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Sports Science-Based of Badminton Footwork Shadow Training Model for Beginner Athlete

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Utilization of this product is expected to improve the conditions of badminton tactics and techniques training. This product is expected to be an alternative to the sports science-based badminton footwork shadow model for young athletes aged 12-15. The method used in this research is the research and development of ADDIE. The sample in this study is 40 beginner athlete of badminton (Age: 12.9$\pm$0.85), the small group trial was carried out on beginner athletes PB Anugrah Mandiri (n=20), Tasikmalaya City, West Java. Large group trials were carried out at the Badminton Club Sarwenda Jakarta (n=20). The resulting products are 16 items of badminton footwork shadow training model. Based on the results of the effectiveness test using the t- test, it is known that the t-value is 5.79 with a sig value. (p-value) = 0.004 < 0.05. It can be concluded that there are significant differences based on the two groups of exercises. Based on the mean different, it is known that the badminton shadow footwork training model in the experimental group is the most effective in improving badminton shadow footwork skills for beginners athlete.

Keywords: Sport Science; Exercise; Badminton; Footwork; Shadow

Introduction

Badminton is a sport for two or four people, with a temporal structure characterized by short-duration and high-intensity action (Phomsoupha & Laffaye, 2015). The badminton game has now developed from an old type of game to a modern game. This change is influenced by technological advances that pay great attention to the factors of speed and accuracy. If the old type emphasizes the beauty factor in winning, the modern type prioritizes how to win in a short time. This impact is influenced by people's views on aspects that need to be prioritized maximally in the training process.

Badminton game characteristics to determine the requirements, structure, and moves that indicate the level of performance. This sport requires special preparation in terms of patience, control, and motor action (Seth & Bipasa Seth, 2016). Badminton atypical actions and hitting movements often occur during the game; therefore, many special footwork methods have been developed to facilitate the rapid movements required to hit the shuttlecock, including quick turning and jumping and quick directional change movement (Hung et al., 2020).

In preparing exercise, there are 4 attention, namely: physical, technical, tactical, and mental training (Tudor, Bompa, Buzzichelli, & Edition, n.d.). Some of the skills that beginner athletes must master are strokes and footwork (Dlis, 2020; Dlis, Haqiyah, Hidayah, & Riyadi,

2019). Badminton footwork is one of the most fundamental and critical skills in badminton, which enable players to change positions quickly with excellent motor control (Yu, 2017).

The discussion of material in coaching scientific studies is a basic stage of knowledge in supporting the preparation of a larger and more planned periodization of training programs to achieve maximum performance. Sports coaching science is supported by a variety of disciplines which are commonly referred to as sports science. In the science of sport contained a lot of sub-disciplines, including (1) exercise physiology, (2) the sports nutrition, (3) the psychology of sport, (4) sports medicine, and (5) sports biomechanics. The development of science and technology requires coaches to continue to learn and not only be armed with experience when they are athletes, so they are expected to be able to compile a good training program.

By studying-based coaching sports science, coaches can predict the peak performance athletes, provide training forms according to physiological concepts, and provide nutritional input that must be consumed by athletes to support their performance, understand the mental condition of athletes during training and competitions and provide feedback on sports techniques. Carried out by athletes, to the way of handling injuries (Rubiana, Millah, & Hartadji, 2017).

From the explanation and research that has been done previously, the study of sports science in badminton is very much needed. In this case, it is limited to techniques strokes, and footwork with anthropometric, physiological, and biomechanical studies. Based on the results of observations at Club Sarwenda Jakarta, the implementation of training has not been fully based on studies sports science so that the development of athlete's training based on the physical component has not had a significant impact on the mastery of the skills of novice athletes. The training model of techniques is a stroke and footwork -based sports science important thing to study.

Utilization of this product is expected to improve the conditions of badminton tactics and techniques training. This product is expected to be an alternative to the sports science-based badminton footwork shadow model for beginner athlete.

Materials and Methods

The method used in this study is research and development by ADDIE. . The sample in this study is 40 beginner athlete of badminton (Age: 12.9$\pm$0.85), the small group trial was carried out on beginner athletes PB Anugrah Mandiri (n=20), Tasikmalaya City, West Java. Large group trials were carried out at the Badminton Club Sarwenda Jakarta (n=20). The instrument are vertical jump, sit up 60', back up 60', and two hand medicine ball put (Widiastuti, 2015).

The research step are: (1) Analysis, (2) Design, (3) Develop , (4) Implement, (5) Evaluate. Be visually seen in the figure below:
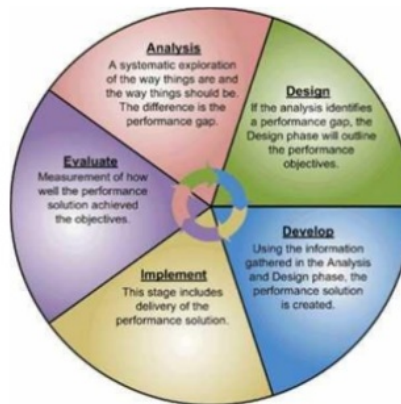
Figure 1: ADDIE Development Procedure Scheme

Result and Discussion

The 16 items of badminton footwork shadow training model, based on some of the exercises below:

Table 1. Exercise Model

No	Model	to Develop
1	*Double Leg Lateral Hops*	
2	*Double Side jump*	Leg Power
3	*High Box Jump*	
4	*Power Squat thrust*	
5	*Weighted power Straight*	
6	*Bounce the ball*	Arm Power
7	*Ball to the wall*	
8	*Push-up tepuk*	
9	*Aquaman*	
10	*Superman*	
11	*Back Extention*	Back Power
12	*Back Arch*	
13	*Reverse Crunch*	
14	*V- Up*	
15	*Abdominal right Roler*	Abdominal Power
16	*Diagonal leg rise*	

Footwork (court control skills) improvement trainings are ranked among the key special physical training elements (Barchukova, Brusovankin, & Migalina, 2019). Badminton requires complex skills that combine various movement techniques such as body position placement, athlete's movements, accuracy in anticipating and returning shuttlecock quickly as an intact combination of physical and mental, especially i n making decisions in a quick time(Donie, Yudi, Hermanzoni, Kiram, & Edmizal, 2020). The model based on sport science in badminton. The additional strength and power training for lower limbs should be carried out for the footwork training (Hopkins, Malcata, Allen, & Spencer, 2012). There is a relationship between handwork and footwork and the links between footwork and physical fitness (Hong-wei, 2011).

Based on the results of data processing, the descriptive statistical analysis of the results of the blow speed test was:

Table 2. Descriptive Statistics

Group	N	Min	Max	Mean	SD
Control	20	558	889	714.15	93.017
Experiment	20	575	906	731.15	93.017
Total	40	558	906	720.58	90.54

Descriptively, it can be seen that there is an increase in the average score of test, the average total value is 720.58 with standar deviation 90.54

The results of the research data normality test can be seen in the table below:

Table 3. Normality Test

Group	Sig	Result
Control	0.178	Normal
Experiment	0.234	Normal

Based on the table above, it is known that the control group sig value is $0.178 > 0.05$, and the experiment sig value is $0.234 > 0.05$. So it can be concluded that the research data is normally distributed. While the results of the homogeneity test can be seen in the table below:

Table 4. Homogeneity Test

Levene Statistic	df1	df2	Sig.
.019	1	78	0.762

Based on the table above, it is known that the value is Levene Statistic 0.000 with df1 = 1 and df2 = 78. The sig value is $0.762 > 0.05$. So it can be concluded that the research data is homogeneous.

After the two pre-analysis requirements are met, then the hypothesis is tested by using the paired sample t-test (Kadir, 2015; Muhamad, Memet; Aridhotul, 2015). The results are as follows:

Table 5. Hypothesis Test Results

Group	Mean Difference	t	Sig.
Experiment to Control	17	5.79	0.004

Based on the table paired samples test, obtained the mean difference each research group, which means the difference scores test results blow on research group. The t-value = 5.79, and the sig or p-value $= 0.004 < 0.05$. Thus it can be concluded that the badminton shadow footwork training model in the experimental group is the most effective to improving badminton shadow footwork skills for beginners athlete.

Badminton shadow training affect the increased agility and reaction speed in badminton (Kusuma, 2013; Nirendan & Murugavel, 2019), and can alternative training in pandemic Covid-19 situation. This product is expected to be an alternative to the sports science-based badminton footwork shadow model for beginner athlete.

Conclusion

Based on the results of data analysis, the resulting products are 16 items of badminton footwork shadow training model. It can be concluded that there are significant differences based on the three groups of exercises. Based on the mean different, it is known that the badminton shadow footwork training model in the experimental group is the most effective in improving badminton shadow footwork skills for beginners athlete.

Acknowledgement

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