

The Versatility of the Kettlebell

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Introduction: The History of Kettlebell Training

Almost all fitness clubs, specifically CrossFit gyms, have uniquely shaped objects, of various weights, that are round in shape with a handle, popularly known as a kettlebell (KB). KBs are currently being used across a broad spectrum of populations, from the elite athlete to the recreational exerciser (1). The use of KBs date back to Russian times in the 1700s when the word *girya* was first used for the KB (2). The popularity of KBs traveled from Russia to other areas in Eastern Europe. It is said that the recent surge in the popularization of KB training is largely due to Russian émigrés former World Champion Valery Fedorenko and a former Soviet Special Forces instructor and Master of Sport, Pavel Tsatsouline (2). Fedorenko founded the American Kettlebell Club and Tsatsouline, the renown hard style Russian Kettlebell Certification (RKC) in 2001(2). The hard style refers to a karate-based style of hand-to-hand combat that was taught in Russian special operations in the 1970s, choosing “power production over power conservation (3).” In KB training, there are six fundamental hard style techniques which include the swing, clean, press, squat, snatch, and Turkish get up (TGU) (2). With this movement, Tsatsouline created the book, *Power of the People*, which became the outline to this training style. It was then followed by his next book, *Enter the Kettlebell*, which remains the most widely cited text for hardstyle technique KB training (2). This training style is very versatile, as it can be used for warm-up, strength, cardio, and recovery. When properly executed, this form of training can improve cardiovascular fitness (4) to core strength (5). Studies have shown that an acute bout of KB training not only improves blood glucose (6), in elderly population, KB even improved sarcopenia levels and helped with retention after training (7). The aim of this study is to evaluate the benefits of KB training across the spectrum of exercises, from the elite athlete to the elderly population (65-75 yrs. old).

The Mechanics of Kettlebell Training

What movement systems are used?

KB training consists of ballistic like movements (2), similar to power training, such as when the body or an object (KB) is using high muscle forces, making them useful for improving strength and cardiorespiratory fitness (8). These ballistic type movements have been shown to increase both the maximal power output and the rate of force development in subjects (1). For

example, in a KB swing, a subject either uses one or both arms to swing a KB, from behind and between the legs to eye level (9). This KB swing uses the muscles of the posterior chain (gluteal, hamstring complex, and back extensors) as the prime movers (9). The involvement of these large muscle groups in the KB swing, induces an acute increase in the hormones (i.e., growth hormone (GH), testosterone, cortisol) that are involved modulation of the neuromuscular adaptations to training such as the increase of maximum power output and rate of force development (9). The movement systems, such as cardiovascular, pulmonary, endocrine and musculoskeletal, all play a role in the benefits of KB training.

Neuromuscular control

Neuromuscular adaptations to resistance training (RT) involve the endocrine milieu and the acute hormonal response to a bout of exercise (9). When there are great amounts of testosterone, GH, cortisol, and other hormones in response to the bout of RT, this may lead to greater physiological adaptations such as increases in strength (9). Budnar et al. (2014) found that the KB swing may cause increases in strength and muscle size, likely due to significant neuroendocrine response induced from this exercise mode.

The Benefits of Kettlebell training: Core Stability and Strength

How Kettlebell training can strengthen both lateral and bilateral sides of body

One exercise in particular called the KB swing, the primary movement comes from the hip extensors and transfers through the core to the arms and the KB (5). These core muscles play a key role in the stabilization of the trunk that allows for effective transfer of forces from the hip to the arm(s) that are holding the KB. In fact, Jay et al. (2010) found that after 8 weeks of performing KB swing exercises, at 3 times/week, the KB-group increased the trunk extensor strength and lowered the pain intensity in the neck, shoulders, and lower back significantly compared to the control group with who continued their daily physical activity but did not receive KB exercises. In a study by McGill and Marshall (2012), there was also similar muscle trunk activation when comparing the one-arm KB swing, KB swing with kime (brief muscular pulsing at the top of the swing), KB swing to KB snatch and KB carrying. Notably, there was only a greater activation in the internal oblique when performing the KB swing with kime, than with a KB swing (10). Paramusua and Mahadevan (2018), determined that KB training increased core strength and endurance in collegiate male volleyball players after 6 weeks of training. Anderson et al. (2016), showed that for the first time, a one-arm KB swing induced

greater activation of the contralateral side of the upper erector spinae than that of the ipsilateral side, with greater results than the 2-arm swing. In practical applications, a KB one-arm swing with submaximal load, provides higher muscle activation in one side of the core muscles, therefore equal number of repetitions on each side is beneficial (5). This may be a better alternative to resistance training in individuals looking to improve performance that demands transferring forces from the legs to the arms, such as javelin, shot put and handball (5).

Kettlebell for Optimal Endurance Training

Is Kettlebell training effective for cardiorespiratory fitness?

KB exercises have proven to be effective in core strength (5) and stabilization, but it can also be effective at improving cardiorespiratory fitness (4). The KB snatch has been proven to not only improve cardiorespiratory endurance but it is also an exercise that can transfer to other physical activities such as running and jumping (4). In a high intensity interval (HIIT) conditioning, a protocol known as 15:15 MVO₂, involves intervals of 15-seconds of KB snatching and 15-seconds of rest. This KB training was compared to a group that did a circuit of free weight and dynamic body weight exercises for 20 minutes with no improvement. When performed for 20 minutes, the maximum average heart rate was 93% and oxygen consumption was 78% of VO₂ max (4). Falatic et al. (2015) found that HIIT KB training, such as the 15:15 MVO₂, improved aerobic capacity in female collegiate soccer players.

Is it comparable to other forms of cardiorespiratory training?

In regard to KB training replacing other modalities of cardiorespiratory training, Falatic and colleagues (2015) demonstrated that a KB- HIIT protocol can produce similar Kilocalories per min (Kcal* min⁻¹), pulmonary ventilation during exercise (V_E), respiratory frequency (f) and heart rate (HR) responses, as a sprint interval cycling (SIC) protocol over the four-week period. However, in comparison, the KB HIIT (4-week period), produced higher VO₂ across time compared to SIC (4). While the KB- HIIT protocol is comparable to the SIC protocol, finding what mode of exercise a client enjoys most, will likely help with adherence to a program.

Kettlebell Training and Weight loss: Physiological

Is it effective in lowering blood glucose compared to other training exercises?

Aerobic and resistance exercise has been shown to improve blood glucose (BG) uptake and insulin action (6). Because of one's sedentary and busy lifestyle, many people lack time, preventing them from having a daily exercise regimen. KB HIIT training is short in duration and

does not require much space or equipment but a KB and the motivation to show up. Additionally, KB training is low impact and less weight bearing which can be a more attractive option than high impact exercises, such as running. These higher impact exercises can cause more stress on the joints to the obese population. Greenwald et al. (2016) compared the effects that KB training had on BG and compared it to interval sprint running. This study found that both KB and HIIT running exercises significantly lowered BG after glucose intervention compared to the control group (no exercise) in sedentary young men. When comparing KB and HIIT training there were no significant differences, which means that both methods are just as effective in lowering blood glucose. So, is it comparable to other modes of training? This was determined to be true in this study. KB training can lower blood glucose similar to HIIT running.

Beneficial to Special Populations

The elderly and Sarcopenia

As aforementioned, KB training has been proved to benefit athletes as well as the sedentary population. However, this training mode can also make an impact on the body composition, muscle strength, and chronic low grade inflammatory markers among the elderly population with sarcopenia (7). Sarcopenia is the loss of skeletal muscle mass (SMM) and the degeneration of muscle strength associated with aging among older people (7). Physical activity is crucial for maintaining healthy bones and a healthy lifestyle. Chen et al. (2018) conducted a study on KB training in the elderly (65-75 yr. women) with sarcopenia and determined that those who participated in the KB training significantly increased their sarcopenia index, grip strength and back strength. This was in comparison to a control group that continued with their daily life and did not participate in any exercise training (7).

Conclusion

KB training was found to be most effective at lowering blood glucose when compared to a matched form of cardiorespiratory training mode in a HIIT style (6) (4). KB training not only increased core strength and endurance in volleyball players but for the first time, the one arm KB swing induced greater activation of the contralateral side of the upper erector spinae than that of the ipsilateral side, with greater results than the two-arm swing (10). In the elderly population (65-75 yr. women) with sarcopenia, those that participated in KB training significantly increased their sarcopenia index, grip strength and back strength (7). KB HIIT training mode is just as effective as SIC in the improvement of cardiorespiratory training (4). Using the F.I.T.T.E

(Frequency, Intensity, Time, Type and Enjoyment) principle, KB training may fit the needs and objections (i.e., enjoyable mode and time constraints) of the client and can play any important role in exercise adherence and furthermore, achieving the client's goals.

Apply it!

- This article provides information on how to improve blood glucose levels and cardiorespiratory fitness through Kettlebell (KB) training.
- Exercise professionals will learn about how KB training can increase sarcopenia index, grip strength and back strength in the elderly populations.
- Fitness professionals will gain knowledge on a HIIT protocol known as 15:15 MVO₂, which involves 15 seconds of KB snatching with 15 seconds of rest.

Bridging the Gap

Due to the sedentary lifestyles and technology at our fingertips, this has contributed to comorbidities in health such as obesity. With the obese population, weight-bearing exercises may be hard on the body due to the excess weight. KB training is a low-impact, non-weight bearing exercise that may even be appealing to the novice gym goer. In as short as 20 minutes, at a high intensity, it has been shown to improve aerobic capacity in collegiate students. KB may even show improvements in glucose which could possibly help those with insulin resistance and managing their blood sugar. In conclusion, KB has a vast of benefits that can help the elderly improve their sarcopenia level and help others improve blood sugar, core strength and aerobic capacity.

Summary Statement

Studies have shown that an acute bout of KB training not only improves blood glucose but in elderly population, KB even improved sarcopenia levels and helped with retention after training. KB training also improved core strength and was effective at lowering blood glucose.

Pulled Text

“Kettlebell HIIT training mode is just as effective as SIC in the improvement of cardiorespiratory training (4). KB training was found to be most effective at lowering blood glucose when compared to a matched cardiorespiratory mode HIIT.”

Bio:

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