

The Impact of Exercise Methods and Genders on Improving the Physiological Capabilities of Futsal Players

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Abstract—This study was aimed at determining the effect of differences in Resistance Band Ladder Drills training patterns with interval and pyramid methods on the Improvement of the Physiological Capability of Futsal Players based on gender and the effect of gender on both methods. The research method used was an experimental method with 2 x 2 factorial design. The research instrument was in the form of Aerobic and Anaerobic Capacity Test. The data analysis techniques used were ANAVA and Tukey Test using SPSS version 23. This study showed that there was an interaction. Men were higher than women in the interval method even though only a few, while women were better than men in the pyramid method. Overall, the analysis results show that the success of the training method depends on the genders being trained. With interaction, we cannot simply conclude that the interval training method is more effective than the pyramid training method, but it depends on the genders being trained. The interval training method appears to be more effective given to men and women compared to the Pyramid training method given to men and women.

Keywords: *aerobic, anaerobic, resistance band, ladder drills, futsal, genders*

I. INTRODUCTION

Futsal is a sport speed, very attractive and requires physical strength and endurance. This is evident from some literature showing that the physical demands of Futsal are an important consideration for coaches in applying training for competitions [1-4], looking at aerobic and anaerobic requirements in Futsal, physiologically differentiate between players at various competitive levels and how the system can be trained to improve maximum performance [3]. Analysis of the demands of movement on Futsal has revealed that the players ran more than 4,500 meters during competitive matches [5]. Therefore, Futsal players really need endurance that greatly supports their performance, Futsal players perform an average of 9 training activities per minute of play, and there is a high intensity effort every 23 seconds of the game which states that the average intensity of playing Futsal usually results in 85-90% of maximal heart rate (HRmax) and 75% of VO2Max [4]. When viewed from the characteristics of Futsal sports, Futsal games require high aerobic abilities supported by good anaerobic abilities [1].

The team with the best strength and conditioning exercises can apply more tactics during the competition, while those with poor strength and conditioning exercises can negatively affect the will of the athlete, jeopardizing their learning ability and endurance during training and competition, which has the potential to hamper performance. The number of studies in this field ensures that there is a good evidence base for further research [4]. Therefore, all things related to aerobic fitness in elite female Futsal players that are very attractive to coaches and sports scientists [7,8], one topic that has received less attention from researchers is gender differences and the consequent factors that influence participation and achievement in training programs. Evidence arising from studies developed with basketball players identifies differences in sports performance variables according to gender in physical attributes, physiological characteristics, psychological skills or game-related profiles [6]. There are differences between men and women, not only anthropometrically [7]. This finding was confirmed by other studies, which also showed that men had better performance in upper and lower limb strength, sprints, changes in direction and aerobic capacity than female soccer players [8].

Related to the training patterns in this study using ladder drills, an excellent form of training pattern to increase speed, coordination, agility, and power. Agility ladder is a popular tool for speed, coordination, balance, and agility of people of various age groups, sports, and genders [9,10]. Ladder drill method is a method that matches the characteristics of Futsal games that prioritizes speed and agility. The point is in agility training that athletes are asked to run faster, turn fast, without losing balance. So it can be said that agility training can also indirectly train speed. Showed increased agility results after being given training in ladder training [11]. There is a significant influence on ladder drill training on running speed, agility and leg power. Based on these studies only speed, agility and power were investigated and included in the category of alactacid anaerobic abilities, whereas for lactacid anaerobic abilities and dynamic anaerobic abilities the effects were not yet seen and there were no studies using ladder drills training patterns [12]. The development of coaching scholarship is growing and advancing. Therefore, researchers

are interested in using a ladder drill training pattern combined with using a resistance band, hereinafter referred to as a resistance band ladder drills, training pattern for increasing physiological abilities in Futsal players using interval training methods and pyramid training methods.

II. METHODS

A. Subject

The population in this study were 40 members of Futsal athletes, players from Universitas Pendidikan Indonesia and the sample used by researchers in this study were the entire population, namely Futsal athletes, players who were members of the Futsal Universitas Pendidikan Indonesia as data collection material for this study as many as 40 people who were divided into 2 groups: 20 man athletes and 20 women athletes. After receiving a detailed description of the objectives, potential benefits, and risks associated with participating in this study, each student gives his written consent.

B. Protocol

In its implementation, the researcher conducts initial testing and measurement and then provides training treatment with the Interval training method and the Pyramid training method, after the treatment is completed then the final stage of testing and measurement are carried out. The steps taken for data collection are preparing test instruments, carrying out testing and measuring according to test procedures by a number of tester personnel (4 people who are experts in data collection). The data collected is a type of quantitative data. The data collection schedule consists of two stages, namely the first stage is the initial test to determine the initial conditions of the subject, and the second stage is the final test to see the development of the results of the training treatment.

The method used in this research is to use an experimental method with a factorial design 2 x 2 [13]. The research instrument used to carry out the process and collect data in the form of resistance bands ladder drill training programs with interval training methods and pyramid training methods for 16 meetings and several test items to determine the ability of Anaerobic and Aerobic, namely the Aerobics ability measured through Bleep Test [14], Anaerobic ability consisting of a speed test that is a 20 m dash sprint test [8], speed in the form of Agility namely a shuttle run 4m x 5 rep Test [8], leg power i.e. Single Leg Triple Hop for Distance Test [15], Power Endurance i.e. Multi Stage Hurdle Jump Test [16] and Speed Endurance are 150 m sprint tests [8].

III. STATISTICAL ANALYSIS AND RESULTS

The data obtained from the sample in conducting pre-test and post-test are then analysed using software SPSS version 23. The first thing is done with a normality test and a homogeneity test, after fulfilling the requirements than performing the analysis technique used is Variance Analysis (ANAVA) followed by the Tukey Test at a significance level of α 0.05.

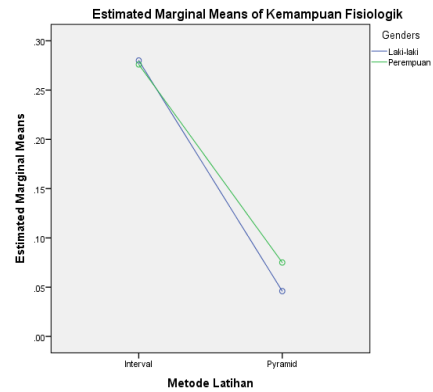


Fig. 1. Profile plot interaction of training methods with genders on physiological abilities.

Figure 1. shows the interaction because there are pieces of lines shown in the graph. Men are higher than women who use the interval method even though only a few, while women with the pyramid method are better than men with the pyramid method in the Resistance Band Ladder Drills training pattern.

TABLE I. COMBINATION OF INTERACTION VARIABLES

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	.477a	3	.159	45.487	.000
Intercept	1.146	1	1.146	327.560	.000
Interaksi	.477	3	.159	45.487	.000
Error	.126	36	.003		
Total	1.749	40			
Corrected Total	.603	39			

a. R Squared = .791 (Adjusted R Squared = .774)

Table I shows that between the four combinations in the interaction variables showed significant values ($F = 45.487$; $p < 0.01$). The multiple determination values of all independent variables are dependent. Because R squared 0.791, it means that the correlation is strong. Because it is significant, we continue to look at getting multiple comparisons or post hoc. If the analysis of variance above, we only know there are differences in physiological abilities in terms of a combination of training methods and genders, then at the post house we can see it in detail.

TABLE II. PHYSIOLOGICAL ABILITY TO BE REVIEW BASED ON OBSERVATION AND RESEARCH GROUP

(I) Interaction	(J) Interaction	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Interval-Male	Interval-Female	.0040	.02645	.999	-.0672	.0752
	Pyramid-Male	.2340*	.02645	.000	.1628	.3052
	Pyramid-Female	.2050*	.02645	.000	.1338	.2762
Interval-Female	Interval-Male	-.0040	.02645	.999	-.0752	.0672
	Pyramid-Male	.2300*	.02645	.000	.1588	.3012
	Pyramid-Female	.2010*	.02645	.000	.1298	.2722
Pyramid-Male	Interval-Male	-.2340*	.02645	.000	-.3052	-.1628
	Interval-Female	-.2300*	.02645	.000	-.3012	-.1588
	Pyramid-Female	-.0290	.02645	.694	-.1002	.0422
Pyramid-Female	Interval-Male	-.2050*	.02645	.000	-.2762	-.1338
	Interval-Female	-.2010*	.02645	.000	-.2722	-.1298
	Pyramid-Male	.0290	.02645	.694	-.0422	.1002

Based on observed means.
The error term is Mean Square(Error) = .003.

* The mean difference is significant at the 0,05 level.

The above results show that:

- There is no significant difference in physiological ability between the application of the interval training method for men and the interval training method for women in the Resistance Band Ladder Drills (MD = 0.0040; $p > 0.05$)
- There is a significant difference in physiological abilities between the application of the Interval training method for men and the Pyramid training method for men in the Resistance Band Ladder Drills training pattern (MD = 0.2340; $p < 0.01$)
- There is a significant difference in physiological abilities between the application of the Interval training method for women and the Pyramid training method for men in the Resistance Band Ladder Drills training pattern (MD = 0.2050; $p < 0.01$)
- There is a significant difference in physiological abilities between the application of the Interval training method for women and the Pyramid training method for men in the Resistance Band Ladder Drills training pattern (MD = 0.2300 $p < 0.01$)
- There is a significant difference in physiological abilities between the application of the Interval training method for women and the Pyramid training method for women in the Resistance Band Ladder Drills training pattern (MD = 0.2010; $p < 0.01$)
- There is no significant difference in physiological abilities between the application of the Pyramid training method in men and the Pyramid training method in

women in the Resistance Band Ladder Drills training pattern (MD = -0.0290; $p > 0.05$)

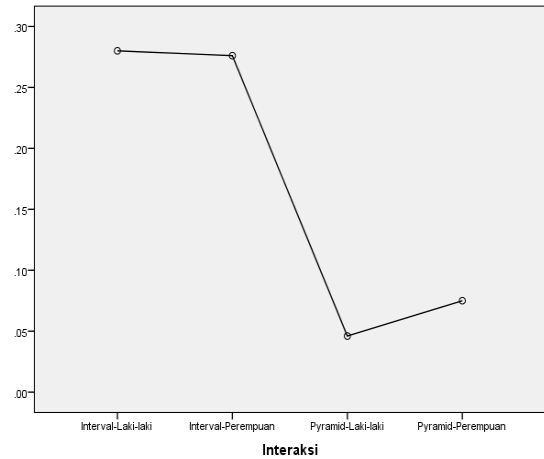


Fig. 2. Physiological ability based on time of observation and research groups.

Overall analysis results show that the success of the training method depends on the genders being trained. With interaction, we cannot simply conclude that the interval training method is more effective than the pyramid training method, but depend on the genders being trained. The interval training method appears to be more effective given to men and women compared to the Pyramid training method given to men and women.

IV. DISCUSSION

Below will be explained findings that can be discussed further, after seeing physiological abilities both aerobic and anaerobic abilities influenced by interval training methods and pyramid training methods to improve physiological abilities of Futsal players, the following has explained the relationship between training methods with genders on aerobic abilities in players Futsal.

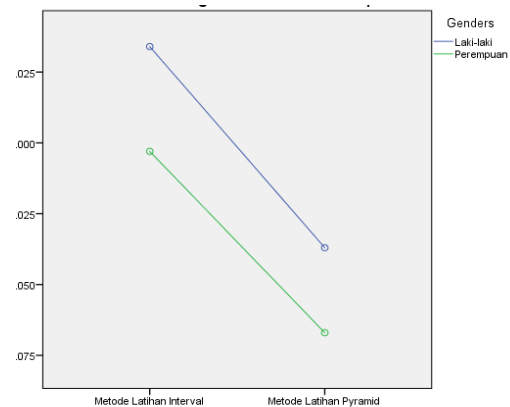


Fig. 3. Profile plot interaction of training methods with genders on aerobic ability.

Figure 3. Shows the absence of interaction because the aerobic ability line pattern in the Resistance Band Ladder Drills training pattern on both the training method and the genders are the same. The two lines look parallel and there is no visible line

cut that is shown by the graph, however, the interval training method shows more effective than the pyramid training method in both men and women.

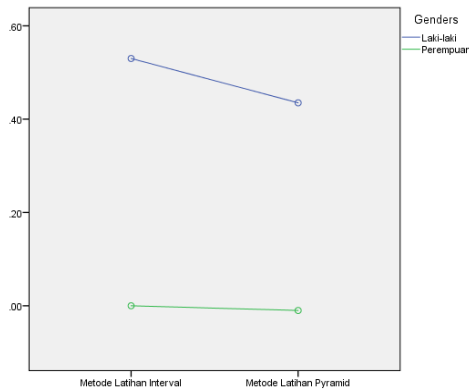


Fig. 4. Profile plot interaction of training methods with genders on aerobic ability.

In the anaerobic ability shown in Figure 4. There is no interaction because the anaerobic ability line pattern in the Resistance Band Ladder Drills training pattern on both the training method and the genders are the same. The two lines look parallel and there are no visible lines shown by the graph, as well as the aerobic ability of the interval training method shows that it is more effective than the pyramid training method for both men and women. However, after the results of aerobic and anaerobic abilities and representing physiological abilities are combined then there is interaction.

This is a finding that needs to be discussed so that scientific development in the application of training methods becomes more meaningful and useful, especially when given treatment to men or women, not just applying those methods. More than that, the coaches is required to be clever in choosing methods and be smart in calculating the intensity and volume of training needed and are required to get the maximum results in the effort of minimal effort. The researchers examined physiological responses and activity patterns for playing Futsal simulation games on professional players, and found that Futsal played at a professional level is a physical exercise that demands physical strength consisting of aerobic and anaerobic abilities [11,12,17].

V. CONCLUSION

Application of the interval training method with resistance band ladder drill training patterns looks more effective compared to the pyramid training method both men and women towards increasing physiological abilities both aerobic and anaerobic, it is recommended that each trainer be able to design training programs with interval training methods with a varied form of exercise because this is important so that the training needs become more secure and the target of the training becomes directed and takes into account the adequate volume and intensity in accordance with the needs of the physical components to be trained. Likewise with the pyramid training method which is no better than the interval training method because it is in accordance with the characteristics of

the pyramid training method that is uphill intensity, then decreases, rest varies and increases between reps and between sets and the distance that changes each repetition and set. Adequate application of training by paying attention to training methods, training patterns, principles, and norms of training properly is an important key to getting over compensated. For further research it is recommended that scientific development in coaching be more effective and efficient, so in this study it can be developed through other training patterns or application to sports that are more specifically dominant physical abilities, such as sports that are dominant in speed (sport speed), dominant power endurance (sport power), or dominant endurance (sport endurance).

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