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PROCEDURE METODOLOGICHE PER LO SVILUPPO DELLE COMPETENZE MOTORIE

METHODOLOGICAL PROCEDURES FOR THE DEVELOPMENT OF MOTOR SKILLS

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Abstract

The function of methodological procedures is necessary to facilitate and optimize learning processes useful for developing basic and specific skills. Through the motivational strategies of functional and conscious movements it is possible to achieve objectives concentrated in different time frames: short, medium and long term. These, allow to identify specific skills and behaviors necessary for the task and to constitute a reference for the comparison between current and desired performance. The complex information for a practical execution is aimed at facilitating the understanding of the task and developing the mental representation of the gesture and an action plan. The motor learning through the practice on the task, represents for athletes of high level the energetic expenditure of main time due to the repetition of the typical gestures of their discipline. There is no alternative to the huge amount of exercises needed to achieve high performance. In this study we presented a practical proposal that facilitates and optimizes the acquisition processes, because in addition to the amount of exercise you have to consider its quality. We therefore aimed to evaluate the post-exercise energy expenditure of a functional exercise compared to a running protocol on treadmills in isocaloric conditions, but also a learning of specific learning skills, decomposing and recomposing the available elements, linking and verifying the results, correcting any errors in order to acquire the general idea of the movement, to then develop and improve it technically more and more.

La funzione delle procedure metodologiche è necessaria per agevolare e ottimizzare i processi di apprendimento utile per sviluppare le abilità di base e specifiche. Attraverso le strategie motivazionali di movimenti funzionali e consapevoli è possibile conseguire degli obiettivi concentrati in diversi archi di tempo: a breve, a medio e a lungo termine. Questi, consentono di individuare competenze e comportamenti specifici necessari per il compito e per costituire un riferimento per il confronto tra prestazione attuale e desiderata. Le informazioni complesse per un'esecuzione pratica sono finalizzate a facilitare la comprensione del compito e a sviluppare la rappresentazione mentale del gesto e di un piano d'azione. L'apprendimento motorio attraverso la pratica sul compito, rappresenta per gli atleti di alto livello la spesa energetica di tempo principale dovuta alla ripetizione dei gesti tipici della loro disciplina. Non esistono alternative all'enorme quantità di esercitazioni necessarie per ottenere una performance elevata. In questo studio abbiamo illustrato una proposta pratica che agevola e ottimizza i processi di acquisizione, perché accanto alla quantità di esercitazione si deve considerare la sua qualità. Abbiamo quindi mirato a valutare il dispendio energetico post-esercizio di un esercizio funzionale rispetto a un protocollo di corsa su tapis roulant in condizioni isocaloriche, ma anche un apprendimento di specifiche abilità nell'apprendere ad apprendere, scomponendo e ricomponendo gli elementi disponibili, collegando e verificando gli esiti, correggendo gli eventuali errori. al fine di far acquisire l'idea generale del movimento, per poi svilupparlo e migliorarlo tecnicamente sempre di più.

[1] Entrambi gli autori hanno partecipato egualmente alla stesura dell'articolo

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keywords:
Motor Learning, Motor transference, Motor skills, Movement, Energy expenditure.
parole chiave:
Apprendimento Motorio, Transfert Motorio, Abilità motorie, Movimento, Dispendio Energetico.

1. Introduction

The use of the functional movement therefore, leads those who practice it to concentrate as much as possible on multi-joint movements, unlike all other single-joint movements, isolated, which work mainly on a single specific muscle and especially in conditions of recovery, as they are separated from the others. For this reason, all the movements performed with the functional movement are performed always keeping the body in contact with the floor, or in an upright position, or kneeling, or lying on the ground and this to ensure the intentional management of overload, through the position and the weight of the body, incorporating in the movements, the control of the stability of the body itself. All movements, ballistic or slow lifting, continuously stimulate balance and proprioception, consequently there is always a continuous muscular search for tension, connection, balance and stability (Lake & Lauder 2012). For example, the motor control of stability can be improved and induced through rotational movements, whose support of the feet on the floor is asymmetrical and unstable. In conclusion, the use of functional movement is a continuous teaching of the management of one's body weight in all planes of movement. For the reasons described, therefore, it is important to train the movements and not the muscles. Arthro-muscular balance and not the development of strength as an end in itself is the primary goal of functional training through the use of Kettlebell (KT), (McGill & Marshall 2012). The Swing (SW) with the KT is the ballistic movement par excellence. Its movement mechanics intensely and simultaneously involves the posterior and anterior muscle chains, thus strengthening: the core muscles, improving the flexibility and mobility of the hips and increasing muscle and cardiovascular conditioning. There are countless variations, progressions and regressions, so as to make the SW adaptable to any type of athlete or anyone who wants to try it for the first time; few exercises are able to guarantee such a remarkable positive transference in countless physical qualities, to the point of allowing to improve athletic performance in many sports (Andersen et al., 2016). Being able to correctly perform the different variations of the SW is the indispensable condition for correctly interpreting all the main exercises with the KT. Among the ballistic exercises with the KT, the movement of the SW has been much studied but despite everything, there are still doubts about the modality and intensity of training in favor of performance and the optimization of physiological adaptations (Jay et al., 2011 ; Fortner et al., 2014; Hulsey et al., 2012). In fact, conflicting results are available on cardiovascular adaptations due to the repeated SW studied in some works. For Jay et al. (2011), the ballistic movement of the SW with the KT, engages the whole body without providing a sufficient improvement of the aerobic condition. In contrast, in the study by Farrar et al. (2010), the SW with the KT is a valid training means to allow an increase in VO2 max. This diversity of results is most likely due to a lack of standardization of the weight of the KT, which can be used in research, to study the SW both using a maximal KT for a short or prolonged time, and a light KT always for a short or long time. This, in addition to not protecting the correct movement of the same, guaranteeing the quality of movement and the health of athletes or performers, does not allow to understand well the relative energy expenditure due to too heavy or too light effort, in a variable time. Furthermore, the grip of the KT, during movement, allows the center of gravity between the body and that of the KT to be moved away during the ballistic action (Lake & Lauder, 2012). Therefore, each different movement involves

a different consumption of O2 extra post exercise (EPOC) and a different energy expenditure (EE) for a specific period of time that varies depending on the factors related to the same exercise. Numerous studies report a different duration of EPOC, time to return to pre-exercise values Thornton & Potteiger (2002), and in addition, many studies consider intensity as the main cause of post-exercise oxygen consumption (Baldwin et al., 2000). EPOC and post-exercise energy expenditure are two aspects of the adaptive mechanism of the same organism. The first concerns the VO2 parameters, therefore the excess quantity of O2 which is closely linked to energy consumption. In fact, knowing the caloric equivalent of 1LT of O2 (4.82 Kcal) it is possible to calculate the energy expenditure from the VO2 data (da Silva et al., 2010). Scientific evidence has shown that both endurance exercise (RT) and intensity increase the extent of EPOC compared to resting conditions (Melanson et al., 2002). As demonstrated, intensity is one of the main factors that can affect a greater or lesser consumption of oxygen, as well as the training medium and its method of execution. It is also known that intermittent exercise produces a higher EPOC than non-intermittent exercise (Tabata et al., 1996). In the present study we studied the EPOC stimulated by the SW KT exercise, through an intermittent protocol and we compared it with continuous running in iso-caloric conditions. The execution of the SW exercise took place at the maximum intensity and technique of the movement. We tried to understand the energy expenditure of exercise and post-exercise.

2. The learning of motor technique

The learning of the motor technique is the basis of a pyramid whose summit can result in professional sports or simply in the acquisition of a motor useful to deal with the normal daily social activities. Motor learning is the acquisition of a "technique" that can then be re-proposed in the future, a new pattern that includes both an action, a behavior, and an expression.
A motor learning is really achieved when you can evaluate: the external situation, your resources, your intentions and your needs. Therefore, it can be considered appropriate when it is appropriate, relevant, effective and efficient. In terms of "timing", motor performance is considered a process that evolves through several steps:

- establish the general objective of the task to be learned;
- formulate a plan (or motor program) to be used in the first test;
- provide the answer, in relation to the initial conditions, and make, on the basis of previous experiences, the choice of parameters to be applied to the selected program; at the same time the proprioceptive and external-oceptive sensory consequences are anticipated;
- wait for feedback, comparing the resulting information with expected consequences, recognizing any errors and updating the action plan;
- decide how to try to do it next time;
- repeat the process

In motor learning, kinesthetic perceptions play an important role and this poses the problem of making movement heard, introducing a series of didactic devices (direct assistance or external guides) that overcome the lack of sensory feedback. Sensory solicitation is a privileged means for the stimulation of a richer and more articulated mental image that can guide the attention on aspects that are not easily perceptible, such as the rhythm of movement. Crucial is the difficulty related to the level of learning in function of cognitive discernment skills and the experiential baggage acquired. The process of "motor literacy" must be understood as a process of "habilitation", for which a baggage of motor schemes is not yet available, which allows the proper use of the necessary motor program. In this sense it is probable that the goal is not reached in the first attempts and that the executions are coarse or wrong, although important to

store information on the initial conditions, the parameters used for the response, sensory feedback and results obtained; they are enriched with every further execution, up to the formation of a stable scheme by means of which the movement can approach the sought technical model. In the execution of a movement, any deviation between expected value and real value is considered error: when, however, the movement considered wrong, because it does not coincide with the reference model, falls within the same action program, Error also constitutes a variation of movement and as such reinforces the pattern of response. In learning specific skills it is, then, initially appropriate to simplify the task in order to acquire a first general idea of the movement, accepting sufficiently correct executions. The education to the movement is therefore constant learning of those techniques and those exercises necessary to learn the specific skills of a sport that only after continuous training will be successfully achieved. The variety of theoretical frameworks, individual teaching and learning styles form the basis for identifying new practical teaching strategies, for improving the mastery of motor skills, for promoting self-esteem, to promote self-efficacy and a positive self-image. The educational strategy and experimental training, find space in the new motor experiences, through the ballistic action of functional training with the KT, specifically in Swing. This movement develops and improves not only conditional but also coordinating abilities. A didactic programming, in favor of innovative and inclusive paths, that presupposes that the motor education must be based on functional movements, necessary to the base of a strategy finalized to the development of the formative processes of learning. The development of knowledge will be transactional, within a reality whose final product will be the relationship between subject and environment, through the body. For this reason, in the movement there is all the truth, made not only by objective and subjective reality, external and body, but, more generally, by relationships, emotions, symbols, meanings, all necessarily useful to build a knowledge of the vision of reality, the real.

3. The Swing

To perform the Swing (SW) you have to position yourself in an upright position, with your feet placed at a distance slightly greater than the width of the shoulders and the toes facing outwards with the arms extended at the sides (Bullock et al., 2017). The KT is positioned in front, and not between the legs as in the Deadlift, forming an equilateral triangle with the malleolus of the feet, always looking towards the horizon. The descent phase is the same as that of the Deadlift, with a deep inhalation, a first movement of the hips with the knees flexing at a later time; the arms must be extended until they reach the KT, then hook onto it and using the hands as a hook. Subsequently, the KT will be inclined towards the lower limbs, so that the handle and the body of the same become the extension of the forearm, giving the arms the movement of external rotation, arching the lumbar area and pushing the shoulders towards the pelvis, away from the head. Subsequently, it will be necessary to throw it with force backwards, between the adductors without altering the position of the body by making the KT handle pass higher than the knees. This type of movement brings the arms to press against the rib cage, the forearms to press against the adductors, and the body of the KT to tilt upwards with respect to the handle. It is the moment in which the ascent phase begins, with an explosive movement thanks to the thrust of the feet against the floor and the extension with force of the hips and knees, with an immediate contraction of the buttocks and quadriceps (Del Monte et al., 2020). The KT will lift forward and up to about the height of the chest, with the arms relaxed, which will have the task of transferring the energy impressed by the extension of the hips to the KT, without participating in the lifting. At the end of the ascent the arms, forearms and body of the KT must be perfectly aligned. The next phase concerns the descent of the KT, in fact once the KT has reached the

apex of the ascent, it must be allowed to float in mid-air for a fraction of a second and, only when the KT begins to fall back towards the bass, it will have to be guided backwards again. For almost the entire descent phase, at least until the hands have reached the height of the navel, at which time one must maintain the erect but contracted position of the abdomen, at the same time, also of the buttocks and quadriceps, while knees and they will also be in full extension. Only at the last moment, when the hands have passed the navel, the hips will have to flex until they reach the low position of the movement and then lead the KT to the starting position. There are several variants of the SW which are divided into:

- Two hands Swing, that is two-handed SW;
- One hand Swing, ie one hand SW;
- Hand to hand Swing, ie SW with change of hand.

4. The motor transfert

Transference is at the basis of educational progress, the order of which is increasing. This represents the basis of the teaching of learning, thus allowing the execution of subsequent actions. Movement combined with pedagogical skills activate motor transference, representing the prerequisites. In fact, transference conditions and modifies, positively or negatively, both the new and the reproduction of a known activity (Parlebas, 1999). The effects of transference affect many phenomena, affect behavior, the emotional, affective and relational component, as well as basic motility and abilities, through the acquisition of the new promotes change and learning through adjustments that promote the development of psychomotor adaptation. Therefore, the transference is defined as positive if the task is carried out more effectively, otherwise we speak instead of "negative transference". It is pro-active, when the effect affects a new activity, when it affects a known activity, it is referred to as "back-active". In fact, Bertin (1995), assumes that the ability to act in situations solving problems, is underlying the competence in learning to learn, breaking down and recomposing the available elements, connecting and verifying the results, correcting any errors. in order to acquire the general idea of the movement, and then develop it and improve it technically more and more. Weineck (2009), in the field of physical education and sport, states that the multilaterality of development in childhood and preadolescence is conditioned by the anthropological, psychological, pedagogical, didactic and anatomy-physiological fields: "The organism of children and adolescents who are in the growth phase needs numerous stimuli to be able to develop harmoniously the different organ systems and apparatuses, such as, for example, the active (muscular) and passive (bone, cartilage, tendons, ligaments), the cardiovascular system, the metabolic and hormonal system, the nervous system, etc. These requirements cannot be met by unilateral, specialised loads" (Weineck, 2009). The education to motor literacy and the culture of movement, from birth influences choices, lifestyles and habits. This study, transversally, focuses on the effects that intensive movement, such as swing with the KT, can produce on the aspects of control and correction/ stabilization of motor behavior.

5. Method and procedures

6 males (age 31.6 ± 12 years; height 175 ± 2 cm; weight 74 ± 4 Kg) and 6 females (33 ± 12 years; height 164 ± 6 cm; weight 63 ± 9 Kg) signed a medical questionnaire and an approved

written consent document, in which they were informed of the procedures, risks and benefits of the study. The subjects were previously instructed to move the 2-hand SW sequence.

Figure1 KT Swing Sequence (images from the web)

The study was divided into two trials, each measuring the resting metabolic rate (RMR) at 8:00 (baseline), fasting for at least 12 hours, and resting from physical activity for 24 hours. RMR was detected immediately after protocol exercise and hourly thereafter until returning to baseline. Among the various RMR measurements, the subjects remained in conditions of fasting and rest. In the first trial, one hour after the first metabolic measurement (at rest - RMR0), the subjects performed a SW protocol with the KT (KST) consisting of 30 seconds of two-handed SW movement (Figure 1), with a KT load equal to 1/3 of body weight, performed in 30 seconds of movement and 30 seconds of rest, still in place, for a total of ten minutes. During the KST, calories from energy expenditure and heart rate were monitored. After a week, from the test, the subjects were subjected to the same procedures as the KST test, however, replacing the same exercise with continuous running (CC). The CC consisted of running at 8.5 km / h for females and 10 km / h for males at 1% gradient until reaching the same caloric consumption obtained in the previous test of the KST expressed by the same subject. Anthropometric data were collected before each trial. The Cosmed quark b2 metabolimeter (Cosmed, Rome, Italy) was used to evaluate the RMR, by means of which Vo2 and Kcal data were collected every 30 seconds (instrumental sampling). The calorie consumption, during both protocols (KST and CC), was instantly monitored with the Cosmed Fitmate Pro indirect calorimetry (Cosmed, Rome, Italy).

6. Data Analysis and Results

Only KSTs performed with the correct technique were considered valid throughout the study. Statistical analyzes were performed using Prism Graphpad (San Diego, California). Data were reported as mean ± standard deviation (SD) and statistical significance was set to $p < 0.05$. The paired t-test was used to compare VO2 EPOC and RER values between KST and CC. During the isocaloric attacks, subjects consumed on average 94.5 ± 18 Kcal with no significant difference in the duration of the studies (KST: 10 min; CR: 8.15 ± 1, $p > 0.05$). On average, energy expenditure was greater during the post-exercise period KST compared to CC (KST: 1.18 ± 0.2 Kcal / min; CC: 1.01 ± 0.1 Kcal / min, $p < 0.05$, Figure 2).
Considering the time to return to RMR (KST: 158 ± 51 min; CC: 136.3 ± 55 min, $p > 0.05$, Figure 3), higher post-exercise energy consumption was observed after KST compared to CC (KST: 183.6 ± 55 Kcal; CC: 139.5 ± 66 Kcal, $p < 0.05$, Figure 4).

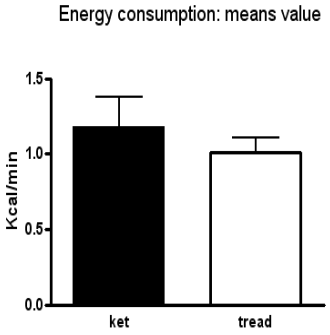
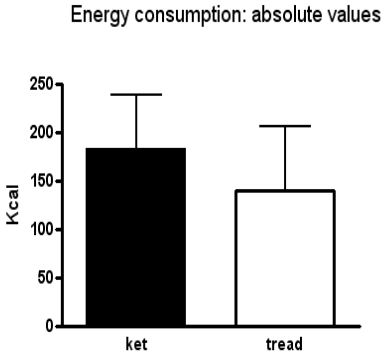
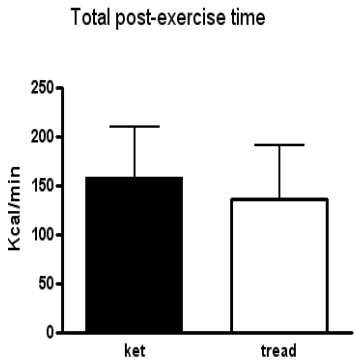
Figure 2	
Figure 3	

Figure 4	

7. Conclusions

The KB swing exercise can be used by both beginners and experienced athletes to improve the intensity of aerobic endurance training. In fact, this 10-minute KST research protocol is sufficient to meet current criteria for the development of aerobic capacity and could represent an alternative training means. Other factors to investigate may be the duration of the SW versus recovery time, the weight of the KB, the advanced level of other SW techniques and the overall volume of work that can produce optimal results for performance. In addition, the SW with the KB can be effective for activating multiple muscle groups and therefore also valid for the work out of strength. Future studies can certainly investigate the eccentric flexion movement of the hips using electromyography for the assessment of muscle strength. It is important to point out that during the use of the exercises with the KB, that the movement must be correct to preserve the natural mechanics and the correct alignment of the spine (Pollock et al., 1998; McGill, 2015). In isocaloric conditions, KIT determines a higher post-exercise energy expenditure than CC. The two paradigms return to baseline energy expenditure values at approximately the same time. From these analyses, it is concluded that there are no well-defined methodologies to develop motor skills; for this reason it is recommended to adopt synchronic methodologies (Moliterni, 2021) but only if they help to enhance the person's skills. The scope of revaluation is certainly that of the sciences of movement, because the body is not only the vehicle of learning, but also constitutes its purpose, the object of analysis, very specific content of the discipline of study (Scarpa, 2021). Therefore, the education to the development of skills that involve the whole person implies another obvious certainty: the impossibility of transferring from one head to another the practical wisdom that justifies the existence of skills. It is not possible to "teach" skills in the same way as technologies or content are taught, but the only way to be pedagogically competent is to accompany consciously and responsibly, athletes as well as students in the educational process, giving them direct testimony, showing they are competent. By transferring this awareness into the motor sciences, we want to conclude that the body's positive and educational power can only be preserved by experiencing it.

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