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The Effect of Ladder Drill and Zig-Zag Run Training on Agility of SSB Arunda U11-13 Years Malang Regency

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ABSTRACT

This study aims to determine the effect of increasing agility of ladder drill and zig-zag run training on soccer athletes at SSB Arunda U11-13 years old, Malang Regency. This research method uses quantitative research with experimental methods (Pretest and Posttest Control Group). The population in this study were Arunda soccer school athletes U11-13 years old. The number of samples was taken using a purposive sampling technique, so that 20 athletes were obtained. The instrument used the illinois agility test to determine the agility of athletes. The results of the pretest-posttest ladder drill of Arunda soccer athletes U11-13 years old were 19.14 ± 0.91 ver. 17.36 ± 0.84. While the results of the pretest-posttest zig-zag run of Arunda soccer athletes U11-13 years old were 19.22 ± 0.76 ver. 17.62 ± 0.71. Statistical test using paired sample t-test analysis technique on ladder drill and zig-zag run groups, the results showed 0.000 <0.05. From the test results using independent sample t-test, the results showed 0.457 > 0.05. From these results, it shows that there is no significant difference in increasing agility between ladder drill and zig-zag run.

INTRODUCTION

Exercise is a physical activity that aims to get fit. People usually exercise to improve their general physical health. With the advancement of sports and society, participation in sports is now more than just a means of entertainment and well-being. Nowadays, playing sports is not just a job but also a goal-oriented hobby. Football is a team sport that competes with each other to win, each team consists of eleven players (Siaga Agustina, 2020) . The goal is to score points against the opponent's goal in two sets of 45 minutes each. A soccer athlete must have a high physical condition to compete in the sport. For soccer players to perform well in competition, their physical condition is a very important component. In addition to technical, tactical, and mental preparation, physical condition development is also important for various sports (Bafirman & Sujana Wahyuri, 2018) . Some components of physical condition that are important for a footballer to have, namely: physical quality, endurance, speed, agility, coordination, body balance, accuracy, response.

Agility is an aspect of physical condition that is very calculated in the sport of soccer. Agility is the ability to condition body reflexes to change direction quickly when moving at high speed (Budiwanto, 2012) . Having better agility than opposing players is an advantage because in football if a player has speed and agility above opposing players, then the opponent will have difficulty in

following every movement and eventually easily fooled. In fact Lionel Messi became the best player in the world 2009 version of FIFA because he was able to outwit opponents with just seconds (Hendri Firzani, 2010) . Based on Mawardi & Wahyudi's research entitled the effect of zig-zag run training on the agility of soccer players, it shows the results that the zig-zag run has an effect on increasing agility by 0.25 seconds (Mawardi et al., 2021). Meanwhile, based on the results of research by Yohanes & Komaini (2021)entitled the effect of *ladder drill* training on increasing the agility of soccer players, revealed that from the results of the study there was an effect of *ladder drill* training on the agility of soccer players (Yohanes & Komaini, 2021).

From the results of the interview and observation visit with the SSB Arunda coach, that the SSB has never used *ladder drill* training as a support to improve the agility of its athletes. Exercises that are often used to train agility are a form of turning or *zig-zag* pattern training. This is in line with research from Prasetio et al., (2022) which states that using *zig-zag* training can be used as a solution to improve agility. Researchers found that the agility training carried out by students was still not optimal. This has an impact on their performance when playing, especially in dribbling. The agility of an athlete is usually clearly visible when the player dribbles, but this ability is still less than optimal in the students studied. According to Hoffman, agility can be described as an athlete's ability to react to a stimulus, be it a flash of light or a hand movement (Hoffman, 2020).

Ladder drill is a preparation tool used to prepare speed and agility in the form of a ladder frame that is useful for training leg muscles (Soffan et al., 2016) . Preparation using ladder drills with various models that train the ability to develop footwork that serves to train agility, speed and coordination. The fulcrum of the foot is prioritized in *ladder* training as an indirect weight-bearing support, which will lead to an increase in the strength of the Tibialis, Soleus, Gastrocnemius muscles, this will help strengthen the legs when making rapid changes in movement naturally (Febrian & Bakti, 2021) . In previous research, *ladder drill* had a significant increase in agility with a *mean pretest* of 40.8 and *posttest of* 47.3 using the *side step test* (Fansuri & Situmeang, 2021) .Jumping movements have a strong impact on leg muscle explosive power which can affect agility by 2.10% (Puriana, 2016) . While *zig-zag* is a form of agility training performed by moving in a winding manner, which aims to prepare the body's ability to respond to changing body direction with fast reflexes (Ardianda & Arwandi, 2018) . The type of *zig-zag run* exercise is a running exercise that moves across cones or tracks that function to train agility and body balance. From previous research, it explains the effectiveness of zig-zag model training is only 1.23 seconds to increase agility (Imron & Wismanadi, 2022) .

METHODS

The design of this study used an experimental method (pre test & posttest control group), this study aims to determine the effect of ladder drill and zig-zag run training on the agility of Arunda U11-13 year old football school (SSB) Malang Regency. The population of this study were Arunda soccer

school (SSB) athletes aged 11-13 years Malang Regency. The sampling technique using purposive sampling because there are certain criteria, and obtained as many as 20 athletes. Of the entire sample divided into 2 groups, 10 athletes *ladder drill* group and 10 athletes *zig-zag run* group. The instrument uses the illinois agility test (Hachana et al., 2013) .

This study was conducted for 16 meetings during January-February. The treatment was given 3 times a week on Tuesday, Thursday, Sunday. In this study what was observed was the change in the results of the pretest and posttest of agility after being given the treatment of ladder drill and zig-zag run as the independent variable and for the results of the agility test as the dependent variable.

Table1 . Research Design

Subject	Pretest	Treatment	Posttest
K1	O1	X1	O2
K2	O1	X2	O2

In this study, using statistical tests by utilizing the help of the SPSS program, namely the *Paired Sample* Test hypothesis test (T-test*)* with SPSS 26. The first step is the prerequisite test, with the normality test and homogeneity test of the research data. The normality test is used to analyze whether the data is normally / abnormally distributed (Nuryadi et al., 2017) . *Shapiro Wilk* normality test by utilizing the help of the SPSS program. The provisions of the normality prerequisite test with significance results <0.05. Then the data is not normally distributed, if the data significance> 0.05. Then the data is declared normally distributed (Arikunto, 2010) . After that, the homogeneity test is carried out with the distribution of values on the analyzed data. Homogeneity testing uses variance analysis with the help of SPSS. The provisions of the homogeneity prerequisite test with significance results <0.05 then the data is homogeneous.

RESULTS AND DISCUSSION

Result

The results of this study are to analyze and describe an experimental result that has been done. Broadly speaking, it shows that the differences that exist in the *ladder drill* and *zig-zag run* groups where stated in the test analysis results as follows. The first step taken in the study by conducting a pretest to all sample subjects taken from the population in this study and obtained as follows.

Table2 . Descriptive Results of *Ladder Drill* and *Zig-Zag Run* Groups on Agility SSB Arunda U11-13 Years Malang Regency

No	Keterangan	N	Min	Max	Mean	SD
1	*Pretest Ladder Drill*	10	17.30	20.12	19.14	.91414
2	*Posttest Ladder Drill*	10	15.64	18.24	17.36	.84803
3	*Prettest Zig-Zag Run*	10	18.04	20.09	19.22	.76395
4	*Prettest Zig-Zag Run*	10	16.50	18.47	17.62	.71250

The above table shows the results of the agility pretest at the Arunda U11-13 Year Football School (SSB) Malang Regency which consists of 20 athletes. While the results of the acquisition rate of the *ladder drill* group pretest data mean value of 19.14. While the results of the ladder *drill* group posttest data show the acquisition of a mean value of 17.36. In the *pretest zig-zag run the* mean value is 19.22. While the results of *the zig-zag run posttest* show the acquisition of a mean value of 17.62. Then the data will be analyzed for the difference between the results of the pretest agility value and the results of the posttest agility value.

Picture1 . Graph of Pretest and Posttest Results of Ladder Drill Group on Agility SSB Arunda U11-13 Years Malang Regency

The results show the pretest and posttest in the ladder drill group can be graphically depicted as above. Based on the results of the pretest and posttest of the ladder drill group on the agility of soccer athletes (SSB) Arundan U11-13 Years there is an increase after being given treatment for 16 meetings by getting the highest increase of 1.88 seconds and for the lowest increase of 1.66 seconds. While the average result of the increase shows 1.78 seconds.

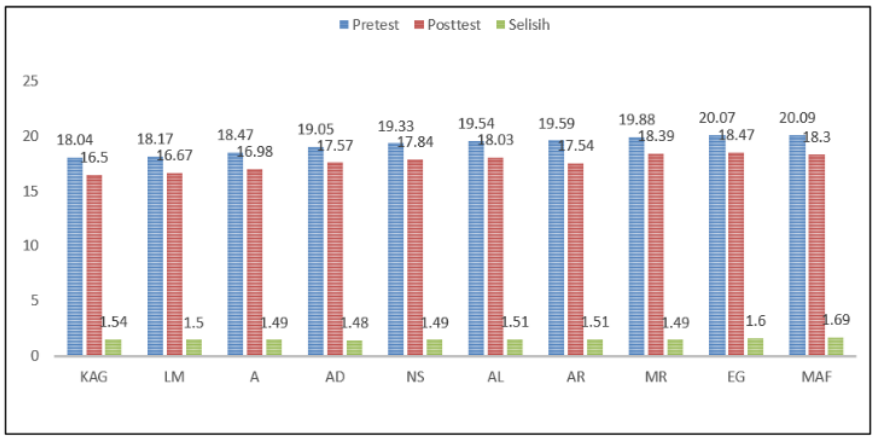

Figure 2. Graph of Pretest and Posttest Results of Zig-Zag Run Group on Agility SSB Arunda U11-13 Years Malang Regency

The results show the *pretest* & *posttest* on the *zig-zag run* can be graphically depicted as above. Based on the results of the *pretest* & *posttest* *zig-zag run* on the agility of soccer athletes (SSB) Arundan U11-13 Years there is an increase after being given treatment for 16 meetings by getting the highest increase of 1.69 seconds and for the lowest increase of 1.48 seconds. While the average increase shows 1.53 seconds. While the average result of the increase shows 1.53 seconds.

Table3 . Normality Test Results

Keterangan	Jumlah (N)	Hasil Uji (sig.)
Kelompok *Ladder Drill*		
Pretest	10	0,272
Posttest	10	0,258
Kelompok *Zig-Zag Run*		
Pretest	10	0,238
Posttest	10	0,255

In table 3, above shows that the significance results > 0.05. In the ladder drill pretest with a number 0.272 and posttest ladder drill with a number 0.258. Then the pretest zig-zag run with a number 0.238 and posttest zig-zag run with a number 0.255. So that the data results can be concluded by stating that the data is normally distributed.

Table4 . Descriptive Results of Homogeneity Test

Keterangan	Levene Statistic	Sig.	Hasil
Based on Mean	0,13	0,942	Homogen

In table 4. shows the value of the significance number based on mean> 0.05. With a numerical value of 0.942. Then the data results can be concluded by stating that the data is homogeneous.

Paired Sample t-Test Analysis

Table5 . Descriptive Results of Paired t-Test

Keterangan	Sig. (2-tailed)	Kesimpulan
Pretest-Posttest Kelompok *Ladder Drill*	0,00	Signifikan
Pretest-Posttest Kelompok *Zig-Zag Run*	0,00	Signifikan

Table 5. above describes that the results of the Sig value. (2-tailed) <0.05. With a numerical value of 0.00. So it can be concluded that there is an effect of *ladder drill* and *zig-zag run* training on the agility of Arunda U11-13 year old soccer school (SSB).

Analysis Independent Sample T-Test

Table6 . Descriptive Results of Independent Sample T-Test Test

Variabel		Mean	95% CI	Beda Mean	P value
Kelincahan	Zig-Zag Run	17,62	1,00187 - 0,46987	.532	.457
	Ladder Drill	17,36			

In table 6, above describes that the results of the mean value in the *zig-zag run* group (17.62) are greater than the difference in the mean of the *ladder drill* group (17.36). The statistical test results describe no significant difference between the mean agility in the *zig-zag run* group and the *ladder drill* group (p>a; a = 0.05).

Discussion

Based on the analysis of the research results that have been carried out, the discussion of the effect of the *ladder drill* & *zig-zag run training* model on the agility of the Arunda U11-13 year soccer school (SSB) Malang Regency. From the results of the analysis that has been done it can be explained that; 1) There is a significant influence of the *ladder drill* model on the acquisition of increased agility of soccer school athletes (SSB) Arunda U11-13 Years. 2) There is a significant influence of the *zig-zag run training* model on the acquisition of increased agility of SSB Arunda U11-13 Year soccer athletes. It can be seen that both exercises have increased agility. The cause of the increase in agility in athletes is the result of training. The results of *ladder drill* training that is applied regularly can increase agility by 1.7 seconds (Assya'bani, 2016) . Based on Fadhli (Zainuddin & Yusuf, 2021) Ladder drill increases athlete agility by 0.07% from the initial test and also speed by 0.35%. From exercises performed repeatedly with a systematic and planned for the purpose of skill formation (Budiwanto, 2012) . This causes an increase in the ability of the leg muscles from the training that has been done. In agility also involves several elements such as flexibility, coordination, balance and speed (Bismar & Fadillah, 2020) . The *ladder drill* movement pattern focuses on the speed of leg movements with body balance and flexibility at the same time (Mashud & Karnadi, 2015) . There is a correlation of leg muscle strength

with speed in affecting the agility of athletes (Patraserasah, 2012) . Poor physical ability will affect the athlete's ability, so the important basis for developing physical conditions to support, both in terms of technique, tactics and mentality (Bafirman & Sujana Wahyuri, 2018) . According to (Febrian & Bakti, 2021) the *ladder* model can significantly improve leg agility because it can provide changes in leg muscle strength. Ladder training is a good and fun way to improve movement skills (Mulya & Millah, 2019) . An important thing to note to maximize the training process, athletes must undergo proper and quality training. Training using a ladder model to train footwork is a form of exercise variation that focuses on training footwork development skills that function to prepare agility, coordination and speed (Setya et al., 2018) . In the sport of soccer, physical abilities are needed, namely the physical development of agility. In soccer games, especially agility as a basis that must be taken into account in the sport of football which affects performance on the field (Mawardi & Wahyudi, 2021) . With *basic* agility that is qualified will support the ability of an athlete to dribble when playing. Someone with above average agility, it will have an impact on good game execution (Efendi et al., 2018) . Foot agility is a person's ability to react to stimuli and continue to be ready whenever the body changes direction and stops suddenly and can be done repeatedly in playing (Budiwanto, 2012) . It is a physical basis that has a major effect on the sport of football which functions to change direction and when responding to stimuli (Mufti & Kusuma, 2022) .

The ladder model is a footwork development training tool used to train foot speed and agility, in the form of a *ladder* that is useful for training leg muscles (Soffan et al., 2016) . While *zig-zag* is an exercise model with a winding track, with the aim of training the body's adjustment ability to change direction quickly without losing body balance (Ardianda & Arwandi, 2018) . Increased agility from *zig-zag* training due to increased lower extremis muscles that affect aspects of movement (Satriaputra & Widodo, 2019) . In research on the effect of *zig-zag run* on agility U13-15 years increase agility is influenced by body weight and age (Kinanti, 2016) . The training program is prepared based on the principles of training to encourage improvement according to the needs of the sport (Bompa & Buzzichelli, 2015) . So it is very important to apply the principles of training in providing training. Exercise loading is given gradually and increases according to changes in the condition of the athlete itself (Emral, 2017) . With the provision of a training program for 16 meetings based on specificity, which leads in accordance with the objectives. With the application of training that is not monotonous and varied, it will have a good impact on improving athlete achievement (Hasyim & Saharullah, 2019) . Increased training intensity has an effect on faster and more effective improvement (Gemael & Kurniawan, 2020) . Meanwhile, *zig-zag* can be used to improve foot agility because the training model contains elements of running motion with movements to change body position quickly (Muhammad Ihsan Shabih et al, 2021) . Many factors influence the increase in athlete agility during the training process. According to (Utomo & Syafi'i, 2022) during the agility training process, there will be a stretch-shortening cycle (SSC), namely concentric contractions in the extensor muscles which will provide

good concentric compression. By often doing movements that train agility will increase the speed of reaction / stimulation. Increased foot agility due to increased muscle fibers in the connective tissue between muscle cells (Kinanti, 2016) .

CONCLUSION

Based on the results of statistical test data processing, it can be concluded that: (1) *ladder drill* model training has a significant effect in increasing the agility of SSB Arunda U11-13 soccer players; (2) *zig-zag run* model training also has a significant impact on increasing the agility of players in the same age group; and (3) there is no significant difference between the effectiveness of ladder drill and *zig-zag run* training in increasing the agility of the players. Researchers hope that these results can be used as training evaluation material so that coaches at SSB Arunda can develop more effective and innovative training programs to develop player agility. In addition, by utilizing various models and varied training equipment, coaches are expected to maximize the potential of students so that they grow into superior soccer players.

However, this study has several limitations, including the research subject which only includes SSB Arunda U11-13 year old players so that the results may not be generalized to other age groups. The short duration of training and the absence of consideration of other factors such as diet or fitness level are also limitations. Therefore, further research is recommended to involve a more diverse population, use a longer training period, and utilize technology for more accurate analysis. Taking into account these limitations and recommendations, future research is expected to make a greater contribution to the development of agility training for soccer players.

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