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The Effects of six weeks strength exercises on static and dynamic balance of young male athletes

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Abstract

This study was conducted to examine the effects of six weeks of strength training on static and dynamic balance in young male athletes. Thirty 15-17 young male athletes with mean and SD (62.79±3.62kg ∞171.1±4.46cm) were divided into two groups (15 subjects for each group). We used the SEBT and Romberg adjusted balance test before and after exercise programs to test balance. Strength exercise consisted, including: squat, leg extension, and calf raise, lunge, curl up. The results showed a significant increase in static and dynamic balance in the group (P=0.001). A possible reason for increased balance in the experimental group maybe increasing strength muscle in lower extremity after exercise program, the process of decreasing disinhibition and stimulating of muscles' spindles during strength training.

Keywords: static and dynamic balance,strength exercise, young male athletes;

Introduction

Adolescents participate in sports commonly. In a survey of adolescents in Alberta, 59% reported that took part in sports more than 5 hours per week (Steinbruck, 1999). The result of previous studies showed that 5.4% of all high school students were injured during regular physical education (PE) courses in Germany and of all injuries, 54.4% occurred during ball games (Dima, 2006). Epidemiologic data demonstrate that sport injuries most often affect the lower extremities (Carolyn, 2005). Furthermore, adolescents are at greater risk of suffering sport injuries than younger children, with peak injury rates occurring in the oldest adolescent age group (Keon and Bijur, 2008). Postural control or balance can be defined statically as the ability to maintain a base of support with minimal movement and dynamically as the ability to perform a task while maintaining a stable position (Bressel, 2007). Balance is an important factor in many athletic skills, Such as gymnastics, basketball and volleyball. Lack of balance with some injuries, such as sprain in acute ankle and knee and knee osteoarthritis is associated(Marsh, 2004) also deficits in strength of the lower extremities and postural control have been associated with a high risk for sustaining sport-related injuries.(Mery and Wang, 2006).Factors that influence on postural control and balance are included sensory information obtained from the somatosensory, visual, vestibular systems and motor responses that

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affect coordination, joint range of motion (ROM) and strength.(Palmieri, 2002)Training methods that have been evaluated to determine the effects of them on balance are resistance training, aerobic or endurance training, educational training, balance training and most recently velocity training(Earl, 2001). The effectiveness of balance training on balance ability are clear (Zech, 2010). but the effects of strength training on dynamic balance has been associated with conflicting results as Manini et al (2007), Mahieu et al (2006), Jeffery et al (2001) studied the effects of strength training on postural control. The results of these studies didn't show any significant differences before and after of strength training. Randa et al (2001), Paterno et al (2004),Young et al (2010) stated that strength training caused a significant increase in static and dynamic balance. Because of the contradictory results, this study was conducted to examine the effects of six weeks of strength training on static and dynamic balance in young male athletes.

Methods

Thirty 15-17 young male athletes with average and standard deviation weight of 62.79±3.62kg and length 171.1±4.46cm without any lower extremity injury, vestibular problems, visual problems, voluntarily participated in this study. They divided into two groups: Strength exercise and control. We used the Star Excursion Balance Test (SEBT) in eight directions (Anterior, Anterior-Lateral, Lateral, Posterior-Lateral, Posterior, Posterior-Medial, Medial and Anterior-Medial) to evaluate the dynamic balance and Romberg adjusted balance test to test static balance before and after exercise programs. Strength exercise consisted of three sessions a week for 6 weeks, including: squat, leg extension, and calf raise, lunge, curl up (Cynthia, 2004). The duration of each session was 30 minutes. The training started with Delorme's program using 10RM also weight was increased by 5% in per week (Prentice, 2004)

Descriptive statistic and paired t sample test was used to analyze data. Level of significance was considered 0.05.

Results

The results not showed Significant different between two groups in age, length (P=0.5), weight (P=0.1), and reaching distance in eight directions of SEBT and Romberg adjusted balance test before from executing of exercises. In addition, the significant difference observed in mean and difference range of reaching distance in eight directions of SEBT between control and exercise group post executing of exercises. Our dynamic balance scores for Strength exercises group in eight directions Includes: Anterior(%4.3), Anterior-Lateral(%4.8), Lateral(%5.9), Posterior-Lateral(%6.1), Posterior(%6.3), Posterior-Medial(%6.6), Medial(%5.9) and Anterior-Medial(%5.1).

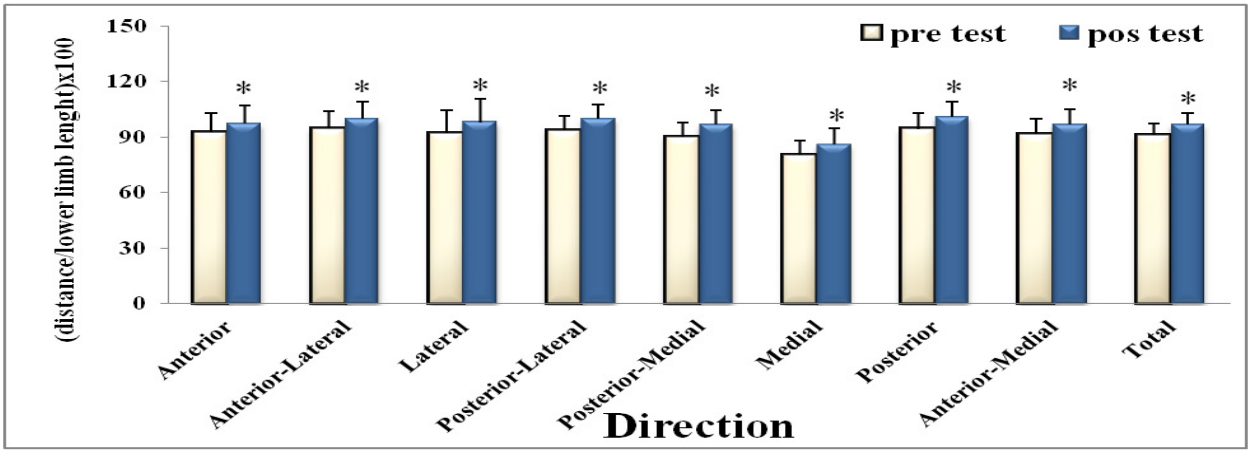

Figure 1. Star Excursion Balance Test (SEBT) values (mean_ SEM) for athletes. Values represent the means for the dominant limb. *Indicates that experimental group displayed greater reach distances than control group (*P = 0.001*).

The result of t test showed a significant difference in static balance of experimental group before and after training (t=-22.73, P=0.001)

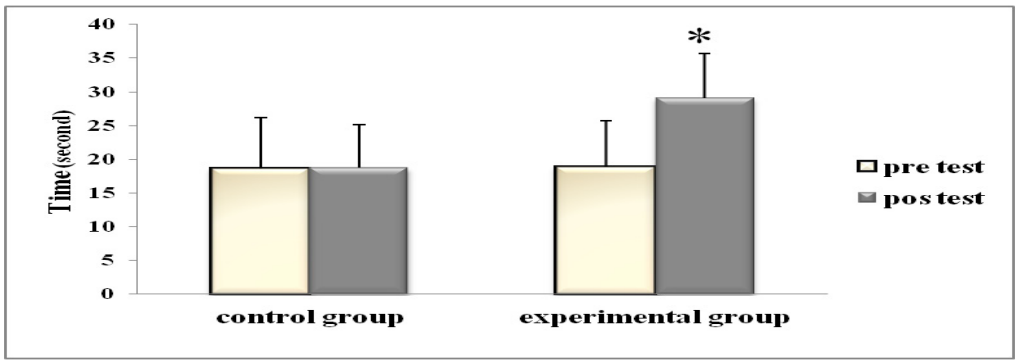

Figure 2. Romberg adjusted balance test values (mean _SEM) for athletes. Values are the means for the dominant limb. *Indicates that experimental group displayed more time than control group (P=0.001).

Discussion and Conclusion

The purpose of this study was to determine the effect of Strength exercises on Dynamic and static balance in young male athletes. The findings in this study were that Strength exercises was
able to produce a significant increase in dynamic and static balance in young male athletes.
The most affection of Strength exercises were observed in five Posterior-Medial(%6.6), Posterior(%6.3), Posterior-Lateral(%6.1), Lateral(%6.1), Lateral(%5.9), and minimum effects, in the Anterior(%4.3), Anterior-Lateral(%4.8), Anterior-Medial(%5.1) directions, respectively. The average of static balance test in experimental group was (18.53 sec) before training, this amount was (28.66 sec) after training.

These results are similar to Randa et al (2001), Paterno et al (2004),Young et al (2010) stated that strength exercises cause a significant increase in static and dynamic balance. A possible reason for increase of balance in the experimental group could be increasing of muscle's strength in lower extremity after exercise program, facilitating in fast twitch motor units, increase of muscle's coordination(Young, 2010) ,the process of decreasing disinhibition and stimulating of muscles' spindles during strength training. In these conditions, muscles contraction stimulated activity of Gamma efferent in muscles' spindles. Sensitivity enhancement of muscles' spindles may improve joint position sense that has an important role in the postural' control (Bressel, 2007).

The results of current work are not in accordance with the Manini et al (2007), Mahieu et al (2006), Jeffery et al (2001) control. The Possible reasons of this could be the difference between the types of exercises, intensity, duration and type of training and personal characteristics of the subjects. Results showed that increasing strength in lower extremity and stabilizer muscles, can improve dynamic and static balance and posture control. It is suggested to young male athletes that initially are not able to stand pressure of exercise and special sport skills to obtain a level of balance through strength exercise. At the other hand, it's recommended to coaches to use these trainings to prevent injuries in their athletes. It is suggested to use this exercise Because of special need for young male athletes to balance in athletic skills

References

Bijur, P. E., Trumble, A, Harel, Y, Overpeck, M. D.Jones, D, & Scheidt, P. C. (1995) . Sports and recreation injuries in U.S. children and adolescents. Archives of Pediatries and Adolescent Mediane, 149, 1009-1016.

Bressel E, Joshua C. (2007). Comparison of Static and Dynamic Balance in Female Collegiate Soccer, Basketball, and Gymnastics Athletes. Journal of Athletic Training;42(1):42–46

Carolyn E; Cassidy J; Terry P Klassen; Rhonda J Rosychuk; Brian H(2005). -Effectiveness of a home-based balance-training program in reducing sports. Canadian Medical Association.

Cynthia AT. (2004). The effects of strength and plyometric training on joint position, joint moments and joint stiffness at the knee. Dissertation. Faculty of Brigham young university (Canada)

Dima, E, Kemeny, P, & Scherer, K. (2006). Sportunfälle an allgemein bildenden Gymnasien [Sports accidents in general high schools] . Bundesverband der UnfaUhassen

Earl JE, Hertel J. 2001. Lower-extremity muscle activation during the star excursion balance tests. J sport Rebabil. 10: 93-104

Jeffery S, David N, Camaione and Steven VO. (2001). ffect of intense strength training on standing balance, walking speed and sit to stand performance in older adults. J Geront Series A. 56: 281-86

Manini, T., Marko, M., VavArnam, T., Cook, S. (2007),. Efficacy of resistance and task-specefic exercise in older adults who modify tasks of everyday life Gerontol, 62A6:616-623

Marsh Dw, Richard La, Williams LA, linch Kj. 2004. The relationship between balance and pitching in college baseball pitchers. J Strength Con Res. 18(4): 441-56

McKeon P, Hertel J (2008), Postural Control and Lateral Ankle Instability, Part II: Is Balance Training Clinically Effective? : A Systematic Review, Journal of Athletic Training ;43(3):305–315

Mery, C. A, CassidyJ. D, Klassen, T. P, Rosychuk, RJ, & 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 fournal, 1 72, 749-754.

Nele N, Mahieu E, Witvrouw D, Van D.V, Diny M, Vale´ rie.A. (2006).Improving Strength and Postural Control in Young Skiers: Whole-Body Vibration versus Equivalent Resistance Training. J Athletic Trai. 41(3):286–293

Palmieri RM, Ingersoll CD. (2002). Center-of-pressure parameters used in the assessment of postural control. J Sport Rehabil. 11:51–66

Paterno mv.myer g. (2004). Jun.Neuro muscular training improves single-limb stability in young female athletes. J Orthop Sports Phys Ther;34(6):305-16

Prentice, W.E. (2004). Rehabilitation Techniques for Sports Medicine & Athletic Training.147-150

Randa, et al. . (2001). Effect of physical activity and sporting activities on balance control in elderly people.British journal of sportsmedicine33 (2). Pp.12626

Steinbruck, K (1999). Epidemiology of sports injuries – 25. year analysis of sports orthopedic-traumatologic ambulatory care. Sportverletzung Sportschaden, 13, 38-52

Wang, H. K, Chen, C. H., Shiang, T. Y, Jan, M. H., & Lin, K H. (2006) . Risk-factor analysis of high school basketball-player ankle injuries: A prospective controlled cohort study evaluating postural sway, ankle strength, and flexibility. Archives of Physical Mediane and Rehabilitation, 87, 821-825

Young, MD; and Jordan D. Metzl, MAY. (2010). Strength Training for the Young Athlete Warren K. MDPEDIATRIC ANNALS 39:5

Zech A, Hu¨ bscher M, Vogt L, Banzer W, Ha¨ nsel F, Pfeifer K. (2010). Balance Training for Neuromuscular Control and Performance Enhancement: A Systematic Review, Journal of Athletic Training;45(4):392–403