UNIVERSIDADE FEDERAL DE CIÊNCIAS DA SAÚDE DE PORTO ALEGRE

CURSO DE FISIOTERAPIA

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O Single Leg Bridge Test avalia a capacidade de resistência dos músculos flexores do joelho?

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Trabalho de Conclusão de Curso de Fisioterapia, da Universidade Federal de Ciências da Saúde de Porto Alegre, como requisito parcial para obtenção do título de Bacharel em Fisioterapia

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Dedico este trabalho aos meus amados pais, sem os quais a conclusão desta etapa da minha vida não seria possível. Embora possam não encontrar sentido nos textos aqui apresentados, vocês compreendem como ninguém o verdadeiro significado por trás desta conquista. Agradeço por todo o apoio, amor e dedicação que tornaram este momento possível. Vocês são a base sólida que sustentou cada passo desta jornada.

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RESUMO

Objetivo: O principal objetivo foi investigar a correlação entre a pontuação no Teste de Ponte em Uma Perna (SLBT) e a capacidade de resistência dos músculos flexores do joelho, conforme mensurado. Secundariamente, nosso objetivo foi investigar a correlação do índice de simetria dos membros (LSI) encontrado no SLBT e no teste de resistência dos flexores do joelho.

Delineamento: Estudo transversal.

Local: Laboratório universitário.

Participantes: Quarenta homens saudáveis e fisicamente ativos.

Principais desfechos: Correlação entre as pontuações no SLBT e a capacidade de resistência dos flexores do joelho, avaliada por meio de um protocolo isocinético composto por 30 contrações máximas concêntricas dos flexores do joelho a 120°/s.

Resultados: A pontuação no SLBT (27±7 repetições) não apresentou correlação significativa com a capacidade de resistência dos flexores do joelho fornecida pelo pico de torque isocinético (52±9%) ou trabalho (57±9%). Da mesma forma, o LSI encontrado no SLBT (99±12%) não apresentou correlação significativa com os valores de LSI encontrados no teste de resistência dos flexores do joelho (107±26% e 102±18%).

Conclusão: O SLBT não avalia a capacidade de resistência dos músculos flexores do joelho.

Palavras-chave: Isquiotibiais, fadiga, força, validade.

ABSTRACT

Objective: The primary aim was to investigate the correlation between the Single Leg Bridge Test (SLBT) score and the endurance capacity of the knee flexor muscles as measured. Secondarily, we aimed at investigating the correlation of limb symmetry index (LSI) found in the SLBT and the knee flexor endurance test.

Design: Cross-sectional study.

Setting: University laboratory.

Participants: Forty healthy and physically active men.

Main outcome measures: Correlation between SLBT scores and knee flexor endurance capacity assessed through an isokinetic protocol comprising 30 maximal concentric knee flexion contractions at 120o/s.

Results: The SLBT score (27±7 reps) presented no significant correlation with knee flexor endurance capacity provided by isokinetic peak torque (52±9%) or work (57±9%). Similarly, LSI found in the SLBT (99±12%) was not significantly correlated with LSI values found in the knee flexor endurance test (107±26% and 102±18%).

Conclusions: The SLBT does not assess the endurance capacity of knee flexor muscles.

Keywords: Hamstring, fatigue, strength, validity.

LISTA DE FIGURAS

LISTA DE TABELAS

LISTA DE ABREVIATURAS E SIGLAS

HSI - Hamstring strain injury;

HHD - Handheld dynamometer;

SLBT - Single Leg Bridge Test;

LSI - Limb symmetry index;

SD - Standard deviation;

CI - Confidence intervals.

SUMÁRIO

REFERENCES

1. Baroni, BM, Leal Junior, EC, Geremia, JM, Diefenthaeler, F, and Vaz, MA. Effect of light-emitting diodes therapy (LEDT) on knee extensor muscle fatigue. *Photomed Laser Surg* 28: 653-658, 2010.
2. Baroni, BM and Oliveira Pena Costa, L. Evidence-Based Prevention of Sports Injuries: Is the Sports Medicine Community on the Right Track? *J Orthop Sports Phys Ther* 51: 91-93, 2021.
3. Bigland-Ritchie, B, Rice, CL, Garland, SJ, and Walsh, ML. Task-dependent factors in fatigue of human voluntary contractions. *Adv Exp Med Biol* 384: 361-380, 1995.
4. Buckthorpe, M, Wright, S, Bruce-Low, S, et al. Recommendations for hamstring injury prevention in elite football: translating research into practice. *Br J Sports Med* 53: 449-456, 2019.
5. Cohen, J. *Statistical power analysis for the behavioral sciences.* Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers, 1988.
6. Diemer, WM, Winters, M, Tol, JL, Pas, H, and Moen, MH. Incidence of Acute Hamstring Injuries in Soccer: A Systematic Review of 13 Studies Involving More Than 3800 Athletes With 2 Million Sport Exposure Hours. *J Orthop Sports Phys Ther* 51: 27-36, 2021.
7. Dunlop, G, Ardern, CL, Andersen, TE, et al. Return-to-Play Practices Following Hamstring Injury: A Worldwide Survey of 131 Premier League Football Teams. *Sports Med* 50: 829-840, 2020.
8. Edouard, P, Mendiguchia, J, Lahti, J, et al. Sprint Acceleration Mechanics in Fatigue Conditions: Compensatory Role of Gluteal Muscles in Horizontal Force Production and Potential Protection of Hamstring Muscles. *Front Physiol* 9: 1706, 2018.
9. Ekstrand, J, Bengtsson, H, Waldén, M, et al. Hamstring injury rates have increased during recent seasons and now constitute 24% of all injuries in men's professional football: the UEFA Elite Club Injury Study from 2001/02 to 2021/22. *Br J Sports Med* 57: 292-298, 2022.
10. Ekstrand, J, Ueblacker, P, Van Zoest, W, et al. Risk factors for hamstring muscle injury in male elite football: medical expert experience and conclusions from 15 European Champions League clubs. *BMJ Open Sport Exerc Med* 9: e001461, 2023.
11. Ekstrom, RA, Donatelli, RA, and Carp, KC. Electromyographic analysis of core trunk, hip, and thigh muscles during 9 rehabilitation exercises. *J Orthop Sports Phys Ther* 37: 754-762, 2007.
12. Eliakim, E, Morgulev, E, Lidor, R, and Meckel, Y. Estimation of injury costs: financial damage of English Premier League teams' underachievement due to injuries. *BMJ Open Sport Exerc Med* 6: e000675, 2020.
13. Freckleton, G, Cook, J, and Pizzari, T. The predictive validity of a single leg bridge test for hamstring injuries in Australian Rules Football Players. *Br J Sports Med* 48: 713-717, 2014.
14. Gasparin, GB, Ribeiro-Alvares, JBA, and Baroni, BM. Single Leg Bridge Test is Not a Valid Clinical Tool to Assess Maximum Hamstring Strength. *Int J Sports Phys Ther* 17: 613-621, 2022.
15. Green, B, Bourne, MN, van Dyk, N, and Pizzari, T. Recalibrating the risk of hamstring strain injury (HSI): A 2020 systematic review and meta-analysis of risk factors for index and recurrent hamstring strain injury in sport. *Br J Sports Med* 54: 1081-1088, 2020.
16. Hallett, P. A reliability study examining the inter- and intra-observer reliability of the muscle capacity tests included in the ECB musculoskeletal screening protocol [Masters]. *University of Nottingham*, 2010.

17. Hirose, N and Tsuruike, M. Differences in the Electromyographic Activity of the Hamstring, Gluteus Maximus, and Erector Spinae Muscles in a Variety of Kinetic Changes. *J Strength Cond Res* 32: 3357-3363, 2018.
18. Ho, IMK, Ng, LPC, Lee, KOL, and Luk, TCJ. Effects of knee flexion angles in supine bridge exercise on trunk and pelvic muscle activity. *Res Sports Med* 28: 484-497, 2020.
19. Jacobsen, P, Witvrouw, E, Muxart, P, Tol, JL, and Whiteley, R. A combination of initial and follow-up physiotherapist examination predicts physician-determined time to return to play after hamstring injury, with no added value of MRI. *British Journal of Sports Medicine* 50: 431-439, 2016.
20. Macdonald, B, O'Neill, J, Pollock, N, and Van Hooren, B. Single-Leg Roman Chair Hold Is More Effective Than the Nordic Hamstring Curl in Improving Hamstring Strength-Endurance in Gaelic Footballers With Previous Hamstring Injury. *J Strength Cond Res* 33: 3302-3308, 2019.
21. Mahnič, N, Rauter, S, Hadžić, V, and Šimenko, J. The Single Leg Bridge Test (SLBT) as a field test to measure hamstring strength in young footballers. *Science & Sports* 36: 417.e411-417.e417, 2021.
22. Martin, RL, Cibulka, MT, Bolgla, LA, et al. Hamstring Strain Injury in Athletes. *Journal of Orthopaedic & Sports Physical Therapy* 52: CPG1-CPG44, 2022.
23. McCurdy, K, Walker, J, and Yuen, D. Gluteus Maximus and Hamstring Activation During Selected Weight-Bearing Resistance Exercises. *J Strength Cond Res* 32: 594-601, 2018.
24. Mendiguchia, J, Martinez-Ruiz, E, Edouard, P, et al. A Multifactorial, Criteria-based Progressive Algorithm for Hamstring Injury Treatment. *Med Sci Sports Exerc* 49: 1482-1492, 2017.
25. Meurer, MC, Silva, MF, and Baroni, BM. Strategies for injury prevention in Brazilian football: Perceptions of physiotherapists and practices of premier league teams. *Phys Ther Sport* 28: 1-8, 2017.
26. Moore, D, Semciw, AI, and Pizzari, T. A Systematic Review And Meta-Analysis Of Common Therapeutic Exercises That Generate Highest Muscle Activity In The Gluteus Medius And Gluteus Minimus Segments. *Int J Sports Phys Ther* 15: 856-881, 2020.
27. Morin, JB, Gimenez, P, Edouard, P, et al. Sprint Acceleration Mechanics: The Major Role of Hamstrings in Horizontal Force Production. *Front Physiol* 6: 404, 2015.
28. Neto, WK, Soares, EG, Vieira, TL, et al. Gluteus Maximus Activation during Common Strength and Hypertrophy Exercises: A Systematic Review. *J Sports Sci Med* 19: 195-203, 2020.
29. Opar, DA, Williams, MD, and Shield, AJ. Hamstring strain injuries: factors that lead to injury and re-injury. *Sports Med* 42: 209-226, 2012.
30. Rey, E, Paz-Domínguez, Á, Porcel-Almendral, D, et al. Effects of a 10-Week Nordic Hamstring Exercise and Russian Belt Training on Posterior Lower-Limb Muscle Strength in Elite Junior Soccer Players. *J Strength Cond Res* 31: 1198-1205, 2017.
31. Robaina, BdQ, Medeiros, DM, Roberti, LdS, Franke, RdA, and Baroni, BM. The Single Leg Bridge Test does not replace handheld dynamometer hamstring tests in a clinical setting. *Physical Therapy in Sport* 63: 126-131, 2023.
32. Valente, HG, Oliveira, RR, and Baroni, BM. How are hamstring strain injuries managed in elite men's football clubs? A survey with 62 Brazilian physical therapists. *Phys Ther Sport* 61: 73-81, 2023.
33. van den Tillaar, R, Solheim, JAB, and Bencke, J. Comparison of hamstring muscle activation during high-speed running and various hamstring strengthening exercises. *Int J Sports Phys Ther* 12: 718-727, 2017.
34. Youdas, JW, Hartman, JP, Murphy, BA, et al. Electromyographic analysis of gluteus maximus and hamstring activity during the supine resisted hip extension exercise versus supine unilateral bridge to neutral. *Physiother Theory Pract* 33: 124-130, 2017.