

The Effect Of Circuit Training With Fixed And Decreasing Rest Intervals On The Ability Of The Dominant Physical Component Of Female Volleyball Players

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Abstract

The circuit training model is one of the effective training models in improving the physical abilities of an athlete. The purpose of this study was whether circuit training with fixed and decreasing rest intervals had an effect on the ability of the dominant physical component in female volleyball athletes. This type of research is quantitative research with a quasi-experimental approach. The population in this study were all female volleyball players of the Baja 78 volleyball club, then taken based on purposive sampling technique and used as subjects in this study, then the size of the sample was determined by the population and taken according to the characteristics determined by the researcher, namely: 1). Female gender, 2). Age 15 – 23 years, 3). Physically and mentally healthy. 4). Volleyball athletes in this study had to train for at least 1 year. This research was conducted at the Bantul Regional Government Volleyball Hall and the Bantul District Square. The time of this research was carried out for two months, namely between July - September 2018 with a frequency of training three times a week, so it can be seen that the implementation of this treatment was carried out 24 times face to face. The collection technique in this study is a test and observation technique. The instruments in this study were test and non-test instruments. The analysis technique in this research is quantitative. The statistic used is t test. The results showed that there was an increase in strength, muscle endurance, speed, flexibility, power, agility, and cardiovascular endurance between before and after circuit training treatment with fixed rest intervals. Then the researchers concluded that circuit training with fixed rest intervals in general had an effect on the dominant physical component.

Keywords: Interval, Rest Remains Decreased, Physical Predominant, Athlete.

1. Introduction

Interesting to study so that many sports circles devote their attention to efforts to improve fitness and sports achievement [1–3]. Coaching efforts through marketing, breeding, training, and research activities must be carried out in order to be able to compete in a sporting manner in each championship and be able to produce optimal performance [1,4]. The discovery of exercise methods that can be applied in the daily exercise process can be seen clearly in the overall sport science has developed rapidly which was originally only a natural explanation, now it has become a scientific cutting-edge knowledge so that it is expected to be able to keep up with changes in the world [5,6]. changes that occur in the world of sports, especially the use of science and technology for maximum sports achievement [7,8]. Likewise with volleyball in Indonesia [9,10].

Volleyball achievements in Indonesia, both for men and women, have had their ups and downs, with the last achievement of the Indonesian men's volleyball team being ranked fourth in the 2017 Asian

Men's Championship which took place from 24 July- 1 August at Tridharma Gymnasium, Gresik [11]. For Indonesia, being in fourth place is a new history [12]. Previously, Indonesia's best achievement was in sixth place (1975, 1991, 1999, and 2009). At the Sea Game in Malaysia, the men's volleyball team won a silver medal [15]. For the women's volleyball team, the achievements have had ups and downs. Finally, the achievement of the women's volleyball team at the Sea Game in Malaysia 2017 getting a silver medal, defeated by the Thai team, has exceeded the target of PBVSI.

The special area of Yogyakarta for volleyball achievements, especially women's, has decreased, as evidenced by the absence of women's volleyball teams from national events such as pro league and livoli in Indonesia. The tiered and continuous coaching will greatly affect the athletes and will even be able to bring up talented athletes who are new to volleyball players, especially women. For DIY, many have taken part in giving athletes to men's volleyball such as Andre, Miko, Zainudin, but they are very

unequal with the women's volleyball team in DIY. From some observations, the coach is more concerned with technical training than physical training on the grounds that the preparation for team formation is short, the level of knowledge of athletes is minimal about the importance of physical exercise and also many are less serious in physical exercise.

The importance of physical condition in sports, especially in volleyball players is as a foundation for learning technique, tactics, strategy and mentality [13–15]. Prevent injury or reduce the risk of injury, able to accept relatively strenuous exercise, can maintain posture and body weight and can increase self-confidence [16,17]. The benefits of physical exercise for volleyball players are better, not easily tired even in relatively long matches, easy to recover after heavy training and competition, reduce muscle pain, able to practice longer and better techniques and techniques, not easily injured, recover quickly if injured, prevent mental fatigue and improve concentration [18]. More confident and enjoy playing more [19,20].

The basic factors of training which include physical preparation, technique, tactics, and psychology are closely related, but each formation has a way of developing [21,22]. Physical and technical preparation provide the basis for the formation of subsequent abilities [23]. Physical ability is needed to acquire better technical skills, better technical abilities, to be prepared to acquire tactical abilities and if tactical abilities are obtained, it is useful to use them to prepare for competition maturity abilities [24]. Of these various factors, physical is the foundation of the peak of achievement [25]. Physical condition plays a very important role in the training program, because technique, tactics, and mentality will be developed properly if they have good physical qualities [26,27].

Physical exercise methods that are suitable to improve the ability of physical conditions which include aerobic capacity and anaerobic capacity [28–30]. These training methods include using the circuit training method [31,32]. Circuit training was developed by Morgan and Anderson in 1953 at the University of Leeds in England [33,34]. The start of this exercise consists of 9 to 12 exercise protocols using moderate intensity (40% to 60% of 1 RM) with a certain number of repetitions and a certain time with little rest on each shift to the next exercise station [35]. The circuit system consists of a series of resistance exercises performed successively with minimal rest between each exercise, by performing circuit training can increase the time to lactate threshold, body composition, and improve strength and endurance [36].

From the results of the study, after doing a circuit exercise consisting of two programs, namely using

body weight and an aerobic program, it can improve health, cardiorespiratory and muscle fitness [37,38]. High-intensity circuit training (HICT) is an efficient way of training to help reduce body fat, improve insulin sensitivity, increase VO₂ max and muscle fitness. Circuit training is a useful and effective method for improving cardiovascular strength and performance [39–41].

Circuit training 3 times per week for six weeks for 2 minutes at an intensity of 90% – 95% of target heart rate in increments of reps every two weeks of 8, 10 12 reps followed by active rest at 60% – 70% of heart rate showed that there was a significant increase in aerobic capacity and improved cardiovascular fitness [42]. Meanwhile, circuit training carried out in 15 weeks lasting about 45 minutes with an intensity of 60% - 85% of heart rate can affect significant changes in anthropometric variables and physical conditions [43].

The types of exercises to improve physical condition are a unified whole and cannot be separated [44]. This means that in improving the physical condition of all components, it must be developed even though it is carried out with a priority system according to the circumstances or status required by the athlete [45,46]. Of the several types of components of physical condition, most of them must be present in the circuit training program that will be given to every athlete in the achievement sport, in this case the female volleyball player in the Special Region of Yogyakarta.

In order to know the method of physical exercise needed, it is necessary to know the extent to which circuit training affects the ability of the dominant physical components of female volleyball players which include strength, muscle endurance, speed, flexibility, power, agility and cardiovascular endurance.

2. Methods

This research is a quantitative research, while in terms of the method used in this research, it is a quasi-experimental research [47,48]. Based on data analysis using quantitative analysis, the treatment group was measured by providing the type of exercise in the form of circuit training with fixed rest intervals and decreasing rest intervals to increase the ability of the dominant physical components consisting of strength, muscle endurance, speed, flexibility, power, agility, endurance. cardiovascular.

The population in this study were all female volleyball players of the Baja 78 volleyball club. The sample in this study will be taken from the existing population by means of "Purposive Sampling". The size of the sample is determined by the total population and is taken according to the

characteristics determined by the researcher, namely: 1. Female gender, 2. Age 15 – 23 years, 3. Physically and mentally healthy. 4. Volleyball athletes in this study had to train for at least 1 year. This research was conducted at the Bantul Regional Government Volleyball Hall and the Bantul District Square. The time of this research was carried out for two months, namely between July - September 2018 with a frequency of training three times a week, so it can be

seen that the implementation of this treatment was carried out 24 times face to face. While the exercise program applied to improve physical condition by using fixed rest intervals and decreasing rest intervals by circuit training. The research design uses a design with a factorial design as described in table 1 and the circuit training program table in this study is described in table 2 below:

Table 1. Research Design

	Intervals (B)	
	Rest Interval Fixed 45 sec (B1)	Rest interval Decreases every 10 sec (B2)
Circuit training (A1)	A1-B1	A1-B2
	description	
A1B1:	circuit training method with fixed rest intervals on strength, muscle endurance, speed, flexibility, power, agility, cardiovascular endurance	
A2B1:	circuit training method with rest intervals decreased on strength, muscle endurance, speed, flexibility, power, agility, cardiovascular endurance.	

Table 2. Training Circuit

Information	Circuit Training
Practice time	8 weeks
Frequency	3 times per week
Number of Circuits	9 stations (shuttle run, half squat jump, squat trust, jumping jack, frog jump, step up, side
Time per circuit amount of time	10 minutes – 20 minutes
Burden	30 – 45 minutes
Reps	60 - 80 % of RM (Maximum Reps)
Rest interval for each station	15 – 20 times
Total Rest	45 seconds for fixed intervals and 10 seconds for decreasing intervals, starting from 80 seconds for one station to the next station

3. Results and Discussion

The results of the study on the effect of circuit training with fixed and decreasing rest intervals on the ability of the dominant physical component of female volleyball players. The dominant physical components studied consisted of muscle strength, muscle endurance, speed, flexibility, leg power, agility, and cardiovascular endurance. Below will be explained in detail on each component in this study as follows:

1. Muscle Strength Test Results

Measurement of muscle strength is carried out by measuring the strength of the back muscles and leg muscles using a measuring instrument hand and leg digital dynamometer.

Based on the results of arm muscle measurements, it can be seen that from 36 female volleyball athletes in the pretest measurement there were no subjects who had arm muscle strength in the perfect and very good category (0.0%), 14 subjects (38.9%) had strong arm muscles. arm muscles in the good category, 21 subjects (58.3%) had arm muscle strength in the sufficient category and 1 subject (2.8%) had arm muscle strength in the less category. The measurement results in the posttest also did not have subjects who had arm muscle strength in the perfect category, there was 1 subject (2.8%) had arm muscle strength in the very good category, 18 subjects (50.0%) had arm muscle strength in the very good category. good category, 17 subjects (47.2%) had arm muscle strength in the sufficient category and no subject had arm muscle strength in the less category (0.0%). From the results of these measurements, it

can be concluded that between the measurements of arm muscle strength, there is a change between the pretest and posttest. The results showed that in the pretest the majority of the research subjects had arm muscle strength in the sufficient category, while in the posttest the majority of the research subjects had arm muscle strength in the good category. Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls. The results of the calculation of the mean (mean) arm muscle strength between the pretest and posttest between treatments are presented in the following table.

Table 3. Comparison of Average Arm Muscle Strength between Treatments

Treatment	Pretest	Posttest	Difference
Control	21,4	23,0	1,62
Fixed Rest	27,6	29,3	1,67
Downhill Rest	25,4	27,5	2,14

Comparison of the results of the measurement of arm muscle strength in the table above, it can be seen that the circuit training treatment interval with fixed and decreased rest and control both showed an increase between pretest and posttest. However, the measurement of arm muscle strength in the circuit training treatment with a decreased rest interval showed the highest difference between the pretest and posttest, and the increase in arm muscle strength in the circuit training treatment with a rest interval did not show a significant difference with the control.

The results of measuring the leg muscle strength of female volleyball athletes were compared with the norm of the leg muscle strength test according to the sex of each subject.

Based on these results, it can be seen that from 36 female volleyball athletes in the pretest measurement there were no subjects who had leg muscle strength in the perfect category (0.0%), 2 subjects (5.6%) had leg muscle strength in the good category. once, 7 subjects (19.4%) had leg muscle strength in the good category, 20 subjects (55.6%) had leg muscle strength in the moderate category and 7 subjects (19.4%) had leg muscle strength in the less category. The measurement results in the posttest also did not have subjects who had leg muscle strength in the perfect category, there were 2 subjects (5.4%) had leg muscle strength in the very good category, 10 subjects (27.8%) had leg muscle strength in the very good category. good category, 23 subjects (63.9%) had leg muscle strength in the sufficient category and 1 subject (2.8%) had leg muscle strength in the less category.

From the results of these measurements, it can be concluded that between the measurements of leg muscle strength there is a change between the pretest and posttest. The results showed that the number of subjects with lower leg muscle strength in the posttest category was less than in the pretest and there was an increase in the number of subjects with leg muscle strength in the good category. Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls. The results of the calculation of the mean (mean) leg muscle strength between the pretest and posttest between treatments are presented in the following table.

Table 4. Comparison of the Average Strength of the Limbs between Treatments

Treatment	Pretest	Posttest	Difference
Control	81,7	95,0	13,33
Fixed Rest	114,4	132,3	17,92
Downhill Rest	99,3	119,8	20,54

Comparison of the results of the measurement of leg muscle strength in the table above, it can be seen that the treatment of interval circuit training with fixed and decreased rest and control both showed an increase between the pretest and posttest. However, the measurement of leg muscle strength in circuit training treatment with a decreasing rest interval showed the highest difference between the pretest and posttest, and the increase in leg muscle strength in circuit training with rest intervals did not show a significant difference with the control.

2. Muscle Endurance Test Results

The results of the measurement of abdominal muscle endurance of female volleyball athletes with a sit up test were then compared with the norm of abdominal muscle endurance with a sit up test according to the sex of each subject. Based on the results of these measurements, it can be seen that from 36 female volleyball athletes in the pretest measurement there were no subjects who had abdominal muscle endurance in the perfect category (0.0%), 3 subjects (8.3%) had abdominal muscle endurance. in the very good category, 10 subjects (27.8%) had abdominal muscle endurance in the good category, 12 subjects (33.3%) had abdominal muscle endurance in the moderate category and 11 subjects (30.6%) have abdominal muscle endurance in the less category. The measurement results in the posttest also did not have subjects who had abdominal muscle endurance in the perfect category, there were 2 subjects (5.6%) had abdominal muscle endurance in the very good

category, 10 subjects (27.8%) had good endurance. abdominal muscles in the good category, 20 subjects (55.6%) had abdominal muscle endurance in the moderate category and 4 subjects (11.1%) had abdominal muscle endurance in the less category.

From the results of these measurements, it can be concluded that the measurement of abdominal muscle endurance shows that there is a change between the pretest and posttest. The results show that the number of subjects who have abdominal muscle endurance in the less category in the posttest is less than in the pretest and there is an increase in the number of subjects with abdominal muscle endurance in the sufficient category. Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls. The results of the calculation of the mean (mean) abdominal muscle endurance between pretest and posttest between treatments are presented in the following table.

Table 5. Comparison of Average Abdominal Muscle Endurance between Treatments

Treatment	Pretest	Posttest	Difference
Control	36,1	37,3	1,17
Fixed Rest	43,2	46,1	2,92
Downhill Rest	41,8	47,3	5,50

Comparison of the results of abdominal muscle endurance measurements in the table above, it can be seen that the treatment of interval circuit training with fixed and decreased rest and control both showed an increase between the pretest and posttest. However, the measurement of abdominal muscle endurance in the circuit exercise treatment with a decreasing rest interval showed the highest difference between the pretest and posttest, and the increase in abdominal muscle endurance in the circuit exercise treatment with a rest interval did not show a significant difference with the control.

Then the results of the measurement of arm and shoulder muscle endurance of female volleyball athletes with a push up test were then compared with the norm of arm and shoulder muscle endurance with a push up test according to the gender of each subject. Based on the measurement results, it can be seen that bahwa dari 36 orang atlet bola voli putri pada In the pretest measurement there were 30 subjects who had arm and shoulder muscle endurance in the perfect category (83.3%), 1 subject (2.8%) had arm and shoulder muscle endurance in the very good category, 4 subjects (11, 1%) had arm and shoulder muscle endurance in the good category, 1 subject (2.8%) had arm and shoulder muscle endurance in the moderate category and no subject (0.0%) had arm and shoulder

muscle endurance. shoulder in the less category. The measurement results in the posttest there are 33 subjects who have arm and shoulder muscle endurance in the perfect category (91.7%), 3 subjects (8.3%) have arm and shoulder muscle endurance in the very good category, and no subject (0.0%) who have arm and shoulder muscle endurance in the good, sufficient or less category.

From the results of these measurements, it can be concluded that the measurement of arm and shoulder muscle endurance shows that there is a change between the pretest and posttest. The results showed that the number of subjects who had perfect arm and shoulder muscle endurance in the perfect category increased between pretest and posttest and the lowest arm and shoulder muscle endurance in the posttest was in the good category. Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls. The results of the calculation of the mean (mean) arm and shoulder muscle endurance between the pretest and posttest between treatments are presented in the following table.

Table 6. Comparison of Average Arm and Shoulder Muscle Endurance between Treatments

Treatment	Pretest	Posttest	Difference
Control	26,1	26,9	0,83
Fixed Rest	27,6	30,3	2,67
Downhill Rest	26,3	31,4	5,17

Comparison of the results of the measurement of arm and shoulder muscle endurance in the table above, it can be seen that the treatment of interval circuit training with fixed and decreased rest and control both showed an increase between the pretest and posttest. However, the measurement of arm and shoulder muscle endurance in circuit training treatment with a decreasing rest interval showed the highest difference between the pretest and posttest, and the increase in arm and shoulder muscle endurance in circuit training with rest intervals still showed a lower difference than the control.

3. Test Results Speed

Measurement of speed or speed is carried out by the 50-meter sprint method. The results of the female volleyball athlete's speed measurement were then compared with the speed test norm. Based on the results of these measurements, it can be seen that from 36 female volleyball athletes in the pretest measurement there were no subjects who had speed in the perfect category (0.0%), 1 subject (2.8%) had speed in the very good category, 10 subjects (27.8%)

had speed in the good category, 16 subjects (44.4%) had speed in the moderate category and 9 subjects (25.0%) had speed in the less category. The measurement results in the posttest also did not have subjects who had speed in the perfect category, there were 4 subjects (11.1%) who had speed in the perfect category. good once, 13 subjects (36.1%) had speed on good category, 15 subjects (41.7%) had speed in the moderate category and 4 subjects (11.1%) had speed in the less category.

From the results of these measurements, it can be concluded that between the speed measurements, there is a significant change between the pretest and posttest. The results show that the number of subjects with less speed in the posttest category is less than in the pretest and there is an increase in the number of subjects with speed in the good category. Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls.

Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls. The results of the calculation of the mean (mean) speed between the pretest and posttest between treatments are presented in the following table.

Table 7. Comparison of Average Speed between Treatments

Treatment	Pretest	Posttest	Difference
Control	8,9	8,8	0,13
Fixed Rest	8,6	8,5	0,16
Downhill Rest	8,7	8,1	0,56

Comparing the speed measurement results in the table above, it can be seen that the treatment of interval circuit training with fixed and decreased rest and control both showed an increase between the pretest and posttest. However, the measurement of the speed of the circuit training treatment with a decreasing rest interval showed the highest difference between the pretest and posttest, and the increase in the speed of the circuit training treatment with a rest interval still did not show a significant difference with the control.

4. Flexibility Test Results

Flexibility measurement was carried out using the flexometer method. The results of measuring the flexibility of female volleyball athletes were then compared with the norm of the flexibility test according to the gender and age category of each

subject. Based on the measurement results, it can be seen that from 36 female volleyball athletes in the pretest measurement there were 11 subjects who had flexibility in the perfect category (30.6%), 2 subjects (5.6%) had flexibility in the very good category, 23 Subjects (63.9%) had flexibility in the good category, and no subject (0.0%) had flexibility in the sufficient or less category. The measurement results in the posttest were 33 subjects who had flexibility in the perfect category (91.7%), 3 subjects (8.3%) had flexibility in the very good category, and no subject (0.0%) had flexibility in the good, sufficient and poor categories.

From the results of this measurement, it can be concluded that between the flexibility measurements there is a change between the pretest and posttest. The results show that the number of subjects who have flexibility in the perfect category increases between pretest and posttest and the lowest level of flexibility in the posttest is in the very good category. Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls. The results of the calculation of the average (mean) flexibility between pretest and posttest between treatments are presented in the following table.

Table 8. Comparison of Average Flexibility between Treatments

Treatment	Pretest	Posttest	Difference
Control	18,1	28,4	10,26
Fixed Rest	23,1	33,7	10,58
Downhill Rest	23,7	34,7	11,01

Comparison of the results of flexibility measurements in the table above, it can be seen that the treatment of interval circuit training with fixed and decreased rest and control both showed an increase between the pretest and posttest. However, the measurement of flexibility in the treatment of interval circuit training with decreased rest showed the highest difference in improvement between the pretest and posttest.

5. Power Test Results

The power measurement is carried out using the Jump-DF digital Vertical Jump method. The results of measuring the power of women's volleyball athletes were then compared with the norm of the power test. Based on the measurement results, it can be seen that from 36 female volleyball athletes in the pretest measurement there were 16 subjects who had power in the perfect category (44.4%), 8 subjects

(22.2%) had power in the very good category, 7 Subjects (19.4%) had power in the good category, 4 subjects (11.1%) had power in the moderate category and 1 subject (2.8%) had power in the less category. The measurement results in the posttest there are 19 subjects who have power in the perfect category (52.8%), 10 subjects (27.8%) have power in the very good category, 6 subjects (16.7%) have power in the good category, 1 subject (2.8%) has power in the sufficient category and no subject (0.0%) has power in the less category.

From the results of this measurement, it can be concluded that between the power measurements there is a change between the pretest and posttest. The results show that the number of subjects who have power in the perfect category increases between the pretest and posttest and the lowest level of power in the posttest is in the sufficient category. Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls. The results of the calculation of the mean (mean) power between the pretest and posttest between treatments are presented in the following table.

Table 9. Comparison of Average Power between Treatments

Treatment	Pretest	Posttest	Difference
Control	44,6	45,4	0,83
Fixed Rest	46,3	50,2	3,92
Downhill Rest	44,5	48,9	4,42

Comparison of the results of power measurements in the table above, it can be seen that the treatment of interval circuit training with fixed and decreased rest and control both showed an increase between the pretest and posttest. However, the measurement of circuit training treatment power with interval decreased rest showed the highest difference between pretest and posttest, when compared to the circuit training treatment with rest intervals and control.

6. Agility Test Results

Measurement of agility was carried out by the T-test method. The results of measuring the agility of female volleyball athletes were then compared with the agility test norm. The results of these measurements are then compared with the norm of cardiopulmonary endurance test according to the gender and age category of each subject. Based on the results of these measurements, it can be seen that of the 36 female volleyball athletes in the pretest measurement, all of them have agility in the less category (100.0%). The

measurement results on the posttest also showed that all subjects had agility in the less category (100.0%).

From the results of this measurement, it can be concluded that between the agility measurements there is no change between the pretest and posttest. The results showed that in both the pretest and posttest, the majority of research subjects had agility in the poor category. Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls. The results of the calculation of the mean (mean) agility between the pretest and posttest between treatments are presented in the following table. The results showed that there was an increase in the number of subjects who had good cardiovascular power. Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls. The results of the calculation of the average (mean) cardiovascular power between pretest and posttest between treatments are presented in the following table.

Table 10. Comparison of Average Cardiovascular Power between Treatments

Treatment	Pretest	Posttest	Difference
Control	30,0	30,4	0,37
Fixed Rest	31,9	32,5	0,61
Downhill Rest	32,7	34,0	1,30

Comparison of the results of agility measurements in the table above, it can be seen that the treatment of interval circuit training with fixed and decreased rest and control both showed an increase between the pretest and posttest. However, the agility measurement of circuit training treatment with decreasing rest intervals showed the highest difference in improvement between pretest and posttest.

7. Cardiovascular Power Test Results

The measurement of cardiorespiratory endurance/fitness (VO₂Max) is the Multistage Fitness Test method. The results of these measurements are then compared with the norm of the cardiopulmonary endurance test according to the sex and age category of each subject. Based on the measurement results can it is known that from 36 female volleyball athletes in the pretest measurement there were no subjects who had cardiovascular power in the perfect, very good and good categories (0.0%), 28 subjects (77.8%) had cardiovascular power in the moderate category and 8 subjects (22.2%) had cardiovascular power in the less category. The

measurement results in the posttest also did not have subjects who had cardiovascular power in the perfect or very good category (0.0%), there were 4 subjects (11.1%) had cardiovascular power in the good category, 22 subjects (61.1%) had cardiovascular power in the moderate category and 10 subjects (27.8%) had cardiovascular power in the less category.

From the results of these measurements, it can be concluded that between the measurements of cardiovascular power, there is a change between the pretest and posttest. The results showed that there was an increase in the number of subjects who had good cardiovascular power. Furthermore, the calculation of the mean (mean) between pretest and posttest between circuit training treatments with fixed and decreasing rest intervals and comparison with controls. The results of the calculation of the average (mean) cardiovascular power between pretest and posttest between treatments are presented in the following table.

Table 11. Comparison of Average Cardiovascular Power between Treatments

Treatment	Pretest	Posttest	Difference
Control	30,0	30,4	0,37
Fixed Rest	31,9	32,5	0,61
Downhill Rest	32,7	34,0	1,30

Comparison of the results of cardiovascular power measurements in the table above, it can be seen that the treatment of interval circuit training with fixed and decreased rest and control both showed an increase between the pretest and posttest. However, the measurement of cardiovascular power in circuit training treatment with a decreasing rest interval showed the highest difference between the pretest and posttest, and the increase in cardiovascular power in the circuit exercise treatment with rest intervals did not show any significant difference with the control.

A similar study (Arazi et al, 2017) with the title "The effect of resistance training set configuration on strength, power, and hormonal adaptation in female volleyball players" but previous research only discussed an 8-week training program to measure the endurance of female volleyball athletes. Another thing from previous research is that researchers focus on anthropometric characteristics. However, previous researchers supported the results of this study. This is based on the results of research which states that the 7 factors that the researchers examine are an inseparable part of the achievements of women's volleyball athletes. Thus, the controversy between previous research and this research lies in the focus of the study.

This study aims to determine the effect of circuit training with fixed and decreasing rest intervals on the ability of the dominant physical component of female volleyball players. The predominant physical component exercise has a very important role in the athlete's training program for achievement sports. According to Puspodari et al. (2015), a well-planned and systematic physical condition training program aimed at improving physical fitness and functional abilities of body systems enables athletes to achieve better performance. From the circuit training method that has been carried out in the implementation of the research, it shows that overall it proves that there is a significant effect on the circuit training method with the rest interval remaining 45 seconds and the rest interval decreased by 10 seconds to the ability of the dominant physical component. The results showed an increase in strength, muscle endurance, speed, flexibility, power, agility, cardiovascular endurance, but at the circuit training interval with a fixed 45 second rest interval the increase in the ability of the dominant physical component did not show a significant difference with the control.

The measurement of arm muscle strength in the control group showed an increase of 1.62 kg, in the rest group it still increased by 1.67 kg and in the decreased rest group it showed an increase of 2.14 kg. Measurement of leg muscle strength in the control group showed an increase of 13.33 kg, in the resting group it still increased by 17.92 kg and in the decreasing rest group it showed an increase of 20.54 kg. Measurement of abdominal muscle endurance in the control group showed an increase in sit-ups by 1.17 times per minute, in the resting group it still increased by 2.92 times per minute and in the decreasing rest group it showed an increase of 5.5 times per minute. Measurement of arm and shoulder muscle endurance in the control group showed an increase in push-ups of 0.83 times per minute, in the rest group it still increased by 2.67 times per minute and in the decreased rest group it showed an increase of 5.17 times per minute.

Measurement of speed in the control group showed an increase of 0.13 seconds, in the rest group it continued to increase by 0.16 seconds and in the decreased rest group it showed an increase of 0.56 seconds. Measurement of flexibility in the control group showed an increase of 10.26 cm, at the resting group still increased by 10.58 cm and in the decreasing rest group it showed an increase of 11.01 cm. The power measurement in the control group showed an increase in Vertical Jumps by 0.03 cm, in the resting group it still increased by 3.92 cm and in the rest group it increased by 3.92 cm. decreased rest showed an increase of 4.42 cm.

Measurement of agility in the control group showed an increase in beam side step of 3.17 seconds,

in the rest group it still increased by 3.25 seconds and in the decreased rest group it showed an increase of 4.67 seconds. Measurement of cardiovascular endurance in the control group showed an increase of 0.37 ml.kg/minute, in the resting group it continued to increase by 0.61 ml.kg/minute and in the decreased resting group showed an increase of 1.30 ml.kg/minute.

The results showed that the increase in strength, muscle endurance, speed, flexibility, power, agility, cardiovascular endurance in circuit training with rest intervals decreased higher than fixed rest intervals. Based on these results, it can be concluded that circuit training with a decreasing rest interval of 10 seconds is more effective in improving the ability of the dominant physical component than a fixed rest interval of 45 seconds.

The system in circuit training with intervals includes alternating periods of work and rest. Circuit training program designed to improve physical condition, in compiling a program it is necessary to emphasize the physiological effects that are produced as training goals to be achieved [49–51]. This means that the athlete will try harder to complete the exercise from one post to the next than he does in a fixed 45 second rest interval training [52]. So, the shorter the recovery time, the more the training load will increase [53]. So, the shorter the recovery time, the more the training load will increase. Recovery is a process that is directly related to the training load used. recovery curve that represents the body's ability to achieve homeostasis is not linear [54,55].

4. Conclusions

Based on the results of research on the effect of circuit training with fixed and decreasing rest intervals on the ability of the dominant physical component of female volleyball players, it can be concluded that circuit training with fixed rest intervals in general has an influence on the dominant physical component. The results showed that there was an increase in strength, muscle endurance, speed, flexibility, power, agility, and cardiovascular endurance between before and after circuit training treatment with fixed rest intervals, but the increase did not show a significant difference with the control.

Circuit training with decreased rest intervals generally has an effect on the dominant physical component. The results showed that there was an increase in muscle endurance, speed, flexibility, power, agility, cardiovascular endurance between before and after circuit training treatment with decreased rest intervals, and the increase showed a significant difference with the control.

There are differences in circuit training with fixed and decreasing rest intervals that have an effect on the ability of the dominant physical component. The

results showed that the increase in strength, muscle endurance, speed, flexibility, power, agility, cardiovascular endurance in circuit training with rest intervals decreased higher than fixed rest intervals. Based on these results, it can be concluded that circuit training with decreased rest intervals is more effective in improving the ability of the dominant physical component than fixed rest intervals.

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