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The Influence of Hurdle Drill and Zig Zag Running Training Models on Agility at PFK Angels Football Club

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Abstract

This study aims to examine: the effect of the hudle drill and zig zag running training models on agility; whether there is an influence of the hurdle drill training model on agility; and whether there is an effect of the zig zag running training model on agility. This research method uses quasi-experiments and the research population is all PFK Angels club players with research samples taken using the total sampling method, so that the research sample is 16 players. The instrument for measuring agility uses the Illimois Agility Test. The data analysis technique used is the T-Test at a significance level of $\alpha = 0.05$. The results of the study are as follows: (1) There is a significant effect of the hurdle drill and zig zag running training model on agility because the p significance is 0.270 > 0.05 for the pretest and the p significance value is 0.202 > 0.05. (2) there is an effect of the hurdle drill training model on agility because the significance value of p is 6.000 > 0.05 for the pretest and for the posttest the significance of p is 0.001 < 0.05 these results show a significant difference. (3) there is an effect of the zig zag running training model on agility because the p significance value is 3.586 > 0.05 for the pretest and for the posttest the p significance is 0.009 <0.05 these results show a significant difference.

Keywords: Hurdle Drill, Zig Zag, Agility

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1. INTRODUCTION

Sports are beneficial as a means of recreation, health, and achievement. One of the sports widely favored by the people in Indonesia is soccer. Research conducted by (Wang et al., 2019) indicates that soccer is highly popular among the Indonesian population, as evidenced by its use for sweating, casual play, seeking achievements, and turning soccer into a profession. Soccer is a team sport that relies on technique, tactics, and mental strength to achieve maximum performance (Arcos et al., 2020; Kringstad et al., 2021). Soccer is a game that requires quality players (Gyambrah et al., 2013). The physical components involved in soccer include agility, speed,

cardiovascular endurance, flexibility, coordination of ankle movements, balance, and strength (Vanhelst et al., 2014). One dominant component in soccer is agility (França et al., 2022). (Yudanto & Nurcahyo, 2020) state that a good soccer player must meet the criteria as an individual and as a member of the eleven-player team. This means that a soccer player must have good agility in game performance. Agility is crucial for a soccer player in facing specific match situations and conditions that require movement to control the ball and in defense to avoid collisions. This is emphasized by (Sheppard & Young, 2006), stating that agility is the ability to quickly change direction or body position simultaneously with other movements. The development of women's football in Pekalongan Regency has been very promising (Prokompim, 2022).

This is evident through the emergence of several women's football clubs that have produced quality players. One of the women's football clubs in Pekalongan Regency is a club called Puslat Football Kedungwuni Angels, commonly referred to as PFK Angels. The PFK Angels club, founded in early 2020, received a positive response from the local community. This is evident from the strong support of many parents for the achievements and positive activities of the club, leading parents to allow their children to train with PFK Angels. However, in reality, the PFK Angels football club still has players who need to improve their physical abilities, particularly in terms of agility. This is evident during matches on the field and during training sessions, as some players still face challenges in controlling the ball and dealing with opponent defenders due to their lack of agility and stiffness. Another factor contributing to this is the lack of training focused on physical aspects, especially agility, and a lack of variety. Therefore, to enhance the agility of PFK Angels players, it is necessary to implement appropriate training models. Training is the process of becoming better, involving the improvement of physical quality, functional abilities of the body, and the psychological training quality of an individual (Bana et al., 2018).

Agility training involves a series of repetitive body movements with the aim of quickly changing positions or directions in response to the situation at hand (Kiram, 2019). Another perspective is presented by (Bolotin & Bakayev, 2017), stating that agility is a crucial component in physical condition, as it trains the body's ability to change direction quickly and without hindrance or loss of balance. Quickness is defined as the ability to perform various movement tasks that can be completed in a short period . Agility training refers to a set of physical exercises specifically designed to improve agility, speed, balance, and body coordination. The main goal of agility training is to develop an individual's ability to move quickly, responsively, and efficiently in various directions and conditions (Nouchi et al., 2016). According to (Rahardian et al., 2019), one of the training methods used to improve the agility of football players includes zig-zag running and hurdle drills. Zig-zag running training involves changing body positions while running in a zig-zag pattern (Fischerova et al., 2021). In line with (Freitas et al., 2021), the Zig-zag Run is a type of exercise involving turning and maneuvering through cones that have been placed. Zig-zag Run exercises are intended to enhance the ability to change direction quickly without losing balance. On the other hand, hurdle drills are a form of agility and power training that can be modified with various simple equipment based on the players' needs (Thonglong & Bussamongkhon, 2022).

In agreement with (Cosmin, D., & Mircea, 2015), agility training involves the use of various portable equipment. This equipment includes agility ladders to train quick footwork,

cones and poles to mark turning points in running exercises. Plyometrics and speed are among the recommended components of this training (Kim et al., 2022). Obstacle training is one form of plyometric exercise. According to (Eraslan et al., 2021), plyometric exercises include hurdle jumps, long jumps, box jumps, stadium jumps, single-leg hops, broad jumps, slip jumps, and lateral hurdle jumps. These types of exercises can enhance a player's speed, agility, balance, strength, and flexibility. A similar perspective is shared Plyometric exercises can enhance the explosive power of the leg muscles (Chen et al., 2023).

Based on the description above, the importance of agility in achieving the desired training goals is evident. Additionally, understanding whether the training models of hurdle drills and zig-zag running have an impact on agility is crucial. Therefore, the author will conduct research to investigate the influence of the hurdle drill and zig-zag running training models on the agility of female football players in PFK Angels. The success of this research will be indicated by the improvement in the agility of PFK Angels players.

2. METHOD

2.1. Participants

The population of this study consists of all PFK Angels players, totaling 16 players. Sampling was done using the total sampling method, where all members of the population, which is 16 players, became the research sample. This sampling technique is based on the population research approach, where all members of the population are part of the sample. The data collection technique used in this study is measurement using the Illinois Agility Test, which was conducted in both the pretest and posttest phases.

2.2. Research Design

The research design employed in this study is an experimental research with a quantitative approach. This design was chosen because it aims to investigate the influence of the hurdle drill and zigzag running training models on agility in the PFK Angels women's football club, and the researcher applied these training models as interventions. Group selection was done using the ordinal pairing method, and therefore, the research design used in this study is the Two Group Pretest-Posttest Design (Fanni, 2021). This design can be described as follows:

Table 1.

Research Design Two Group Pretest-Posttest Design

X1	**O1**	**X1**
X2	**O2**	**X2**

(Sugiyono, 2019)

2.3. Instruments

This study utilizes the Illinois Agility Test, which is employed to gather statistical data through testing and measurements. The Illinois Agility Test is a fitness test designed to assess an individual's sports agility (Test and Measurement Book, 2015). It is a simple test that is easy to administer and requires minimal equipment. This test assesses subjects by having them change

direction rapidly and alter their speed, making it highly suitable for measuring an individual's agility.

2.4. Procedures

The research procedure consists of four stages: 1) preparation stage, 2) pretest stage, 3) treatment stage, 4) posttest stage.

2.4.1. Stage Preparation

After obtaining permission from the advisor for the research, the researcher then met with the coach of the PFK Angels Football Club to confirm and discuss the research implementation plan. After receiving approval from the coach, the researcher subsequently contacted the players who would be the research subjects to inform them about their participation in this study.

2.4.2. Stage Pre-test

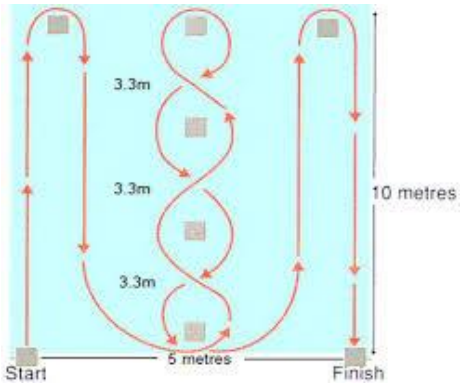
The pre-test process was conducted to measure the initial abilities of the players before they underwent the treatment of sprinting through obstacles. The test used was the Illinois Agility Test.

The procedure for conducting the Illinois Agility Test is as follows: 1) The testing area is 10 meters in length and 5 meters in width, with this distance representing the space between the start and finish points; 2) Two cones are used as markers for the start and finish points, as well as for changing the direction of movement; 3) Four additional cones are placed equidistantly between the start and finish points, with a distance of 3.3 meters between each of the middle cones.

The implementation of the Illinois Agility Test is as follows: 1) The test subject prepares to run with their body inclined forward; 2) When the command "Go" is given, the stopwatch is activated, and the subject begins to run as fast as possible. While running, the subject must follow the predetermined movement pattern, as shown in the diagram below, and must pass through the cones without hitting or touching them until they reach the finish line.

Figure 1.

Instrumen Test and Measurement Book (2015), Page: 141



2.4.3. Stage Experiment

After conducting the pre-test, the research subjects were divided into two experimental

groups. The first group underwent hurdle drill running exercises with lateral weave forward variations, while the second group underwent zag zag running exercises using cones. The implementation of the treatment was in accordance with the training program previously designed and organized systematically by the researcher. This treatment was carried out three times a week, with a total of 12 sessions during the research period.

Table 2.

Treatment Stage Design

Group	Experiment	Meeting
1	Hurdle drill training with lateral weave forward variations	12 Times
2	Zig zag training with cone	12 Times

2.4.4. Stage Post-test

After the training program was completed, a post-test was conducted using the same procedure as the pre-test. The purpose of the post-test implementation was to analyze the training outcomes achieved by the players, both in experimental group 1 and experimental group 2, after completing the training program.

In the implementation of the post-test, the tools and materials used referred to the book "Tes dan Pengukuran Olahraga" from 2015. This included: 1) the use of a page or field measuring 10 meters in length and 5 meters in width as the testing area, 2) *cone*, 3) whistlet, 4) *stopwatch*, 5) stationery, 6) meter. In carrying out the *illinois agility test*, there are several officer roles which include: 1) distance measurer, 2) starter, 3) score recorder.

The data collection technique is a method used to gather relevant information for the research being conducted. In this study, data collection was carried out through an experiment involving two measurement stages, namely before and after the treatment. There were a total of 14 sessions involved in this research. First, a pre-test was conducted once to assess the agility abilities of each sample before the players received the training treatment. Second, a post-test was conducted once after the subjects underwent the training treatment for 12 sessions. The purpose of the post-test was to evaluate whether there was an improvement or change in agility abilities after completing the training program. To obtain the necessary data in this research, the Illinois Agility Test was used as the measurement tool. This test was used to analyze the results of the training program provided to the research subjects.

The data analysis technique in this research involves several steps as follows: 1) Analysis Assumption Tests, a) Normality test of the data using the Kolmogorov-Smirnov model, b) Homogeneity test using Levene's test., 2) The impact test in this research employs a t-test analysis to determine if there is a significant difference in the impact between the pre-test and post-test results conducted to assess agility capabilities after and before the treatment.

3. RESULTS

This research was conducted on female soccer players who are members of the PFK

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Angels club. In this study, the sampling technique used was total sampling, where all players in the club were included as research samples. The rationale for this selection was to involve all club members in the research. The total number of research samples was 16 players. In this study, the sampled players underwent treatment in the form of hurdle drill running exercises and zag zag running exercises to evaluate the impact of both types of training on players' agility abilities.

The distribution of research data obtained from the field in a general overview, so that the data can be described in the form of processed data from raw data using the following types of analysis.

The pre-test and post-test data are presented in the table below.

Table 2.

Frequency Distribution of Result Pre-test and Post-test Test Agility

Experiment I (Hurdle Drill)							
No	Illinois Agility Test	Category	Prestest	Posttest	Percent (%)		Enhancement (%)
					Pre-test	Post-test	
1	<17.0	Very Good	-	-	-	-	-
2	17.0 – 17.9	Good	-	-	-	-	-
3	18.0 – 21.7	Enough	3	4	37,5	50	12,5
4	21.8 – 23.0	Not Enough	-	1	-	12,5	12,5
5	>23	Very Less	5	3	62,5	37,5	-25
Amount			8	8	100	100	

Experiment II (Zig Zag)							
No	Illinois Agility Test	Category	Prestest	Posttest	Percent (%)		Enhancement (%)
					Pre-test	Post-test	
1	<17.0	Very Good	-	-			
2	17.0 – 17.9	Good	-	-	-	-	
3	18.0 – 21.7	Enough	4	5	50	62,5	12,5
4	21.8 – 23.0	Not Enough	-	1	-	12,5	12,5
5	>23	Very Less	4	2	50	25	-25
Amount			8	8	100	100	

Sumber: Personal Data

The results of the pre-test in the hurdle drill running exercise indicate that 37.5% of female soccer players from PFK Angels reached the "satisfactory" category, which is 3 samples, while

62.5% fell into the "very poor" category, which is 5 samples. In the calculation of the post-test results for the hurdle drill running exercise, it was found that the Agility of female soccer players from PFK Angels experienced both improvement and decline. Out of the 8 samples that reached the "satisfactory" category, there was an increase of 12.5% compared to the pre-test results, which previously had only 3 samples or 37.5%. Meanwhile, 1 sample or 12.5% fell into the "poor" category, whereas in the pre-test, none reached that category. Therefore, it can be concluded that the Agility of female soccer players from PFK Angels improved by 12.5% in the "satisfactory" category, while experiencing a decrease of -25% in the "very poor" category compared to the pre-test results.

The pre-test results for the zig-zag running exercise show that 50% of female soccer players from PFK Angels reached the "satisfactory" category, while 25% fell into the "very poor" category. However, there were changes in the post-test results. Out of the 8 samples that reached the "satisfactory" category, there was an increase of 12.5% compared to the pre-test results, which previously had only 4 samples or 50%. Meanwhile, 1 sample or 12.5% fell into the "poor" category, whereas in the pre-test, none reached that category. However, in the "very poor" category, there was a decrease of -25% from 4 samples in the pre-test results to 2 samples in the post-test results. Therefore, the agility of female soccer players from PFK Angels improved in the "satisfactory" category but declined in the "very poor" category compared to the pre-test results.

Based on the overall data describing the improvement in Agility of female soccer players from PFK Angels as discussed above, it can be concluded that the hurdle drill running and zig-zag running exercises can indeed influence the Agility of PFK Angels' players.

The prerequisite analysis in this research: 1) The normality test of the data yielded the following results.

Table 3.

Data Normality Test Pre-test and Post-test

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Pre-test Experiment I	.270	8	.088[c]
Post-test Experiment I	.195	8	.200[c]
Pre-test Experiment II	.270	8	.200[c]
Post-test Experiment II	.173	8	.200[c]

Based on the results in Table 3 for the pre-test and post-test of the hurdle drill exercise, it shows a Sig value of 0.88 > α (0.05) and Sig 0.200 > α (0.05). And for the pre-test and post-test of the zag zag running exercise, it shows a Sig value of 0.200 > α (0.05). Therefore, it can be concluded that the data for experimental groups I and II are normally distributed.

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2) The homogeneity test of the data yielded the following calculation results.

Table 4.

Data Homogeneity Test Pre-test and Post-test

	Pre-test	Post-test
Sig.	.630	.182

Sumber: Data Pribadi

Based on Table 4, both the pre-test and post-test groups show significance values > 0.05. Therefore, it can be concluded that the data in both groups of this study are homogeneous or have equal variances.

This research applies hypothesis testing using parametric statistical testing, namely the independent samples t-test, to test hypotheses. Here are the presented results of the statistical test:

The test for the influence of pre-test and post-test data aims to determine whether the hurdle drill and zag zag running exercises have a significant impact on the Agility level or not. The results of the pre-test and post-test data analysis can be found in the following table:

Table 5.

Test The Influence of The Result Pre-test and Post-test

Data	N	Average	t_{hitung}	t_{table}	Information
Pre-Test Experiment I	8	2.70250	6.000	1,895	There are significant differences
Post-Test Experiment I					
Pre-Test Experiment II	8	3.01125	3.586	1,895	There are significant differences
Post-Test Experiment II					

Sumber: Personal Data

In the table above, it is observed that experimental group I has a t-value (t-observed) of 6.000, while the t-table value (t-critical) is 1.895 for a significance level of 0.05 with degrees of freedom (df) of 7 (8-1=7). Experimental group II has a t-value of 3.586, with the same t-table value of 1.895 for a significance level of 0.05 and df = 7. Therefore, it can be concluded that experimental group I, with an Agility t-value of 6.000, exceeds the t-table value of 1.895. Hence, the alternative hypothesis (Ha) in this study is accepted. Similarly, experimental group II, with an Agility t-value of 3.586, also exceeds the t-table value of 1.895, so the alternative hypothesis (Ha) is also accepted. This indicates that there is an influence of the hurdle drill and zag zag running training models on the agility level of female soccer players in PFK Angels. Additionally, from the table above, it can be seen that the average agility of experimental group I in the pre-test and post-test is 2.7025, while experimental group II has an average of 3.0112. This shows a difference of 0.3087 between the hurdle drill and zag zag running training models, indicating an

improvement of 8.15%. Therefore, based on the pre-test and post-test data, it can be concluded that the players' agility level improved by 8.15%.

4. DISCUSSIONS

The exercises used in this research are the hurdle drill and zigzag running, both of which are aimed at enhancing the agility of soccer players. The hurdle drill is a training model that utilizes simple equipment as markers for repetitive movements while running over hurdle obstacles. On the other hand, zigzag running involves weaving through obstacles in a "Z" pattern, using simple cones as markers. Both the hurdle drill and zigzag running exercises are common and provide strong motivation for improving physical fitness, including agility.

Based on the important theories underlying the research decision, it is evident that there is a strong relationship between training outcomes and agility. Therefore, there is an interaction between the hurdle drill and zigzag running exercise models and agility, which have a strong correlation. It is known that performance in soccer is influenced by physical conditions, including agility. Agility is a crucial component of physical fitness demonstrated by players and required of individuals executing movements in soccer games.

This research was conducted from February 18, 2023, to March 19, 2023, involving PFK Angels players at Podo Field. The players participated in 12 treatment sessions, preceded by an initial test (pre-test) before the treatment and a final test (post-test) after the treatment. Therefore, the entire series of activities involved a total of 14 sessions.

The initial test conducted on the players before undergoing the hurdle drill training model showed that the majority of players were in the category of "very poor," accounting for 62.5%. Meanwhile, in the zag zag running training model, 50% of players were classified as "very poor." These results indicate that the physical agility condition of the players was initially very low. Therefore, structured and systematic training is needed to improve the players' agility quality. This aligns with the perspective expressed by Nossek that training is "a process that takes several years until the athlete reaches a high-performance standard" (Khairiyah, 2021).

After undergoing the hurdle drill and zag zag running training, the quality of agility in PFK Angels players improved. The improvement in the hurdle drill training was 10.87%. This result is consistent with the research conducted by (Kriswiyanto, 2021), which found a significant increase in agility by 3.07% after hurdle drill training. Similarly, the zag zag running training resulted in an improvement of 12.85%. This aligns with the research by Shabih et al. in 2021, which showed that zag zag running training can enhance soccer players' agility. The research found a significant effect on agility, with a value of 30.5 > 1.70. Therefore, both the hurdle drill and zag zag running training models can significantly enhance agility because they involve repetitive body movements with rapid changes in direction. As mentioned by (Kiram, 2019), agility training involves repeated body movements that quickly change position and direction in response to the conditions faced and desired. Training models are structured and detailed training programs created by coaches systematically to improve a player's agility, especially in sports like soccer. There are various types of training models, such as zig zag running and hurdle drill.

According to (Kahfi & Wijaya, 2020), zigzag running is a form of training where athletes run in a zigzag pattern, forming a "Z" shape, with the aid of cones used as markers. According to (Ash et al., 2022), hurdle drill training with lateral weave forward variations involves running in

a zigzag pattern to the right and left while navigating simple hurdle obstacles. In line with (Mikael, 2016) research on Soccer players' agility skills depending on their field position in 2016, he concluded that reactive agility and preplanned agility depend on different qualities and may suggest that reactive and preplanned agility are independent of each other. Meanwhile, (Shabih et al., 2021) conducted research on the provision of zigzag running training. They concluded that zigzag running training has a significant impact on agility in dribbling the ball.

Based on the research results, hurdle drill and zigzag running exercises have a significant impact on agility in the performance of soccer players. Hurdle drill and zigzag running exercises bring innovation to agility training with the achievement of desired goals. In theory, hurdle drill and zigzag running exercises provide clarity on the differences in their effects based on the research results, which can then be used as a reference by coaches to create more varied training programs than before. Several experts believe that the hurdle drill and zigzag running exercise models are the most effective forms of training. They argue that these training programs are effective because they can be tailored to the varying physical conditions of each individual. Providing the hurdle drill and zigzag running exercise models in consecutive training sessions can indeed have a positive impact and serve as a training guideline. These models provide a tangible representation of the results achieved during the players' training sessions. There are several issues that players experience directly on the field during training. If the training methods provided do not evolve with innovative approaches, the desired improvements in agility may not occur. Therefore, before implementing training programs for players, coaches should conduct agility tests using the Illinois Agility Test, as done by the researcher. This helps ensure that the agility training material aligns with the physical condition of each individual player.

5. CONCLUSIONS

Based on the data analysis from the conducted research, the following conclusions can be drawn: Overall, the contribution of the hurdle drill and zigzag running training models to the improvement of agility reached 8.15%. This can be observed from the t-test results in experimental group I, with a t-value of 6.000, exceeding the critical t-value of 1.895 (significant), and in experimental group II, with a t-value of 3.586, which also exceeded the critical t-value of 1.895 (significant). Specifically, the conclusions are as follows: 1) The agility of PFK Angels players mostly falls into the category of "very poor" (62.5%) and "poor" (50%), while no players were in the "fair" category (0%), and some were in the "good" category (37.5%) and (50%). 2) After undergoing the hurdle drill training, the agility of PFK Angels players improved, with some moving to the "very poor" (37.5%) and "poor" (12.5%) categories, while others reached the "good" category (50%). 3) Following the zigzag running training, the agility of PFK Angels players also improved, with some remaining in the "very poor" (25%) and "poor" (12.5%) categories, while the majority reached the "good" category (62.5%).

This research indicates that the training models have an impact on the agility of PFK Angels players. It is expected that the zigzag running exercise model can enhance agility to support performance during both training and matches. It's worth noting that this study only discusses a few training models that affect the agility of PFK Angels soccer players. There are many other training models, such as shuttle runs, jumping jacks, stair climbing, high knee drills, and so on. Further research that explores other variables will enable a comprehensive analysis of all training models that affect agility, leading to improved performance for PFK Angels soccer

players.

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