Bölüm 6

KUVVET ANTRENMANINDA YENİ YAKLAŞIMLAR: HIZA DAYALI KUVVET ANTRENMANLARI

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GİRİŞ

Sporcuların aerobik ve anaerobik uygunluk seviyesi (Buchheit ve Laursen 2013a, Buchheit ve Laursen 2013b), maksimal kuvvet düzeyi (Silva vd 2015), güç düzeyi (Cormie vd 2011) ve hız (Hartmann vd 2015) gibi fiziksel performans göstergeleri sporcunun doğrudan performans seviyesini etkilemektedir. Bir antrenmanın yoğunluğunu doğru ve objektif bir şekilde belirlemek, antrenman programını yaparken sık karşılaşılan bir sorundur (Folland ve Williams 2007, Kraemer ve Ratamess 2004). Çoğunlukla sporcunun yapabileceği maksimum performansın bir yüzdesi olarak belirtilen antrenman yoğunluğu, kuvvet antrenman programlarının tasarımı için temel bir değişken olarak kabul edilir (Folland ve Williams 2007, Kraemer ve Ratamess 2004). Kuvvet antrenmanlarını tasarlarken antrenman yoğunluğunu hesaplayabilmek için çeşitli yöntemler kullanılmıştır; 1 tekrarlı maksimal (1TM; sadece bir kez kaldırılabilen yük) en yaygın kullanılanı olmuştur (Gonzalez-Badillo ve Sanchez-Medina 2010). Bununla birlikte, antrenman yoğunluğunun 1TM'nin bir yüzdesi olarak belirtilmesinin büyük bir dezavantajı vardır: Submaksimal yüklerde hata yapmamak için maksimum kaldırma (1TM'nin doğrudan tahmini) veya birkaç tekrar (1TM'nin dolaylı tahmini) yapılması gerekir (Dohoney vd 2002). Hataya karşı tekrarların yapılması, ürettiği yüksek dereceli yorgunluk nedeniyle, antrenmanlı sporcularda bile, nöromüsküler performansı azalttığını göstermiştir (Drinkwater vd 2007, Gorostiaga vd 2012, Izquierdo-Gabarren vd 2010). Özellikle antrenmansız sporcular için, yeni bir antrenman programının başlamasından birkaç hafta sonra sporcuların 1TM değerleri artabilir (Folland ve Williams 2007, Schoenfeld vd 2014). Bu nedenle, antrenörler doğru antrenman yükü uygulamak isterlerse, sporcuların 1RM değerlerini sık sık almalıdırlar (Gonzalez-Badillo ve Sanchez-Medina 2010). Her ne kadar hıza dayalı kuvvet antrenmanı 1TM ölçümünün potansiyel dezavantajları olmadan (Gonzalez-Ba-

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oldukça önemlidir (Balsalobre-Fernandes ve Torres-Ronda 2021). Bu kavramlar, farklı programlama modellerinde uygulanabilir ve antrenörlere daha fazla kontrol ve tasarlama ile geleneksel yaklaşımları uygulamada yardımcı olabileceği bu çalışmanın amacını oluşturmaktadır.

NEDEN HIZA DAYALI KUVVET ANTRENMANI?

Hız, kuvvet antrenmanında 3 nedenden dolayı diğer kinetik veya kinematik çıktılara göre yaygın olarak kullanılır. İlk olarak, dış yük arttıkça, kaldırma hızında kayıpların meydana geldiği iyi bilinmektedir (Izquierdo vd 2006, Weakley vd 2020). Bu hız kaybı, minimum hız eşiğine karşılık gelen 1TM'lik bir yük elde edilene kadar devam eder (Izquiero vd 2006). İkincisi, maksimal gücün yüzdesi olarak hız ve yoğunluk arasında neredeyse mükemmel bir doğrusal ilişki vardır. Bu, bir dizi egzersiz ve submaksimal yüklerde tutarlı bir şekilde gösterilmiştir (Cook vd 2018, Garcia-Ramos vd 2018). Üçüncüsü, egzersize bağlı yorgunluğun birçok tanımının ortak bir unsuru, yorgunluk arttıkça kas lifi kısalma hızlarında, gevşeme sürelerinde ve hareket hızında azalmalara neden olan kuvvet üretme kapasitesinde geçici bir düşüş olmasıdır (González-Badillo vd 2017, Sanchez-Medina vd 2011). Basitçe söylemek gerekirse, yorgunluk arttıkça hareket hızı azalır. Uygulayıcılar, bu temel kavramları kabul ederek, yorgunluktan ve sporcunun antrenmana hazır oluşundaki dalgalanmalardan bağımsız olarak, her antrenman için harici yükleri ve antrenman hacimlerini doğru ve nesnel bir şekilde belirlemek için hız parametrelerini kullanabilirler.

KAYNAKÇA

Aslan A. Futbolda oyun dinamiklerinin incelenmesi ve değerlendirilmesi. Doktora tezi, ***Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü***, Ankara, 2007, s. 99.

Balsalobre-Fernández C, Glaiste, M, Lockey RA. The validity and reliability of an iPhone app for measuring vertical jump performance. ***J Sports Sci*** 2015; 33(15): 1574-1579.

Balsalobre-Fernandes C, Torres-Ronda L. The implementation of velocity-based training paradigm for team sports: Framework, technologies, practical recommendations and challenges. ***Sports*** 2021; 9: 47.

Balsalobre-Fernandez C, Marchante D, Munoz-Lopez M, Jimenez SL. Validity and reliability of a novel iPhone app for the measurement of barbell velocity and 1RM on the bench-press exercise. ***J Sports Sci*** 2018; 36: 64–70.

Banyard HG, Tufano JJ, Weakley JJS, Wu S, Jukic I, Nosaka K. Superior changes in jump, sprint, and change-of-direction performance but not maximal strength following 6 weeks of velocity-based training compared with 1-repetition-maximum percentage-based training. ***Int J Sports Physiol Perform***, 2020; 16(2): 232-242.

Banyard HG, Nosaka K, Vernon AD, Haff GG. The reliability of individualized load velocity profiles. ***Int J Sports Physiol Perf*** 2018a; 13: 763–769.

Banyard HG, Tufano JJ, Delgado J, Thompson S, Haff GG, Nosaka K. Comparison of velocity-based training and traditional 1RM percent-based training methods. ***Int J Sport Phys Perf*** 2018b; Ahead of Print.

Behm DG, Sale DG. Velocity specificity of resistance training. ***Sports Med*** 1993; 15(6): 374-388.

Buchheit M, Laursen PB. High-intensity interval training, solutions to the programming puzzle. Part I: cardiopulmonary emphasis, ***Sports Med*** 2013a; 43(5): 313–38.

Buchheit M, Laursen PB. High-intensity interval training, solutions to the programming puzzle. Part II: anaerobic energy, neuromuscular load and practical applications. ***Sports Med*** 2013b; 43(10): 927–54.

Bort-Roig J, Gilson ND, Puig-Ribera A, Contreras RS, Trost SG. Measuring and influencing physical activity with smartphone technology: a systematic review. ***Sports Med*** 2014; 44(5): 671-686.

Casartelli NC, Bolszak S, Impellizzeri FM, Maffiuletti NA. Reproducibility and validity of the physical activity scale for the elderly (PASE) questionnaire in patients after total hip arthroplasty. ***Phys Ther*** 2015; 95(1): 86-94.

Chambers R, Gabbett TJ, Cole MH, Beard A. The use of wearable microsensors to quantify sport-specific movements. ***Sports Med*** 2015; 45(7): 1065-1081.

Cormie P, McGuigan MR, Newton RU. Developing maximal neuromuscular power. Part 1: biological basis of maximal power production. ***Sports Med*** 2011; 41(1): 17–38.

Cormie P, McCaulley GO, Triplett NT, McBride JM. Optimal loading for maximal power output during lower-body resistance exercises. ***Med Sci Sports Exerc*** 2007; *39*(2): 340-349.

Cook JA, Julious SA, Sones W, Rothwell JC, Ramsay RC, Hampson LV, Emsley R, Walters SJ, Hewitt C, Bland M, Fergusson DE, Berlin JE, Altman D, Vale LD. DELTA 2 guidance on choosing the target difference and undertaking and reporting the sample size calculation for a randomised controlled trial. ***Trials*** 2018; 19: 606.

Dahlin M. The use of velocity-based training in strength and power training - A systematic review (Dissertation). Yüksek lisans tezi, ***Linnaeus University, Faculty of Social Sciences, Department of Sport Science***, Växjö, 2018, s. 47.

Dankel SJ, Jessee MB, Mattocks KT, Mouser JG, Counts BR. Training to fatigue: the answer for standardization when assessing muscle hypertrophy. ***Sports Med*** 2017; 47: 1021-1027.

Dohoney P, Chromiak JA, Lemire D, Abadie BR, Kovacs C. Prediction of one repetition maximum (1-RM) strength from a 4-6 RM and a 7-10 RM submaximal strength test in healthy young adult males. ***J Exerc Physiol*** 2002; 5(3): 54-59.

Docherty D, Sporer B. A proposed model for examining the interference phenomenon between concurrent aerobic and strength training. ***Sports Med*** 2000; 30(6): 385-394.

Drinkwater EJ, Galna B, McKenna MJ, Hunt PH, Pyne DB. Validation of an optical encoder during free weight resistance movements and analysis of bench press sticking point power during fatigue. ***J Strength Cond Res*** 2007; 21(2): 510-517.

Faude O, Koch T, Meyer T. Straight sprinting is the most frequent action in goal situations in professional football. ***J Sports Sci*** 2012; 30(7): 625-631.

Folland JP, Williams AG. Morphological and neurological contributions to increased strength. ***Sports Med*** 2007; 37(2): 145-168.

Garcia-Ramos A, Pestana-Melero FL, Perez-Castilla A, Rojas FJ, Gregory Haff G. Mean velocity vs. Mean propulsive velocity vs. Peak velocity: Which variable determines bench press relative load with higher reliability? ***J Strength Cond Res*** 2018; 32: 1273–1279.

Garnacho-Castaño MV, López-Lastra S, Maté-Muñoz JL. Reliability and validity assessment of a linear position transducer. ***J Sports Sci Med*** 2015; 14(1): 128.

González-Badillo JJ, Sánchez-Medina L. Movement velocity as a measure of loading intensity in resistance training. ***Int J Sports Med*** 2010; 31(05): 347- 352

Gorostiaga EM, Mikkola J, Rusko H, Izquierdo EM, Häkkinen K. Neuromuscular and cardiovascular adaptations during concurrent strength and endurance training in untrained men. ***Int J Sports Med*** 2012; 33(09): 702-710.

Hartmann H, Wirth K, Keiner M, Mickel C, Sander A, Szilvas E. Short-term periodization models: effects on strength and speed-strength performance. ***Sports Med*** 2015; 45 (10): 1373–86.

Hansen KT, Cronin JB, Newton MJ. The reliability of linear position transducer and force plate measurement of explosive forcetime variables during a loaded jump squat in elite athletes. ***J Strength Cond Res*** 2011; 25: 1447 - 1456.

Harris NK, Cronin J, Taylor K, Boris J, Sheppard J. Understanding position transducer technology for strength and conditioning practitioners. ***Strength Cond J*** 2010; 32: 66- 79.

Helgerud J, Rodas G, Kemi OJ, Hoff J. Strength and endurance in elite football players. Int J Sports Med 2011; 32(9): 677.

Helmes ER, Cronin J, Storey A, Zourdos MC. Application of the repetitions in reserve-based rating of perceived exertionscale for resistance training. ***Strength Cond J*** 2016; 38: 42–49.

Hirsch SM. Instrument, analysis and coaching considerations with velocity-based training. Yüksek lisans tezi. ***Master of Science Department of Exercise Science Universtiy of Toronto***, Toronto, 2018, s. 97.

Izquierdo M, Gonzalez-Badillo J, Hakkinen K, Ibanez J, Kraemer WJ, Altadill A, Eslava J, Gorostiaga EM. Effect of loading on unintentional lifting velocity declines during single sets of repetitions to failure during upper and lower extremity muscle actions. ***Int J Sports Med*** 2006; 27: 718–724.

Izquierdo-Gabarren M, Expósito RGDT, Garcia-Pallares J, Sanchez-Medina L, Villarreal ESS, Izquierdo M. Concurrent endurance and strength training not to failure optimizes performance gains. ***Med Sci Sports Exerc*** 2010; 42(6): 1191-1199.

Jovanovic M, Flanagan EP. Researched applications of velocity based strength training. ***J Aust Strength Cond*** 2014; 22(2): 58-69.

Jidovtseff B, Harris NK, Crielaard JM, Cronin JB. Using the load-velocity relationship for 1RM prediction. ***J Strength Cond Res*** 2011; 25(1): 267-270.

Kanehisa H, Miyashita M. Specificity of velocity in strength training. ***Eur J Appl Physiol*** 1983; 52(1): 104-106.

Kraemer WJ, Ratamess NA. Fundamentals of resistance training: progression and exercise prescription. ***Med Sci Sports Exerc*** 2004; 36: 674-688.

Kawamori N, Haff GG. The optimal training load for the development of muscular power. J Strength Cond Res 2004; 18(3): 675-684.

Loturco I, Nakamura FY, Kobal R, Gil S, Abad CCC, Cuniyochi R, Roschel H. Training for power and speed: Effects of increasing or decreasing jump squat velocity in elite young soccer players. ***J Strength Cond Res*** 2015; 29(10): 2771-2779.

Loturco I, Nakamura FY, Artioli GG, Kobal R, Kitamura K, Abad CCC, Franchini E. Strength and power qualities are highly associated with punching impact in elite amateur boxers. ***J Strength Cond Res*** 2016; 30(1): 109-116.

Loturco I, Kobal R, Kitamura K, Cal Abad CC, Faust B, Almeida L, Pereira LA. Mixed training methods: effects of combining resisted sprints or plyometric with optimum power loads on sprint and agility performance in professional soccer players. ***Front Physiol*** 2017a; 8: 1034

Loturco I, Kobal R, Moraes JE, Kitamura K, Cal Abad CC, Pereira LA, Nakamura FY. Predicting the maximum dynamic strength in bench press: the high precision of the bar velocity approach. ***J Strength Cond Res*** 2017b; 31(4): 1127– 1131.

Mann JB, Ivey PA, Sayers SP. Velocity-based training in football. ***Strength Cond J,*** 2015; 37: 52-57.

Meckel Y, Harel U, Michaely Y, Eliakim A. Effects of a very short-term preseason training procedure on the fitness of soccer players. ***J Sports Med Phys Fitness*** 2014; 54(4): 432.

McBride JM, Triplett-McBride T, Davie A & Newton RU. The effect of heavy-vs. light-load jump squats on the development of strength, power, and speed. ***J Strength Cond Res*** 2002; 16(1), 75-82.

Padulo J, Mignogna P, Mignardi S, Tonni F, D'Ottavio S. Effect of different pushing speeds on bench press. ***Int J Sports Med*** 2012; 33: 376-380.

Pareja-Blanco F, Rodríguez-Rosell D, Sánchez-Medina L, SanchisMoysi J, Dorado C, Mora-Custodio R, Yáñez-García JM, Morales-Alamo D, Pérez-Suárez I, Calbet JAL, González-Badillo JJ. Effects of velocity loss during resistance training on athletic performance, strength gains and muscle adaptations. ***Scand J Med Sci Sports*** 2017a; 27(7): 724-735.

Pareja-Blanco F, Sánchez-Medina L, Suárez-Arrones L, González-Badillo JJ. Effects of velocity loss during resistance training on performance in professional soccer players. ***Int J Sports Phys Perf*** 2017b; 12: 512-519.

Pareja-Blanco F, Rodriguez-Rosell D, Sanchez-Medina L, Gorostiaga EM, Gonzalez- Badillo JJ. Effect of movement velocity during resistance training on neuromuscular performance. ***Int J Sports Med*** 2014; 35: 916-924.

Perez-Castilla A, Garcia-Ramos A, Pestana-Melero FL, Rojas FJ, Gregory Haff G. Mean velocity vs. Mean propulsive velocity vs. Peak velocity: Which variable determines bench press relative load with higher reliability? ***J Strength Cond Res*** 2018; 32: 1273–1279.

Randell AD, Cronin JB, Keogh JW, Gill ND, Pedersen MC. Reliability of performance velocity for jump squats under feedback and nonfeedback conditions. ***J Strength Cond Res*** 2011; 25: 3514 - 3518.

Redkva PE, Paes MR, Fernandez R, Sergio G. Correlation between match performance and field tests in professional soccer players. ***J Hum Kinet*** 2018; 62: 213-219.

Samozino P, Edouard P, Sangnier S, Brughelli M, Gimenez P, Morin JB. Force-velocity profile: imbalance determination and effect on lower limb ballistic performance. ***Int J Sports Med*** 2014; 35: 505-510.

Sanchez-Medina L, Perez CE, Gonzalez-Badillo JJ. Importance of the propulsice phase in strength assessment. ***Int J Sports Med*** 2010; 31: 123-129.

Sanchez-Medina L, Gonzalez-Badillo JJ. Velocity loss as an indicator of neuromuscular fatigue during resistance training. ***Med Sci Sports Exerc*** 2011; 43: 1725–1734.

Silva JR, Nassis GP, Rebelo A. Strength training in soccer with a specific focus on highly trained players. ***Sports Med Int Open*** 2015; 1(1): 17.

Soslu R, Çuvalcıoğlu, İ. Hıza dayalı direnç antrenmanları: Kuvvet ve güç performansını etkiler mi? ***INSAC Acad Stu on Health Sci*** 2021; 24.

Schoenfeld BJ, Ratamess NA, Peterson MD, Contreras B, Sonmez GT, Alvar BA. Effects of different volume-equated resistance training loading strategies on muscular adaptations in well-trained men. ***J Strength Cond Res*** 2014; 28(10): 2909-2918.

Tomasevicz CL, Hasenkamp RM, Ridenour DT, Bach CW. Validity and reliability assesment of 3-d camera-based capture barbell velocity tracking device. ***J Sci Med Sport*** 2020; 23: 7-14.

Thompson SW, Rogerson D, Dorrell HF, Ruddock A, Barnes A. The reliability and validity of current technologies for measuring barbell velocity in the free-weight back squat and power clean. ***Sports*** 2020; 8(7): 94.

Weakley J, Chalkley D, Johnston RD, Amador GR, Andrew T, Harry D, Madison P, Matthew M, Micheal C. Criterion validity, and inter-unit and between-day reliability of the FLEX for measuring barbell velocity during commonly used resistance training exercises. ***J Strength Cond Res*** 2020; 34(6): 1519-1524.

Weakley J, Mann B, Banyard H, McLaren S, Tannath S, Amador GR. Velocity-based training from theory to application. ***Strength Cond J*** 2020; 1-20.

Weakley JJS, Till K, Read DB, Roe GAB, Jones JD, Padraic J, Ben J. The effects of traditional, superset and tri-set resistance training structures on percieved intensity and physiological responses. ***Eur J Appl Physiol*** 2017; 117: 1877-1889.

Weakley JJS, Wilson KM, Till K, Read DB, Darral-Jones J, Roe GAB, Phibbs PJ, Jones B. Visual feedback attenuates mean concentric barbell velocity loss and improves motivation, competitiveness and perceived workload in male adolescent athteles. ***J Strength Cond Res*** 2019; 33(9): 2420-2425.