THE 8 WEEKS TRAINNG OF 20M SPRINT IN FEMALE FOOTBALL PLAYERS

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Abstract

Background: The study purpose was determined the effect of 8 weeks training of 20 m sprint use very heavy sled training on female football players.

Method: This is an experimental study with a pretest-posttest group design. The study samples are 36 female football players used simple random sampling techniques (ages of 20.06 ± 1.98 years, height of 156.39 ± 4.84 cm, weight of 53.87 ± 5.31 kg, and body mass index of 21.99 ± 1.38). During the treatment, the sample underwent very heavy sled training by pulling weights based on a body mass index of 50%-85% for 8 weeks (3 sessions per week). Data were collected by measuring body mass index and dividing the 20-meter sprint test for each distance into 5 meters and its multiples.

Results: The results showed that there is an effect of 8 weeks training of 20m sprint with very heavy sled training on the sprint speed of female's football players with t_{count} 13.139 > 2.030 for 5-m distance, t_{count} 12.980 > 2.030 for 10-m distance, t_{count} 13.034 > 2.030 for a 15-m distance, and t_{count} 13.102 > 2.030 for a 20-m distance.

Conclusions: The results showed that there are potential advantages for very heavy sled training in developing sprint performance, judging from the percentage increase in each distance, such as 13.618% at 5-m distance, 13.628% at 10-m distance, 13.651% at 15-m distance, and 13.677% at 20-m distance.

Keywords: Very heavy sled training. Sprint. Female football players. Football. Distance

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Introduction

Football, as an achievement game, is included in a competitive sport that requires tactical, technical, and physical performance skills that are usually taught at different levels of training program. There are some needs that should to be mastered by football players, such as physical and tactical skills as the sports characteristics. The football player also need mastered the application of each skill in competitive situations. Football player should know when and where used their skill. However, physical condition is the most effective preparation for maximum performance, so every coach should plane training to improve the players' physicality [1]. It has been stated that the combination of physical, psychological, tactical and technical characteristics to determine football achievement has been well documented, whereas higher physical characteristics, including speed, have distinguished between international or professional football players' level compared to amateurs player.

In particular, to achieve success in football, sprint at high speed must be mastered by every football player because sprint is an action that often has to be done to score goals, shoot or avoid opponents [2]. Likewise for women's football players, the higher the level of match, the intensity of the match will increase but it will decrease at the end of the match because the players feel tired. [3] This occurs at all levels of competition [2]. Sprints with high intensity occur early in the game. Sprint activity is affected by the location of the player. Attackers do more sprints with high intensity in the opposing team's area than in their own team's area [4]. Attackers cover the longest sprint distance (345 ± 129 m), which is 9% longer than midfielders (313 ± 119 m) and 100% longer than central midfielders (167 ± 87 m). .

The difference in sprints based on the player's position was related to the activities taken, such as tactics and technique. CD (central defender) who usually takes defensive steps aimed at securing the team's goal area, while FW (forward) continues to receive feedback, reaches the opponent's penalty area and runs to make a shot on goal [2]. It showed the importance of sprints in competitive situations and thus has implications for training. Considering the relevance of sprints in different situations, it is recommended that sprints should be included in training [5]. It has also been said that the ability to gradually increase the sprint is the most important component of competitive performance [6]. Resistant sprint training (RST) is one of the specific sprint training. This training is done with a load on the athlete while in sprint motion. This exercise was most effective in increasing the <20 meters sprint. Furthermore, the load applied affects the increase in sprint speed and the production of stressed or pulled energy moving from one direction to the other [7]. So when sprints, contact time decreases and stride length increases, which is makes less sprint time and indicates a positive effect from the implementation of resistant sprint training. The RST effect was greatest in men who were active in recreational sports or trained in football teams. However, the effect of RST on the female's football team is unknown [8]. Therefore, this study purposed determined the effect of 8 weeks training of 20 m sprint with very heavy sled training on the sprint speed of female football players.

Literature Review

Sprint speed demands in football games

Every football player must be able to adapt and compete to the highest standards due to the physiological demands of the game. Football is a sport that has some characteristics, one of them is speed. Sprint is an activity that is often a defining part of a football game. [9] This is because the ability of football players varies from high-speed action in match performance. Speed is a convenient feature for football players, contributing directly to possession and goal scoring. In line with this, the straight sprint is the predominant action in an offensive situation in elite football by either an attacking or defensive player. Straight sprints allow players to escape from opponents and/or to reach the free zone to shoot at goal or provide a passing [10].

Very heavy sled training

One of the key success in the development and competition of individual and team sports is sprint. Therefore, it is necessary to sprints training that reflect the interaction between speed development, maturity, and growth. The sprint stages development affected by the interaction between growth and age [11]. Regarding sprint training, there are two training that can be applied to young athletes, such as traditional resistance training which is a non-specific training and resistance training which is a specific training [10]. The resistant training is more recommended because it is consistent with hormonal and structural changes in young athletes [12]. RST (resistant sled training) is one of the specific sprint training with loads when running at horizontal levels of speed. The RST used absolute weight or body mass percentage (%BM) to recommend sled training. [13] Resistant sled training (RST) is an effective training method to improve sprint performance in both acceleration stages and maximum speed. The effect of RST was greatest in recreationally active or trained males who practiced team sports in football or rugby [8].

In addition, intensity (load) is not a determinant of sprint performance growth, but the recommended volume is > 160 meters per session and about 2680 meters per week, with a training frequency of two to three times per week for at least 6 weeks [14]. RST regarding the loading parameter explains that very heavy is more effective than very light in the initial acceleration phase, while medium to light will increase the conversion to the late acceleration and maximum sprint velocity phases, respectively. However, in the RST application, efficiency, age, strength, and maturity need to be considered in order to introduce the program structure and the progression of loads applied from light, medium to heavy. Young athletes may apply a very heavy sled to emphasize certain aspects [15].

Methods

Research design

This research used experimental method. This method was applied because the research was carried out by giving treatment to the subject and then a test

was carried out after the subject underwent treatment to determine the effect of the treatment. The research design used a "one group pretest-posttest design". This design can be used as an exploratory experiment, especially if the researcher can predict the expected pretest–posttest changes in research participants if they do not receive the experimental intervention. [11]

Participant (subject) characteristics

The research subjects were female football players with a population of 40 players. The inclusion criteria for research subjects were 18-22 years old, players in striker, midfielder and defender positions

Sampling method

The sampling technique used simple random sampling. In the simple random sampling technique, all individuals in population have an equal and independent chance of being selected as a sample [16]. In this simple random sampling technique, researcher assigns a number to each individual in the population and randomly takes each individual's number according to the required number. The sample size is based on the table to determine the number of samples [17]. For a population of 40, the sample is 36, with an average age of 20.06 ± 1.98 years, height of 156.39 ± 4.84 cm, body weight of 53.87±5.31 kg and body mass index of 21.99±1.38.

Experimental manipulation or interference

This study used a one-group pretest-posttest design, so there was only one group, namely the experimental group in which participants underwent very heavy sled training. Regarding the intensity of training (meeting sessions), the training frequency is 2–3 times per week for a minimum of 6 weeks [18]. In this study, participants intervened for 8 weeks with 3 sessions/meetings per week [19], namely Monday, Wednesday, and Friday. So that the total sessions/ meetings are 24 sessions/meetings. Very heavy sled training is done by pulling weights based on body mass and 20 meters sprint. Initial training load starting from 50% of body mass. Exercise is increased by 5% of the initial load given, so that for 8 weeks the load drawn starts from 50% to 85% of each participant's body mass. Exercises are performed with 2-4 repetitions and 2-5 sets with recovery of 2 minutes between repetitions and 5 minutes between sets (table 1).

Data collection and research tools

The study data including of weight, height, body mass index, and 20m sprint speed. The research instruments included body weight and height measurements to calculate body mass index and a 20-meter sprint test [15].

Weight measurement

The test purpose was measured the body weight. The test tool used weight scale. Testees are required to wear as little clothing as possible without wearing footwear. The testees are standing on the weighing scale with the body straight and looking straight ahead. Assessment based on the numbers printed on the weighing device in units of kg.

Height measurement

The test purpose was measured body height. The test tool used a stadiometer. Height is the distance from the toe (sole of the foot) to the top of the head by standing upright. The number obtained from the measurement results is the height in centimeters (cm)

Body mass index calculating

Body mass index (BMI) is the ratio of weight and height with the following formula:

$$BMI = \frac{Body\ weight}{Body\ height\ x\ Body\ height}$$

20m sprint test

The 20 meter sprint test used to evaluate the sprints. This test starts from the starting line with a standing position. Participants ran 20 meters as fast as possible. Time is evaluated for 5, 10, 15 and 20 meters. They then repeated the experiment for two experiments and provided an active recovery period of 60 seconds between tests. The fastest time was used for further analysis from two experiments.

Data analysis

The data are presented as mean and standard deviations. The paired T tests were performed to determine the difference between pre-test and post-test performance at each distance of 5 m, 10 m, 15 m, and 20 m with significance level of 5% ($P < 0.05$). Prerequisite analysis of the t test in the form of a normality test using the Kolmogorov Smirnov was carried out to proven that the data is normally distributed so that the t test can be carried out. Data analysis was performed with SPSS 16 (Table 1).

Results and Discussion

Statistics and data analysis

(Table 2) Table 2 shown the difference test with the paired t-test statistical

Table 1: Experimental manipulation or interventions.

Day	Session	Exercise: Pulling load (Load %BM)	Distance (meter)	Intensity	Repetitions Per Exercise	Set	Rest Between Reps (minute)	Rest Between Sets (minute)
Tuesday	1	50% BM	5	50%	3	2	2	5
Thursday	2							
Saturday	3							
Tuesday	4	55% BM	5	55%	4	2	2	5
Thursday	5							
Saturday	6							
Tuesday	7	60% BM	10	60%	2	3	2	5
Thursday	8							
Saturday	9							
Tuesday	10	65% BM	10	65%	3	3	2	5
Thursday	11							
Saturday	12							
Tuesday	13	70% BM	15	70%	4	4	2	5
Thursday	14							
Saturday	15							
Tuesday	16	75% BM	15	75%	2	4	2	5
Thursday	17							
Saturday	18							
Tuesday	19	80% BM	20	80%	3	5	2	5
Thursday	20							
Saturday	21							
Tuesday	22	85% BM	20	85%	2	5	2	5
Thursday	23							
Saturday	24							

Source: Prepared by the Author (2023)

Table 2: The difference results between the initial test and final test in the very heavy sled training group.

20m sprint test	Pretest	Posttest	Mean different	t-count	sig	Percentage of increase
	Mean ± SD	Mean ± SD				
5-m (s)	2.09 ± 0.10	1.81 ± 0.10	0.28	13.139	0.000	13.618 %
10-m (s)	2.93 ± 0.15	2.53 ± 0.14	0.40	12.980	0.000	13.628 %
15-m (s)	3.34 ± 0.17	2.88 ± 0.16	0.46	13.034	0.000	13.651 %
20-m (s)	4.18 ± 0.21	3.61 ± 0.21	0.57	13.102	0.000	13.677 %
Source: Prepared by the Author (2023)						

analysis results the t_{count} value of very heavy sled training group between the results of the initial and final test greater than t_{table} value with n = 36, db = 36 – 1 = 35 with a level a significance of 5% is 2,030, so it can be concluded that H0 is rejected, so there is a significant difference between the initial and final test in the very heavy sled training group. Table 2 also shown that the percentage increase in sprint speed was 13,618% at 5 meters, 13,628% at 10 meters, 13,651% at 15 meters, and 13,677% at 20 meters.

Discussion

Sprint ability is an important factor in determining performance success. During a football match, professional football players sprint a total distance of between 200 and 1,100 m, with an average sprint duration of 2-4 seconds (Rumpf et al., 2016). This results in an average sprint distance of around 10-30 m, with most sprints being shorter than 20 m. The sprint speed test in this study used a 20 m sprint.

Football brings bigger dimensions and longer playing time. The success of football match performance is strongly influenced by the sprint ability. The professional football players performed 200–1100 meters sprint during matches, duration about 2-4 seconds, the average sprint is 10-30 meters, and the sprints are mostly more than 20 meters. Sprint is an important activity in the football game and this activity requires good functioning of the neuromuscular system. So it is important to develop sprint ability with a focus on neuromuscular adaptation. To develop sprint ability with neuromuscular adaptation, the researchers applied very heavy sled training to 20-meter sprint training. The study results showed that the implementation of very heavy sled training on 8 weeks training of 20 m sprint able to increase sprint speed. [20]

Very heavy sled training clearly produces the most horizontal power and increases mechanical performance. This confirms the hypothesis that very heavy sled training is an effective and practical method for increasing sprint speeds for female football players. In addition, changes in pre- and post-test indicated an increase in sprint speed at each distance. Changes in pre and post, at the start to 5 m distance, sprint speed performance increased by 13.618%. In addition, at a distance of 10 meters, the sprint speed performance increased by 13.628%. At a distance of 15 meters, the sprint speed performance increased by 13.651%. Then at the end of the 20 m distance, the performance of the sprint speed increased by 13.677%. This indicated the potential benefits of implementation of very heavy sleds in developing sprint performance from start to finish. [17]

Theoretically, a heavier sled causes more overload. The principle of overload systematically increases the body's requirements for further repair. As the neuromuscular becomes stronger when applying very heavy sled, endurance increasing was required to stimulate further sprint growth because the effects of sled training are maximized. This is because there is a balance between the increasing demand for applied training and special adaptations to overload [18]. Thus the increase in sprints after very heavy sled training due to neuromuscular adaptation after increased sprint performance and increased loads make muscle adaptation stronger. If at first the muscles are not able to work at a higher load, they will be able to work at a higher load after giving a heavy load because the muscles have adapted to the higher load. So it can be said that by applying very heavy sled training, force production in the horizontal direction increases, thereby increasing stride length.

Conclusion

Based on the study results and data analysis, it can be concluded that very heavy sled training has a significant effect on increasing the sprint speed of female football players. The results shown that there are potential benefits to using very heavy sled training to develop sprint performance from start to finish. The percentage increase in each are 13,618% in 5 meters, 13,628% in 10 meters, 13,651% in 15 meters, and 13,677% in 20 meters.

Very heavy sled training is very effective in increasing the performance of the 20 meter sprint. So this implies that when designing sprint training, especially in terms of development sprint speed performance, trainers and coaches need to pay attention to the right methods, practices, and techniques. The method used in the training process must be considered for the effectiveness and efficiency to achieve maximum training results. It must also be adjusted to the characteristics of the athletes and the characteristics of the exercises to be trained.

Conflict of Interest

The authors declare that there is no conflict of interest.

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