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A Research on Speed-Centered Pre-competition Training of 1500 Meters Sportsman

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Abstract

This paper starts from the characteristic of 1500 meters sports to explore the method of speed capacity training. Middle-distance race is a speed endurance event in track and field sports, the character of which is its high intension muscle movement for a long time. The more competitive and the nearer level of the sports, the higher request of the speed is asked. This article analyses and discusses the development of modern middle-distance race characteristics by literature data, statistics and antitheses. It points out that the guiding ideology "speed training as the center" and high speed ability training is the main and effective ways of training middle-distance race nowadays.

Keywords: Middle-distance race, speed training, high speed capacity

1. Introduction

The theory and method of modern long-distance race has been developed for nearly 100 years. Be it natural run training method, or intermittent training method, or the "marathon" training method, or Chinese famous coaches Ma Renjun's training method in 90 s, they are all centered around one contradiction--volume and intensity. And every change and development in training theory and method is followed by more advanced theory, more scientific training method and the emergence of the new world record and world champion.

After 1980, the world middle-distance theory takes a new leap, with highlighting training volume substituted by highlighting the training intensity, especially Mr. Ma, a famous coach in our country, is capable of breaking through the restricted zone in traditional theory of middle-distance race, which has injected new ideas to world long –distance race theory, method and development. Fully reveals the competition is not only of endurance, but more of the speed, more of competition between "high speed" continuous run steering ability of athletes.

1500m is a typical cyclical endurance project. Its prominent features are its special speed endurance in high speed continuous run, and high intension muscle movement in a long time. Judging from the characteristics of the project, load intensity and load capacity are indispensable elements in the training. Nowadays, only at the end of long-distance race can we get to know which one is better. Those slow in speed are bound to lose. Therefore, speed is the critical part in determine an athlete's final spurt and good grades. Throughout the past and present of the middle-distance race training, today it gradually broker through the traditional large volume training and established "speed training as the center" as the guiding ideology, which is now the main and effective ways of training middle-distance race during athletes' many years of training. However, it remains a question as to how to implement the speed training as the core of guiding thought, reasonably arrangement of the training load and intensity load proportion, the determinant of the training time and times.

2. Current Situation and Development Trend of the 1500 Meter Movement

World outstanding athletes not only pay close attention to the special speed training. They also break the routine, boldly to training and strength training together, such as the Romanian woman's middle and long distance running training and training in Africa and Kenya, Morocco and Russian men and women middle and long distance running training. They not only pay attention to the high speed training of the premise of the amount of artillery, but to improve the special speed as the core of training.

From the 60's to 80's, the main difference between the world's advanced level and the advanced level of the world's advanced level is the difference of the speed of middle distance runner. We have a big gap between

athletes, the general endurance level and the world's top athletes, but considering the level of special speed, the final sprint speed of the level, we lag behind. At present, the improvement of the ability of middle distance running training in our country still stays on the amount, but the modern middle distance running is the ability of the special high speed, so the special speed of the middle distance running is the core of training.

From the world record in the past years, the results of middle distance race are always changing, from table 1, it can be seen from table that in the course of time, the speed of middle distance runner is increased year by year. Which lasted 87 years, the men 10000m score from 30min58.8s to the current 26min22.75s ratio of the original record improving 4min36.5s, the average speed has increased from the initial 6.32m/s to 5.38m/s, increased by 2m/s. According to reports, the world outstanding 10000m running male athletes, the final 400m sprint about in 50-53s, average speed is 8m / S - 7.5/s, 1500m run. The last 200m sprint in 23-24s, the average rate of 8.7 - 8.3m/s, women's 10000m world record holder Wang Junxia, average velocity over the 1000m sprint to 6.26m/s. In the 26th Olympic Games 5000m final, final lap ran 57s average per 100m nearly 14.25s. A middle distance runner, in order to have such a sprint ability, it must have a higher absolute speed. For example: the British famous middle distance runner plug. Branch, in the training focus on the improvement of speed strength, 100m score reached 10.39s, 400m45.08s, he created the 800m 1min41.73s world record in 1981, until August 1997 was the Danish Kenya Kipketer to 1min41.24s's score. Time interval of 16 years, in 1995, breaking the world record of 1500m and 3000m2 Algeria's athlete Moseley is a typical speed type athlete, whose 400m score is 46.13s, the speed reached 8.7m/s. It can be seen that the speed of middle distance runner has a trend of further improvement.

Table 1. Development of world records in the middle distance race (1910-1998.11)

		Initial-results	time	Average-speed	current-results	time	Average-speed	increased-percentage	year
Male	800m	1:51.9	1912.7	7.15	1:41.11	1997.8	7.91	0.76	85
	1500m	3:55.8	1912.6	5.70	3:26.00	1998.7	7.33	0.37	86
	5000m	14:36.6	1923.7	5.70	13:39.36	1998.6	6.66	0.96	86
	10000m	30:58.8	1911.11	5.38	26:26.70	1998.6	6.32	0.94	87
Female	800m	2:16.6	1928.8	5.85	1:52.32	1983.7	7.06	1.21	55
	1500m	4:10.7	1967.9	5.98	3:50.46	1983.7	6.51	0.53	14
	5000m	8:27.2	1976.7	5.91	8.06.11	1993.7	6.16	0.25	17
	10000m	30:13.74	1986.7	5.51	29:31.78	1993.7	5.64	0.13	7

3. Pre-competition Training with Speed as the Core of the Training Method

For middle and long distance running project, the main factor that decides the result of special sports is speed, speed strength and speed endurance level. Speed endurance is the foundation, the speed is the core, the speed strength and strength endurance is the guarantee. Oxygen mixed training, the final CP - ATP and anaerobic metabolism of the main strength training, improving athletes in training, competition in various systems for energy, energy output power and the ability to mobilize in the fatigue state, which is the mainstream. From 1990 to 1998, men and women middle distance running project and Masson, 12 people broke 35 world record or the world's best results is a good evidence.

3.1 Speed Training

To cultivate the high speed of the middle distance runner, we must speed up and down the speed training, training should focus on speed and speed endurance, short, long, short, training method of choice should be close to the content of the training. But emphasizing the speed of training can not be separated from the characteristics of the arrangement, which should consider the improvement of the absolute speed and be combined with special features. The other is that the speed training must not only pay attention to the quality, but also pay attention to the high excitability, the body of the speed of the special and quality training, the effect is good. Meanwhile, the nervous system, muscle system exercise, the combination of ability and technology are also good. Through several years of training practice, this kind of training method and arrangement is suitable for middle and long distance running athletes and it is effective to improve the speed and endurance.

Although the foundation of the long distance running project is endurance, but with what speed to run is a key issue. In the past, in order to improve the endurance of athletes running, it generally used a large number of low

intensity of cross country running or running and so on. In essence, this kind of low speed runs to the athlete's heart and lung organ stimulation and it is not to be too big role, which can not reach the training effect and the purpose of aerobic metabolism. It just however a waste of time.Therefore, development of middle and long distance runners endurance run to have certain speed constraint, such as male players per kilometer run speed to 3 minutes and 40 seconds to 4 minutes between, run away from 8 to 16 km, the pulse control between 160 ~ 170 beats / min, from the point of physiology and biochemistry of the pulse, it just can increase the athlete's heart capacity which is stimulation of mitochondrial metabolism - the most suitable intensity range. Literature data show that when the human body is in the range of motion, the output is close to the maximum and the maximal oxygen uptake is the most important index to evaluate the endurance. So middle and long distance running athletes is in endurance running training to emphasize a certain speed (recovery run except, especially on 16 ~ 17 years after 2 ~ 4 years training of juvenile athletes is very necessary, including morning exercise training also cannot ignore the requirements.)

The technical features of excellent medium-long distance athletes are high frequency, fast rhythm, small gravity wave aberration, stable gravity, being relaxed and labor saving on the basis of keeping the best pace length. During the whole process of competition, high frequency and evident rhythm are mainly concluded as fast and rhythm. Being on this feature, during the teaching and training, we should get hang of the link technical teaching and training universally ASAP and pay attention to the standards, rhythm, reasoning of actions during technical training, stable and labor saving , the coordination between upper and lower limbs, sequence of using forces as well as structural direction, etc.. The running abilities of long time, high frequency and fast rhythm owned by medium-long distance athletes will be formed and reached only through steadfastly getting hang of the technique fast and rhythm ASAP in order to lay a good exclusive speed foundation to enter into the adulthood.

3.2 Speed and Strength Training

According to the development trend and running performance prediction of the existing medium-long distance running, all the excellent athletes in medium-long distance program should consider how to further improve the performance of running. Athletes will not improve their performance without successfully implementing the following effective speed and force training methods.

3.2.1 Sandy Running Training

Sandy running is of great benefit to medium-long distance athletes, many world-class medium-long distance athletes treat sandy running as a major content of the plan for speed and force training. The athletes with Ezequiel Cerutti as the coach once trained a lot in the dune zone of Australian harbor in bare foot for large amount of speed and force. Elliot, this training accounts for a great proportion of the former world gold winner and record keeper of 1500m running in 1960. Pitifully, the ignorance of sandy running in China becomes pretty serious. Most of the male medium-long distance athletes start to attempt to accept training in sandy land in Africa and in bare foot when promised by their physical functions which wins an excellent training performance. In the sandy training, athletes suffer exhaustion load on cardiovascular system and muscle system with a slow speed, which cannot be achieved by other trainings. Therefore, athletes can achieve evident performance only through few exercises. Athletes should treat sandy training seriously in multiple manners with few possible wounds. When training on highway, the medium-long athletes are always shocked when feet touch the ground, especially up the slope. Compared by this, running-jumping training in sandy lands will keep them safe. Conversely, sandy training can make them healthier and can help athletes get hang of a running technique with better biochemical effect in running. Additionally, running training in sandy land, grassland and soft land can grant athletes a better speed and force. After the accomplishment of running training, not too many speed and force trainings are needed to maintain the balanced development of sorts of muscle force. When promised by conditions, it’s important for medium-long distance athletes to do some force exercises on sandy land, grassland or soft ground in bare foot after training and competition to achieve a better speed and force training effect.

3.2.2 Running in Water

Auxiliary training for running in swimming pool is much better than doing such auxiliary training on other instruments or places, as running in water can accelerate the recovery of athletes’ organisms and the development of force and is helpful to maintain the balance between various force trainings. Speed, speed endurance and speed force are three abilities that should be developed in a balanced way. If athletes only pay attention to the development of speed and endurance in different phases of preparation period, they may get hurt due to synchronous development of speed force. Hard muscle (especially in the early days after running) with pains may be noticed in primary muscle diagnosis which will not be easily relaxed. Moreover, muscle blood flow disturbance and muscle anoxia may appear which may further lead to the losing of flexibility of muscles,

and the athletes may get hurt when the flexibility of muscle is lost too much which may cause that the athletes can't accept running training in the whole training season, even the end of the sports career. That's why some intellectual coaches and athletes add some speed force training after training of speed and speed endurance and fierce competition. Additionally, athletes should better do some running exercise in water in every two training courses. If the athletes have to stop training for a long time due to hurts, the best way to keep a good aerobic sporting through accomplishing the running exercises regulated in running training course in the running in water course in swimming pool. The cardiovascular functions and speed force level can be improved through running exercises in water and the athletes are definitely in a perfect condition for training or competition if they don't get hurt for a long time.

3.2.3 Flexibility

Flexibility is of great significance to the performance of speed, speed endurance and speed force for medium-long distance athletes. Poor flexibility can limit movement range which may lead to falling moving speed and the retreatment of coordination between nerves and muscles. Many athletes worry that flexibility training may influence their speed force, yet correct flexibility training will not influence the speed force, instead it improve the speed force of athletes. The increasing speed force can enhance muscle force endurance and speed endurance to a certain extent and athletes may lose the competition when the flexibility or muscle force of specific location is not evenly developed. According to some studies, increasing flexibility on joint location can improve its surrounding muscle flexibility and force.

High muscle flexibility may lead to the increase of force which may further enlarge force storage when muscle extension and contraction abilities can increase the muscle speed force. Recently, University of Western Australia made an test to 5000m athletes on the purpose of studying whether higher muscle flexibility force might be conducive to the sporting performance. 8-week long static extension exercise for the experimental group, while no flexibility exercise was requested to the control group and both groups continued to finish their normal training plan. The experimental group do some flexibility exercise of 10~15 minutes after normal training course which help them win an average increase of 31.1% in flexibility and an increase of 5.4% performance in fast barbell squat as well as an average increase of 54''43 in exclusive sporting performance. Compared, the flexibility, fast barbell squat and exclusive sporting abilities are not evidently improved in the experimental group. From the result of study, we can reach a conclusion that flexibility exercise will not only increase the flexibility surrounding joints and increase muscle force. Moreover, with the improvement of muscle flexibility and tension, muscle can better use the energy of speed force.

This discovery is of special significance to muscle pre-extension before activity and to the items demand increase of muscle force with no change to weight. Medium-long distance athletes don't need rough muscle, instead, they need muscle speed force. To be visualized, medium-long distance athletes need muscle force like that of deer, instead of that of a cow. As the muscle fiber of deer is long with a small intersection, a strong contractibility, a good flexibility, as strong speed force; conversely, the muscle fiber of a cow is short with a large intersection, a poor speed force and a strong absolute force. Increase of muscle speed force is the necessary quality demand of medium-long distance athletes. Through flexibility exercise, medium-long distance athletes can get necessary dynamic extension, instead of static extension like lying on the floor with hands and feet stretched. The more effective the technical action of an athlete is, the better the flexibility of him or her is along with a smaller possibility of getting hurt. Therefore, most of athletes use good running technology to implement dynamic flexion and extension exercise for a higher speed force.

3.2.4 Circulative Speed Force Training and Speed Force Training with Equal Super Length

The advantage of these two training methods is variable. The diversity of training can help relieve the physical and psychological consumption of athletes after implementation of repetitively same exercise.

Circulative speed force training is a traditional method to complement the training preparation period of medium-long distance athletes and can help combine the new various training stimulus adopted by the athletes. The combination of stimulus can promote the overall development of the whole body forces which is also usually encountered in medium-long distance running exercise. The advantage of circulative speed force training is that each part of the body of athletes is stimulated one by one until the whole body is stimulated, meanwhile and a higher heart rate within the whole training period can be maintained.

As the fatigue of a specific location on the body of an athlete is caused by internal lactic acid accumulation, the alternative use of body parts (upper limb, lower limb, action muscle group, resistant muscle group) can help relieve the appearance of the force exhaustion of the whole body. In this way, the training course can continue for a longer time and aerobic training performance can be achieved to the largest extent when implementing

force training. The major methods of circulative speed force training are in the following order: push-up →sit-up →vertical legs split →parallel bars arms flexion and extension →knee raise →pull-up →sit straight with raising legs →legs open →legs closed →rope climbing →right angle sitting bracing →arm step, etc..

Speed force training with equal super length can be applied to the ordinary physical training in preparation period for medium-long athletes. Speed force training with equal super length is of greatly effective to the medium-long distance athletes. In order to achieve a proper development of muscle force, various exercises must be taken strictly. The speed force training with equal super length is in the following order: high leg lift →kick hip run →long striding →single foot jump →single or double foot tip jump →knee to breast jump with double feet →jump and rotate 180º →frog jump →double feet rope skipping, etc..

The above 2 speed force training methods are mainly concentrated on muscle groups in the upper body and lower limbs. If designated stable action speeds are used in all exercises, a necessary heart rate demanded for maintaining cardiovascular training and force stimulus when the athletes run fast towards the next location for exercise as designed. Coach or team members should better watch them as the trainees may have the mindset of being anxious to finish the exercise when being close to their final fatigue. The two speed force trainings require strictly about the physicality of athletes and the trainees can achieve a good speed force training effect after the training of the whole structure for 20~25 minutes.

3.3 Speed Endurance

Speed endurance is the core of medium-long distance running while speed is the basis and guarantee of speed endurance. Only when the basis of the item can be seized, a high-efficient effect can be achieved. We can see through analysis of the whole process of modern medium-long distance running competition, the whole process is undergoing with constantly changing speed and athletes should be able to constantly speed up during running, while anaerobic metabolism must be used to provide energy source for running. Due to changing speeds, the anaerobic process during medium-long distance competition doesn't only appear in the final dashing phase, instead the whole course. Due to an increasing proportion of anaerobic metabolism, to develop the energy supply through glycolysis, the movement load should reach at a certain extent which is also the best method to increase the acid-resistant and enduring ability of the athletes. Therefore, speed training should penetrate into the whole process of training.

Speed and endurance is contradictory, united and restricted on each other, once arrangements are not properly made, conflicts will definitely appear. According to the movement biochemical theory, the source of speed originates form the fast decomposition of ATP and the resynthesis of CP, the anaerobic metabolism of phosphagen. The energy of endurance comes from anaerobic glycolysis. During training, over emphasized endurance training will lead to the over development of the ability of energy supply through glycolysis which will further restrict the increase of speed quality. Speed and endurance is determined by individual difference.

In the past, people generally considered that medium-long distance running is an endurance item, therefore, the training on lactic acid energy is not enough and the performance of medium-long distance running is staying unchanged. Since late 1990s, speed and endurance were put on the same position, and medium-long distance elite athletes were considered not only to be with good endurance but also with accelerated speed. Factors determining the performance of medium-long distance running is the speed and speed endurance levels when speed endurance is the basis ,speed is the core, force is the guarantee. Focus on mixed aerobic and anaerobic training after aerobic metabolism training. Finally, take large intensity and high speed training predominated by anaerobic glycolysis metabolism to develop fast speed ability and speed endurance ability.

According to biochemical study, the glycolysis energy metabolism of ATP-CP accounts for 20~30% or so in the modern medium-long distance running which indicates speed's position in medium-long distance running. When developing speed, pay attention to the development of speed and endurance. Both factors should be implemented at the same time. The corresponding biochemical factors can always be changed through common training methods on endurance and speed development. Aerobic load training like field run and some force training is usually taken for the development of endurance, when average heart rate is 40~150 times/minute, PH is 7.35, blood lactic acid is 3mmol /L. Mixed aerobic and anaerobic load training like repetitive section run, varied pace running and 5000m rhythm running is always taken for the development of speed and endurance, when average heart rate is 150~180 times/minute, PH drops from 7.36 to 7.20 and the blood lactic acid is 3~15mmol/L.

Wang Junxia basically enhances her energy supply ability from various systems in training and competition through the above three training methods in an all round manner and enhances her speed ability under energy output and fatigue. Therefore, these methods are always depended on to run in a high speed in training and competition along with energy utilization and saving high jump tonic technology. Because of this, she broke the

world record in 10000m female competition in the seventh session of nationwide sporting games with 8’17’’34 in the final 3000m. This truth eloquently indicates the great potential of medium-long distance athletes in speed training through endurance training like anaerobic load.

4. Speed Force Training Should Be Based on the Principle of Balanced Development

During the training of medium-long distance running, athletes should pay attention to the balanced development of various physical qualities. We can treat endurance, speed and force as three angles being balanced with the central point of the triangle that when one angle is lifted up, the other angles will be in a lower position. If two angles are lifted up at the same time, the rest angle will also be in a lower position. Generally speaking, it’s difficult to lift up three angles, but is necessary. Through maintaining the balanced development of endurance, speed and force, athletes can enhance the overall level of physical qualities in a faster way.

Although this theory is purely theoretical, it’s still conducive for people to understand the three components demanded by medium-long distance athletes. Through combination of speed force training, force endurance training, speed training, endurance training, speed endurance training with the development of agility, flexibility and extensibility, muscle wastage and narrowing movement scale can be prevented. After training courses on speed force, force endurance, speed and speed endurance, relaxation activities should be taken, including some exercises on extensibility and flexibility in the form of entertainment activity in order to sustain the high-level coordination between nerve muscles. Otherwise, it may appear that technical level drops while force increases which usually occur on fast growing youth athletes.

5. Conclusions

The target of medium-long distance training is to run faster within a specific distance, namely to exert the maximum absolute speed within a certain limit. Therefore, all the training methods and manners should surround this target. Each world class excellent athletes put speed at the first position. Firstly, the performance of medium-long distance athletes depends on the born quality and good physical shape and cardio-pulmonary function of the athletes. Secondly, the specific training is the necessary method to enhance the sporting performance. Through analysis of some new changes in medium-long distance training in the world, it is found that speed quality is the major factor to enhance the performance of medium-long running. Add in a large sum of items with large intensity and short distance has become a new trend for the development of the world medium-long distance running and a major guarantee to constantly enhance the performance of medium-long distance running.

Through the method about speed training in this thesis, the performance of medium-long distance athletes can be improved, especially the performance of those athletes who once ignore speed ability training.

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