World Academy of Science, Engineering and Technology
International Journal of Sport and Health Sciences
Vol:12, No:10, 2018

Comparisons of Drop Jump and Countermovement Jump Performance for Male Basketball Players with and without Low-Dye Taping Application

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Abstract : Excessive foot pronation is a well-known risk factor of knee and foot injuries such as patellofemoral pain, patellar and Achilles tendinopathy, and plantar fasciitis. Low-Dye taping (LDT) application is not uncommon for basketball players to control excessive foot pronation for pain control and injury prevention. The primary potential benefits of using LDT include providing additional supports to medial longitudinal arch and restricting the excessive midfoot and subtalar motion in weight-bearing activities such as running and landing. Meanwhile, restrictions provided by the rigid tape may also potentially limit functional joint movements and sports performance. Coaches and athletes need to weigh the potential benefits and harmful effects before making a decision if applying LDT technique is worthwhile or not. However, the influence of using LDT on basketball-related performance such as explosive and reactive strength is not well understood. Therefore, the purpose of this study was to investigate the change of drop jump (DJ) and countermovement jump (CMJ) performance before and after LDT application for collegiate male basketball players. In this within-subject crossover study, 12 healthy male basketball players (age: 21.7 ± 2.5 years) with at least 3-year regular basketball training experience were recruited. Navicular drop (ND) test was adopted as the screening and only those with excessive pronation (ND ≥ 10mm) were included. Participants with recent lower limb injury history were excluded. Recruited subjects were required to perform both ND, DJ (on a platform of 40cm height) and CMJ (without arms swing) tests in series during taped and non-taped conditions in the counterbalanced order. Reactive strength index (RSI) was calculated by using the flight time divided by the ground contact time measured. For DJ and CMJ tests, the best of three trials was used for analysis. The difference between taped and non-taped conditions for each test was further calculated through standardized effect ± 90% confidence intervals (CI) with clinical magnitude-based inference (MBI). Paired samples T-test showed significant decrease in ND (-4.68 ± 1.44mm; 95% CI: -3.77, -5.60; $p < 0.05$) while MBI demonstrated most likely beneficial and large effect (standardize effect: -1.59 ± 0.27) in LDT condition. For DJ test, significant increase in both flight time (25.25 ± 29.96ms; 95% CI: 6.22, 44.28; $p < 0.05$) and RSI (0.22 ± 0.22; 95% CI: 0.08, 0.36; $p < 0.05$) were observed. In taped condition, MBI showed very likely beneficial and moderate effect (standardized effect: 0.77 ± 0.49) in flight time, possibly beneficial and small effect (standardized effect: -0.26 ± 0.29) in ground contact time and very likely beneficial and moderate effect (standardized effect: 0.77 ± 0.42) in RSI. No significant difference in CMJ was observed (95% CI: -2.73, 2.08; $p > 0.05$). For basketball players with pes planus, applying LDT could substantially support the foot by elevating the navicular height and potentially provide acute beneficial effects in reactive strength performance. Meanwhile, no significant harmful effect on CMJ was observed. Basketball players may consider applying LDT before the game or training to enhance the reactive strength performance. However since the observed effects in this study could not generalize to other players without excessive foot pronation, further studies on players with normal foot arch or navicular height are recommended.

Keywords : flight time, pes planus, pronated foot, reactive strength index
Conference Title : ICKES 2018 : International Conference on Kinesiology and Exercise Sciences
Conference Location : Osaka, Japan
Conference Dates : October 11-12, 2018