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The Impact of Aerobic Circuit Training Methods on the Improvement of Anaerobic Dynamic and Aerobic Capacity

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***Abstract*—This research was aimed at knowing the impact of aerobic circuit training to the improvement of anaerobic capacity which, in this research, consists of the ability of movement speed, power, power endurance, and the aerobic capacity. The method used to obtain data and goals to be achieved was the experimental method, by the design of one – group pretest and posttest, by giving the treatment to the student of football Sports Activity Unit. The result of research showed that (1) The implementation of harness training did not give a significant impact to the improvement of anaerobic dynamic capacity, (1.a) The implementation of aerobic circuit training gave a significant impact to the improvement of the ability of movement speed, (1.b) The implementation of aerobic circuit training did not give a significant impact to the improvement of "power" capacity, (1.c) The implementation of aerobic circuit training did not give a significant impact to the improvement of "power endurance" capacity, and (2) The implementation of aerobic circuit training gave a significant impact to the improvement of dynamic aerobic capacity.**

Keywords: aerobic circuit training, the anaerobic capacity, the aerobic capacity

I. INTRODUCTION

Circuit training is a sports training program that has a series of posts, with each post having different types of training to be carried out in a more systematic and directed manner. For athletes training in circuit training is familiar, this is due to the frequent application of this training model when the training program is being implemented [1].

For training circuit material, namely concentration of physical condition or physical fitness of the player which is influenced by several components of physical conditions including: strength, endurance, muscle power, speed, flexibility, agility, coordination, balance and accuracy. The following is an example of a circuit training method as shown in the figure below [2].

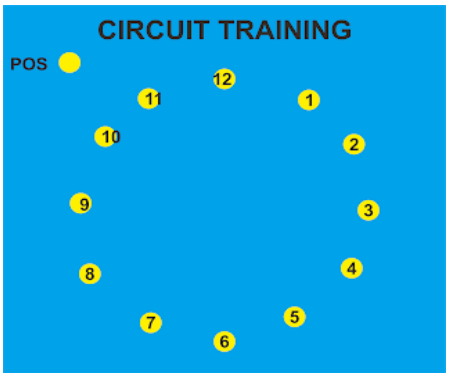

Fig. 1. Circuit training posts.

The circuit training was developed by R.E Morgan and G.T Anderson in 1953 at the University of Leeds in England. It is called circuit training because it consists of several posts arranged in a cycle. Definition or Definition of Circuit Training According to Sarwono is circuit training is a form of exercise consisting of a series of sequential exercises, designed to develop physical fitness and skills related to certain sports [3]. Furthermore M. Sajoto, circuit training is an exercise program consisting of several stations, and at each station an athlete performs the type of exercise that has been determined [4]. One training circuit is said to be completed when an athlete has completed training at all stations in accordance with a predetermined dose.

So to say circuit training (circuit training) is an exercise program consisting of several posts / stations, arranged for one round of training where each post / station has its own movement / type of training. The circuit training material can consist of several movements that are adapted to ability and age. Examples of movements that can be done are zigzag, squat thrust, down the line drill, jingle, lateral spin jingle, dot wave drill and shuttle run, and others [5].

The results of the study showed that circuit training had an impact on improving the physical condition components [6]. That discuss about study examined the effects of power-based complex training (PCT) on body composition and muscular strength in male and female collegiate athletes [7]. the results

of the research are the current study suggests that the 6-week PCT program can positively alter body composition particularly for female athletes and significantly improve upper and lower body strength for both male and female athletes, which will contribute to improvement in athletic performance.

Then in his research results with the title the acute effect of upper-body complex training on power output of martial art athletes as measured by the bench press throw exercise, the result is it was concluded that, in complex training, matching a heavy preload stimulus with a longer rest interval, and a lighter preload stimulus with a shorter rest interval is important for athletes wishing to increase their power production before training or competition [8].

From some of these studies, circuit training has an impact on improving the physical condition component. The author is interested in inserting aerobic exercise between exercise posts, with the hope that the physical condition component of endurance will increase as well.

Aerobic Circuit training has the advantage of having advantages compared to ordinary circuits, but certainly and there must be a shortage of this method, circuit training will provide results or training effects that are more dominant to muscular endurance, which in turn will support the ability to aerobic (aerobic increase) 6%). While aerobic circuit training besides muscle endurance between training posts is given an interval with jogging with sub-maximal intensity so that with this loading the aerobic ability will increase (11%) [9].

Regarding the pattern of activity and loading explained by Pesurnay & Sidik [10] that: "The pattern of activities is based on: 1) Number of repetitions (rations), 2) Time limit (time). Charging can be: 1) Internal resistance (prisoners from within / weight loads), 2) External resistance (prisoners from outside / load devices) ". An example of an aerobic circuit training method is illustrated as follows:

Aerobic Circuit Training

- Pos 1: exercise for the legs which is sitting standing jogging 200 meters
- Pos 2: exercise for the upper body / arm ie 200 meters push up jogging
- Pos 3: exercises for the stomach which are diagonal sit up jogging 200 meters
- Pos 4: exercises for the legs ie 200 meter squat jump jogging
- Pos 5: exercises for the upper body / arm that is pulling up jogging 200 meters
- Pos 6: exercises for the back, the diagonal back up jogging 200 meters
- Pos 7: exercise for the legs ie step up jogging 200 meters
- Pos 8: exercises for the stomach, namely a 200 meter jogging knife

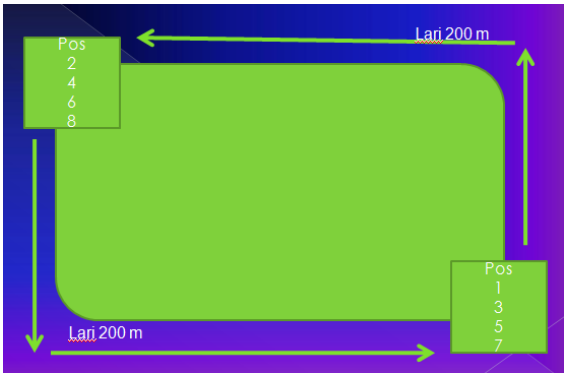

Fig. 2. Aerobic circuit training plan.

The posts above are one example of aerobic circuit training using internal resistance or body weight, the results of these exercises have an impact on increasing the ability of aerobic endurance and aerobic endurance.

II. METHODS

The research method applied in this study was an experiment with the design of "one group pretest and posttest". The design of this study are:

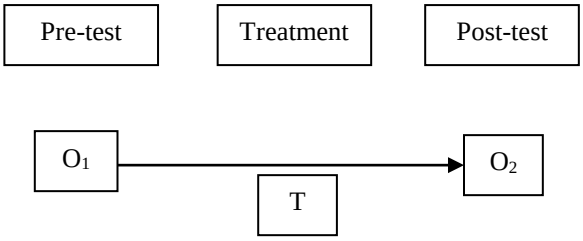

Fig. 3. One group pretest - posttest design [11].

Place and time The research was carried out at UPI Bandung stadium from September to November 2018. The exercise was conducted 3 times a week depending on the training objectives in accordance with the principles and norms of training load in achieving physical training goals. The research subjects were 15 female students who joined the soccer achievement sports activities unit.

Research instruments used to carry out the process and collect data in the form of training programs for harness training and several test items to determine the capabilities of Anaerobes and Aerobes, namely:

1) Anaerobic ability which consists of tests:

- Speed in the form of Speed: a 20 m dash sprint test
- Leg power: 3 Hop test
- Power Endurance: 10 Hop test

2) His aerobic ability is measured through a Bleep run endurance test.

III. Results and Discussion

This section presents an overview of the results of testing and measurement data that have been processed in each component of anaerobic ability and aerobic ability at the initial and final tests as set out below [12].

1) Speed: From the data processing results obtained values:

t-count (2,712)> from t table (2,056), then Ho is rejected and Ha (research hypothesis / work hypothesis) is accepted which means that aerobic circuit training has a significant impact on increasing the ability of the speed of motion "Speed".

2) Power: From the data processing results obtained values:

t-count (0,00062) < from t table (2,056), then Ho is accepted and Ha (research hypothesis / work hypothesis) is rejected which means that aerobic circuit training does not have a significant impact on increasing the ability of "Power".

3) Power Endurance: From the data processing results obtained values:

t-count (0.0012) < from t table (2,056), then Ho is accepted and Ha (research hypothesis / work hypothesis) is rejected which means that aerobic circuit training does not have a significant impact on increasing the ability of "Power Endurance".

4) Anaerobic ability improvement t test: From the data processing results obtained values:

t-count (0.002) <from t table (2,056), then Ho is accepted and Ha (research hypothesis / work hypothesis) is rejected which means that aerobic circuit training does not have a significant impact on increasing the "Anaerobic" dynamic capability.

5) Aerobic ability improvement t test: From the data processing results obtained values:

t-count (7,116)> from t table (2,056), then Ho is rejected and Ha (research hypothesis / work hypothesis) is accepted which means that aerobic circuit training has a significant impact on increasing the ability of "Aerobics (Endurance)".

From the calculation above, aerobic circuit training does not have an impact on improving anaerobic ability. This is because there is only an increase in the physical condition component of the movement speed, whereas for the physical condition component of power and power endurance there is no significant increase. However, the physical condition component of power and power endurance increased on average, although slightly. Furthermore, for aerobic ability, aerobic circuit training has a significant impact.

Therefore the application of aerobic circuit training patterns has an impact on increasing anaerobic ability (speed of movement, and only a little on power and power endurance) and aerobics. Therefore, each trainer is expected to be able to design a variety of aerobic circuit training programs because this is important so that training needs are more secure and training targets are directed [13]. Adequate application of training by paying attention to training methods, training patterns, principles, and norms of training properly is an important key to getting overcompensated (Exercise Effects) [14]. In order to produce scientific development in coaching that is more effective and efficient, this research can be developed through other studies or application to sports that are more specifically dominant physical abilities, such as sports that are dominant speed (sport speed), dominant power endurance (sport power), or dominant endurance (sport endurance) [15,16].

IV. Conclusions and Recommendations

The results of this study found the conclusion that the application of aerobic circuit training did not have a significant impact on increasing Anaerobic dynamic abilities, whereas for aerobic dynamic abilities there was a significant increase. Suggestions for trainers to provide aerobic circuit training in stages, systematically in accordance with the needs of periodization and the demands of training objectives related to speed training in the form of speed, dynamic power in the form of jumping movements, as well as power endurance, and the ability durability.

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