

The Effect of Special Critical Speed Exercises in Developing Variables of Running Strides and Achievement in the 100 m Dash Race for Youth

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ABSTRACT

When we look at the great achievements at each source of developing sport levels all over the world, we will realize that sport training has a great position in developing human abilities, discover their latent powers and transform them to great achievements that will last for eternity along history. Countries around the world are interested in developing various sports and at all levels. This is clear in Olympic and world championships in terms of raising performance and record levels. This is also evidence on high ability to employ scientific facts and theories to serve sport development. Lately, a set of critical speed exercises were introduced as they express speed related to performance with a special rule that may become an evidence on the use of times of training intensities and determine these intensities based on the output time period of this training. Therefore, the researcher decided to use a new training method to develop speed using new training methods to reach critical speed using target time, develop time, reaching achievement at the least possible time in performance as well as knowing the player's bio-kinematic movement. This means to analyze the performance of the player to be able to know the variables that are involved in performance and reach world achievement. The study aims to prepare exercises based on critical speed and define their effect on developing running strides (length and frequency) in the 100 m dash achievement for both groups of the study. The researcher proposed that there are statistically significant differences between pre- and post-tests for both groups of the study in variables under study. The empirical method was used by the design of two empirical groups. The sample of the study included 12 young players of 100 m dash races from the specialist care center for talents. Sample homogeneity was performed for members of the sample. After that, the researcher divided the sample into two groups randomly through polls. Each group included six players. The first empirical group applied critical speed exercises, while the second one applied speed training. Step length, stride frequency, achievement of 100 m dash within the Kinovea analysis for all variables of the study. The method was applied on (8) weeks in three training units per week with total 24 units. Items of the methodology were determined for both empirical groups in distances, repetitions, sets and rest periods. As for the difference in both groups, the first one calculates the times of distance performance and critical speed and found that critical speed exercises achieved a development in the length, frequency and achievement of 100 m dash better than the group of speed exercise s. the researcher recommends adopting special exercises according to critical speed time period in athletic training on 100 m dash event and for the youth, especially in the specialist center for talents.

Keywords: Special exercises, critical speed, running, achievement, the youth

Access this article online



Website:
<http://sjsr.se/>

ISSN:
2001-9211

INTRODUCTION

The sports training method develops the sports performance level to reach high levels of achievement in various sport competitions and these methods contribute to develop the achievement. The 100m dash race is one of the fast and short running

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competitions that consist of low start - reaction - acceleration -maximum speed – extending maximum speed, which constitute the technical stages of the race and affect in varying degrees. Recently, critical speed exercises were introduced as they express the special performance speed and there is a special law that could be evidence of the use of the times related to training intensity and determine special intensities according to the time extracted during training as the method of critical speed is one of the modern training methods used in the training of the higher levels of short, medium and long distances (1:24). It is no secret that there is an impact of variables such as running strides (step length and frequency) are of the kinematic variables in the study of player’s movement.

Therefore, the researcher decided to develop speed using new training methods to reach critical speed using the target time, work on the development time, reach achievement in less time possible to perform effectively, as well as knowledge of the player’s bio-kinematic movement or player performance analysis to be able to know the variables that involve in performance and reach higher achievement by the player.

The research aims to prepare exercises according to critical speed and get to know their impact on the development of strides of sprinting (step length and frequency) and the achievement of 100m dash for the youth for the two groups of the study.

The researcher proposed that there are statistically significant differences between pre and post tests for groups of the study in variables with statistically significant differences in the post-test between the two groups in the study for variables under study.

SCOPES OF THE STUDY

Human: young runners of 100m dash race (12 players).

Time: the period from 29/01/2016 to 16/04/2016.

Place: the Specialist Center for Talent Care.

METHODOLOGY OF THE STUDY

The study used the empirical study by design of two empirical groups.

SAMPLE OF THE STUDY

The sample of the study included 12 young players of 100m dash race from the Specialist Center for Talent Care. Table 2 shows that skewness values are between ± 3 which refers to homogeneity among members of the sample in variables related to homogeneity. After that, the researcher divided the sample into two groups randomly through a poll. Each of the empirical groups consists of six players. The first group applied critical speed exercises, whereas the second group applied speed exercises.

FIELD PROCEDURES OF THE STUDY

Variables of the Study

The researcher selected step length, stride frequency and achievement of 100 m dash within the Kinovea analysis for all variables of the study.

Exploratory Trial

The trial was carried out on Saturday 06/02/2016 in order to determine correctness of variables and ability to measure critical speed. Through this trial, the researcher determined the variables related to motor imaging machine, height of its lens, validity and then implemented it on a sample outside the study sample consisting of 4 players at the same position and for the same youth competition.

Pre-Tests

Pre-test was conducted on 13/02/2016 on Saturday at the National Center for Talent Care in the specialist school near Al Shaab Stadium. The researcher pictured the study sample upon conducting the achievement

Table 1: Sample homogeneity in weight, length, age and training age

Statistical methods variables	Measure unit	Arithmetic mean	Median	Standard deviation SD	Skewness coefficient
Age	Year	17.5834	17.5	3.3699	0.0743
Length	Cm	7092,1	7150,1	0556,0	3130,0
Weight	Kg	60	59	6681,3	8179,0
Training Age	Year	6667,1	5200,1	2083,0	113,2

Table 2: Arithmetic mean, standard deviation SD, calculated T value, error level and significance for pre- and post-Tests for both groups of the study

Statistical methods variables	Mean		SD		F Value	A.F	Calculated T	Significance Level	Difference significance
	Pre	Post	Pre	Post					
Critical speed exercises									
Step Length (m)	987,1	058,2	039,0	026,	072,	007,	957,10	000,0	Significant
Step Frequency (No.)	94,3	99,3	062,0	065,0	048,	018,0	63,2	046,0	Insignificant
Achievement (s)	75,12	157,12	139,	204,0	593,0	053,0	215,11	000,0	Significant
Speed exercises									
Step Length (m)	982,1	02,2	045,0	021,0	38,0	016,0	335,2	067,0	Significant
Step Frequency (No.)	978,3	932,3	157,0	078,0	046,0	036,0	265,1	262,0	Insignificant
Achievement (s)	699,12	594,12	241,0	186,0	105,0	044,0	371,2	064,0	Significant

test to count its time, step length and frequency by motor analysis.

Training Method

The method was applied from Friday 19/02/2016 to Wednesday 13/04/2016 as the course was along (8) weeks (3 training units a week) on Friday, Monday and Wednesday of each week, so the total of training units was (24 units). Items of the course were unified for both empirical groups as follows:

1. Using distances from 30 m to 120 m.
2. Intensity ranged between 85% and 100%.
3. High intensity interval training and frequency training were used.
4. The work was made according to rest periods of work (1:3, 1:4 and 1:5)
5. Repetitions ranged between: a single repetition with 100% intensity till 10 repetitions with an intensity of 85% was 2 – 4 groups.

As for the difference between the two groups: in the first group, distance performance times were counted as follows: The researcher used critical speed rule, which is a rule that was referred to in some Arab and foreign sources and references that indicated to the critical speed rule that was Arabized and applied by Dr. Sareh Al Fadli, Professor of Biomechanics and Kinematics at the Faculty of Physical Education and Sports Science - Baghdad University. The foreign source is: Brian Mackenzie; 101 Performance Evaluation Test, Electric pic, British library, 2005, pww57.

- Critical Speed = (the longest distance – the shortest distance) ÷ the difference between time in both distances.

Post-Tests

After completing training for both groups of the study, post-tests were conducted on Saturday 16/04/2016 with consideration of the same time and place conditions during which pre-tests were conducted.

Presenting, Analyzing and Discussing Results of Step Length and Achievement for Pre- and Post-Tests for Both Groups of the Study

Through results of Table 2, the researchers found that the first group using critical speed exercises developed with a range of step length as it considered one of the main significant aspects in the 100m dash race as an effective means to increase the speed in short distances provided they do not reduce the range of steps, and the player can reach the length of a typical step by adjusting the technical performance, so the researcher used the kinetic analysis program (Kinovea) to extract the length and the number of steps. In addition, there is a difference between race distances and thee researcher attributed reason for this difference between distances to the increasing speed consistent with (Qassim Hassan Hussein, 1987) (6:15) as he said that “high acceleration is accompanied by either expansion of steps or escalation of recurrence” and (Dia Al Taleb 1988) (4:22) also noted that “step length continues to increase the speed up till the athlete reaches his maximum speed”, as the used exercises result in improved tight and relaxed muscles of the legs causing development and improvement in step length, as stated by the (Sareh Al Fadli) (3:57) “exercises emphasizes the link between step length, speed, and accordingly can develop the maximum speed of the player in which the target is the judgment of step length, taking into account preservation of step frequency and manner consistent

with the increase in step length while running. On the contrary, if this efficiency decreases, this step will decrease as well”.

There are no significant differences in the variable of step frequency and the researchers attributed this to the fact that the player was dependent on the length of step in running in pre-test more than relying on frequency, as found by (Adel Mohammed Dahash) who said: “...and that the development in step length of the sample gives the indication that the frequency was consistent with length of the move and that any development happening both in stride length or frequency is over another” (5: 131) and this was shown in results. Moreover, it was found in the test results of achievement the development as a logical result for the development of physical attributes with direct relation to 100 m dash race and thus this is reflected on the development of achievement and this is consistent with the view of each of (Mohammad Hassan Allawi and Essam Abdul Khaliq) that “the 100m dash race to combines between speed and power, the correlation between speed and power has to be proportional and that there should be integration between strength and speed as strength is actually the motor reality, while speed is the motor appearance. The greater the strength in as little time as possible and the less time its exertion is, the more we will be able to overcome the resistance and benefit from the starting with maximum speed in the start-up phase” (2:29).

The researchers, through the results of tests, found that the second group did not develop in training with speed and this shows the effectiveness of the training course for critical speed using various training intensities through step length, frequency as well as achievement, as there are significant differences between the two tests between step length for critical speed training and without speed exercises, whereas in step frequency there were no significant differences because they are directly related to step length and frequency. The proportion between step lengths of the first distance

should be proportionate with step length in the second distance as well as frequency of steps during the race.

As for, achievement, the first set of critical speed exercises has developed more than the second group.

Presenting, Analyzing and Discussing Results of Step Length and Achievement of the Post-test for Both Groups of the Study

Through results of Table 3, the researchers found a notable development and improvement in post-tests attributed to the use critical speed of different intensities within the time-outs. This means in any time that is taken, intensities are distributed according to time and reducing the time-out during the distance traveled in the race in addition to the development of special physical abilities in the 100 m dash race reaching achievement in performance.

The researchers attribute the significant differences appeared on population members in pre- and post-tests to the effectiveness of the special workouts based on determining the length of time of the critical speed, which has been adopted, and was implemented using high intensity interval training with maximum above the maximum for the group. “the high intensity interval training method is used to improve and raise the level of the special case of the event, that is, they are very useful for private settings in sports training, where they lead to Internalization responses of the body as it begins to build the capillaries to become more efficient in transporting oxygen to the working muscles. This method also helps to prevent injury and allows an increase of loads without the occurrence of a case over the training and as a result of these cases, the performance level and achievement improve.

CONCLUSIONS

1. The method of working with special exercises based on determining the time period of critical speed has

Table 3: Arithmetic mean, standard deviation SD, calculated T value, error level and significance of the post-Test for both groups in variables of the study

Statistical methods Variables	Group 1		Group 2		F Value	A.F	Calculated T	Significance level	Difference significance
	Mean	SD	Mean	SD					
Step Length (m)	058,2	02,2	026,0	021,0	038,0	014,0	835,2	018,0	Significant
Step Frequency (No.)	998,3	932,3	066,0	078,0	066,0	042,0	573,1	147,0	Insignificant
Achievement (s)	157,12	594,12	204,0	186,0	436,0	113,0	878,3	003,0	Significant

Freedom degree (5) under significance level (0.05)

an effective influence on developing step length and achievement.

2. The traditional training set by the researcher without using critical speed exercises training method developed step length and achievement, but it was not as the level of developing critical speed exercises.
3. Using training loads according to determination of the time period of critical speed, organization of effort and rest times has an effect on developing step length and achievement.
4. The variable of step frequency did not develop for both groups due to development of each step length.

RECOMMENDATIONS

1. Special exercises based on determining the time period of critical speed in sport training for the 100 m dash event and for the youth division, especially at the specialist center for talents.
2. Developing the physical attributes of the players to be consistent with their abilities and characteristics of the age group they are going through and for both genders.
3. To conduct studies on other events using critical speed exercises.
4. To apply critical speed exercises on other training

classes, events and various games to determine the feasibility of these exercises in the development of achievement.

5. It is preferred to perform training on these exercises thoughtfully to be consistent with the capabilities of players and their physical and age potentials.

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