BALANCE AND STABILITY WITH FITWALL EXERCISE

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1. INTRODUCTION

Balance and stability are an essential part of athletic performance, general fitness and daily tasks. Finding efficient ways to maximize balance and control is one of the primary goals of Functional Training. Benefits include improved athletic performance, reduced injury rate and increased overall strength.

Fitwall training includes traditional movement patterns as well as novel techniques and movements that improve balance and stability. The goal of this paper is to highlight some of the benefits and improvements Fitwall training adds to traditional balance and stability training.

2. DEFINITIONS

Balance is defined as maintaining equilibrium of the body in static and dynamic conditions. During unloaded static activities, balance is maintained when the body's center of gravity is within its base of support, and stability is the state of that equilibrium[11].

Stability is sufficient stiffness in surrounding tissues and appropriate motor control around the joint(s) to resist perturbations[6].

Functional Training is integrated, multi-dimensional movement that requires acceleration, deceleration and stabilization in all three planes of motion[10].

3. OVERVIEW OF FITWALL MOVEMENT PATTERNS

Fitwall movements occur with either 3 or 4 anchor points on the vertical axis, which causes activation of the trunk stabilization muscles (see Figures 1 and 2). Remaining vertical while performing Fitwall exercises allows gravity to act in a different plane than typical floor stability movements. A stable core enables one to effectively transfer forces between the upper and lower body, maximizing the transfer of power and the protection of single joints, multi-joints and limbs. This complex contraction pattern requires coordination between the musculoskeletal system and central nervous system using feedback and feedforward communication patterns. Anticipatory postural adjustments (APAs) are a feedforward response. These occur before anticipated rapid movements and increase stiffness and balance[4].

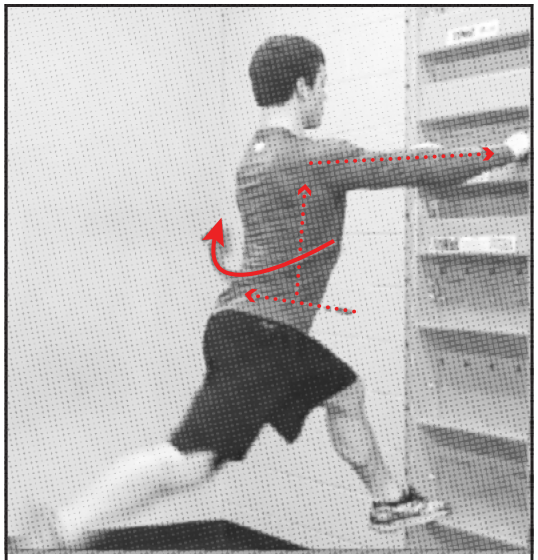

Figure 1: Hip extension engaging rotary stability (roll component) and 3 point anchor Hip abduction engaging trunk stabilizers

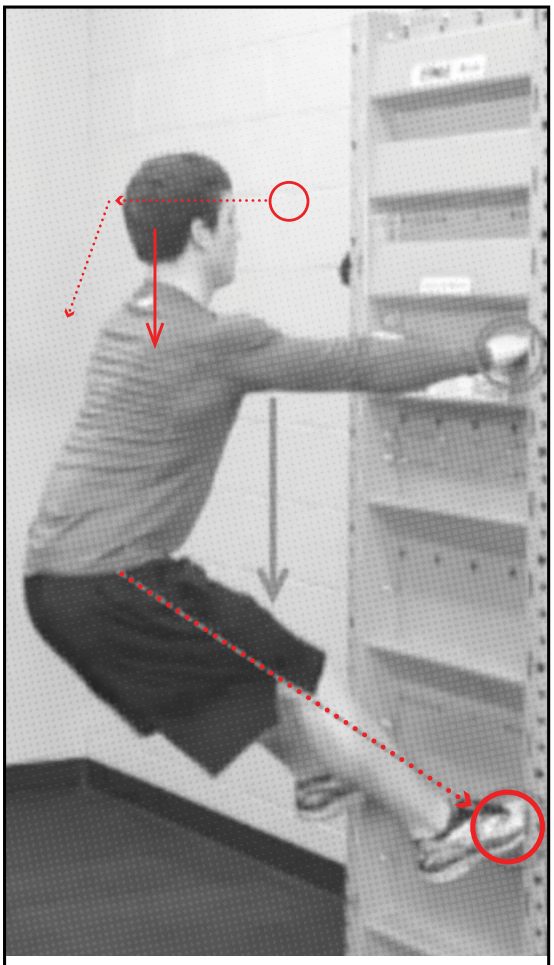

Figure 2: 4 point anchor and force line

4. STRENGTH AND ATHLETIC PERFORMANCE

6-weeks of neuromuscular (balance) training has been shown to improve strength and lower-extremity biomechanics. Strength measures increase by as much as 92% (squat strength) and knee varus torque (risk indicator for knee injury) may increase by as much as 38% with balance training8. Additionally, further studies have shown that incorporating balance training into a five week program has resulted in 33% improvement in static balance and 9% increase in vertical jump height.[12]

Lumbar spine stability also increases with increased trunk load magnitude, to the extent that this load brings about an increase in trunk muscle activation. The data from this study suggests that the muscle reflex response to sudden loading can augment the lumbar spine stability level achieved immediately prior to the sudden loading event.[1]

5. INJURY

Eise. More than 3.5 million kids under the age of 14 receive medical treatment for sports injuries each year.

Each year, one in every three adults 65 and older falls. Falls can cause moderate to severe injuries, such as hip fractures and head injuries, and can increase the risk of early death. According to the CDC, falls are most commonly caused by a loss of balance or stability.

A study of 765 high school soccer and basketball players found that balance training significantly lowers the rate of ankle sprains (6.1%, 1.13 of 1000 exposures vs. 9.9%, 1.87 of 1000 exposures; P = .04). Athletes with a history of an ankle sprain were found to have twice the risk of sustaining a sprain (risk ratio, 2.14), whereas these same athletes who performed the intervention program decreased their risk of a sprain by one half (risk ratio, 0.56).[7]

Hip abduction strength and recruitment may improve female athletes' control of lower extremity alignment, decrease knee abduction motion, and decrease loads resulting from increased trunk displacement during sports activities. This results in a significantly lower incident of ACL injury.[9]

Specific motor control training can help restore the deep abdominal muscles that show delayed activation and histological changes secondary to injury or pain and has been shown to be beneficial for spondylolisthesis, acute low back pain, and pregnancy-related pain.[6]

6. AGE AND BALANCE

Recent evidence suggests that perturbations with a roll component may be more representative of conditions which induce falls in everyday life. For example, spontaneous or induced sway in the mediolateral plane appears to correlate better with falls than anterior-posterior sway. In fact, a large proportion of falls in the elderly have been found to involve lateral motion[5] (Figure 2) and are associated with the genesis of hip fractures.

Lateral perturbations may be more destabilizing because they require a more complex coordination of muscle responses in the left and right side of the body, and therefore place a greater demand on the processing requirements of the CNS. Furthermore, the body must achieve coordination of differing pitch and roll trunk dynamics to resist lateral perturbations[4]. Therefore proprioceptive information elicited by multidirectional stance perturbations may well be more difficult for the elderly to process than that coming from a pure pitch plane perturbation.

Similarly, adequate balance corrections in two planes may be more difficult to generate.[5] Fitwall movement patterns are well-suited to mimic these two planes to improve balance and possibly reduce rates of falls and injury.

7. CONCLUSION

Balance and stability are critical components in high level athletics as well as in daily tasks and injury prevention. Balance and stability require multi-joint coordination and strength. Fitwall movements occur with either 3 or 4 anchor points on the vertical axis, which causes activation of the trunk stabilization muscles.

Remaining vertical while performing the Fitwall movements allows gravity to act in a different plane than in typical floor stability movements. A stable core enables one to effectively transfer forces between the upper and lower body. Fitwall programming has movement patterns that have been shown to significantly increase balance and stability, which has been shown to improve athletic performance, strength, speed, vertical jump, as well as reduce injury rates for the hip, knee, ankle and lower back.

It is also concluded that Fitwall is a novel method of performing these movement patterns while in a vertical position that mimics many 'real world activities'. These movement patterns are likely to be even more effective in eliciting balance and stabilization resulting in improved athletic performance and injury prevention because of the direction of forces during these movement patterns.

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