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Effect of Different Speed Training Protocols on Speed and Sprint Acceleration on Long Jumping Performance in Professional Sprinters: An Experimental Study

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ABSTRACT

Introduction: Sprinting is an indispensable constituent of countless sports activities. Sprint can be alienated in to a number of stages including quickness, acceleration and deceleration. In many sporting events like sprinting, soccer, rugby, basketball, and cricket, the athletes never attain maximum acceleration and speed during sprinting. Because of that they fail to show the best performance. Along with that sprinter required huge amount of lower limb power which helps them to exert more effort to perform well.

Objective: To estimate the consequence of varied speed drill protocols on speed and sprint acceleration in long jump performance in professional competitive sprinters using 60 m speed test and standing long jump test.

Methodology: 40 professional sprinters (n=40) were screened for the study. 3 weeks speed training protocol was given to the participants. age criterion was 18-25 yrs. Post training acceleration, speed and long jump performance was assessed.

Result: Speed training protocol had a positive effect on sprint acceleration, speed and standing long jump performance in professional sprinters.

Key words: Acceleration, Speed, Sprinting, 60m speed test, Standing long jump test

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INTRODUCTION

Competitive running was commended as a non-secular festival in different territories like Balkan state, Egypt, Asia and furthermore the East and Rift in Africa [1]. Then again running, particularly sprinting, has been a part of the Olympics since its commencement. There are three sprinting occasions that are held at the Olympics and outside world championships that is 100m, 200m, and 400m. At first these races were estimated in empirical estimation but later changed over to metric units [2].

Evaluation of sprinters is done on different parameters like acceleration, steady speed, and deceleration of the velocity curve. Investigation of dash demonstrates that it is most extreme essential to deliver high energy toward the starting itself for the initial stage. During the propulsion stage, expanding explosive force/power and effectiveness of movement [1]. Effective sprint running requires ideal coordination between internal factors and external factors. The internal factors are identified with proficiency while the external factors manage footwear, ground and air resistance. Stride length and stride frequency have been observed to be critical components impacting the running speed [3].

Acceleration is critical to peak performance across different games [4]. In sprinting, an empirical body position is intriguing as feet

on the block will bring about boosting up their acceleration [5]. Speed is the capacity to move rapidly over the base or move limbs in space to grab or throw. Speed isn't just how energetically someone will run (or cycle, swim and so forth.), yet depends on their acceleration (how rapidly they will accelerate from a stationary position), the best speed of movement, and speed maintenance (limiting deceleration) [6].

Acceleration is improved with the advancement of reactive power, which is done by Plyometric training [7]. Similarly improving sprint sessions can prompt step length adjustment just as improved sprint, as long as they are movement specific and progressively overloaded [8]. The vital part of the sprint training is free sprint training i.e. without any resistance equipment [9].

Though there are many studies conducted on runners and on enhancing running performance in athletes using Numerous strengthening protocols based on sole parameters of speed and acceleration though speed and strength training being essential components in long jump training protocol [10]. But there are hardly any studies undertaken on long jump performance. Hence the present study is proposed to evaluate the effectiveness of speed training protocols on long jump performance. With a detailed study on the effects of these modalities, specific training programme can become more specific for long jump.

MATERIALS AND METHODS USED

Materials used

Consent form.

Data collection sheet.

Apparatus and equipment.

Measuring tape

Cones.

Radar gun [3].

Resistance parachute [4].

Hurdles.

Markers.

Methodology

Ethical clearance was obtained from the Institutional Ethical Committee of KAHER Institute of Physiotherapy, Belgavi. Participants were recruited according to the fulfilment of the inclusion and exclusion criteria respectively. Written informed consent was obtained from subjects. Before commencement of the study. The participants were from the various institutes and sports academies of in and around Belagavi city. Demographic characteristics of the participant, including their age, gender, age of onset of playing and years of playing were noted. The inclusion criteria were athletes with age group of 18-25 year of age both male and female who were willing to participate. The participant was excluded if there is musculoskeletal problems such as fracture and sprain/strain of lower limb in the previous 1 year.along with Subjects with existing neurological, respiratory or cardio vascular problem (Table 1).

Outcome measures

60-meter speed test [5].

Standing long jump test [6].

RESULTS

Statistical analysis for the present clinical trial was done using version 20 of Statistical Package of Social Sciences (SPSS). In this study 40 samples were allocated. Number of males (92.50%) were more than the number of female participants (7.50%). But as far as the overall sample size is considered, unfair distribution of gender was seen (male=37 & female=3). The homogeneity in group was not seen. The mean age of population is (20.63 ± 1.92) with the age range of 7yrs (18-25yr of age). The mean BMI of population is (21.35 ± 2.56) with the BMI range of (15.30-26.95 kg/m2). Whereas mean experience is found to be (2.25 ± 1.28) with the experience range of (1-6yrs). No statistically significant difference was seen and groups were homogenous with respect to age, BMI and experience years at the baseline (Table 2).

The acceleration of sprinting component in the athletes were significantly improved after 3 weeks of free sprinting, resisted sprinting and plyometric training protocol. (p=0.0001*) the result showed that the mean acceleration

Table 1: Gender wise distribution.

Gender	No of patients	% of patients
Male	37	92.5
Female	3	7.5
Total	40	100

pretest score was (3.49 ± 0.65), whereas after the intervention, it was significantly improved to (3.69 ± 0.66) at the rate of -5.78% of change.

The speed of sprinting component in the athletes were significantly improved after 3 weeks of free sprinting, resisted sprinting and plyometric training protocol (p=0.0001*). The result showed that the mean speed pretest score was (33.60 ± 4.65), whereas after the intervention, it was significantly improved to (35.33 ± 4.61) at the rate of -4.82% of change.

The standing long jump performance in the athletes were significantly improved after 3 weeks of free sprinting, resisted sprinting and plyometric training protocol (p=0.0001*). The result showed that the mean standing long jump pretest score was (2.36 ± 0.38), whereas after the intervention, it was significantly improved to (2.48 ± 0.36) at the rate of -5.01% of change (Tables 3 to 5) (Figures 1 and 2).

Figure 1: Running.

Figure 2: Sprints.

DISCUSSION

The acceleration of sprinting component in the athletes were significantly improved after 3 weeks of free sprinting, resisted sprinting and plyometric training protocol. (p=0.0001*) the result showed that the mean acceleration pretest score was (3.49 ± 0.65), whereas after

Table 2: Summary of age in years, BMI and experience in yrs of patients.

Summery	Age in years	BMI	Experience (Yr)
Minimum	18	15.3	1
Maximum	25	26.95	6
Range	7	11.65	5
Mean	20.63	21.35	2.25
Std.Dev.	1.92	2.56	1.28
Variance	3.68	6.54	1.63

Table 3: Comparison of pretest and posttest of Acceleration scores by Wilcoxon matched pairs test.

Time	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Z-value	p-value
Pretest	3.49	0.65	-0.2	0.38	-5.78	3.9041	0.0001*
Posttest	3.69	0.66					
*p<0.05							

Table 4: Comparison of pretest and posttest of speed scores by Wilcoxon matched pairs test.

Time	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Z-value	p-value
Pretest	33.7	4.65	-1.63	1.17	-4.82	5.0119	0.0001*
Posttest	35.33	4.61					
*p<0.05							

Table 5: Comparison of pretest and posttest of standing long jump scores by Wilcoxon matched pairs test.

Time	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Z-value	p-value
Pretest	2.36	0.38	-0.12	0.21	-5.01	5.0614	0.0001*
Posttest	2.48	0.36					
*p<0.05							

intervention, it was significantly improved to (3.69 ± 0.66) at the rate of -5.78% of change.

Like our study one more study was done. The aim of the study was to improve sprint speed over 100m in sprinters. That study provides details regarding the effect of free sprint, weights, plyometrics. 60m sprint test and SLJ were improved after the protocol. Effect of training protocols were represented through the assessment of 60m sprint test, and measurements of SLJ. The 0- to 5-m interval have a stronger affectin conjunction to 10- to 15-m sprint performance, is indicated through a few researches [11,12]. Therefore, it was concluded that achievement of high velocity running is crucial for positive acceleration during short sprints.

Speed of sprinting component in the athletes were significantly improved after 3 weeks of free sprinting, resisted sprinting and plyometric training protocol. (p=0.0001*) the result showed that the mean speed pretest score was (33.60 ± 4.65), whereas after intervention, it was significantly improved to (35.33 ± 4.61) at the rate of -4.82% of change.

Similar to our study one more study states that the 0- to 10-m interval featured the highest training volume for the FST and RST groups because all sprint intervals featured this distance. Effective acceleration helps in developing quickness. Implementation of right protocol is said to improve short sprint in athletes. Significant velocity could be achieved by 4.82% in 60-m sprint test. Therefore, maximum velocity could be attained through improved acceleration [13].

The standing long jump performance in the athletes were significantly improved after 3 weeks of free sprinting, resisted sprinting and plyometric training protocol. (p=0.0001*) the result showed that the mean standing long jump pretest score was (2.36 ± 0.38), where as after intervention, it was significantly improved to (2.48 ± 0.36) at the rate of -5.01% of change.

The Standing long jump also called Broad Jump, to examine explosive leg power. The reliability of the test is proven and interclass reliability coefficient is r=0.99. While Standard Error of Measurement (SEm) is 0.04m. SLJ is easy to conduct, easy various situations, and is inexpensive. Superior performance is said to be related with SLJ [14].

Similar to our study one more study was done on junior high school male student; which aimed at evaluating eight week training with extra weight on standing long jump performance. The study provides specifics regarding unweighted and weighted vertical jumps, arms swings, and standing jumps. Increased peak horizontal ground reaction force, enhanced the standing long jump performance, and horizontal impulse during the takeoff phase was said to be improved following protocol. Where as in our study 3 weeks of free and resisted sprint training along with plyometric training was given. Measurements of standing long jump test, embodies effect of training protocols. The exercise group improved by 5.01% in standing long jump performance. Previous research specified that optimal added weights necessary in command to surge jumping distance. Superior peak hip and ankle velocities are said to enhance post training standing long jump performance [15].

CONCLUSION

Present study concluded that speed, sprint acceleration and long jump performance was efficiently improved in professional sprinters by different speed training protocol.

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