
The Effect of Pliometric Training Methods and Agility on the Results of 100 Meter Run on Students the Son of Sport Training Education Faculty of Sport Science Manado State University

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Abstract: The purpose of this study was to determine: 1) the effect of the plyometric training method between the alternate leg bound with obstacles and the alternate leg bound without obstacles on the results of the 100 meter run on Sports Coaching Education Students, FIK UNIMA, 2) the effect of the alternate leg bound with obstacles and alternative leg bound without obstacles for students who have a high level of agility to the results of the 100-meter run in Sports Coaching Education Students, FIK UNIMA, 3) there is an interaction between plyometric training methods and agility on the results of the 100-meter run in Sports Coaching Education Students, FIK UNIMA.

The research design used a 2x2 factorial experiment. The population used is the male students of the Faculty of Sport Science Training, amounting to 120 people. A sample of 40 people was taken at random purposively. The instruments used to collect data were: (1) 100 meter running ability test, (2) agility ability test by running back and forth, (4) The exercise program is a guideline that will be used in giving treatment. The data analysis technique used was Analysis of Variance (ANOVA) at a significance level of = 0.05.

The results of hypothesis testing are proven that: (1) There is a significant difference in the effect between the alternate leg bound exercise using obstacles and the alternate leg bound exercise without obstacles on the results of the 100 meter run where the calculated F value = 33.480 > F table = 3.96, at the level of significance = 0.05; (2) there is a significant difference between high agility and low agility on the results of the 100 meter run where the calculated F value = 33,863 > F table = 3.96, at the significance level = 0.05; (3) there is an interaction between training methods and agility on the results of the 100-meter run, the calculated F value = 25.088 < F table 3.96, at the significance level = 0.05;

Research conclusions: 1) there is a significant difference in the effect of alternate leg bound using obstacles and alternate leg bound exercises without obstacles on the results of the 100 meter run. 2) there is a difference in the effect of high agility and low agility on the results of the 100 meter run in male students majoring in sports coaching education. 3) there is an interaction between plyometric training and agility on the results of the 100 meter run in male students majoring in sports coaching education.

Keywords: Plyometric Exercise Method, Agility, 100 Meter Run.

INTRODUCTION

Sport is basically a need for every human being in life, so that physical conditions and health are well maintained. Sport provides an ideal opportunity to channel energy in a good way towards harmonious, harmonious and balanced happiness to achieve true happiness in life. One of Indonesia's current development focuses is the field of achievement sports

development. Achieving good sports achievements cannot be separated from supporting factors directly or indirectly that appear during training, for example providing the right training program and motivating athletes during training to do exercises well in order to get good sports achievements during the competition. In addition to the basic skills that must be possessed in an effort to achieve an achievement in one sport, there are also other supporting factors that should not be ignored, namely the interests and talents of a person, because without the interests and talents of a person, everything he does will be in vain. In the end result becomes incompatible with the purpose of the exercise. In addition to interests and talents, one's physical condition is also another supporting factor to achieve a sports achievement goal, a good physical condition and in accordance with the sport in which one is engaged will certainly contribute to the composition of motion that is carried out systematically.

The physical condition of a person is indeed not the same even though they have the same skills and pursue the same sports achievements. Of course because this will lead to differences in achievement results even with the same training program. Because the physical is the main factor of the components of motion in sports, without a good physique and in accordance with the sport it will be able to cause good motion in the sport. Of the many numbers that exist in sports, researchers are interested in discussing athletics. Athletics is a sport that consists of a combination of several types of physical sports, such as running, jumping, throwing and walking. Athletics is seen in the community as a simple sport because it does not require a lot of complicated equipment and equipment because it is much liked by the public in general, both young and old. This can be seen on the road and on the running tracks in sports stadiums, people who are involved in athletic activities on the road and on the running track mostly walk or run. Community participation in athletic activities such as walking or running is mostly aimed at maintaining physical fitness and maintaining health. Because according to dr. Kevin Adrian if someone runs or walks regularly can prevent heart disease, control blood sugar, keep blood pressure stable and can reduce the risk of osteoporosis. Athletics is a sport that is a mandatory activity to be taught to students and sports students in general. Schools or colleges can adapt to the state of the facilities they have. Athletics is also known as an activity that is cheap, easy and mass. Based on the author's observations at this time of athletic learning in schools and in several sports majors, students or students look bored and tend to play alone. Therefore, creativity and initiative are needed so that athletic learning is not boring. Teachers and lecturers need to modify learning with interesting forms of activity, for example with play and competition approaches.

As for one of the numbers from the athletics branch that is taught in schools and in faculties majoring in sports, is the 100 m run. To get a good 100 m run, it is very important to have a good mastery of basic techniques. According to Nick Anderson that "how to run a good 100 m, it needs to be reviewed from several aspects concerning the overall 100 m running technique, namely starting technique, running technique and finishing technique. In the 100 m run, there are 3 star squat techniques used, namely a short start (bunch/bullet start), an intermediate start (medium start), and a long start (elongated start). Several techniques to achieve good short distance running form, which need to be considered in running techniques such as shoulder and head position, arm position, waist, knee and leg position. According to the IAAF, a runner's time is recorded when a limb crosses the finish line. For that, there are three finishing techniques, namely: 1. Leaning the chest forward. 2. Lean one shoulder forward. 3. And leaning head forward.

Sports achievements in Indonesia are getting better from year to year both in national and international events in certain sports, for example in badminton. However, it is inversely proportional to sports achievements in athletics at this time. In fact, Indonesia has had good short distance runners such as: Purnamo who was able to compete with short distance runners

at the 1982 Olympics and had entered the semi-finals with a record time of 10.47. Then came the sprinter who could break Mardy Lestari's national record in 1989 with a time of 10.20. and a few years later, Indonesia was stirred up by Lalu Muh Zohri because he was able to become the fastest runner in the junior athletics world championship which was held in tanpere firland with a record time of 10, 18 seconds and that time he got in the men's 100 meter number and made Zohri the fastest runner that Indonesia currently has and also the record holder for the fastest men's runner in Indonesia at this time. Looking at the achievements that have been made by Indonesian short distance runners, there is a big gap in terms of increasing achievement. And the gap in athletic sports achievement also occurs in North Sulawesi, which has long been fasting for titles in several sporting events that compete in athletics. It is proven that in the recent pound event in Papua, North Sulawesi has not been able to bring home a medal in athletics. And the problem of achievement gaps in athletics also occurs among North Sulawesi students, especially in the 100 meter number. The proof is that every time an Indonesian student sports event is held or a national student sports week (POMNAS) the athletes sent to represent universities in North Sulawesi have not been able to award medals in the 100 meter running event, both in the men's and women's categories. After all, a question arises in the mind of the researcher, why did this happen?

To achieve good 100 m running results, the coach must consider the factors that support each other in achieving good training results. Even though someone has good potential and talent but is not supported by good practice, he will not get optimal results as well. Meanwhile, according to some experts such as Chu, Farentinos, and Radcliffe stated that to improve the performance of sprint sports, one of them is using plyometric exercises. In this regard, achieving 100 m running results requires coordination, agility, speed, punctuality, and leg muscle explosive power. Correspondingly, the strength of agility flexibility, coordination and balance affect the results of the 100 m run. To achieve good results in the 100 m run, according to researchers, runners must have good muscle explosive power and good agility as well. So to increase muscle explosive power, researchers used plyometric exercises.

Plyometric exercise is a form of exercise with the aim that the muscles are able to achieve maximum strength in the maximum possible time (Donald A. Chu, 1992:1). Plyometric exercise is also one of the training methods to improve the physical condition component of power which is the favorite trainer used today, especially in sports that require explosive power of the leg muscles or arm muscles (Johansyah Lubis, 2005). According to the author, plyometric exercises are one of the exercises that are currently popular among the public and among trainers to increase leg muscle explosive power. The form of exercise that is often used in plyometric training is the alternate leg bound plyometric exercise using obstacles and those without obstacles. This training emphasizes on increasing the explosive power of the leg muscles (lower limbs), especially the extensor muscles to move forward and has something in common with the movement when running, which is using one leg to push the body forward. Both of these forms of exercise will obtain a form of change in the body's center of gravity rapidly, which is around the center of the base of support which is useful for maintaining balance and body stability which is a factor supporting running speed (Bompa, 1994). Agility is a physical ability that is needed in various sports. A person is said to be agile if he can move quickly and change the direction of movement in a balanced way. According to Harrison, Agility is a person's ability to change direction or position and direction quickly and in a timely manner without losing balance or awareness between body positions. One of the benefits of agility training is that it makes it easier to master the techniques in each sport that you are engaged in, because with good agility training, a person can have a good body balance as well. Based on the description and explanation above, the authors are interested in conducting a study with the title "The Effect of Plyometric Training Methods and Agility on the Results of the 100-meter Run".

Athletics is a combination of several types of sports which can broadly be running, throwing, and jumping (Munisifah, 2008:9). The word athletics comes from the Greek "Athlon" or "athlum" which means race or competition. Athletics is divided into 4 sports, namely running, jumping, throwing, and walking is said to be the oldest sport and is called the mother of all sports (mother of sport). The reason why athletics is the oldest sport because the forms of athletic movement have been reflected in early humans, considering that walking, running, jumping, and throwing unconsciously have been done in an effort to defend their lives and when hunting for food, they even use them to save life. themselves from environmental disturbances (Teguh Sutanto, 2016:20). So athletics is the oldest sport in the world and the forms of movement such as running, jumping, throwing and walking have been used since ancient times to find food or maintain human life. Running is defined as a body movement in which at one time all feet do not touch the ground. (Wikipedia.org). So running is a time where the footsteps are accelerated so that both feet are present during the kite. In contrast to the path where there is no moment of hovering.

The method is a method or tool used to present the content of the lesson to students to achieve the goal (Atwi Suparman 1991:149). Furthermore, Winarno Surahkmad (1994:96) states that the method is a method or tool used to achieve goals. Exercise comes from the word training is the application of a plan to improve the ability to exercise which contains material theory, practice, methods and implementation rules in accordance with the objectives and goals to be achieved. According to Bompa (1994:3) the definition of training is: Exercise is a process expressed in other words a period of time that lasts for several years until the athlete reaches a high standard of appearance. In addition, training is an effort made by someone to prepare themselves in an effort to achieve certain goals. The competition is the culmination of the process of training in sports, with the hope that athletes can perform optimally. To be able to achieve optimal performance or results requires a long training process with good coaching. According to M. Furkon (1995:3) says that: Exercise is a process or stated in other words, a period of time that lasts for several years, until the athlete reaches the highest standard of appearance. Therefore, the coaching process is carried out as early as possible so that the expected goals in certain championships can be achieved and athletes can display their peak achievements. To be able to achieve optimal performance or results requires a long training process with good coaching. According to M. Furkon (1995:3) says that: Exercise is a process or stated in other words, a period of time that lasts for several years, until the athlete reaches the highest standard of appearance. Therefore, the coaching process is carried out as early as possible so that the expected goals in certain championships can be achieved and athletes can display their peak achievements. To be able to achieve optimal performance or results requires a long training process with good coaching. According to M. Furkon (1995:3) says that: Exercise is a process or stated in other words, a period of time that lasts for several years, until the athlete reaches the highest standard of appearance. Therefore, the coaching process is carried out as early as possible so that the expected goals in certain championships can be achieved and athletes can display their peak achievements.

The purpose of training in general is to help coaches, coaches, and sports teachers to be able to apply and have conceptual abilities and skills to help reveal the potential of athletes in achieving peak performance. Meanwhile, the general objective of training is to improve the ability and readiness of athletes to reach peak performance. The formulation of training goals and objectives can be short-term or long-term. For the long term are the goals and objectives that will come in the next one year or more. The main goal is to enrich the skills of various basic movements and basic movements as well as the basics of correct technique. Short-term goals and objectives are preparation times that are less than one year. The main goals and objectives are directly directed at improving the elements that support physical performance, including strength, speed, endurance, power, agility, flexibility, and technical skills in sports.

Usually every three to four week intervals of training have been running, always monitoring the achievement of exercise results. Thus each training session must have real and measurable goals and objectives. This is intended for athletes to always be motivated to work hard. As for the trainer, the monitoring process is a means of feedback from the training process, whether the training program that is prepared and implemented is effective or not, so that if there are deviations in goals and objectives, they can be immediately addressed (Sukadiyanto, 2005:8). According to Fox (1993:288),

The word plyometric comes from the Greek word *plythyn* which means to increase or raise, or it can also be interpreted from the words "plio" and "metric" which means more & measure, respectively which means stretching (Radcliffe and Farentinos, 1985:1). The term plyometric applied to training comes from Europe, which was first known as jumping exercise (Donald A Chu, 1992:1).

Plyometrics is one method for developing explosive power, which is an important component in the achievement of most athletes (Radcliffe and Farentinos, 1985:1). The principle of the plyometric training method is that the muscles always contract both when they are elongated (eccentric) and when they are shortened (concentric). Plyometric training is useful for increasing muscle nerve reactions, explosiveness, speed and the ability to generate force (energy) in a certain direction.

Plyometric training shows the full strength characteristics of muscle contraction with a very fast response, dynamic loading or very complicated muscle stretching (Radcliffe and Farentinos, 1985:111). According to Chu (2000:6) plyometrics has the advantage, utilizing the force and speed achieved by accelerating body weight against gravity, this causes the velocity force in plyometric training to stimulate various sports activities such as jumping, running and throwing more often than weight training or can said to be more dynamic or explosive.

Based on the various opinions above, it can be concluded that plyometric training is a form of explosive power exercise with the characteristics of using very strong and fast muscle contractions, namely the muscles always contract both when elongated (eccentric) and when shortened (concentric) in a fast time, so that during work the muscles no relaxation time.

Plyometric exercises will get good results if done perfectly and with high intensity. Intensive exercise, namely the training process must be heavier by increasing the workload, the number of repetitions of the movement and the intensity of the motion. This training process is called the outer load. or training load that can be directly seen in real. The outer load is regulated by an exercise program controlled by the coaches and athletes themselves. In preparing an exercise program that uses the outer load, the following must be considered (Nossek, 1995:17):

1. Different types of exercise
2. Load volume
3. Load density
4. Load duration

The alternate leg bound exercise with obstacles is a form of plyometric exercise to increase the explosive power of the leg muscles with an obstacle height of 40 cm and a distance between obstacles of 125 cm. The exercise movement is done by jumping as high as possible towards the front with one foot repulsion until it passes through obstacles and lands on one foot. After landing the feet alternately perform the same movement. The jump is done strongly as far and as high as possible (Chu, 1992:61). Range of exercise movements alternate leg bound with obstacles as in the image below:

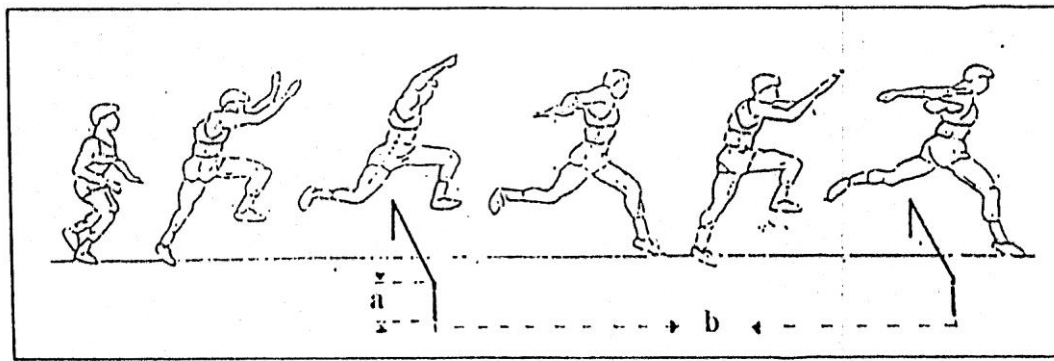


Figure 3. Alternate leg bound exercise with obstacles (Chu 1992:61)

Exercise *alternate leg bound* without obstacles is a form of exercise to increase leg muscle explosive power. The exercise is to use one leg thrust forward alternately the left leg and right leg, raised to knee level parallel to the waist. The exercise is performed in a standing position with one leg in front, arms by the side, repulsion with the back leg and knee movement forward, arms by the side of the body towards the chest. The jump is done strongly as far as possible and before landing keep one foot away from the other (Chu, 1992:59). The series of alternate leg bound exercises without obstacles are as shown in the image below:

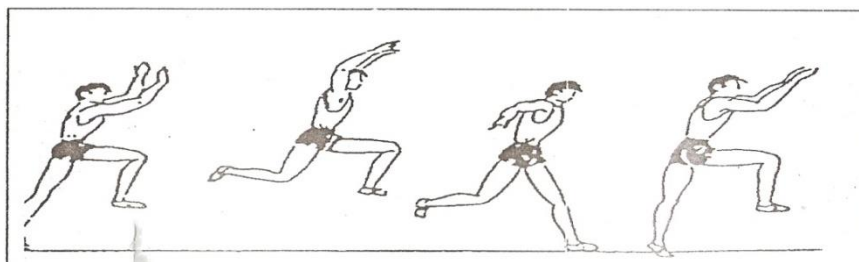


Figure 4. Exercise *alternate leg bound* without hindrance (Chu, 1992:59)

The two forms of exercise above are both exercises to increase leg muscle explosive power. The difference in these exercises is that one uses obstacles and one without obstacles. Alternate leg bound exercises that use obstacles and without obstacles, the muscles stretch at the beginning of the movement and then are given a fast dynamic load, will produce greater strength and also occur stretch reflexes that are useful for controlling body movements. The energy system used in these two forms of exercise uses an anaerobic energy system because during the energy fulfillment process it does not require the help of oxygen O₂ but uses the energy stored in the muscles.

Agility is the maneuverability of the body, namely the ability to change the position and direction of the body or body parts quickly. Meanwhile, according to several other experts, agility is defined as the ability to change body position quickly while moving, without losing balance, coordination, and dynamic balance (Miller, 2010).

Agility is a basic thing that the body has both for functional activities and in sports such as the ability to move quickly and stop suddenly, change direction quickly, efficiently and adjust the motion of the body or body parts during sports activities. Each individual with good agility has a better chance of success in physical activity compared to individuals with poor agility. It is said that because agility itself is an aspect of several physical conditions that must be possessed to improve performance and prevent individuals from injury (Jay, 2011).

RESEARCH METHODS

In research, specifically in the field of sports science in general, to find, develop, or test the

truth of a knowledge. Finding means trying to get something to fill a void or lack. Developing means expanding or digging deeper into what already exists, while testing the truth is twisted if what already exists is still in doubt. The research method as we know it today provides very precise lines and puts forth strict conditions. The purpose is to maintain that the knowledge achieved from a research can have the highest scientific value. In this study, several things will be described about the research methods used in the study concerning the research sample population, research variables, types of research,

Place and time of research

This research was carried out at the UNIMA stadium for male students of sports coaching education at FIK UNIMA and the duration of the research was 8 weeks.

Population and Research Sample

Population

The population is the entire subject that will be used in the study (Suharsimi Arikunto, 1996: 102). The population in this study were male students of sports coaching education at FIK UNIMA, totaling 120 students.

Sampling and Sampling Techniques

The sample is part of the population under investigation. Suharsimi Arikunto (1996: 120) states that if the subject is less than 100 it is better to take all of them, so that the research is in the form of population research, then if the number of subjects is large it can be taken 10-15% or 20-25% or more. depends at least on: (1) the ability of the researcher in terms of time, (2) the narrow breadth of observations from each subject because this involves a lot of data at least, (3) the size of the risk borne by the researcher. For research with a large risk, if the sample is large, the results will be better.

In order for the sample from the population used in the study to be representative, it must use appropriate sampling techniques in accordance with the research objectives. For this reason, the sampling technique was carried out intentionally or purposive random sampling. Sugiyono (2006: 124) states that "purposive random sampling is a sampling technique with certain considerations". The considerations are (1) having the same skill level, (2) being male, (3) not temporarily participating in training in various sports clubs.

Sampling is done by giving an agility test. And the results are sorted from the highest score to the lowest score. To determine the groups that represent high agility and low agility, the presentation technique is used 27% for the upper limit and 27% for the lower limit. Thus, a sample of students who have high agility were obtained as many as 20 people and the sample was taken randomly. Then divided into 2 groups of 10 people each for alternate leg bound exercises using obstacles and 10 people for alternate leg bound exercises without obstacles. low agility students as many as 20 people and the sample was taken randomly, then divided into two groups of 10 people each for alternate leg bound exercises using obstacles and 10 people for alternate leg bound exercises without obstacles. So that the entire sample of this study amounted to 4 groups, each of which contained 10 samples.

The distribution of sample groups can be seen in the table.

Group	Subject group and type of treatment	Number of subjects
I	High agility groups are trained with Alternate leg bound using obstacles	10 people
II	High Agility group trained with Alternate leg bound without hindrance	10 people
III	The low agility group trained with Alternate leg bound using obstacles	10 people

IV	The low agility group is trained with Alternate leg bound without obstacles	10 people
Amount		40 people

Research Methods and Design

This research was carried out using a quasi-experimental method which aims to obtain as much information as needed and in accordance with the subject matter in this study. This research involves 2 kinds of independent variables whose influence on the dependent variable will be examined, namely the results of the 100 meter run. The independent variables include plyometric training, and agility.

Each independent variable consists of 2 levels, namely the training variable consisting of alterenate leg bound plyometric exercises with obstacles and alternate leg bound plyometric exercises without obstacles, and the agility variable consists of high agility and low agility. The exercise variable is the manipulated variable, while the agility variable is the attribute variable.

The relationship between the independent variable and the dependent variable in this study is called the factorial experimental design, which is a research structure that investigates 2 kinds of independent variables whether each affects the dependent variable, and also whether there will be interactions between the independent variables involved in this study.

For the purposes of conducting data analysis, the design of this study was drawn in factorial form. Each factor includes the size of the subject who will receive treatment in the study. With the involvement of 2 variables, each of which has two levels, this is called a 2 x 2 factorial design (Sudjana, 1994) with a design as shown in table 4 below:

Factorial Experimental Design 2 x 2

Plyometric Exercise	Agility	
	Height (B1)	Low (B2)
Alternate leg bound exercise using obstacles (A1)	A1B1	A1B2
Alternate leg bound exercise without hindrance (A2)	A2B1	A2B2

Information:

A1 : Alternate leg bound exercise using obstacles

A2 : Alternate leg bound exercise without obstacles

A1B1 : Alternate leg bound exercise using high resistance and agility

A2B1 : Alternate leg bound exercise without obstacles and high agility

A1B2 ; Alternate leg bound exercise using low resistance and agility

A2B2 : Alternate leg bound exercise without obstacles and low agility

Design/Design Validity

Design validity is controlling the implementation of research so that the research results are truly in accordance with what is expected and not caused by other factors outside the implementation of the research. Therefore, it is necessary to control other variables that can affect the results of the study. Efforts to control variables that can affect research results include internal validity and external validity. In relation to internal validity and external validity, Sevilla (1993: 63) states "internal validity shows that the difference in the test on the dependent variable is the result of manipulation of each independent variable that is different in each group, while external validity is a variable where the results can be generalized or

applied to groups and environments that are not treated experimentally. Furthermore, internal and external validity controls according to John Crewell (2008) include:

Internal Validity

Internal validity is control over external variables that can lead to other possible interpretations in the study. The variables controlled in this study are:

- a. The influence of history, which is related to the existence of additional activities from the subject at the time of experimental activities. The effect of history is controlled by ensuring that no other activity is the same as the treatment given during the exercise. In addition, set a clear, regular and scheduled exercise plan.
- b. The effect of growth, which is related to changes in the results of the treatment as a result of the passage of time and changes in the form of mental development and physical growth of the subject. To avoid this influence, the treatment is given in a relatively short time.
- c. The effect of losing the experimental subject. To avoid losing the subject in the exercise, it is done by tightening the attendance list and continuously monitoring the attendance of the subject.
- d. Effect of contamination between experimental groups. To avoid this influence, it was carried out by approaching and notifying each group so as not to take part in exercises outside the experimental implementation schedule during the study.

External Validity

External validity control in this study is intended to obtain representative experimental results to be generalized to the population. External validity is divided into 2 types, namely population validity including generalized population identification based on treatment results. Meanwhile, the ecological validity concerns the generalization of the treatment results to other environmental conditions. Control on external validity is carried out as follows:

Population validity

Population validity is controlling the population of research subjects which is expected to have the same effect as what was experienced by the research sample. Controlling the validity of the population is by placing the sample according to the characteristics that exist in the population, namely PKL Unima students and have equivalent skills.

Ecological validity

Ecological validity was controlled by: (1) the entire training program was arranged with a clear schedule, (2) the training schedule was carried out in the same situation in the treatment groups, (3) selecting instructors who would train with relatively similar abilities.

Research variable

This study consists of three variables, namely one independent variable, one attribute variable, and one dependent variable. The plyometric training method is an independent variable consisting of alternate leg bound exercises with obstacles and alternate leg bound exercises without obstacles. Agility is an attribute variable consisting of high agility and low agility, while the dependent variable is the result of running 100 meters.

Data collection technique

Data collection activities in this study were tested on the variables studied. Each variable studied has prepared instruments to obtain research data. Data collection in this study included testing agility, and the results of the 100 meter run. The measurements are as follows:

1. Agility Measurement

Agility data collection took place at Unima Stadium. Agility data will be measured before being given treatment for 24 meetings. The students did an agility test in the form of a back and forth running test. From the test results, the test takers will be given a score according to the ability of each individual to determine the high and low results of the individual's ability.

2. Running Results Measurement 100

The data from the 100 meter run was measured after the treatment was given for 24 meetings. The data obtained for the results of the 100 meter run is the travel time score achieved in the 100 meter run.

Data analysis technique

Data analysis techniques in this study will use statistical techniques in accordance with the experimental research design. The data that has been collected through the 100-meter run test, will be tested for analytical requirements, namely by testing the normality of the data with Kolmogorov-Smirnov, and testing the homogeneity of variance with the Levene test.

After the data analysis was declared normal and homogeneous, it was continued with parametric analysis with statistical analysis of variance (ANOVA) at a significance level of = 0.05. If the ANOVA test has a significant effect, then it is continued with the post hock test (Tukey's test) (Kerlinger, 2004) to see which group is the best.

DISCUSSION

In this chapter, the research results will be presented which include: (1) test of variance analysis requirements, (2) hypothesis test, (3) further test (post hock test), and discussion of research results.

Research result

Based on the research data collection, it will be presented regarding the recapitulation of research data concerning: (1) analysis requirements test, (2) hypothesis testing, (3) further test (post hock test).

Test Requirements Analysis of Variance

Data Normality Test

The normality test for the symptoms studied used the Kolmogorov-Smirnov test technique with the aim of seeing whether the data from each group was normally distributed or not and the test used SPSS version 25. A summary of the results of the normality test for each group can be seen in the table below.

One-Sample Kolmogorov-Smirnov Test

		KLP1	KLP2	KLP3	KLP4
N		10	10	10	10
Normal Parameters, b	mean	12.8620	12.8630	14.2520	15.0400
	Std. Deviation	.46878	.55598	1.18812	.79178
Most Extreme Differences	Absolute	.254	.219	.194	.238
	Positive	.254	.219	.194	.238
	negative	-.251	-.168	-.172	-.200
Test Statistics		.254	.219	.194	.238
asymp. Sig. (2-tailed)		.067c	.189c	.200c,d	.115c

Based on the table above, it shows that the results of data analysis from group 1 are 0.067, group 2 is 0.189, group 3 is 0.200 and 4 is 0.115. From the results of the normality test, it can be seen that all research groups have a probability value (P) greater than $= 0.05$ ($P > 0.05$), so it can be said that all research groups have data that are normally distributed. Thus, it can be concluded that all data groups from group 1 to group 4 in this study came from a normally distributed population, so that the data normality requirements were met for further testing purposes.

Test of Homogeneity of Variance

The homogeneity test of population variance will be carried out using SPSS version 25 with Levene's test (Levene Test) on the results of the data from the four research groups. Of the four groups of data must meet the assumption that the variance is homogeneous. The results of the homogeneity test can be seen in the table below.

Test Results of Homogeneity of Variance Data

Levene's Test of Equality of Error Variances^{a,b}

		Levene Statistics	df1	df2	Sig.
run100m	Based on Mean	.223	3	36	.880
	Based on Median	.178	3	36	.911
	Based on Median and with adjusted df	.178	3	29.018	.911
	Based on trimmed mean	.216	3	36	.885

The data from the test results show that the probability (P) = 0.885 is greater than the value of $= 0.05$ ($P > 0.05$), so it can be concluded that the data group being tested comes from a population with homogeneous variance.

Based on the results of the calculation of the requirements for the analysis of the normality test and the homogeneity test above, it can be concluded that the analytical requirements needed for the analysis of variance are met so that further analysis can be carried out with parametric statistics.

Hypothesis testing

The hypothesis testing proposed in this study can be seen in the results of the analysis of variance (ANOVA) in the table below:

Summary of Anava Results Tests of Between-Subjects Effects

Dependent Variable: Lari100m

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	41,632a	3	13,877	30,810	.000
Intercept	7304047	1	7304047	16216,540	.000
MetExercise	15,080	1	15,080	33,480	.000
Agility	15.252	1	15.252	33,863	.000
MetExercise * Agility	11,300	1	11,300	25,088	.000
Error	16,215	36	.450		
Total	7361,893	40			
Corrected Total	57.846	39			

There is a significant difference in the effect between the alternate leg bound exercise using obstacles and the alternate leg bound exercise without obstacles on the results of the 100 meter run.

Based on the results of the analysis of variance in table 4.3, it shows that there is a significant difference in effect between alternate le bound exercises using obstacles and alternate leg bound exercises without obstacles on the results of the 100 meter run with the calculated F count = 33, 480 > F table = 3.96 and the significance value of $p = 0.000$, at the significant level = 0.05. From these results, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, meaning that there is a significant difference in the effect between the alternate leg bound exercise using obstacles and the alternate leg bound exercise without obstacles on the results of the 100 meter run.

Furthermore, the Tukey test (attachment ..) shows that the alternate leg bound exercise group using obstacles (A1) groups 1 and 2 had significantly different results compared to the alternate leg bound exercise group without obstacles (A2), namely groups 3 and 4.

Except that group 1 has the same results as group 2. Thus it can be concluded that there is a significant difference in effect between the alternate leg bound exercise using obstacles and the alternate leg bound exercise without obstacles on the results of the 100 meter run.

There is a significant difference between high agility and low agility on the results of the 100 meter run.

Based on the results of the analysis of variance in table 4.3, the following results were obtained: the calculated F value = 33,863 > from the table F value = 3.96 and the significance value $P = 0.000$, at the significance level = 0.005. From these results, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, meaning that there is a difference between high agility and low agility on the 100 meter run. Furthermore, the results of the Tukey test (attachment..) show that from the high agility sample group, namely groups 1 and 3, the results of the 100 meter run were significantly different compared to the low agility sample group, namely groups 2 and 4. Except for group 1, the results were the same. with group 2.

There is an interaction between training methods and agility on the results of the 100 meter run

The results of the calculation of the interaction analysis in tabel 4.3 above show that there is an influence of the interaction factor between the plyometric training method and agility on the results of the 100 meter run in male students majoring in Sports Coaching Education with the obtained F count = 25,088 < F table = 3.96 and the significant value of $p = 0.000$ at the significant level of = 0.05. From these results, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, meaning that there is an interaction between the plyometric training method and agility on the results of the 100 meter run. Thus, it can be concluded that there is an interaction between the plyometric training method and agility on the results of the 100 meter run. Of the three alternative hypotheses tested, all the alternative hypotheses got significant results.

Discussion of Research Results

There is a significant difference in the effect between the alternate leg bound exercise using obstacles and the alternate leg bound exercise without obstacles on the results of the 100 meter run. Based on the results of data processing and analysis, it is known that alternate leg bound exercises using obstacles and alternate leg bound exercises without obstacles have a significant difference in the results of the 100 meter run. This can be seen in the results of the calculation of the analysis of variance where the calculated F value = 33.480 > F table = 3.96 and the significance value of $p = 0.000$, at the significant level = 0.05. Then from the Tukey

test, it can be seen that the results show that there is a difference in influence between the A1 sample group and the A2 group.

The two forms of training studied in this study, it appears that both require the strength of contraction of the muscles in this case the strength of the muscles of the legs when doing the training but the other training uses obstacles the other without obstacles and the movement of the legs alternately doing the movement the same one. With the difference in movement patterns, alternate leg bound exercises using obstacles require better muscle strength than alternate leg bound exercises without obstacles other than jumping apart from that when jumping over obstacles a greater force is required than without obstacles in addition to flexion than muscles. limbs. In addition, there is a difference in the average results of the alternate leg bound exercise data using obstacles and alternate leg bound exercises without obstacles to the 100 meter run results, so this shows that the alternate leg bound exercise using obstacles makes a significant contribution to the 100 meter run result compared to with alternate leg bound exercises without obstacles. Furthermore, the two forms of exercise have similarities in their implementation, namely using both legs alternately when moving forward so that there are similarities with running movements. These movement skills will be trained repeatedly, it will be patterned on the central nervous system as a sensory experience so that it becomes a complete series of running movements. so this shows that the alternate leg bound exercise using obstacles contributes significantly to the results of the 100 meter run compared to the alternate leg bound exercise without obstacles. Furthermore, the two forms of exercise have similarities in their implementation, namely using both legs alternately when moving forward so that there are similarities with running movements. These movement skills will be trained repeatedly, it will be patterned on the central nervous system as a sensory experience so that it becomes a complete series of running movements. so this shows that the alternate leg bound exercise using obstacles contributes significantly to the results of the 100 meter run compared to the alternate leg bound exercise without obstacles. Furthermore, the two forms of exercise have similarities in their implementation, namely using both legs alternately when moving forward so that there are similarities with running movements. These movement skills will be trained repeatedly, it will be patterned on the central nervous system as a sensory experience so that it becomes a complete series of running movements. Furthermore, the two forms of exercise have similarities in their implementation, namely using both legs alternately when moving forward so that there are similarities with running movements. These movement skills will be trained repeatedly, it will be patterned on the central nervous system as a sensory experience so that it becomes a complete series of running movements. Furthermore, the two forms of exercise have similarities in their implementation, namely using both legs alternately when moving forward so that there are similarities with running movements. These movement skills will be trained repeatedly, it will be patterned on the central nervous system as a sensory experience so that it becomes a complete series of running movements. Furthermore, the two forms of exercise have similarities in their implementation, namely using both legs alternately when moving forward so that there are similarities with running movements. These movement skills will be trained repeatedly, it will be patterned on the central nervous system as a sensory experience so that it becomes a complete series of running movements.

From the description of the training above, the alternate leg bound exercise using obstacles is better than the alternate leg bound without obstacles. There is a difference in the effect of high agility and low agility on the results of the 100 meter run in male students majoring in sports coaching education. Based on the results of the research data analysis, the following results were obtained: the calculated F value = 33,863 > from the F table value = 3.96 and the significance value P = 0.000, at the significance level = 0.005. Furthermore, from the Tukey test, it can be seen that there is a difference in the effect between the high agility sample group and the low agility sample group on the results of the 100 meter run. From the results of statistical calculations, it is shown that the calculated F value = 25,088 < F table = 3.96 and the significant value of p = 0.000 at the significance level = 0.05. Based on these results, it can be concluded that there is an interaction between plyometric training and agility on the

results of the 100 meter run. This suggests that plyometrics and agility training are directly related to the results of the 100-meter run.

Conclusion

From the results of data analysis and discussion in this study, it can be concluded as a result of the study as follows:

1. There is a significant difference in the effect of the plyometric training method between alternate leg bound exercises using obstacles and without obstacles on the results of the 100 meter run for students of sports coaching education at FIK UNIMA.
2. There is a significant difference in the effect of high speed and low speed on the results of the 100 meter run on sports coaching education students at FIK UNIMA.
3. There is an interaction between the plyometric training method and speed on the results of the 100 meter run for students of sports coaching education at FIK UNIMA.

Suggestion

Based on the research results and the conclusions of this study, the following suggestions can be made:

1. It is recommended to coaches or practitioners, that in the training process they can use the alternate leg bound exercise method that uses obstacles in order to improve the results of the 100 meter run, because it provides significantly more effective results compared to the alternate leg bound exercise without obstacles.
2. The results of this study found that speed has a significant effect on the results of the 100 meter run, it turns out that high agility has a better effect than low agility. In this regard, it is recommended to coaches and sports teachers, in order to improve the results of the 100-meter run, one must pay attention to the physical aspects or elements of speed in compiling an exercise program.
3. It is recommended to coaches or practitioners that they can apply variations in the exercise between the alternate leg bound exercise method that uses obstacles and the alternate leg bound exercise method without obstacles according to the characteristics of . Because the results of the study show that the alternate leg bound exercise method without obstacles also has a significant effect in improving the 100 meter running results.
4. From the purpose of this study, it was only limited to exploring the effect of two levels of training methods and two levels of agility. Therefore, as a follow-up, the same exercises can be carried out, but involve other characteristic elements such as weight, height, leg length and others.

It is recommended for follow-up studies longer than 8 weeks. With a time of more than 8 weeks it is likely to give a better effect by sticking to the principles of the exercise. In addition, it is also recommended to add variables and choose other attribute variables.

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