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FUNCTIONAL TRAINING WITH THE KETTLEBELL

ALLENAMENTO FUNZIONALE CON IL KETTLEBELL

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Abstract

This paper aims to highlight the importance of using the kettlebell in today's functional training methodology. The kettlebell is effective because, thanks to its particular shape and its offset center of gravity, stimulates both general and sport-specific motor skills. Among the variety of theoretical models related to movement, the kettlebell represents the basis of new practical teaching strategies, in favor of performance and educational and experimental training skills. This paper includes proposals for exercises using the kettlebell, which can facilitate new motor experiences thanks to ballistic actions and slow lifting. The swing, in fact, is a movement that develops and improves not only conditional skills, but also coordination ones. The Turkish Get-Up, on the other hand, is an efficient exercise based on functional movements and primary motor patterns. Therefore, the benefits of such exercises are clearly useful to promote muscle tension and synergy of the kinetic chains involved. However, training sessions involving the use of this tool are no methods developed in the last decade, but have thousands of years of history, being already present in Persia, ancient Greece and Russia of the Tsars.

Con il presente lavoro si vuole evidenziare l'importanza dell'uso del Kettlebell nell'odierna metodologia dell'allenamento funzionale. Il kettlebell è efficace poiché grazie alla sua particolare forma, con baricentro disassato stimola le abilità motorie sia generali e sia specifiche dei vari sport. Nella varietà di modelli teorici del movimento, il Kettlebell rappresenta la base delle nuove strategie pratiche di insegnamento, a favore della performance e delle competenze educative e formative sperimentali. In tale paper sono presenti proposte di esercizi, attraverso l'uso del Kettlebell, che possono facilitare le nuove esperienze motorie, grazie alle azioni balistiche e alle alzate lente. Lo swing, infatti, è un movimento che sviluppa e migliora non solo le capacità condizionali, ma anche quelle coordinative. Il Turkish get up invece, è un esercizio valido, basato sui movimenti funzionali e sugli schemi motori primari. È evidente, quindi, che i benefici di tali esercizi sono utili a favorire la tensione e la sinergia muscolare delle catene cinetiche coinvolte. Tuttavia, gli allenamenti con questo attrezzo, non sono metodologie sviluppatesi nell'ultimo decennio, ma hanno millenni di storia essendo già presenti in Persia, nell'antica Grecia e nella Russia degli Zar.

Keywords

Kettlebell, Turkish Get-Up, functional training, movement, motor skills.

Kettlebell, Turkish Get-Up, allenamento funzionale, movimento, abilità motorie.

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Introduction

This paper includes studies and experiences carried out over the years, and represents an attempt to create a useful and comprehensive guide to the use of the kettlebell. Athletic and functional training have changed over the years, but the purpose of the training methodology has remained unchanged: to develop and improve performance (Weineck J. 2009). To this end, the main goal of training is to prepare a working methodology that has a clear, accurate and updated approach to the development, improvement or maintenance of motor skills and/or abilities (Colina D. 2015). Thus, our body and the external environment interact through movement, which constitutes a two-way relationship that not only allows it to act in the environment, but also to modify itself by "learning" from the stimuli that come from it. This can be achieved through functional training, thanks to which both conditional and coordination skills are stimulated to improve the movement of the whole body, and not of the single muscle group. Hence, the human body is a highly complex structure, and presents a strong redundancy in the execution of movements (Le Boulch J. 1989). A given action, in fact, can be performed with different rotations in space, and these rotations can occur thanks to different muscle activations. The coordination of a movement consists of a motor skill process of the redundant degrees of freedom of the organ in movement, thus representing the organization of the musculoskeletal system control (Schmidt R., and Wrisberg C., 2000). Therefore, the physiological mechanisms underlying the movement, i.e. the functioning of the locomotor apparatus, composed of the skeletal, muscular and nervous systems, with the activity of the Kettlebell, are now totally changed compared to a training carried out with isotonic machines. This allows realizing effective and specific training sessions to work in the best way possible and reduce injuries (Martini F., et al., 2012). The function or purpose of this tool is to preserve and improve health, from athletes to performers, through specific movements for the development and improvement of basic and specific skills. The use of the kettlebell, therefore, leads its practitioners to focus as much as possible on multi-joint movements, unlike all other single-joint, isolated movements that work mainly on one specific muscle, and especially in recovery conditions, since they are separated from the others. For this reason, all movements performed with kettlebells are carried out always while keeping the body in contact with the floor, or in a standing position, when kneeling or lying on the ground. This ensures the intentional management of the overload, through the position and weight of the body, embedding the control of the stability of the body itself in the movements. These motor gestures carried out with the kettlebell can be performed in all sports, but not only; in fact, some research activities confirmed its versatility, so much so that it is a valid support in specific training sessions in the military field. (Ojanen T., et al., 2020). All movements, whether ballistic or slow lifting, continuously stimulate balance and proprioception, so the muscles are always searching for tension, connection, balance and stability (Grigoletto D., et al., 2020). In fact, the motor control of stability can be improved and prompted through rotational movements, where the support of the feet on the floor is asymmetrical and unstable. In conclusion, using the Kettlebell is a continuous learning of one's body weight management at all levels of movement. Therefore, for the reasons outlined above, it is important to train the movements and not the

muscles (Nicoletti R., and Borghi A.M., 2007). The arthromuscular balance - and not the development of strength as an end in itself - is the primary objective of functional training using kettlebells.

1. History, origins and evolution of the Kettlebell

Kettlebell lifting is a sports activity that has existed for many centuries and is the first form of weightlifting used by man: "the weightlifting of the people, of the working class". The Kettlebell is a gym equipment that has been used since ancient times by various peoples (including Greeks, Romans and Russians). The athletes of ancient Greece, in order to get ready for the Olympics, used rudimentary kettlebells (gyria or ghiria) different from the current ones, but with the same principle: they were bags filled with water or sand. Alternatively, they were crescent-shaped stone with an opening on one side called Halthere; this shows that, already in ancient civilizations, people understood how the body worked and knew the basics of the physiology of movement. The true girya (a device consisting of a massive spherical body with an arched handle) was initially used for commercial purposes, i.e. as a counterweight to scales for goods sold and traded. Their weight was standardized in pood, the Russian unit of measure corresponding to 16 kg. Therefore, there were giri ranging from half pood (8 kg) up to three poods (48 kg) and more. In those times, traveling on horseback was a luxury for the few, so experienced travelers realized that the proper weight to carry during travel was a pood. Among the merchants, in that period, the custom of carrying out physical endurance competitions to test who was able to lift the kettlebell over his own head several times became very popular, to the point that the latter became very famous among the people too. The meaning of girya was first mentioned in Russian dictionaries in 1704, and derives from Persian ("gera" = weight, weighing, difficult). That period saw the first major expansion of their use, involving the entire European part of pre-revolutionary Russia. For many years, the giri were used in many popular celebrations, becoming an integral part of the culture of those territories. Originally, the Kettlebell was not shaped like a cannon ball, but only in 1797 it became such by order of the Tsar. According to various legends, Tsar Alexander III used to train with kettlebells; one day, in 1888, during a trip with his family, their train derailed and their carriage crashed. The roof was about to fall on his whole family, when the monarch surprisingly managed to support the weight until they were rescued. With incredulity, the Tsar saw in the Giri the instrument that had allowed him to save himself and his loved ones. After this event the giri were consecrated throughout the empire as a high-value sports tool, and actively supported all the competitions that began to spread throughout the Russian territory under the patronage of the sovereign. After the Russian Revolution, which saw the birth of the USSR in 1922, the fame of the giri increased even more, and they became the main training tool for the troops of the old Soviet Union who had to move quickly to move cannon balls on the battlefield. The USSR was a very big country, and was preparing to turn from a medieval state to a world power; for this reason, the physical fitness and effectiveness of its soldiers was of paramount importance. People started to talk about the sport of giri at the end of the Nineteenth century, after its introduction in the sports-medical school in St. Petersburg by Dr. Krajevski. 10 years later, one of his students opened a wrestling and gymnastic disciplines school in Kiev, in which the giri were

widely used. After about 50 years, in 1948, there was the first official Great Giri Lifting Competition: 200,000 people including the public and the athletes took part in it, and during the competition, the competitors tried to lift a girya above their heads with one hand, without time limits. This competition gave start to many other ones especially in Russia, Ukraine and Lithuania. In 1960, the first official title of Giri Master was introduced. This title was awarded to the masters who were able to develop more and more effective workouts with kettlebells for the physical strengthening of soldiers, and for power and strength sports. In the West, the giri appeared for the first time around the 1960s under the name of Kettlebell; thanks to Pavel Tsatsouline, a former Russian military instructor, at the end of the 1990s, the Kettlebell became very popular in America and later in Europe. In 1970 in Ukraine, the first official competition rules were defined, which were similar to the current ones: the athletes were divided into weight categories, specifically 60 kg, 70 kg, 82.5 kg and over 82.5 kg. Thus the foundations for the sport of giri began to be laid, which then evolved and took the name of girevoy sport, and currently includes several specialties. With the fall of the Soviet Union in 1992, the International Gira Sport Federation (I.G.S.F.) was founded, which regulates the use of kettlebells and organizes competitions; today, brings together 30 countries around the world. In Italy, the sport of giri was introduced only in 2000, the year in which Oleh Ilika, an international athlete of the I.G.S.F., introduced the first "sport giri". Subsequently, the Federazione Ghiri Sport Italia (F.G.S.I. - Italian Giri Sport Federation) was founded. As for the technical aspect, the original kettlebells were of three sizes: 1 pood = 16 kg (reserved for beginners, boys and women); 1.5 poods = 24 kg (military size); 2 poods = 32 kg (competition weight). Subsequently, models starting at 4 kg and moving up in 4-kg increments were manufactured; today, it is possible to find on the market Kettlebells weighing from a minimum of 4 kg to a maximum of 48 kg (but you can also buy Kettlebells from 60 kg to 80 kg). The introduction of the Kettlebell in the world of fitness also led to the production of vinyl coated kettlebells in various colors that differ from each other by 2 kg. Unlike what is believed, the difference of 4kg from one model to another is instructive, as it forces to acquire a solid base with the lower weight before switching to the next heavier one. The giri turn out to be better balanced than the Kettlebell, and their size stays the same as the weight increases; as a result, the technique acquired does not vary as well. Kettlebells, on the other hand, vary in diameter according to their size, and therefore require adjustments. They create a situation of greater instability when performing the exercises, as the greater circumference of the sphere brings the center of mass of the kettlebell further away from the grip, making the technical performance of all movements more complex. In addition, the offset center of mass amplifies the feedback and strength needed to perform the gesture in a ballistic way. This stimulates the development of mobility and stability of important joints such as hips and shoulders. In addition, kettlebells have the advantage of having a thicker handle (especially those from 32 kg and up), which is very important in order to train the grip.

2. The innovative Kettlebell workout

The Kettlebell is a compact, cheap and indestructible tool. In addition to having the unquestionable advantage of being usable in any place, both indoors and outdoors, on any

surface and especially in very little spaces, it now represents the most suitable tool for functional training. Thanks to its versatility, it can stimulate the physical conditioning of the whole body, through multi-joint and polyaxial movements, such as to involve different muscle groups, thus allowing exploiting the long kinetic chains in favor of general physical strengthening (Tsatsouline P., 2013). Their use involves the whole body and the action of movements: it is always useful to train the different types of strength and coordination constantly. Unlike the barbell, with the Kettlebell, it is possible to perform unilateral training, which means performing the movements with the right and/or left side independently, thus bridging any differences between the two portions (Otto W. H., et al., 2012). The amplitude of the movement trajectories that develop on the three levels during the exercises, especially in ballistic gestures, allow expressing strength at different angles and a dynamics of the movement to be kept under control at all times. Representing the useful and essential elements of functional training, it therefore becomes useful and functional to the improvement of sports activities. With the Kettlebell, it is possible to simultaneously exploit different energy systems and increase lipolysis, thanks to the high repetitions with soft loads. Even at high intensity, their use involves multiple muscle groups, which request for a greater amount of oxygen anticipates the use of fat as an energy source; in addition, there is a significant increase in EPOC - Excess Post-exercise Oxygen Consumption - (Fortner H. A., et al., 2014). Performing the exercises with the correct technique can also improve mobility and flexibility, while always allowing for the increase in strength, power, endurance and explosiveness. In conclusion, training with the kettlebell brings a significant increase in strength and in its neurogenic components (Manocchia P., et al., 2013). A particular characteristic of this tool is that its center of gravity is offset with respect to the load, which is all shifted to one side, and this produces a greater training effect when performing the exercises. The stabilization activity required constantly involves a significant strengthening of the stabilizer muscles, specifically the core, also bringing an improvement to the cardiorespiratory and cardiovascular system with the aerobic exercises. For these reasons, training with the kettlebell is highly functional and suitable for improving the performance of both individual and team sports, allowing also to learn the basic principles in a simplified and more immediate way, which can then be applied with the barbell through the correct technique (Mcgill S. M., and Marshall L., W., 2012). In fact, a prime example is the correct performance of the Swing, an exercise during which the set-up position (feet firmly planted on the ground, hips flexion, proper spinal alignment and connection of the shoulder blades) is the same as the starting position of the deadlift with the barbell. Additionally, when performing the hip hinge (hips flexion-extension or hinged movement in the hips), a fundamental movement of the Swing, the entire spine is preserved from injury, just like during the deadlift (Lake J. P., and Lauder M. A., 2012). Another - but no less important - consideration is the vertical plank position, which is so defined because there is a maximum contraction of the quadriceps, glutes and abdomen, right during the floating phase of the Kettlebell in the Swing, and is very similar to the position that is reached in the final phase of the deadlift with the barbell. In fact, it is in the Goblet Squat that skills that can be used transversally while performing the Front Squat, Back Squat, Bench Press and Good Morning are learned. The standards are: spine in a neutral position, feet firmly on the ground, knees aligned with the feet, hips and knees flexing/stretching simultaneously, and breathing

control (Merrell A. J., and Kardon G., 2013). A final important assessment concerns propaedeutic exercises for kettlebell use. In this regard, joint mobility training is fundamental and preliminary (de RESENDE-NETO A G., et al., 2019). Being it in between the conditional and coordination skills, it does not require either energy substrates or particularly consolidated motor patterns to be implemented. In fact, J. Weineck (2009) wrote: "*Joint mobility is that ability and quality of the athlete that allows him or her to perform movements of great amplitude, in one or more joints, independently or thanks to the intervention or support of external forces*". Each individual has his or her own ability to mobilize joints, which is mostly directly related to muscle elasticity. If a muscle or a muscle group cannot stretch sufficiently, the joint to which they belong will never be free to move with the maximum excursion possible (Kapandji A. I., 1994). For athletes, this condition affects the sport-specific gestures, which require smooth and efficient movements, motor creativity and dexterity, and are linked to the perfection of the technical gesture. Therefore, the preparatory exercises for the use of the Kettlebell are based on joint mobility, firstly because it greatly reduces the risk of injury, improving the athlete's approach to training itself by avoiding boring interruptions related to pain or discomfort, and secondly because it improves the ROM (Range Of Motion). The more flexible and elastic a person is, the more the musculoskeletal system is in a state of general well-being; however, what greatly affects mobility is muscle tone and the ability to stretch muscles (Morton S. K., 2011). In fact, the muscle spindles have the task of maintaining the muscle tone through appropriate modulations, as in the case of the abdominal muscles, the primary function of which is to stabilize the trunk, and consequently to always maintain an average level of activation even at rest just to ensure the stability of the upright station. On the contrary, an excessive muscle tone would result in a poor ability to relax the muscles, causing annoying problems of excessive contraction and little modulation of muscle elasticity. The latter is greatly influenced by connective tissues such as epimysium, endomysium, and the so-called tertiary strands including titin, and not by the contractile elements of the muscle fiber (actin and myosin), except in cases of severe muscle fatigue resulting in ATP depletion (Drummond M. J., et al., 2005). Titin is responsible for defending the muscle sarcomere from internal and external stresses, so intense workout causes an increase in the overall stiffness of the muscles by this protein even at rest, which results in a strong feeling of tension at the slightest stretch. The fact that the muscles can contract this much and not relax is a cause of hyperactivation. Muscles must be able to express a lot of strength, but to do so they need to engage all the tricks that the nervous system puts in place for defensive purposes through the neuromuscular spindles, aimed at avoiding that the disproportionate increase of titin ends up making them little mechanically elastic. For these reasons, even by using a small kettlebell, joint mobility exercises stimulate both muscle elasticity and strength through movement.

3. Functional training and athletic preparation

There are many similarities between functional movement and kettlebell training. Starting with the grip, held in rack position: kettlebells constantly train the grip from the muscles of the hand, wrist and forearm, to the stabilizer muscles of the torso. Therefore, given their potential use for improving mobility, strength and stability, as well as the comfortable and small space they require to be used, it is necessary to examine the criteria for their use. Today, the kettlebell is

used in many sports for functional training and for improving strength motor skills. Thanks to kettlebells, it is possible to train all physical qualities: strength, power, speed, flexibility, coordination, muscular and cardiovascular endurance. Training becomes functional through their use, and in addition to improving athletically, it is ideal for the mobility and stability of body movements (Boyle. M., 2018). Therefore, when training with the kettlebell, the muscle synergies of the body in movements are improved. Training with this tool does not isolate the muscles, but on the contrary, continuous tension is required in all aspects of the movement. In fact, the functional activity of the muscles of the body will never be localized analytically in a single muscle group, but will always involve both secondary and major muscles, just as in the technical gesture of the Turkish Get-up (TGU). Performing this exercise (Liebenson C., and Shaughness G., 2010) always requires muscular tension and motor involvement of the whole body, in addition to balance, dexterity, attention, and muscle coordination. This exercise was defined by Gray Cook as perfect for training primitive motor patterns, such as rolling, kneeling, standing up and stretching out (Cook G., et al., 2011). In addition, the rehabilitation specialist McGill argued that while performing the above-mentioned exercise, athletes learn to lock the ribcage on the pelvis, and this allows them to avoid spinal disorders and injuries. In fact, the spinal posture is controlled while steering a weight overhead; thus, the body learns additional movement strategies, which maintain core stiffness, and push through the other limbs (McGill S. M., 2012). The TGU promotes stability, mobility and strength of the shoulder. It also increases strength through the ability to connect the various muscle groups, avoiding losing strength throughout the exercise; this, in particular, is due to the activation of the stabilizer muscles. Being a so-called "slow lift" exercise, it can always be included at the beginning of each training session, using smaller sizes. After the first part of warm-up/cardiovascular activation and basic mobility, switching to lifts by performing the TGU will allow to complete the warmup perfectly, just because, in addition to what stated before, there is great inter and intramuscular coordination when performing it. An important detail is the choice of the weight or size of the kettlebell to be used. The heavier this will be, the more strength work will be carried out and the longer the recovery time to be observed between repetitions, precisely because the neuromuscular involvement is almost equal to a 100% commitment. Instead, if the objective will be to train strength endurance, by using a kettlebell equal to 50% of 1RM (1 Maximum Repetition) we can do repetitions for each side observing a maximum of 10/20 min of recovery at each change of side, for a maximum of 12 series (or it will lead to exhaustion, with consequent loss of quality of the exercise). If we manage to go on, it means that the load is wrong. Another highly functional exercise is the Swing (Lake J. P., and Lauder M. A. 2012). In fact, it is thanks to the particular shape of the kettlebell having an offset center of mass that it is possible to determine advantages that, from a ballistic point of view, are unique. The oscillatory movement carried out in a hip-hinged position, by means of flexion-extension, is guaranteed by the grip on the handle and by the continuous connection and tension of the body with the tool. The shape of this training tool has a center of gravity that is not on the handle but in the cast iron ball. Consequently, the movement will be more tiring than the one performed with a normal dumbbell, and holding it with one hand will allow to train mobility, static and dynamic motor control (as in the case of the dumbbell), until using it during performances. All this is guaranteed by the absence of any constraints, such as cables or pulleys, so the smaller

muscles will carry out the stabilization work. For these reasons the Swing (SW), if performed well, is useful and works better than many other athletic training exercises. Through this exercise, muscular, cardiovascular and endurance conditioning is provided, and everything is trained at the same time and in a single movement. This exercise simultaneously trains the front and back muscle chains of the body, increasing flexibility, mobility of the hips, lower back and shoulders. The SW is a powerful metabolic builder and can be considered a very effective alternative to running (Hulsey C. R., et al., 2012). In fact, a recent - but not yet published - study was carried out at CRIAMS (interdepartmental research center on motor and sports activities of the University of Pavia, based in Voghera, Italy), during which certified Kettlebell Instructors tested themselves using a Kettlebell equal to 1/3 of their body weight, performing the SW with two hands for 30 seconds and with 30 seconds of recovery, for a total of 10 series (50% of density). Monitored with a metabolimeter before and during the test, and every hour after its completion, the participants showed the same energy expenditure as when running (repeated with the same isocaloric regimen and measurements), and also an EPOC level (Excess Postexercise Oxygen Consumption, i.e. the index measuring the increase in oxygen consumption following intense activity, intended to satisfy the "oxygen debt") higher than when running (Weineck J., 2013). In addition, other parameters were used to measure metabolic engagement and internal load, including both heart rate and lactate. When included in a training schedule, the SW can be both a main and a complementary exercise. With the use of the heavy kettlebell, equal to 50% of one's body weight, it is possible to train explosive strength, by keeping the number of repetitions low (5/6, until the loss of quality of movement), for many minutes or series (12 series). In this way, strength and power are trained through relaxation and the speed of action of the heavy SW, with a metabolic effort in terms of endurance and flexibility.

Conclusions

Functional training and the developments that follow from it, used by coaches, athletic trainers, teachers and personal trainers, is now necessary for the physical exercise methodology and for the programming of training and training tools (Boyle M., 2012). The Kettlebell is a complete and useful training tool for both conditional and coordination skills: it represents an effective tool to be used in today's training methodology. In fact, with the advent of functional training, more and more training methods use tools that promote neuromuscular development and maintenance, with exercises aimed at achieving the multi-joint and polyaxial target of the human body. This target is useful to ensure the training of kinetic chains and the specificity of movements, which characterizes each sport. Nevertheless, some exercises are the basis of movement science education and general training methodology. In fact, the use of the TGU as a way to build strength, maintenance and prevention is significant, both in a competitive and in an amateur perspective. This is precisely because it fosters a physical well-being perspective aimed at building motor learning processes through educational plans for growth, and indirectly targeted at enhancing first the person and then the athlete, thus also improving his/her

psychosocial sphere. Instead, with the SW, it is possible to achieve objectives such as strength, power, mobility, muscle elasticity and prevention, thus ensuring a simultaneous nerve connection of both the lower and upper body, through tension and stability.

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