

The Implementation Impact of High Intensity Interval Training (HIIT) Methods for the Increase of Anaerobic Abilities

(Experimental study of physical training for 28 day meeting on student activity unit women futsal UPI Bandung)

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Abstract—Futsal is football game which required speed, all players must have dynamic and fast movement ability. So that each player is required to have excellent physical ability. HIIT methods is one of the effort to improve the physical abilities which is anaerobic and aerobic. The purpose of this research is to find out whether HIIT method can give a significant impact on the ability of anaerobic. The sample in this study amounted to 14 people by using purposive sampling technique. The method of research is experimental method. The instrument for this research is (1) Speed: 20 m dash sprint test (validity 0.829 and reliability 0.906). (2) Agility: shuttle run 4m x 5 rep (validity 0.796 and reliability 0.877). (3) Power leg: 3 Hop test (Validity 0.792 and reliability 0.871). (4) Power Endurance: Hurdle Jump (validity 0.709 and reliability 0.797). (5) Speed Endurance: sprint test: 150 m (validity 0.945 and reliability 0.971). Data analysis using SPSS version 20 with hypotheses examination through a paired sample t-test. Analysis result (1) There is a significant influence on HIIT methods to increased speed capability. (2) There is a significant influence on HIIT methods to increased agility capability. (3) There is a significant influence on HIIT methods to increased power capability. (4) There is a significant influence on HIIT methods to increased power endurance capability. (5) There is a significant influence on HIIT methods to increased speed endurance capability.

Keywords—*HIIT method; anaerobic abilities; futsal; football; aerobic*

I. INTRODUCTION

Futsal is a soccer game with a smaller field facet of football field then the players must have dynamic and fast moving levels. In playing futsal players have to do repetition run with quick recovery [1]. If the player has excellent physical condition of course can do runout, without experiencing excessive fatigue and recovery will be faster [2]. And If players experience excessive fatigue then there will be a decrease in skills [3]. For improve skill and achievement as much as possible maybe there is four aspect training needs be noticed and trained that is exercise physical, technical, tactical, and

mental [4]. One of the success factors of achievement is physical training [5]. Physical training is a very important part. The many components of the physical needs of the outstanding athlete require the trainer to try to understand well about the training of physical components. such as: the ability of flexibility, velocity (in the form of speed, agility, and speed), maximum strength, power, durability, anaerobik endurance, and aerobic endurance [6]. To use improve ability physical, many practice methods used. One of them is the method exercise High Intensity Interval Training or the usual called with HIIT.

This interval training method is the development of many different forms or patterns of application of the principle of interval training or often called the Interval Training Method. Interval training which means is something system exercise interspersed by intervals form times rest [4]. HIIT can also be called sprint interval training (SIT) which executes above 100% vo2max. because HIIT is exercise done with high intensity means that illustrate intensity start from the lowest 85% of taking oxygen maximum (VO2 max or capacity as aerobics) up to 250 % [7]. Interval training involves repetition and recovery exercises [7]. Repeats in short duration (10-30 s) exercise intensity high interspersed with period recovery active or passive [8]. And interval training involves exercise short to Repeated length from exercise a little intensity high (same or more high of the speed lactate maximum) interspersed with period recovery (exercise light or rest) [9]. What needs to be considered in interval training is the distance or time required, speed or effort, repetition of work interval or recovery time, activity recovery. Of all variables performed the implementation is consistent, and recovery time is suggested with active recovery [10]. here is a period of recovery of the pulse rate that is known at the beginning will be a benchmark for use as a break between reps. And knowing the recovery time after the end of repetition in the first set which then made benchmark for rest among the next set [11].

Some studies showing that research HIIT could increase ability anaerobic, this data show that 10-s (with recovery 2 or 4 minutes) and 30-s SIT (Sprint Interval Training) effective for improve performance anaerobes and aerobic [12]. Training for the short sprint interval (15 minutes of intensive exercise for 3 weeks) increases muscle oxidative capacity and twice the normal endurance during cycling exercise [13]. It was then strengthened in the study Nishimura and Tabata that a 6-week investigation demonstration of moderate-intensity resistance exercise did not have an anaerobic effect but 6 weeks of high intensity exercise (20 seconds of exercise, 10 seconds of rest with intensity of 170% VO₂max) can increase anaerobic capacity and VO₂max simultaneously [14].

II. METHOD

The method used in this research is experimental method with pretest One Group design Posttest [15]. Group experiment that is given exercise with High Intensity Interval Training method. Treatment this given every day for 28 days. The study was conducted from the beginning of March until the end of March 2017. Sample in this research were 14 using technique purposive sampling. Technique to take sample with consideration certain. The instrument in this study used 5 test items consisting of test (1) Speed: 20 m dash sprint test. (2) Agility: shuttle run 4m x 5 rep. (3) Power limb: 3 Hop test. (4) Power Endurance: Hurdle Jump. (5) Speed Endurance: 150 m sprint test.

III. RESULT AND DISCUSSION

The results of this study know the impact of HIIT training methods on anaerobic ability. Test performed using test statistics parametric through test paired sample t-test. The summary of the research can be seen in table 1.

TABLE I. ANAEROBIC TEST RESULTS

	t	t tabel	Sig.	Decision
Speed	5,260	2,14	0,000	Significant Influence
Agility	11,030	2,14	0,000	Significant Influence
Power	-2,453	2,14	0,029	Significant Influence
Power Endurance	-3,687	2,14	0,003	Significant Influence
Speed Endurance	10,644	2,14	0,000	Significant Influence

Based on the results of table 1 obtained value of significance speed = 0,000 < 0.05 This means Ho is rejected, or impact that significant. So can interpreted that to a significant impact method exercise HIIT to enhancement ability speed. Someone that have to speed high could do something a brief movement or in a short time after receive excitatory. Because of Speed as rate motion apply for body on whole or part body [16]. And in the study of Cathal J. Cregg HIIT is an efficient time training method for maintain to speed player football [8].

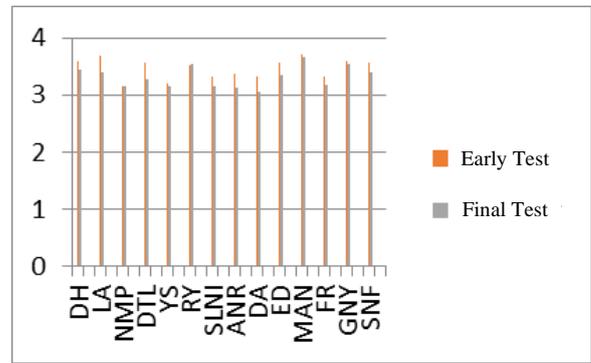


Fig. 1. Diagram of early test results and speed final test.

Agility significance value = 0.000 < 0.05 This means Ho is rejected, or has a significant impact. So it can be interpreted that the impact exercise method to significant HIIT upgrading the ability agility. In futsal demands move dynamically and quickly without losing balance [17]. In this study to increase the rate of dynamic and rapid movement using the HIIT exercise method, this method can improve anaerobic work [12].

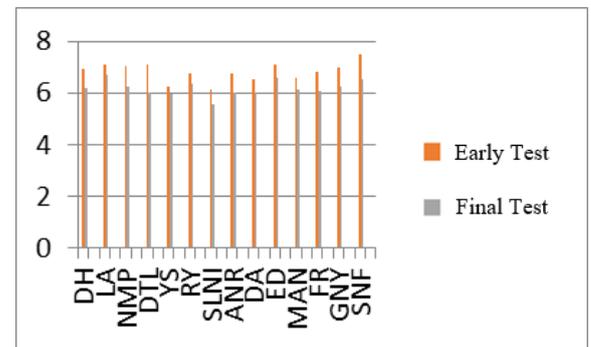


Fig. 2. Diagram of preliminary test results and agility final test.

The value of power significance = 0.029 < 0.05 This means Ho is rejected, or has a significant impact. So it can be interpreted that for significant HIIT impact training methods for capacity building. Only a strong person can move fast, not a person who can quickly move strongly. (Interview with Prof. Santosa). An efficient training time to improve athlete's ability is HIIT [8].

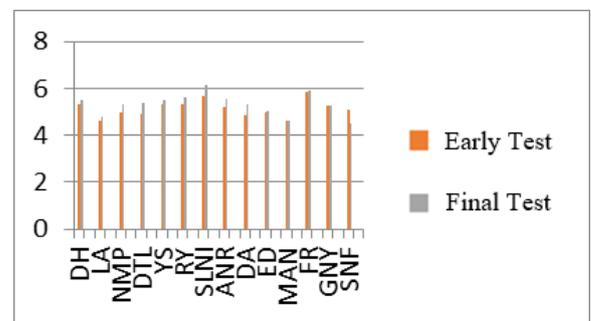


Fig. 3. Diagram of initial test result and final power test.

The value of power endurance significance = 0,003 < 0.05 This means Ho is rejected, or impact that significant. So that

can have interpreted to a significant impact method exercise HIIT to enhancement ability power endurance. For improve power endurance capability of course only we must improve more first components that become basic in formation power endurance capability becomes basic the formation of power is power or strength. As is explained by Harsono Strength permanent is base (base) for determine power [4]. In sports there are several techniques in futsal, and one of them power is used in shooting techniques. If this technique is done continuously with 20 x 20 net time and has the same strength then the player must have good endurance power. In line with Bompa the ability of the muscles to contract repeatedly quickly and strong in a relatively long time [18].

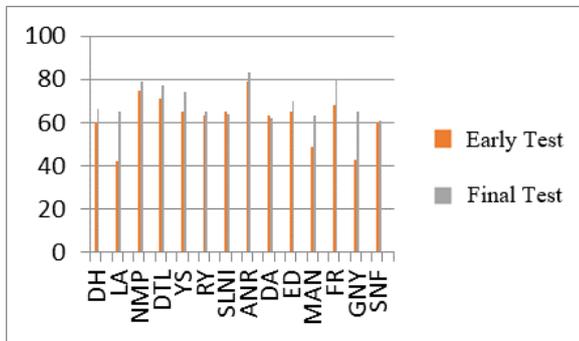


Fig. 4. Test results preliminary and final test *power endurance*.

Value of speed endurance significance = 0,0 00 <0.05 This means H_0 is rejected, or impact that significant. It can be interpreted that there can be a significant impact exercise on enhanced endurance capability. Capacity of minimize slowdown after reach maximum speed (top speed). In sprint generally considered consists of phase acceleration, phase speed, and then slowdown phase.

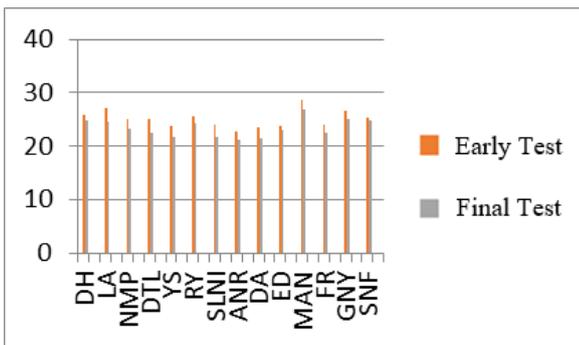


Fig. 5. Diagram of Early Test Result and Final Test *Speed Endurance*.

IV. CONCLUSION

In conclusion there is a significant impact of HIIT training methods on anaerobic enhancement.

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