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APPLYING EXERCISES TO IMPROVE SPEED ENDURANCE IN 100 METERS SPRING FOR MALE STUDENTS AT VINH UNIVERSITY, VIETNAM

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Abstract:
The purpose of this study was to select and apply selected exercises to develop speed endurance in 100 meter sprint for male students. 20 male students (aged 18.8 ± 0.9 years), non-specializing in physical education and sports, regularly attended physical education courses. The participants were divided into two groups: an exercise group and a control group. All subjects were informed of the experimental protocol prior to testing and signed an informed consent form. Participants in the exercise group followed a new exercise program for 8 weeks. Participants in the control group maintained regular physical exercises which were yearly assigned by the department and were asked to not do any new exercise program. After 8-week exercise training, the exercise group showed better performance in two tests in comparison with the control group. It can be concluded that selected exercises had good impacts on improving speed endurance and performance of 100 meter sprint for male students.

Keywords: exercises, speed endurance, students

1. Introduction

The 100 meters is a sprint race in track and field competitions. It is the shortest common outdoor running distance, it is one of the most popular and prestigious events in the sport of athletics. As in any sprint race, the primary objective of the 100 m sprint is to cover the designated distance in the shortest time possible. The 100 meters sprint can be divided into three distinct phases: block start with acceleration, maximum speed, deceleration, and it is defined by the frequency and the length of strides [1, 2]. Speed is determined by stride length and stride frequency. To improve speed, an increase in one or both of these parameters must occur within the context of sound technique. Performance in the 100

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meters sprint is influenced by a multitude of factors including starting strategy, stride length, stride frequency, physiological demands, biomechanics, neural influences, muscle composition, anthropometrics, and track and environmental conditions [3].

100 meters running is one of the subjects of physical education that is taught to students in universities in Vietnam. Although there have been innovations in teaching methods, however, by the means of the study profiles and survey, it showed that the performance of students in the subject of 100 meters sprint is still low. The purpose of this study is to select and apply exercises to improve the speed endurance of 100 meters sprint for male students.

2. Materials and methods

2.1 Participants

This study was conducted on a sample of 20 male students (aged 18.8 ± 0.9 years), non-specialized physical education and sport, regularly attended physical education courses. The participants were divided into two groups: experiment group (EG; n=10) and a control group (CG; n=10). All subjects were informed on the experimental protocol prior to testing and signed an informed consent form.

2.2 Protocol

Participants in EG groups were followed a new exercise program in 8 weeks, three sessions per week, each session last 90 minutes including 15-minute warming up which containing light jogging, stretching, light jumping exercises, accelerations, and 15-minute cooling down. Subjects were instructed to be adequately hydrated, fed, and rested prior to and during the testing day. Participants in CG maintained regular physical exercises which yearly assigned by the department and were asked not to do any new exercise program.

Sprinting requires maximal effort with rapid limb movements. Therefore, it is important to be well warmed up to perform well and also to avoid injury. The warm up for sprinters should be done before each exercise session - whether it be races, on the track training sessions and gym workouts (http://topendsports.com). Warm up exercises used in this study:

- 3 laps of the track at a slow run.
- 10-minutes of stretching involving dynamic and static stretches (e.g. lunges, quad stretch, calf stretch, side bend).
- 40m drills including lifting knees up and kicking heels backwards.
- Run through over 30-40 meters - gradually increasing the intensity from 50% effort to maximal sprint.
- Accelerations over 10-20 meters, including practicing taking off at maximum effort.

A. Interview and discussion method

This method is used to in process of investigation the state of using exercises, method of assessing speed duration in teaching process at universities and colleges in general and in Vinh university in particular. In order to select exercises, experts and teachers in physical education are interviewed. The survey form in built based on the current of speed duration development in 100m distance running. The results of survey are processed by statistical method (percentage value of the answers per the total of questions).

B. Pedagogical observation method

The use of the pedagogical observation method is to directly monitor the content of the 100m running training course during the regular hours of the university students by: Recording the number of exercises, the number of students in the class, the distance organization, class instructions, time for each exercise content, types of exercises used, number of repetitions of exercises. By this method, the study observed the 100m running lessons of students at Vinh University. From there, it helps to assess the actual situation of using speed strength development exercises for students of Vinh University.

C. Method of pedagogical experiment

The pedagogical experimental method is a widely used method in the field of physical education and sports training. In this topic, we use the pedagogical experimental method to test and evaluate the effectiveness of the exercises on the develop speed endurance in 100 meters sprint for male students at Vinh University. Experiment is conducted on selected subjects with 20 male students from Vinh University. It is divided into 2 groups: experimental group and control group.

D. Statistical analysis

Independent t test and were performed to analyze the differences between groups. A $p<.05$ was considered to be statistically significant.

3. Results

3.1 Selected exercises

The exercises for developing the speed endurance of 100 meters sprint in Table 1, were chosen by experts, teachers who work in the field of physical education and sports coaching.

Table 1: Selected exercises applied for developing the speed endurance of 100m sprint

Exercises	**Intensity/Quantity**	**Rest**
60m running	Max Speed/3-5 rep*.	2′ between each rep*.
120m running	85% of capacity/2 – 4 rep*.	3′ between each rep*.
150m running	85% of capacity/2 – 4 rep*.	3′ between each rep*.
300m running	85% of capacity/2 rep*.	5′ between each rep*.
Combined 300m + 200m + 100m running	80% of capacity/2 rep*; 2 sets	3 – 4′ between rep*. 5′ between sets
Interval 50m (rapid) and 50m (slow) running	95% of capacity/ 8 rep*.	3-4′ between rep*.
Interval 100m (rapid) and 100m (slow) running	90% of capacity /4 rep*.	4-5′ between rep*.
80m running	Vmax for last 20m/2-4 rep*.	2-3′ between rep*.

**repetition; ′= minute*

3.2 Selected tests

There were two tests used in this study: 100m running (s), 150m running (s). Those two tests above were chosen by experts, teachers who work in the field of physical education and sports coaching.

Table 2: Results of tests between two groups before intervention

Values	**100m (s)**		**150m (s)**	
	EG	**CG**	**EG**	**CG**
$\bar{x}$	14.80	14.79	24.54	24.56
$\pm\delta$	0.21	0.19	0.27	0.26
t	1.03		1.249	
P	>0.05		>0.05	

The results of Table 2 showed that there were no significant differences in two tests (*100m and 150m*) between EG and CG before intervention. P > 0.05 that accounts for no significant change in performance between the two research groups for both 100m and 150m running tests.

Table 3: Results of tests between two groups after intervention

Values	**100m (s)**		**150m (s)**	
	EG	**CG**	**EG**	**CG**
$\bar{x}$	13.40	14.43	20.32	23.41
$\pm\delta$	0.18	0.21	0.31	0.29
t	2.514		2.536	
P	< 0.05		< 0.05	

The results of Table 3 showed that there were significant differences in two tests (*100m and 150m*) between EG and CG after intervention. P < 0.05 that accounts for the better performance between the two research groups for both 100m and 150m running tests.

These results proved that selected exercises had good impact on improving speed endurance of 100 meters sprint.

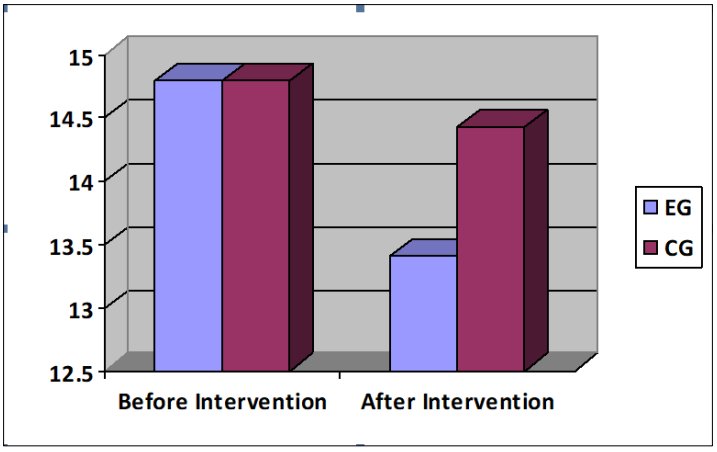

Chart 1: Results of 100m running

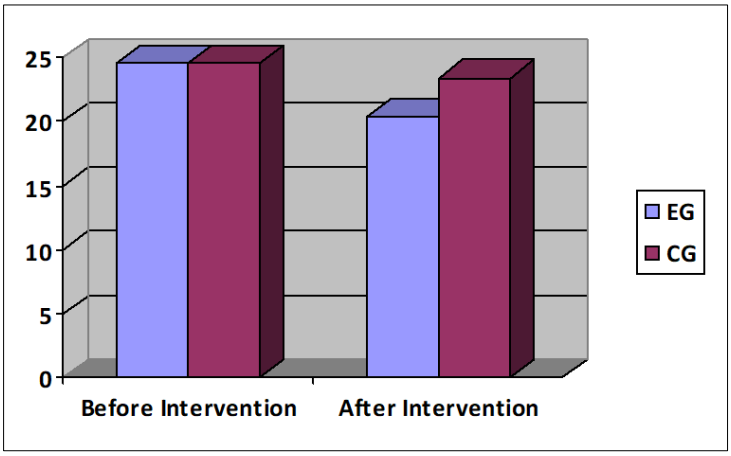

Chart 2: Results of 150m running

5. Discussion

In this study, performance of 100m sprint of male students was considered. After 8 weeks of selected exercises training, speed endurance of 100m sprint of male students was significantly improved. Speed endurance training is used to develop the skill and capabilities needed to maintain speed, as well as for training to resist this deceleration. Speed endurance may be more or less of an important factor depending on the specific athlete, but ultimately all sprinters will need to train for speed endurance if they want to run fast over 100 meters. Previous finding concluded that the main mechanical determinants of 100m performance were a ''velocity-oriented'' force–velocity profile, likely explained by a higher ability to apply the resultant ground reaction forces vector with a forward orientation over the acceleration, and a higher step frequency resulting from a shorter contact time [4].

The results of this study were consistent with study which proved that the most important factor for differences in maximum speed development during both initial and secondary acceleration phase was the stride frequency [5]. Stride length and frequency can be improved through the development of coordination and speed, strength, technique, specific endurance and flexibility. These factors all work together, blending to produce a better spring performance. Prolonging the amount of time where a near maximal speed can be maintained is purpose of speed endurance.

6. Conclusion

After 8-week exercise training, experiment group showed better performance in the two tests in comparison with control group. It can be concluded that selected exercises had good impacts on improving speed endurance and performance of 100 meter sprint for male students.

Conflict of Interest Statement
The authors declare no conflicts of interest.

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