

The Effectiveness of Exercise Intensity on the Agility of U-13 Badminton Players

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Abstract. This research is motivated by the importance of applying intensity so that exercise has high effectiveness on agility. This study aims to partially determine the effectiveness of exercise intensity on the agility of badminton players and the difference between the two. This research is an experimental study using two groups of samples obtained by matching subject designs. The population and samples used were 12 badminton athletes in the Under-13 male group. One group received moderate-intensity exercise, and the other group received low-intensity exercise. The distribution of exercise intensity was done randomly. After 16 exercises, the two sample groups were tested for agility. The research revealed that the data prerequisite test was not met, so a non-parametric quadratic model was carried out. The results of non-parametric data show that exercise using moderate intensity on the agility of U-13 badminton players has an effectiveness of 92.40%, and exercise using low intensity on the agility of U-13 badminton players has an effectiveness of 90.70%. The difference in the effectiveness of low and moderate-intensity training on the agility of Under-13 badminton players is 1.70%. An important finding in this study is that it is better to practice using moderate intensity to improve the agility of the men's Under-13 badminton players.

Key words: moderate-intensity exercise; low-intensity exercise; Agility of U-13 badminton players

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INTRODUCTION

Badminton is one of the most popular sports in the world, with 200 million followers (Phomsoupha & Laffaye, 2015). When competing, the condition faced by badminton players is that they have to reach all corners of the court to return strokes for a rally. Short rallies require high intensity (anaerobic system), and longer rallies (aerobic system) require agility with short recovery times between rallies. High-intensity activities interspersed with short breaks require physiological fitness, specific game skills, and tactics (Chia et al., 2019). The game of badminton requires speed, solid hitting, and agile footwork. (Wong et al., 2019). Badminton research that was found to use high intensity includes research entitled High-intensity interval training (HIIT) (Paul et al., 2016). Effect of High-Intensity Functional Interval Training on Selected Fitness Components Among Young Badminton Players. (Suppiah et al., 2020). Types of low exercise intensity are 60% -70% MHR, moderate, 70% -80% MHR, and high, 80% -90% MHR.

The problem faced by badminton players is that the training uses less intensity. In contrast, for U15 badminton players, the training can use low or moderate intensity so as not to interfere with growth. Research using low and moderate intensity has also yet to be found.

To fill in the research gap, a study was

conducted on U13 badminton players whose training was packed with stroke patterns with the application of moderate and low-intensity exercises and their effectiveness on agility.

This study aims to analyze the effectiveness of training using moderate and low intensity and to find differences between the two intensities on the agility of U13 badminton players. The theoretical benefit of this research is to contribute the scientific benefits of research results to the world of badminton, and practically, the results of this research are to provide input to badminton coaches about the effectiveness of training using intensity on the agility of u-13 badminton players.

METHODS

This research is an experimental study using two groups of samples. The step is to test the footwork agility of several research populations, namely male U13 badminton players. Furthermore, the results are ranked, then the samples are paired with the ABBA formula, and two groups of samples are obtained with the same test average; this method is usually called the matching subject design. The next step is to draw the exercise intensity material at random. After randomization, experimental group 1 received moderate-intensity exercise, and group 2 received low-intensity exercise. The next step is to give treatment as much as 16 times the exercise.

Experimental group 1 received front and back lobe exercises. Lobe practice starts with half straight court, half cross-court, one straight court, one diagonal court, and one random pass field. The intensity starts from 60% MHR for exercises 1, 2, 3, and 4, 70% MHR for exercises fifth, sixth, seventh, and 8th, and 80% MHR for exercises ninth, 10th, 11th, and the 12th exercise and 90% MHR at the 13th, 14th, 15th, and 16th exercises. Experimental group 2 did an exercise using moderate intensity. The exercise starts at 70% MHR for the 1st, second, third, fourth, and fifth exercises. Exercise 80% MHR in exercises 6th, seventh, eighth, ninth, and 10 and 90% MHR in exercises 11th, 12th, 13th, 14th, 15th, and 16th. Lobe drill starts from half straight court, half cross court, a straight court, a diagonal court, and a

random pass field. The next step is the final agility test. The resulting data is then processed in the order of data description, statistical description, data prerequisite test, data analysis, and discussion.

RESULTS AND DISCUSSION

After the samples were collected into two experimental groups, the initial agility test was carried out. The following stage is that each group gets practice hitting with the drill method from half straight court, half cross-court, and one full court, which describes agility training. One group uses moderate intensity, and another group uses low intensity. After the samples received 16 exercises, all samples underwent a final agility test. The measurement results are in table 1 below

Table 1. Description of research data

Number	Experimental group 1	Pre-test	Post-test	Experimental group 2	Pre-test	Post-test
1	X1	12	14	X2	13	14
2	X4	16	17	X3	15	17
3	X5	16	18	X6	16	17
4	X8	17	18	X7	16	18
5	X9	17	19	X10	17	18
6	X12	17	18	X11	17	17
	amount	95	104	amount	94	101

Source: research data

The results of the data prerequisite test are not met, and the non-parametric quadratic model test is carried out. The results are as follows:

a) The effectiveness of exercise using moderate intensity on the agility of U13 badminton players

Table 2. Moderate Intensity Group

Model Name	MOD_1	
Dependent Variable	1	Eks1_Post test
Equation	1	Quadratic
Independent Variable		Eks1_Pre test
Constant		Included
Variable Whose Values Label Observations in Plots		Unspecified
Tolerance for Entering Terms in Equations		0,0001

Table 3. Case Processing Summary

	N
Total Cases	24
Excluded Cases	18
Forecasted Cases	0
Newly Created Cases	0

Cases with a missing value in any variable are excluded from the analysis.

Table 4. Variable Processing Summary

	Variables	
	Dependent	Independent
	Eks1_Post test	Eks1_Pre test
Number of Positive Values	6	6
Number of Zeros	0	0
Number of Negative Values	0	0
Number of Missing Values	User-Missing	0
	System-Missing	18

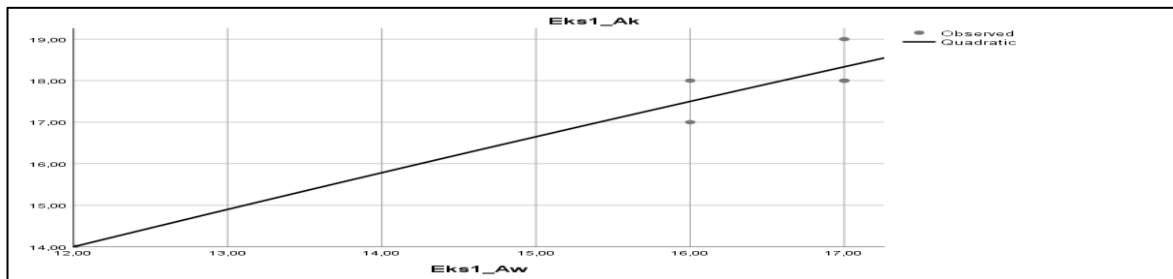


Diagram 1. The effectiveness of exercise using moderate intensity on the agility of U13 badminton players

Resource: Research data

Table 2 on the Moderate Intensity Group up to diagram 1 provides information that exercises using moderate intensity produce an R Square of 0.924 while the significance is 0.021. This means that exercise using moderate intensity has an effectiveness of 92.40% on the agility of U13

badminton players

b) The effectiveness of training using low intensity on the agility of U13 badminton players

Table 5. Low-Intensity Group

Model Description		
Model Name		MOD_2
Dependent Variable	1	Eks2_Ak
Equation	1	Quadratic
Independent Variable		Eks2_Aw
Constant		Included
Variable Whose Values Label Observations in Plots		Unspecified
Tolerance for Entering Terms in Equations		0,0001

Table 6. Case Processing Summary

	N
Total Cases	24
Excluded Cases	18
Forecasted Cases	0
Newly Created Cases	0

Cases with a missing value in any variable are excluded from the analysis.

Table 7. Variable Processing Summary

		Variables	
		Dependent	Independent
		Eks2_Ak	Eks2_Aw
Number of Positive Values		6	6
Number of Zeros		0	0
Number of Negative Values		0	0
Number of Missing Values	User-Missing	0	0
	System-Missing	18	18

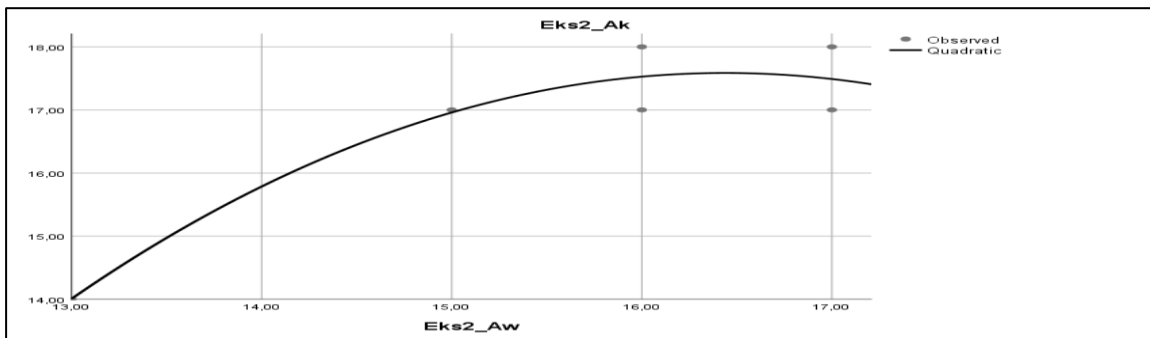


Diagram 2. The effectiveness of training using light intensity on the agility of U13 badminton players

Source: Research data

Table 5 on the Low-Intensity Group up to diagram 2 provides information that exercises using Low-intensity produce an R Square of 0.907 while the significance is 0.028. This means that exercise using moderate intensity has an effectiveness of 90,70% on the agility of U13 badminton players

c) Differences in the effectiveness of training using moderate and light intensity on the agility of U13 badminton players

To determine the magnitude of the difference in the effectiveness of the two intensities, a comparison of the medium-intensity R square and the low-intensity R square was conducted. Based on these results, it is 92,4%:0.90,7%. Based on the comparison, the difference in numbers is 1,70%. So it can be concluded that the R square of the medium-intensity group is 1.70% superior to that of the low-intensity group.

Agility is an essential physical feature for success in participating in tournaments (Negra et al., 2017). Agility is an essential characteristic of team sports athletes (Paul et al., 2016). The practice of hitting in badminton uses the drill method for front and back shooting so that a player performs forward and backward movements like a shuttle run, which represents agility training. Badminton training for athletes

under 13 requires medium and low intensity. The intensity of badminton and running is equivalent (Takahashi & Grove, 2019). The high and low intensity of badminton training has different effects on the effectiveness. The effectiveness of exercise using medium intensity in badminton has a 31% effect. A study on “Low-Intensity vs High-Intensity Home-Based Treadmill Training and Walking Attainment in Young Children with Spastic Diplegic Cerebral Palsy” Found that children in the Low-Intensity group showed significant improvement. However, no statistically significant difference was detected over time (Mattern-Baxter et al., 2020). Other studies have concluded that low-intensity exercise can effectively improve lower leg muscle strength and function in the elderly (Zhang et al., 2022). The results of another study in sports stated, “The HIIT training program in special preparation to improve the dominant biomotor components of endurance, power, and agility developed (Yudhistira et al., 2021). High-Intensity Interval Training (HIIT) appears to be more effective than moderate-intensity continuous training (MICT) (Hannan et al., 2018).

The results of the study on the effectiveness of exercise on the agility of under-13 badminton players in the sample group using medium

intensity had a contribution of 92.40%, while in the sample group using low intensity it had a contribution of 90.70%, and the difference between the two intensities was 1.70%. It can be said that the higher the intensity used during badminton training, the more effective it is. However, badminton players under the age of 13 are not allowed to train at a high intensity so as not to interfere with player growth.

Results and discussion are combined in one part. It contains: The results of the findings to answer the research objectives, Figure and table should be clear and the description must be concise and clear, Discussion must reveal the in-depth analysis of the obtained results it is critical and in-depth synthesis accompanied by proof of evidence related latest references, Explain the novelty of your research, The benefits and contribution of research for the science/ society.

CONCLUSION

The study concluded that the effectiveness of training on the agility of U-13 badminton players in the sample group using moderate intensity contributed 92.40%, while the sample group using low intensity contributed a 90.70% difference. Between the two intensities was 1.70%.

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