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Comparison between sprint training methods in different types of athletes

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ABSTRACT

Each category of disability includes a different type of training that meets your needs. Therefore it is important that each trainer is able to make adequate methodological-didactic decisions, resorting to an ecological and/or cognitive approach, depending on the objectives to be achieved. The following research aims to study the differences in the theories-methods of sprint training (100 meters) adopted in the different categories of athletes: élite able-bodied and disabled athlete. The method adopted is the archival research with the comparison of selected scientific product selected through the revision in the specific topics. The described data contains elements of the different physical characteristics of each athlete, the limits, the possibilities that each one possesses and the organic-muscular adaptations. In conclusion, it is possible to affirm that this implies a personal adaptation to the training method, capable to enhancing all types of athletes according to their specific characteristics. **Keywords:** Sprint training; Training methods; Disabled athletes; Adapted physical activity; Heuristic learning; Prescriptive teaching.

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INTRODUCTION

In recent decades we are placing increased attention to people with disabilities, and especially in the world of sport for disabled. The importance of sport for the disabled was born in 1944 with the intuition of Ludwig Guttmann, who organized specific courses in rehabilitation centres for people with motor deficits, up to 1960 when the first games were organized for disabled athletes (the so-called "Paralympics"), which were held for the first time in Rome. From that moment, talk about sports and disabled has not become a taboo, on the contrary, more and more often, those who have some kind of disability are encouraged to practice healthy sport (D'Isanto et al., 2016). Finally, today sporting activity is widespread among the disabled and is becoming a growing trend, thanks to the numerous disabled sports associations that train all those who have a disability (physical, mental or sensorial). Each type of athlete requires a different training program, so anyone who decides to take care of teaching/training of motor and sports activities must be able to make adequate methodological-didactic decisions (Pisapia et al., 2018). In the specific case of the fast race, the shortest competition on the track is the 100-meter sprint and is considered one of the most popular athletic competitions. The main goal of the 100-meter sprint is to cover this distance as quickly as possible. It often takes place in youth, university, national, Olympic and Paralympic competitions. Often, it is erroneously taken for granted that 100 meters shoot is a simple thing, given the short distance, but this discipline requires a lot of training and commitment (Ferrara et al. 2019). There are numerous strategies that can be used to train better and achieve good results (Alminni et al., 2019). In particular, the athlete's performance, in a 100-meter run, is divided into three phases: in the first, the speed increases (acceleration phase about 0-30m) until it reaches its maximum value which will be maintained only for a few seconds (maximum speed phase 30-70m). In the final section, instead, there is a decrease in speed (phase of decreasing speed 70-100m) (Forte et al., 2019). Therefore, the running technique involves a purely linear movement and no centrifugal or centripetal force (Nataša J. Janjić et al., 2017). The subjects to which the following work refers are athletes belonging to the following categories: amputees, brain-damaged and normal-born. The aim of the research is to identify, from the recognition of scientific literature, a meeting point between the training methods applied on able-bodied athletes and on athletes with the aforementioned disabilities and to understand whether the latter are valid for all categories (disabled and non-disabled) (Pisapia et al., 2019).

METHOD

Not having a group available on which to perform an experimental research, the method adopted in this study is of a theoretical type, more specifically of a logical-rational-deductive type. In particular, the type of research adopted is archive research (or historical research) consisting in the analysis of collected data obtained from the already existing scientific literature, not having the possibility to manipulate the object of study nor to have direct contact with observational data. However, it can only respond to a few hypotheses, that is, only to those that are reflected in the archived data, which generally contain partial information. It consists of:

- Search in archive documents if was already written something inherent to the research topic. This serves to understand both people who may have produced documents useful for research, and to understand which documents on the subject have already been identified by other researchers;
- The documents are ordered according to the order given by the institution or the person who created them;
- There are research tools (like censuses, guides and inventories) that help to identify the archival funds of interest;
- The inventory is the main tool that shows the overall picture of the deeds for a given topic;

- Register where there is given a description of the documents and a brief summary of the contents.

After a careful analysis of the selected scientific products, we move on to the comparison of the latter to hypothesize a training methodology applicable for all categories of elite athletes (able-bodied and with disabilities).

RESULTS

In order to best compete a 100-meter race, it is necessary to improve one's general athletic level through a specific training program, which includes a strengthening of the cardiovascular system as well as endurance training. A week-type of work must include specific core-stability sessions in order to improve the stability of own system and avoid and / or prevent dangerous compensation, insert particular and specific work of force to alternate with those on the track, a particular tense path to combine various expressions and exercises of strength (with overloads, plyometrics) using a sort of contrast between the various elements. Once the "entry" level is established to which the subject settles, it is possible to prepare a progressive program that guides the subject to perform increasingly demanding exercises (Aditi S. Majumdar et al., 2011). It is of fundamental importance to present to each athlete "running" as a movement in the life of a relationship, rather than as a moment of the dynamic technical specialization of an athletic form. Therefore it is necessary to prefix in a very simple way how to bring the support of the foot, the correct positioning of the bust and the movements of the upper limbs through the following suggestions:

- Run on the spot, on the virtual space drawn around you by your outstretched arm;
- Run freely in the space available in the respect of the companions;
- Repeat the same situation by changing the rhythm of execution to a nod of the teacher and thus running slow or fast;
- Run without making noise on the floor;
- Run within spaces delimited by lines drawn on the ground;
- Slalom running among the objects placed on the ground;
- Run in a circle on a marked path on the ground (with a club, etc.);
- Summarize the three previous situations in a single path.

Other exercises that can be used:

- Groups of four or five athletes hold a circle with their right; at the start they run in a circle,
- At the gearbox it turns in the opposite direction;
- Mini relay races on ten / fifteen meters, etc;
- Mark a curve by placing a few circles on the ground at a suitable distance and inviting the athletes to make a single support in each circle, alternating the right and left course.

As for departures, instead, to prompt, through a sound and visual stimulus, motor responses in a short time, the following activities are suggested:

- From a sitting position on the ground facing the direction of travel: sound stimulation and acceleration forward in groups of 4 or 5 athletes for about ten minutes;
- From sitting on the ground with the opposite side to the direction of travel: sound stimulus, stand up, turn around and perform an acceleration as above;
- The same from belly to floor from back to ground and from any other situation;

- With the support of the hands to the wall by entrusting the weight of the body to the upper limbs, an optimal awareness of the bust position during the race is allowed.

In training, the capacity of sprint is trained through repetitions of 30-40 meters starting from a standing start or from slow running. In this way the improvement of the acceleration capacity is simultaneously stimulated. The first phase of the sprint is the most sensitive to the force, while after 20 meters the nervous component takes over (Raiola, 2014, Raiola 2012). During the repetitions on 30-40 meters, the athlete must commit to the maximum without reservations. The length of the repetitions (30-40 meters) must not undergo significant changes, the number of repetitions and of series are, instead, influenced by the performance level and the characteristics of the athlete (Di Tore et al., 2016, Di Tore et al., 2018). Depending on the degree of athletic preparation, different training schemes are used. For example, for a medium-high level sportsman, speed training can be set as follows: 2 series of 6 repetitions on 30 meters with 2 minutes recovery between repetitions and 4 minutes between series.

Pure rapidity is the most important parameter in developing speed. However, attention should also be paid to strength training for better acceleration. The acceleration capacity generally trains, covering distances between 10-20 meters. At the beginning of a sprint it is important to have a good explosive force (max force) that is used in the support and discharge to the ground of muscle power (it plays a decisive role in the first meters in which there is a longer contact time of the foot). It is very difficult to train and reconcile strength training with speed training, because when one varies, the other changes (Rago et al., 2017). However, it is possible to overcome this problem by adopting two types of work: alternate series with heavy loads and series with lighter loads or alternate heavy loads and light loads in the same series. These typologies serve to stimulate the neuromuscular system more, because the greater load involves a slower execution of the exercise while the lower load stimulates the speed of execution thrusts (Raiola et al., 2012).

Table 1. Weekly training-type planning proposal

Monday	Morning: 3x300m recovery 12'
Tuesday	Morning: strength 6x4 flat bench; 4x (6 ½ squat-jump 110 kg + 10 good morning 2x22 kg + 6 throw ball 5 kg + 6 jumps on the plinth); Core stability Afternoon: stretching + sauna
Wednesday	Morning: speed 6x40 m – 4x60 m – 1x350 m Afternoon: physiotherapy
Thursday	Morning: Core stability Forza: 4x (6 ½ squat-jump 110 kg + 10 rapid squat 2x22 kg + 6 throw ball 5 kg + 6 jump off the bench); 3x10 lat machine; 3x10 inverse crosses
Friday	Morning: 4x250 m recovery 8' Afternoon: physiotherapy
Saturday	Morning: speed 50m + 80m + 50m – rec. 8' 50m + 100m + 50 – rec. 8' 50m + 80 + 50 – rec. 8' 50+80+50m – rec. 8' Afternoon: physiotherapy

DISCUSSION

From the analysis carried out till now, it is possible, therefore, to deduce that sprint performances depend on many factors such as: anthropometric measurements (weight, height, limb length, etc.), muscular composition, etc. To combat these limits and achieve positive effects on sprint performance, the goal of the coach is to try to plan workouts aimed at increasing an athlete's strength, power and neuro-muscular system. Sprint running is typically a complex and multi-articular exercise (Raiola, Rago, 2014, Raiola, 2013). Although in sprints the focus is more on the lower part of the body, the upper one also has the important role of counterbalancing the actions of the lower part (Altavilla et al., 2016; Altavilla et al., 2017; Altavilla et al., 2018). The shoulder region is the origin of the swing of the arm, while the hip region is the origin of the swing of the leg: the arms act in a contralateral way on each leg. Stride frequency, which contributes significantly to maximum running speed, is best adapted to strong shoulders and hips, as they are essential for generating a faster swing. Therefore, it is essential to direct both the production of strength and speed of muscles in endurance training, to maximize performance (Altavilla et al., 2018, Altavilla et al., 2015, Altavilla, 2014). We have said that depending on the degree of athletic preparation, different training schemes are used, so it is necessary to go into the details of an individualized job. It is therefore necessary to intervene step by step, so that every motor proposal becomes an automatic and unconscious action, such as to allow an ever greater performance of the spontaneous gesture, natural and as close as possible to the orthodox technique (Cirillo et al., 2016). For this reason the coach establishes a progressive educational process in which each element acquired is basic to the next. The improvement will manifest itself both with the increase in the number of known motor fractions, and with the improvement of their execution and with an increasingly high overall coordination. The teaching methodology will be based on the conditioning of learning through rhythmic exercises, movement associated with fundamental objectives such as posture control, strengthening of breathing, voluntary control and relaxation (Di Tore et al., 2012; Raiola, 2017, Raiola et al., 2017, Raiola et al., 2018). Awareness of rhythms is essential for learning athletic gestures. In fact, to achieve a good running ability, it is necessary to study the alternating movements of the upper and lower limbs with the help of the instructor, who, during the execution, performs a beat of the hands rhythmically.

CONCLUSION

The present research has the purpose to compare, from the reconnaissance of the scientific literature, the different training theories-methods of the fast race, more specifically of the 100-meter sprint, which are currently adopted in the different categories of élite athletes, and that is to say: able-bodied, amputees and brain-damaged (D'Isanto et al., 2018, D'Isanto, 2019). Each athlete has different psycho-physical characteristics (Severino et al., 2019), so it is the task of the coach to value each of them according to their specificity, adapting the training theories-methods to all categories of athletes. In particular, a series of specific exercises and personal training programs are used, which can enhance all types of athletes to achieve common goals (D'Elia, 2019).

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