

SPORDA DENGENİN ÖNEMİ

Gökmen KILINÇARSLAN¹

► GİRİŞ

Sporcuların temel amacı; fiziksel uygunluklarını koruyarak ve geliştirerek sportif başarılarını devam ettirmektir (Aslan ve diğerleri, 2013). Antrenman planları içerisinde seçilen egzersizler hakkında yapılan bilimsel çalışmalar, hangi egzersiz türlerinin ne biçimde uygulanacağı hakkında antrenörleri ve sporcuları bilgilendirmektedir (ACSM, 2013). Son yıllarda denge egzersizlerinin antrenman programlarında ve atletik performans arttırmadaki rolüne dair önemi giderek artmaktadır.

Denge, bütün spor branşları ve günlük hayatta çok önemlidir. Sedanter ve sporcularda nöromüsküler sistem tarafından dinlenme veya hareket anında yer çekimi merkezinin değişikliklerine karşı hızlı bir uyum gerçekleşir (Akyüz ve diğerleri, 2016). Denge, hareket ve dinlenme esnasında yerçekimine karşı gösterilen vücut kompozisyonuna uyum olarak tanımlanabilmektedir (Levey, 2006).

Denge, destek alanı üzerinde vücudun duruşunu muhafaza etme yeteneği olarak tanımlanabilir (Spirduso, 1995). Denge, iyi bir performans için temel oluşturmaktadır. İnsanın denge sağlamadaki yeteneği, diğer motor sistemlerin gelişmesinde belirleyici bir faktördür (Arslanoğlu ve diğerleri, 2010). Dengenin kontrolü, duyuşal girdilerin bütünleşmesi yanında esnek hareket şekillerinin planlanması ve uygulanmasını içeren kompleks bir motor yetenektir (Ferdjallah ve diğerleri, 2002). Denge ve denge

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► Kaynaklar

- Aggarwal, A., Zutshi, K., Munjal, J., Kumar, S., & Sharma, V. (2010). Comparing stabilization training with balance training in recreationally active individuals. *International Journal of Therapy and Rehabilitation*, 17(5), 244-253.
- Akman, N. ve Karataş, M. (2003), *Temel ve Uygulanan Kinesyoloji*, Haberal Eğitim Vakfı, Ankara, s. 247-288.
- Aktümsek, A. (2012), *Anatomi ve Fizyoloji, İnsan Biyolojisi*, Nobel Yayın Dağıtım.
- Akyüz, Ö., Çoban, C., Dilber, A. O., Ergün, Z., Taş, M., Işık, Ö., & Akyüz, M. (2016). İtirme Engellilerde Statik Denge Düzeylerinin Belirlenmesi. *Spor Bilimleri Dergisi*, 1(2), 110-116.
- Alexander KM, La Pier TL. Differences in static balance and weight distribution between normal subjects and subjects with chronic unilateral low back pain. *Journal of Orthopedic Sports Physical Therminology*. 1998;28:378–383.
- Altay, F. (2001), “*Ritmik Cimnastikte İki Farklı Hızda Yapılan Chainé Rotasyon Sonrasında Yan Denge Hareketinin Biyomekanik Analizi*”, Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü, Doktora Tezi, Ankara.
- American College of Sports Medicine. (2013). *ACSM’s Resources for the Personal Trainer*. Lippincott Williams & Wilkins.
- Arslanoğlu, E., Aydoğmuş, M., Arslanoğlu, C., & Şenel, Ö. (2010). Badmintoncularda Reaksiyon Zamanı ve Denge İlişkisi. *Beden Eğitimi ve Spor Bilimleri Dergisi*, 4(2).
- Aslan, C. S., Karakollukçu, M., Gül, M., & Fişne, M. (2013). 13 15 Yaş Güreşçilerinin Fiziksel ve Motorik özelliklerinin Bir Yıllık Değişimlerinin Karşılaştırılması. *Spor Hekimliği Dergisi*, 48, 1-7
- Aslan, U. B., & Livanelioğlu, A. (2003). Hatha yoganın ve kalistenik egzersizlerin statik sağle üzerindeki etkileri. *Spor Bilimleri Dergisi*, 14(2), 83-91.
- Assaiante, C., & Amblard, B. (1995). An ontogenetic model for the sensorimotor organization of balance control in humans. *Human Movement Science*, 14(1), 13-43.
- Aydın, T., Yıldız, Y., Yıldız, C., Ateşalp, S. & Kalyon, A. (2002), Proprioception of the Ankle: A comparison Between Female Teenaged Gymnasts and Controls. *Foot Ankle International*. Febuauy; 23(2):Abst.123-9.
- Behm, D., & Colado, J. C. (2012). The effectiveness of resistance training using unstable surfaces and devices for rehabilitation. *International journal of sports physical therapy*, 7(2), 226.
- Benli, K. (2003), “*Propriosepsiyonun Anatomi Fizyolojisi*”, IX. Ulusal Spor Hekimliği Kongresi, Nevşehir, s. 80-81.
- Bozan, Ö. (2007). Postmenopozal Osteoporozda Egzersiz Eğitiminin Etkisi. *Doktora Tezi, Dokuz Eylül Üniversitesi Sağlık Bilimleri Enstitüsü, İzmir*, 105s.
- Brauer, S. G., Neros, C., & Woollacott, M. (2008). Balance control in the elderly:

- do Masters athletes show more efficient balance responses than healthy older adults?. *Aging clinical and experimental research*, 20(5), 406-411.
- Bressel, E., Yonker, J. C., Kras, J., & Heath, E. M. (2007). Comparison of static and dynamic balance in female collegiate soccer, basketball, and gymnastics athletes. *Journal of athletic training*, 42(1), 42.
- Bringoux, L., Marin, L., Nougier, V., Barraud, P. A., Raphel, C. (2000). Effects of Gymnastics Expertise on The Perception of Body Orientation in The Pitch Dimension. *Journal of Vestibular Research*, 10(6), 251-258.
- Brookbush, B. (2011). *Fitness or Fiction, the truth about diet and exercise*. Los Angeles: Brent Brookbush, 74-88.
- Bruhn, S., Kullmann, N., & Gollhofer, A. (2004). The effects of a sensorimotor training and a strength training on postural stabilisation, maximum isometric contraction and jump performance. *International journal of sports medicine*, 25(01), 56-60.
- Chaudhari A., & M, Andriacchi T.,P (2006). The Mechanical Consequences of Dynamic Frontal Plane Limb Aligment for Non-Contact Acl İnjury. *Journal of Biomech*, 39(2): 330-338.
- Cosio-Lima, L. M., Reynolds, K. L., Winter, C., Paolone, V., & Jones, M. T. (2003). Effects of physioball and conventional floor exercises on early phase adaptations in back and abdominal core stability and balance in women. *The Journal of Strength & Conditioning Research*, 17(4), 721-725.
- Cote, K. P., Brunet, M. E., II, B. M. G., & Shultz, S. J. (2005). Effects of pronated and supinated foot postures on static and dynamic postural stability. *Journal of athletic training*, 40(1), 41.
- Deoreo, K. D. & Wade, M. G. (1971). Dynamic and static balancing ability of preschool children. *Journal of Motor Behaviour*. 3, 326-35.
- Emery, C. A., Cassidy, J. D., Klassen, T. P., Rosychuk, R. J., & Rowe, B. H. (2005). Development of a clinical static and dynamic standing balance measurement tool appropriate for use in adolescents. *Physical therapy*, 85(6), 502-514.
- Emery, C. A., Cassidy, J. D., Klassen, T. P., Rosychuk, R. J., & Rowe, B. H. (2005). Effectiveness of a home-based balance-training program in reducing sports-related injuries among healthy adolescents: a cluster randomized controlled trial. *Canadian Medical Association Journal*, 172(6), 749-754.
- Erkmen, N. (2006), *Sporcuların Denge Performanslarının Karşılaştırılması*, Gazi Üniversitesi Sağlık Bilimleri Enstitüsü Beden Eğitimi ve Spor Anabilim Dalı, Doktora Tezi.
- Erkmen, N., Suveren, S., Göktepe, A.S., & Yazıcıoğlu, K.(2007), Farklı Branşlardaki Sporcuların Denge Performanslarının Karşılaştırılması, *Sportmetre BedenEğitimi ve Spor Bilimleri Dergisi*, V(3): s.115-122
- Ferdjallah, M., Harris, G.F., Smith, P., Wertsch, J.J. (2002). "Analysis Of Postural Control Synergies During Quiet Standing in Healthy Children and Children With Cerebral Palsy", *Clinical Biomechanics*, 17, 203-210.
- Franco, A. H. (1987). Pes cavus and pes planus: analyses and treatment. *Physi-*

- cal Therapy*, 67(5), 688-694.
- Gibson, E. J. (1987). Introductory essay: What does infant perception tell us about theories of perception?. *Journal of Experimental Psychology: Human Perception and Performance*, 13(4), 515.
- Gioftsidou, A., Malliou, P., Pafis, G., Beneka, A., Godolias, G., & Maganaris, C. N. (2006). The effects of soccer training and timing of balance training on balance ability. *European journal of applied physiology*, 96(6), 659-664.
- Gökmen, B. (2013). *Denge geliştirici özel antrenman uygulamalarının 11 yaş erkek öğrencilerin statik ve dinamik denge performanslarına etkisi*. Yüksek Lisans Tezi, Ondokuz Mayıs Üniversitesi Sağlık Bilimleri Enstitüsü Beden Eğitimi ve Spor Anabilim Dalı, Samsun.
- Graham G., H., Hale S., A. & Parker M. (2001) *Childrenmoving A Reflective Approach to Teaching Physical Education*. California: Mayfield Publishing Company.
- Granacher, U., Wick, C., Rueck, N., Esposito, C., Roth, R., & Zahner, L. (2011). Promoting balance and strength in the middle-aged workforce. *International journal of sports medicine*, 32(01), 35-44.
- Guskiewicz, K. M., & Perrin, D. H. (1996). Research and clinical applications of assessing balance. *Journal of Sport Rehabilitation*, 5(1), 45-63.
- Guyton, A. C., & Hall, J.E. (2000). *Textbook of medical physiology*. Elsevier Inc, 1600, 1910-2899.
- Guyton, A. C. (1986). *Textbook of Medical Physiology*. WB Saunders, Philadelphia, 298-299.
- Günay, M. ve Cicioglu, İ. (2001), *Spor Fizyolojisi*, Gazi Kitap Evi, Ankara, s.103-105.
- Gündoğdu, C., Aygün, Y., İlkım, M., & Tüfekçi, Ş. (2018). Explaining the Impact of Disabled Children'Engagement with Physical Activity on Their Parents' Smartphone Addiction Levels: A Sequential Explanatory Mixed Methods Research. *Journal of Education and Training Studies*, 6(2), 44-53.
- Güvendik, G.(2007), *Adölesan İdiopatik Skolyozlu ve Sağlıklı Çocuklarda Denge Postür Parametrelerinin Karşılaştırılması Olarak İncelenmesi*. Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü, Fizik Tedavi ve Rehabilitasyon Programı, Uzmanlık Tezi, Ankara, s.17-18.
- Hatipoğlu A, 2005. *Normal ve işitme engelli çocuklarda denge alıştırmalarının denge becerilerine etkisinin incelenmesi*. Marmara Üniversitesi Eğitim Bilimleri Enstitüsü, Beden Eğitimi ve Spor Anabilim Dalı, Spor Eğitimi Bilim Dalı, İstanbul, Yüksek Lisans Tezi, 2-119.
- Haynes, W. (2004). Core stability and the unstable platform device. *Journal of bodywork and movement therapies*, 8(2), 88-103.
- Haywood, K. M., & Getchell, N. (2001). *Learning activities for life span motor development*. Human Kinetics Publishers.
- Haywood, K., Robertson, M., & Getchell, N. (2012). *Advanced analysis of motor development*. Human Kinetics.
- Hertel, J., Gay, M. R., & Denegar, C. R. (2002). Differences in postural control

- during single-leg stance among healthy individuals with different foot types. *Journal of athletic training*, 37(2), 129.
- Horak, F. B. (2006). Postural orientation and equilibrium: What do we need to know about neural control of balance to prevent falls? *in Age and Ageing* 35.
- Hrysomallis, C. (2007). Relationship between balance ability, training and sports injury risk. *Sports Medicine*. 37 (6): 547-56.
- Hrysomallis, C. (2011). Balance ability and athletic performance. *Sports medicine*, 41(3), 221-232.
- Johnson, E. G., Larsen, A., Ozawa, H., Wilson, C. A., & Kennedy, K. L. (2007). The effects of Pilates-based exercise on dynamic balance in healthy adults. *Journal of bodywork and movement therapies*, 11(3), 238-242.
- Kapucu, Y.B., & Güngör, A. (2012). Uzayda Denge, *Kulak Burun Boğaz ve Baş Boyun Cerrahisi Dergisi*, 11 (4).
- Kean, C. O., Behm, D. G., & Young, W. B. (2006). Fixed foot balance training increases rectus femoris activation during landing and jump height in recreationally active women. *Journal of sports science & medicine*, 5(1), 138.
- Kejonen, P., & Kauranen, K. (2002). Reliability and validity of standing balance measurements with a motion analysis system. *Physiotherapy*, 88(1), 25-32.
- Kibele, A., & Behm, D. G. (2009). Seven weeks of instability and traditional resistance training effects on strength, balance and functional performance. *The Journal of Strength & Conditioning Research*, 23(9), 2443-2450.
- Kioumourtzoglou, E., Derri, V., Mertzanidou, O., & Tzetzis, G. (1997). Experience with perceptual and motor skills in rhythmic gymnastics. *Perceptual and motor skills*, 84(3), 1363-1372.
- Kirchner, G. (2001). *Physical Education For Elementary School Children*. Brown Publishers Iowa, USA.
- Kriese, C. (1997). *Coaching tennis*. Masters Press.
- Kuo, A. D., & Zajac, F. E. (1993). Human standing posture: multi-joint movement strategies based on biomechanical constraints. *In Progress in brain research* (Vol. 97, pp. 349-358). Elsevier.
- Lazar, R. B., & Lazar, R. B. (1998). *Principles of neurologic rehabilitation* (Vol. 29). McGraw-Hill, Health Professions Division.
- Leavey, V. (2006). *The Comparative Effects of a Six-Week Balance Training Program, Gluteus Medius Strength Training Program, and Combined Balance Training/Gluteus Medius Strength Training Program on Dynamic Postural Control* [Tesis para optar al grado de Master of Science in Athletic Training]. USA: Universidad West Virginia.
- Lee, H. M., Cheng, C. K., & Liao, J. J. (2009). Correlation between proprioception, muscle strength, knee laxity, and dynamic standing balance in patients with chronic anterior cruciate ligament deficiency. *The Knee*, 16(5), 387-391.
- Lelard, T., & Ahmaidi, S. (2015). Effects of physical training on age-related ba-

- lance and postural control. *Neurophysiologie Clinique/Clinical Neurophysiology*, 45(4-5), 357-369.
- Lephart, S. M., & Henry, T. J. (1996). The physiological basis for open and closed kinetic chain rehabilitation for the upper extremity. *Journal of Sport Rehabilitation*, 5(1), 71-87.
- Li, F., Harmer, P., Fisher, K. J., & Mcauley, E. (2004). Tai Chi: improving functional balance and predicting subsequent falls in older persons. *Medicine & science in sports & exercise*, 36(12), 2046-2052.
- Mirovsky, Y., Blankstein, A., & Shlamkovitch, N. (2006). Postural control in patients with severe idiopathic scoliosis: a prospective study. *Journal of Pediatric Orthopaedics B*, 15(3), 168-171.
- Morioka, S., & Yagi, F. (2004). Influence of perceptual learning on standing posture balance: repeated training for hardness discrimination of foot sole. *Gait & posture*, 20(1), 36-40.
- Muammar, R. (2008). *Düzenli egzersiz yapan kişilerde ayak tabanı deri rezistansının proprioseptif duyu ve denge üzerine etkilerinin incelenmesi*. Doktora Tezi, Marmara Üniversitesi Sağlık Bilimleri Enstitüsü, İstanbul.
- Muehlbauer, T., Roth, R., Mueller, S., & Granacher, U. (2011). Intra and inter-session reliability of balance measures during one-leg standing in young adults. *The Journal of Strength & Conditioning Research*, 25(8), 2228-2234.
- Myer, G. D., Ford, K. R., Brent, J. L., & Hewett, T. E. (2006). The effects of plyometric vs. dynamic stabilization and balance training on power, balance, and landing force in female athletes. *Journal of strength and conditioning research*, 20(2), 345.
- Nagy, E., Feher-Kiss, A., Barnai, M., Domján-Preszner, A., Angyan, L., & Horvath, G. (2007). Postural control in elderly subjects participating in balance training. *European journal of applied physiology*, 100(1), 97-104.
- Nashner, L. M., Black, F. O., & Wall, C. (1982). Adaptation to altered support and visual conditions during stance: patients with vestibular deficits. *Journal of Neuroscience*, 2(5), 536-544.
- Nashner, L.M. (1997). *Practical biomechanics and physiology of balance*. In: Jacobson GP, Newman CW, Kartush JM, editors. *Handbook of balance function testing*. San Diego (CA): Singular Publishing Group, 261-79.
- Nawoczenski, D. A., & Ludewig, P. M. (1999). Electromyographic effects of foot orthotics on selected lower extremity muscles during running. *Archives of Physical Medicine and Rehabilitation*, 80(5), 540-544.
- Neumann, D. A. (2002). *Kinesiology of the musculoskeletal system: Foundations for physical rehabilitation*. St. Louis, MO: Mosby.
- Ogaya, S., Ikezoe, T., Soda, N., & Ichihashi, N. (2011). Effects of balance training using wobble boards in the elderly. *The Journal of Strength & Conditioning Research*, 25(9), 2616-2622.
- Okubo, J., Watanabe, I., Takeya, T., & Baron, J. B. (1979). Influence of foot position and visual field condition in the examination for equilibrium fun-

- ction and sway of the center of gravity in normal persons. *Agressologie: revue internationale de physio-biologie et de pharmacologie appliquees aux effets de l'agression*, 20(2), 127.
- Okudur, A., & Sanioglu, A. (2012). 12 Yaş Tenisçilerde Denge ile Çeviklik İlişkisinin İncelenmesi. *Selçuk Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi*, 14(2), 165-170.
- Oliver, G. D., & Di Brezzo, R. (2009). Functional balance training in collegiate women athletes. *Journal of Strength and Conditioning Research / National Strength & Conditioning Association*, 23(7), 2124–2129.
- Özdemir, M., Kaldırım M., İlkım M., Dinçer N., Mızrak O. (2014). 8 Hafta Süren Fiziksel Egzersiz 11-14 Yaş Aralığındaki Down Sendromlu Özel Öğretim Öğrencilerinin Reaksiyon Zamanları Üzerine Etkisi, *Atatürk Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi*, C.16,(4), 9-16
- Peker, Ö. (2000). *Fonksiyonel Değerlendirme*, Beyazova, M., Gökçe-Kutsal, Y. *Fiziksel Tıp ve Rehabilitasyon*, Cilt 1, Güneş Kitabevi 2000: 642-656
- Paillard, T., Noe, F., Riviere, T., Marion, V., Montoya, R., Dupui, P. (2006). Postural performance a strategy in the unipedal stance of soccer players at different levels of competition. *Journal of Athletic Training*, 41(2):172-181.
- Perrin, P., Deviterne, D., Hugel, F., & Perrot, C. (2002). Judo, better than dance, develops sensorimotor adaptabilities involved in balance control. *Gait & posture*, 15(2), 187-194.
- Ribeiro, F., Santos, F., Gonçalves, P., & Oliveira, J. (2008). Effects of volleyball match-induced fatigue on knee joint position sense. *European Journal of Sport Science*, 8(6), 397-402.
- Ricotti, L. (2011). Static and dynamic balance in young athletes. *Journal of Human Sport and Exercise*, 6(4), 616-628.
- Riemann, B. L., Myers, J. B., & Lephart, S. M. (2002). Sensorimotor system measurement techniques. *Journal of athletic training*, 37(1), 85.
- Ruiz, R., & Richardson, M.T. (2005), Functional Balance Training Using A Domed Device. *Strength and Conditioning Journal*, 27(1),s. 50-55.
- Samson, K. M., Sandrey, M. A., & Hetrick, A. (2007). A core stabilization training program for tennis athletes. *Athletic Therapy Today*, 12(3), 41-46.
- San-Bayhan, P., & Artan, İ. (2004), *Çocuk Gelişimi ve Eğitimi*, İstanbul, Asır Matbaası.
- Sato, K., & Mokha, M. (2009). Does core strength training influence running kinetics, lower-extremity stability, and 5000-M performance in runners?. *The Journal of Strength & Conditioning Research*, 23(1), 133-140.
- Schilling, B. K., Falvo, M. J., Karlage, R. E., Weiss, L. W., Lohnes, C. A., & Chiu, L. Z. (2009). Effects of unstable surface training on measures of balance in older adults. *The Journal of Strength & Conditioning Research*, 23(4), 1211-1216.
- Scibek, J. S. (1999). *The effect of core stabilization training on functional performance in swimming* (Doctoral dissertation, University of North Carolina at Chapel Hill).

- Sekendiz, B., Cug, M., & Korkusuz, F. (2010). Effects of Swiss-ball core strength training on strength, endurance, flexibility, and balance in sedentary women. *The Journal of Strength & Conditioning Research*, 24(11), 3032-3040.
- Shumway-Cook, A., & Woollacott, M. H. (2001). *Theory and Practical Applications*.
- Simoneau, G. G., Leibowitz, H. W., Ulbrecht, J. S., Tyrrell, R. A., & Cavanagh, P. R. (1992). The effects of visual factors and head orientation on postural steadiness in women 55 to 70 years of age. *Journal of gerontology*, 47(5), 151-158.
- Singer, R., N. (1980), *Motor Learning and Human Performance*. Florida States University, s.202-204.
- Spennewyn, K. C. (2008). Strength outcomes in fixed versus free-form resistance equipment. *The Journal of Strength & Conditioning Research*, 22(1), 75-81.
- Spiridus, W.W. (1995). *Balance posture and locomotion In: Physical Dimensions of aging*. Human Kinetics Champaign, Illinois, 152-185.
- Stanton, R., Reaburn, P. R., & Humphries, B. (2004). The effect of short-term Swiss ball training on core stability and running economy. *The Journal of Strength & Conditioning Research*, 18(3), 522-528.
- Suveren Erdoğan, C., Er, F., İpekoğlu, G., Çolakoğlu, T., Zorba, E., & Çolakoğlu, F. F. (2017). Farklı denge egzersizlerinin voleybolcular da statik ve dinamik denge performansı üzerine etkileri. *Spor ve Performans Araştırmaları Dergisi*, 8(1), 11-18.
- Taube, W., Kullmann, N., Leukel, C., Kurz, O., Amtage, F., & Gollhofer, A. (2007). Differential reflex adaptations following sensorimotor and strength training in young elite athletes. *International journal of sports medicine*, 28(12), 999-1005.
- Tsang, W. W., & Hui-Chan, C. W. (2003). Effects of tai chi on joint proprioception and stability limits in elderly subjects. *Medicine & Science in Sports & Exercise*.
- William, F.G. (2005), *Tıbbi Fizyoloji*. Çev; Türk Fizyoloji Bilimler Derneği, Barış Kitapevi, Ankara, 12: s. 219-220.
- Winter, D. A., Patla, A. E., & Frank, J. S. (1990). Assessment of balance control in humans. *Medical Program Technology*, 16(1-2), 31-51.
- Woollacott, M. H. (1989). *Development of posture and gait across the life span*. University of South Carolina.
- Yaggie, J. A., & Campbell, B. M. (2006). Effects of balance training on selected skills. *Journal of strength and conditioning research*, 20(2), 422.
- Yalçın, S. & Özaras, N. (2001), *Yürüme Analizi* (1.Baskı), Avrupa Matbaacılık, İstanbul, s.1-23.
- Yıldizer G. (2014). *Effects of 8-week core stability training on junior male soccer players static balance performance*. Yüksek Lisans Tezi. Orta Doğu Teknik Üniversitesi. Sosyal Bilimler Enstitüsü. Ankara.

- Zemková, E. (2009). Postural sway response to different forms of resistance exercise. *International Journal of Application Sports Science*, 21(2), 64-75.
- Zemková, E. (2014). Significantly and practically meaningful differences in balance research: p values and/or effect sizes?. *Sports medicine*, 44(7), 879-886.
- Zemková, E. (2014). Sport-specific balance. *Sports Medicine*, 44(5), 579-590.
- Zemková, E., & Dzurenková, D. (2009). There is no difference in balance impairment after intermittent and continual exercise. *Medicina Sportiva*, 17, 1068-73.