2003), muscular strength (Fu et al. 2008, Slupik et al. 2007), and especially on jumping performance (Hisieh et al. 2007), but the results and conclusions of the effect of Kinesio taping were not uniform. Yet there are discrepancies to the correct taping technique in order to reach the desired effects.
The purpose of this study was to investigate the effect of a taping method without any tension of the tape on jumping performance. By taping on knee extensors (m. vastus lateralis, m. vastus medialis), it is possible to detect a clear effect because of limited intervention on a single joint only.

METHODS: 23 subjects took part in the study. They were randomly divided into control and intervention group. The control group consisted of 6 female and 6 male subjects (age 25 ± 1.9 years, weight 71.3 ± 13.2 kg). 5 female and 6 male subjects (age 25 ± 2.2 years, weight 70.2 ± 14.1 kg) established the intervention group. The subjects performed two trials of a vertical jump. Three-dimensional ground reaction forces were measured by an AMTI force plate (Model OR6-6-2000, AMTI, Watertown/ USA). Every subject was briefly introduced into the test procedure before the measurement started. Counter-movement jumps were performed without a supporting arm-swing (arms close to the breast), starting position was upright standing on the force plate. The first trial included three maximal vertical jumps and delivered the data-baseline. For the second trial a y-shaped flexible tape (skin coloured Physiotape Kinseo Ltd., Kaltenkirchen, Germany) was applied to intervention group on the m. vastus lat. and m. vastus med. There was no tape applied to control group for the second trial. Subjects were taped according to the instruction manuals of a physiotherapist (Physio Training Academy Bühlertal, Germany) by one licensed person. There was a break of 15 minutes between those two trials, where all subjects rested in the same position. The second trial of three maximal vertical jumps followed. Data were recorded with a sampling rate of 1000 Hz and analyzed with the AMTI NetForce software. The statistical comparison of groups and trials was realized by a one-factor ANOVA for repeated measurement (α=0.05). All statistical procedures were carried out using Statistica 6.0 (StatSoft Inc., Tulsa/ USA). The impulses of the jumps were calculated by integrating the force with respect to time. Jumping height ($h_{t_{peak}}$) was calculated by using the following formulas (m mass of the subject, $V_{t_{TO}}$

take-off velocity in vertical direction, g acceleration due to gravity, $h_{t_{TO}}$ height of the centre of

$$\frac{1}{2}mV_{t_{TO}}^2 + mgh_{t_{TO}} = \frac{1}{2}mV_{t_{peak}}^2 + mgh_{t_{peak}}.$$

$$h_{t_{peak}} - h_{t_{TO}} = \frac{V_{t_{TO}}^2}{2g}.$$

gravity during take-off, $V_{t_{peak}}$ vertical velocity at the highest point, $h_{t_{peak}}$ highest point of centre of gravity):
Mean values of the two jumps with highest impulse in the vertical direction were calculated for each subject.

RESULTS: Comparing both groups in each trial, no significant difference could be determined. For the intervention group the mean impulse in horizontal direction (z-direction) was 197.9 ± 67.3 N*s in Trial 1 and 188.4 ± 54.7 N*s in Trail 2. The control group had a vertical impulse of 184.8 ± 46.7 N*s in Trial 1 and 182.9 ± 46.1 N*s in Trial 2.

Table 1

Mean value of the impulse in vertical direction.

Trial	Intervention Group		Control Group		Significance (between groups, p<0.05)
	n	Mean ± SD	n	Mean ± SD	
Trial 1	12	197.9 ± 67.3 N/s	11	184.8 ± 46.7 N/s	n.s.
Trial 2	12	188.4 ± 54.7 N/s	11	182.9 ± 46.1 N/s	n.s.
Significance (in groups, p<0.05)		n.s.		n.s.	

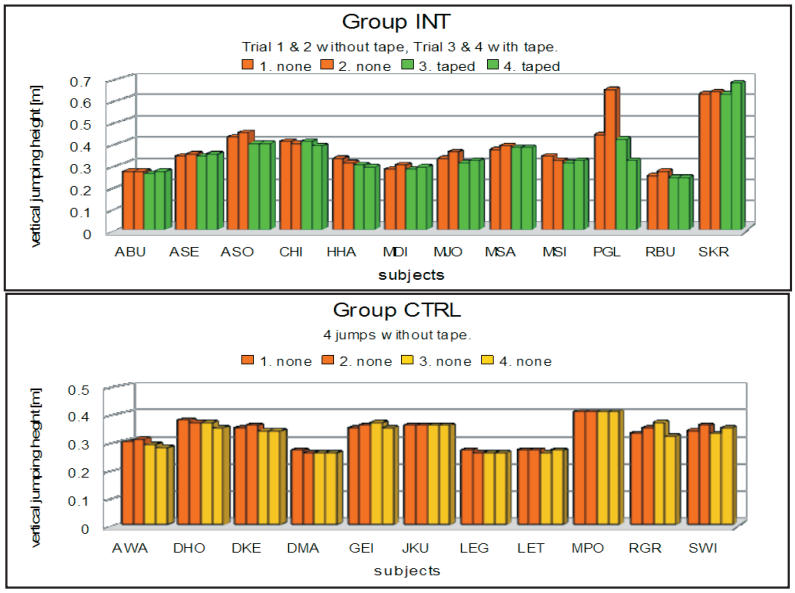

Figure 1: Mean jumping heights of the two best jumps of each trial, illustrated for each single subject. Graphs are divided into intervention group and control group. Jumping heights are represented in metres.

To illustrate the results, the jumping height was calculated using impulse values in vertical direction. The intervention group's mean jumping height was 0.38 ± 0.11 m in Trial 1 and 0.35 ± 0.10 m in Trail 2. The control group's mean jumping height was 0.33 ± 0.05 m in Trial 1 and 0.33 ± 0.05 m in Trial 2.

DISCUSSION: The results of the present study suggest that flexible taping without any tension does not inhibit or enhance jumping performance neither in jumping height nor impulse. Those findings confirm the results of Hsieh et al. (2007). Their measurement included ground reaction force during vertical jumps. However it is not possible to compare the results of this study with Hsieh (2007) because Hsieh (2007) did not provide full details of the taping method. Nevertheless, counter-movement jumps seemed to be reproducible measurements for human performance. There were no significant changes in impulse calculated from measured ground reaction forces in any direction. The changes in muscle activation, as measured in other studies (Janwantanakul & Gaogasigam 2005, Alexander et al. 2003, Slupik 2007) may occur, but do not have such a big impact on the impulse of a functional movement as the counter-movement jump.

CONCLUSION: This study has not shown any improvement in jumping performance due to Kinesio tape on the knee extensors. In further studies all other muscles that are involved in the jumping performance should be taped and examined.

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