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Effect of Weight Training on Increasing 100 Meter Running Speed in Sprinter Athletes Based on Gender

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Abstract

The aim of this study was to investigate the effect of weight training on the performance of 100meter spinner athletes based on gender. This research is *one group pretest – posttest*. Samples on athletes were carried out voluntarily provided that they were not injured and were not taking part in a competition period. The sample consisted of 10 male sprinters (mean: height 170.2±0.6 cm, weight 64.2±2.7, body mass index (BMI) 21.27, training experience 5.6±7.8 years) and 10 female sprinters (mean: height 168.7±7.2, weight 53.7±0.6, body mass index (BMI) 18.14, training experience 5.2±14 years) with age 17 – 22 years. The test for pretest–posttest is 100 meters run, while determining the load volume uses the 1RM Brzycki formula. This training program is carried out for 6 weeks (3 times a week), training volume 40% - 60% with 3 sets x 8 repetitions, types of weight training are *bench press, deadlift, leg press, half squat, double leg bounds*. The results of the t test, this research shows that weight training has an effect on increasing the 100 meters sprint of male athletes by 0.000 < 0.05 with an increase in time of 0.33 seconds. Then weight training has an effect on increasing the 100 meters sprint of male athletes by 0.000 < 0.05 with an increase in time of 0.20 seconds. The recommendation of this research is to train at the general preparation stage, because this weight training using 2 supports on the right and left sides of the hands and feet.

Keywords: Weight training, Sprinters athletes, 100 meters.

INTRODUCTION

Athletics is a sport that is easy to play and can be developed if you are disciplined in practicing based on the theory or practice of sports science. In athletics, this includes running numbers, jumping numbers and throwing numbers as well as walking numbers [1, 2]. In athletics there is also the term sprint which means running a short distance. Types of athletic sports, namely running, are consecutive jumps and in it there is a phase where both feet do not step on or rest on the ground, sprinting is fast running over a short distance so that a sprinter is required to use all his energy to run as fast as possible until the finish line [3, 4]. Someone who runs short distances or sprints is called a sprinter. Sprint is a race that is contested by running as fast as possible (sprint) over a distance of 100m, 200m and 400m which is carried out on a running track [5]. The difference between short running, middle distance running and *long-distance* running lies in the running speed carried out by the runner.

The ability to run fast is an important factor in various athletic activities, especially the success of a runner's speed, especially for 100 meters. From a sporting point of view, running speed is an individual's ability to perform motor actions in minimum time and maximum efficiency so training is very important, because speed is needed in a runner's speed in the 100 meters [6, 7].

In the 100 meters run, leg muscle strength is a factor that is no less important for improving performance. Deficiencies in muscle strength can be improved through weight training that is programmed and this training includes components of physical condition [8, 9]. This means that every effort to improve performance and effort to improve physical condition must develop everything contained in these components. Weight training can increase strength, power and sprint speed at a distance of 100 meters [10, 11].

Previous research results explain that *squats* with 5 – 8 repetitions with 60 – 80% of 1 RM can improve sprint ability [12]. *Squats* with low to moderate

loads can increase leg muscle strength, thereby affecting sprint performance [13]. Then combining *squats* and *lunges* can also affect acceleration in sprints [14]. In addition, there are indications that weight training on the upper body can influence athletes' performance to increase running speed such as *deadlift* training, although this evidence has not been assessed for sprinters [15]. Based on these facts, it can be seen that mastery of the 100 m run is influenced by various factors, one of which is the type of exercise that has been practiced.

However, based on the results of scientific literature studies, types of weight training to increase the running speed of 100 meters sprinters have been carried out but not many types of training have been scientifically published. The aim of this study was to investigate the effect of weight training on the performance of 100 meters sprinters athletes. The uniqueness of this research is that it analyzes sprinters based on gender.

RESEARCH METHODS

This research is experimental research which is defined as a research method used to find the effect of a certain treatment on predetermined variables. This type of research is one group pretest - posttest without control variables, meaning that before and after the sample is treated, a predetermined test is carried out. The test used in this research was the 100 meters run, and to determine the training volume of 1RM using Brzycki's formula.

The sample for this study was 100 meters sprinter athletes who volunteered, provided that the athletes were not injured and were not taking part in a competition period. After collecting samples of 20 athletes (10 male sprinters and 10 female sprinters) aged 17 – 22 years, they were then grouped until the characteristics of the athletes were known. Male athletes have an average height of 170.2 0.6 cm, weight 64.2±2.7, body mass index (BMI) 21.27, training experience 5.6±7.8 years. Female athletes have an average height of 168.7±7.2, weight 53.7±0.6, body mass index (BMI) 18.14, training experience 5.2±14 years.

In this research procedure, sprinter athletes will carry out a pretest stage with a 100 meters sprint on Sunday. Then the next day, Monday, the athlete does a 1RM test using the Brzycki formula. Once the results of the 1RM are known, the athlete will be given 2 meetings on Wednesday and Friday to try various movements from the training program that have been determined as anatomical adaptations. Then the training program starts on the following Monday, for 6 weeks, namely Monday, Wednesday, Friday (table 1). After the athlete has completed the training program, the athlete is given 1 day of rest and then a posttest is carried out on Sunday with a 100 meters sprint.

Table 1: Training Program

Training Materials					
Bench Press*					
Deadlift*					
Leg Press*					
Half Squat*					
Double leg bounds					
Week	***Volume (% of 1RM)**	**Set**	**Repetition**	**Recovery Between Sets**	**Recovery Between Practice**
1 - 2	40%	3	8	3 minutes	1 minutes
3 - 4	50%				
5 - 6	60%				

RESULT

Normality Test

Table 2: Normality Test

Gender	**Test Results**	**Shapiro-Wilk**		
		Statistic	**df**	**Sig.**
Male	Pretest	0,936	10	0,510
	Posttest	0,877	10	0,122
Female	Pretest	0,968	10	0,470
	Posttest	0,969	10	0,482

Based on the results of the normality test using Shapiro-Wilk in table 2, the pretest and posttest results for male gender show a significance value of more than 0.05, meaning that the results of the male gender test data are normally distributed. Then the pretest and posttest results for the female gender show a significance value of more than 0.05, meaning that the results of the female gender test data are normally distributed.

Homogeneity Test

Table 3: Homogeneity Test

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
Pre_Post_Test	Based on Mean	1,891	1	38	0,177

Based on the results of the homogeneity test in table 3, the Levene value shows a significance value of 0.177 > 0.05, meaning that the data comes from the same or homogeneous population.

Descriptive Analysis

Table 4: Descriptive Analysis

Result	Male		Female	
	Pretest	Posttest	Pretest	Posttest
Min	11.85	11.24	12.43	12.24
Max	11.06	10.89	12.20	12.02
Mean	11.44	11.11	12.32	12.12
Average Increase	0.33		0.20	

Based on the results from table 4, the average male 100 meters sprinter athlete's pretest result was 11.44 seconds, the average posttest result was 11.11 seconds. So the average increase after being given weight training for 6 weeks was 0.33 seconds. Then, the average female 100 meters sprinter athlete's pretest result was 12.32 seconds, the average posttest result was 12.12 seconds. So the average increase after being given weight training for 6 weeks is 0.20 seconds.

T Test

Table 5: T Test

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Male Athleles	Pre - Post	33,100	22,427	7,092	17,056	49,144	14,667	9	0,000
Female Athletes	Pre - Post	19,800	5,441	1,720	15,708	23,492	11,392	9	0,000

Based on the results of table 5, the effect of 6 weeks of weight training can influence the sprint speed of 100 meters sprinter athletes in the male gender with a significance value of 0.000 > 0.05. Meanwhile, the influence of 6 weeks of weight training can influence the sprint speed of 100 meters sprinters in women with a significance value of 0.000 > 0.05.

DISCUSSION

Weight training is an exercise that focuses the body parts on the weight used. This weight training can have a significant effect on the effectiveness of increasing the 100 meters run. In this exercise, namely the bench press, deadlift, leg press and half-squat, you still use 2 supports on the right and left legs or the right side. This reason is so that the right and left muscle strength is balanced or there is no significant difference [16, 17]. This is because weight training that focuses on the legs will increase leg strength, endurance and also power in the legs. If weight training is carried out in a monitored manner and the improvements are measurable, the results of the training can increase leg muscle power. So, a training duration of 6 weeks (3 times a week) with a volume of 40 – 60% of 1RM can have an influence on the 100 meters run. Previous research also shows the same duration as this research, that weight training with 40 – 60% of 1RM with 4 – 8 repetitions and 3 – 5 sets can increase acceleration in sprints of 30 meters [18-20]. However, the difference in previous research is the total length of the training program and training sessions in 1 week. By increasing the power of the legs, the strength of the stiff muscles will increase, which will encourage the legs to run faster.

Apart from that, there is a relationship between weight training based on gender which is used to improve the 100 meters run. Male athletes are usually more likely to improve better than women. This is because men's body muscles and physical condition are more able to accept more stress than women. Scientific studies show that male and female athletes have the same adaptation time when carrying out weight training such as *squat* and *bench press* [21, 22]. Then weight training with a wider variety of types of exercise on the leg muscles can affect the cross-sectional area of the muscles which of course can be beneficial for 100 meters

sprinters [23]. Measurable weight training, apart from increasing muscle strength, will also have an impact on the fitness of sprinter athletes [24, 2, 25]. Of course, this will provide the advantage of not getting injured easily and not getting tired quickly. To keep sprinters in top condition, of course nutrition is needed because many cells are damaged during training and competitions [26, 27]. It will definitely affect the muscle abilities of sprinters.

In order to be able to obtain maximum time results, other training models are also needed, such as agility or using variations of training to increase leg muscle strength [28-30]. It is also important to pay attention to the good quality of service from clubs or athletic sports coaches, because good training will of course affect the time when running the 100 meters sprint [31, 32]. Because the 100 meters sprint is a measurable type of sport, meaning the main target is time, so it requires high motivation and a coach who has high competence [33, 33, 34, 35, 36].

The limitation of this research is the author's lack of understanding of the effect of weight training on 100 meters sprinters, so the type of training carried out has already been done by other 100 meters sprinters. However, with the publication of these scientific results, it can become the basis for further research to focus more on samples, gender, or physiological changes. The recommendations of this research are that it would be suitable to be trained at the general preparation stage, because this exercise using 2 supports, namely the right and left sides of the hands and feet, which makes it possible to have balanced strength before training with heavier strength.

CONCLUSION

Weight training to increase the running speed of 100 meters sprinters in men and women has been proven to have a good effect. Weight training such as bench press, deadlift, leg press, half squat, double leg bounds can increase the sprint time of male athletes by 0.33 seconds and female athletes by 0.20 seconds. The recommendation of this research is that it be trained at the general preparation stage, because this exercise using 2 supports, namely the right and left sides of the hands and feet, which allows sprinters to gain balanced strength before being trained at the special preparation stage and competition preparation stage.

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