The Effect of Plyometric Training Methods and Speed on the Results of 100 Meter Run in Men Students of Sports Training Education Faculty of Sports Science Manado State University

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Annotation: The purpose of this study was to determine: (1) the differences in influence of training method plyometric Among alternate leg bound exercise with obstacle and practice alternate leg bound without obstacle to results 100 meters run, (2) The difference in influence between speed tall and low speed to results 100 meter run, (3) Interaction between plyometric training method and speed to the results run 100 meters .

The research design used a 2x2 factorial experiment. The population used is male students majoring in Sports Coaching Education totaling 1 05 people. A sample of 40 people was taken at random purposively. The instruments used to collect data are: (1) Test speed with test speed 30 meters run, (2) Test results run 100 meters with a travel time test, (3) The exercise program is a guideline that will be used in providing 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 between the alternate leg bound exercise and obstacle and practice alternate leg bound without obstacle to results run 100 meters where the calculated F value = 84.253 > F table = 3.96, at the significance level = 0.05 ; (2) There is a significant difference between speed tall and low speed to results run 100 meters where the calculated F value = 7.449 > F table = 3.96 , at the significance level = 0.05 ; (3) There is an interaction between the training methods plyometrics and speed to the results run 100 meters where the calculated F value = 8.052 < F table 3.96, at the significance level = 0.05.

Research conclusions: 1) There is a significant difference influence _ Among train an alternate leg bound with obstacle and practice alternate leg bound without obstacle to results run 100. 2) There is a significant difference in the effect between speed tall and low speed to results run 100 meters. 3) There is an interaction between training methods plyometrics and speed to the results run 100 meters.

Keywords: Method Execirse Plyometrics, Speed, Run 100 Meters.

INTRODUCTION

Sport is a very important thing for humans anytime and anywhere. Because sport is a necessity of life that must be met by every human being. In addition to improving physical fitness, exercise can also improve and improve the performance of the human brain so that it can work optimally. Having a good physical condition and good thinking power makes a person confident to do all activities.

In today's modern life, humans cannot be separated from sports activities as recreation, education, health and achievement. For everyone, exercise is not only aimed at improving physical health. There are so many people who do sports activities with the aim of reducing

stress due to daily routines and burdens, some are just hobbies and some are to develop their talents or abilities in terms of improving performance. One of the sports that is currently in great demand by all levels of society, especially for young people is athletics. This is because athletic sports can be done with simple equipment and bring pleasure to everyone who exercises.

Athletics is a sport in the form of dynamic and harmonious physical activity, which includes running, jumping, throwing and walking. Athletics is one of the elements of physical and health education, as an educational component that prioritizes physical activity as well as fostering a healthy life and developing achievement. Athletics is also the mother of all sports, because athletics is the first sport in the world and also contributes to basic movements for other sports.

In athletics championships there are several numbers that are contested such as running, jumping, throwing and walking. Especially in the running numbers that are competed, including the sprint (short distance), middle-distance running and long-distance running. Of the three numbers, the sprint (short distance) is the running number in a very prestigious and popular athletic competition. With the short distance, there were a lot of enthusiasm from young children who took part in this number, where runners had to run as fast as possible with maximum ability from start to finish at maximum speed.

In Indonesia, athletics, especially short distance running, is very well known by other countries with achievements that have been inscribed. Short distance running also has special attention from the government in terms of improving the achievements of athletes at the world level, this issupport with PLATNAS. It is proven by the existence of this National Training, Indonesia has succeeded in having several athletes who can compete at the world level, one of which is Lalu Muh Zhori who managed to become the fastest runner in the 2018 junior athletic world championship which took place in Tampere Finland and could record a time of 10.18 seconds. in the 100 meter run, where Zhori could beat runners from the United States who were in second and third place. where

Seeing the achievements of sports in Indonesia, especially short distance running, which is very global, the achievements of North Sulawesi, which used to be a province that produced short distance athletes such as Youtje Gosal, Cristian Nenepat and Fernando Lumain, are now one of the provinces whose achievements are very declining. This shows that the improvement in current achievements can be said to be no progress which causes North Sulawesi to be left behind from other provinces. Where in recent years North Sulawesi no longer has athletes who excel. All of this can be seen from the participation of North Sulawesi in various championships such as the National Championship and even the National Sports Week, which shows that North Sulawesi's achievements are declining.

Similar to North Sulawesi's declining performance, Manado State University is also one of the campuses participating in the National Student Sports Week Championships (POMNAS), which until now has not been able to produce achievements in short distance running.

Many factors influence why Manado State University students are unable to compete with other campuses in short distance running. The training method is one of the factors that occupies the most important position in terms of increasing achievement. Even though the student has high talent and potential, it is not supported by maximum training for optimal achievement. As for experts such as Bompa, Farentinos, Radcliffe and Chu suggest to improve short-distance running performance, one of them is using the plyometric training method. One of the references for trainers in developed countries is to use this training method. The advantages of the plyometric training method are in increasing power, reaction and muscle elasticity. In North Sulawesi, especially Manado State University, The plyometric training method has actually been known for a long time among trainers, but in fact until now

the application of this training method has not improved existing performance. Judging from the current coaching method, it shows that the application of the training method system and the use of technology in the training process is not optimal, which causes the lack of achievements achieved by athletes.

Based on the facts and realities in the field, the researchers tried to provide plyometric training, as well as how much influence it had on the results of the 100 meter run. There are so many plyometric training methods that are being developed and can be used, but in this study only focused on Alternate leg bound plyometric training using obstacles and without obstacles. The purpose of this exercise is to increase the explosive power of the leg muscles (lower limbs), especially the extensor muscles to carry out forward movements, which are similar to movements when running, using one leg as a support to push the body forward alternately. Bompa (1994) argues that these two forms of exercise can result in a rapid change in the body's center of gravity, which is around the base center of support, which is useful for maintaining balance and body stability, which are factors supporting running speed. The use of this form of exercise is based on the opinion of experts who say that in increasing strength it is necessary to add speed to increase the speed of limb movement (lower limbs).

In addition to the use of training methods that support the improvement of student achievement, the ability of physical conditions is also very important in improving achievement. Speed is the most important physical component in improving athlete performance. Harsono (2001) said that speed is a determining factor for many sports. Speed has a very important role for every student, especially in short distance running. Therefore, every coach must know the level of speed ability of each athlete and also be able to increase the speed of each athlete.

To get answers to the problems that have been described in the background above, the authors are interested in conducting research that examines the plyometric training method, speed and results of the 100-meter run with the title "the influence of plyometric training methods and speed on the results of the 100-meter run".

Starting from the background and identification of the problem, the problem is only limited to exploring the effect of the alternate leg bound plyometric training method using obstacles and without obstacles, and the effect of speed on the results of the 100 meter run. Thus, the independent variables manipulated in this study were the alternate leg bound plyometric exercise method with obstacles and the alternate leg bound plyometric exercise method without obstacles. The attribute variable is speed which consists of 2 categories, namely high and low, while the dependent variable is the result of running 100 meters.

Athletics is physical activity or physical exercise, containing natural/natural movements in accordance with what is carried out in our daily lives such as: running, walking, throwing and jumping (Yahya and Septian, 2020: 1). Athletics is a sport that is often contested every time there is a sporting event, because athletics is a sport that is often awaited by young children where their interest is very high to participate. Carr (1999: 2) says that the running section consists of the following numbers: (1) Sprints with numbers: 100m, 200m, 400m, (2) Middle distance running with numbers: 800m , 1500m, 3000 (3) Long distance running with the numbers: 5000m, 10,000m and marathon.

Of the several race numbers in athletics, the sprint or sprint is one of the most popular numbers for athletes, because with short distances, many are interested in participating in this short distance running. Short distance running or sprint is one of the numbers in athletics which is carried out with full strength and speed along the track line from start to finish where the winner is determined based on the shortest time record. To get a win, a short distance runner needs a fast reaction, good speed, efficient running and accuracy when starting, and trying to maintain speed from the start to reach the finish line (Widodo 2010).

Short distance running or sprint is a running race in which all runners at very full speed cover 100 meters, 200 meters and 400 meters (Mujahir 2007). Muhtar (2011: 12) in the book on basics of athletics also states that sprinting is a way to run where athletes must cover the entire distance with the maximum speed possible. This means that you have to run as quickly as possible by exerting all your strength from the start (start) until you pass the finish. From the above understanding, it can be concluded that short distance running is one of the running numbers in which every runner must have good reaction, strength and speed skills when running from the start line to the finish line by obtaining the shortest possible time. To get maximum running results cannot be separated from mastering good technique. Balesteros (1993) said that getting good results in short distance running including 100 meters is influenced by several factors such as: starting technique, running technique which includes; posture, leg movement, arm swing and the attitude of entering the finish. To become an outstanding short distance runner, you must master three basic techniques, namely: start technique, running technique, and finishing technique.

In modern times there are so many training methods that are used for coaches with the aim of improving athlete performance. In preparing good training conditions in learning movement skills, it is necessary to consider methods. The use of the right method will definitely be useful to anticipate the conditions and situations of students or athletes in a less favorable environment. Method is a systematic way used to achieve goals. Method is a method or tool used to achieve a goal (Winarno Surahkmad 1994:96). Atwi Suparman (1991:149) said that the method is a way or tool used to present the content of the lesson to students to achieve the goal. How to determine the right method in achieving a goal can also determine the results of achievement. The importance of using methods in learning or training makes teachers or trainers have to be smart in determining which method is suitable for the surrounding conditions.

Exercise is defined as an activity that is carried out for a long time, systematically and progressively according to the level of individual ability, aiming to form physiological and psychological functions that meet the requirements for the tasks of sports activities (Bompa 1994: 2). Furthermore, Nossek (1992:12) states that exercise is a process of perfecting sport which is regulated by scientific principles. In the IAAF (1993:61) it is stated that training is a systematic process with the aim of increasing the freshness of an athlete in a part of the competition. Exercise is a stimulus that is carried out systematically with the aim of improving movement skills or increasing achievement. One of the goals of training is to help athletes improve their skills and achievements as much as possible. Exercise is a very important factor in efforts to hone talent and improve the achievements of athletes. Therefore, intensive and programmed training is needed. Intensive training is an exercise that is carried out continuously by paying attention to the principles of correct training, while a well-programmed exercise is an exercise that has a clear direction and purpose, with the provision of material that is in accordance with the sport, sufficient time available, adequate time distribution. clear, as well as with training strategies that are in accordance with the material provided. From the above understanding, it can be concluded that the training method is a method that is carried out systematically and regularly over a long period of time to obtain a predetermined goal.

The term plyometrics is a combination of words derived from the Latin, namely plyo and metrics which have the meaning of a measurable increase. Radcliffe and Farentinos (1985:3-4) state that plyometric training is an exercise that has a special characteristic, namely very strong muscle contractions in response to dynamic loading or rapid stretching of the muscles involved. The sudden stretch before the muscle contracts again allows the muscle to reach maximum strength in a very short time. Donald Chu (1992:1) suggests that the training method Plyometrics is an exercise method that can produce strong muscle contractions with

explosive movements so that become the main key to success in all Track and field activities. Plyometrics is defined as exercises that allow muscles to continue the sensory input associated with vigorous muscle stretching to produce a stretch reflex. According to Nala (2001:64) the stretch reflex is a response to a certain level of muscle stretching and is one of the fastest reflexes in the human body with the spinal cord and muscles concerned. From the opinions above, it can be concluded that plyometric training is a form of exercise that is used to increase muscle explosive power and speed.

The component of physical condition is one of the basics in improving sports performance, therefore without a good physique it will not be easy to do a good technique. Nala (2001: 5-12 says the physical condition is one unified whole with all the elements related to improving and fostering sports achievements, while the elements of physical condition are: endurance, speed, strength, agility, flexibility, accuracy. , coordination, balance and reaction. In running 100 meters the most important physical condition element is speed. A runner will not get good results if he does not have the element of physical condition that supports speed. Speed is a person's ability to perform similar movements in sequence in the shortest possible time or the ability to cover a distance in a very fast time (Harsono 2018; 146). In almost all sports, the speed component is the most important physical component, both the speed of the legs, arms, and the speed of other body parts. Harsono (2001) also states that speed is a determining factor for achievement in various sports. Meanwhile, Bompa (1990) said that speed is one of the important biomotor abilities in sports activities. Judging from the motion system, speed is the basic ability of the mobility of the central nervous system and muscle apparatus to perform movements at a certain speed. From a mechanical point of view,

RESEARCH METHODS

Place and time of research

This research was carried out at the UNIMA stadium for Sports Coaching Education Students, FIK UNIMA and the duration of the implementation was 8 weeks on Monday, Wednesday and Friday.

Population

The population is the entire subject that will be used in the study (Suharsimi Arikunto, 1996: 102). The population in this study were all male students in the second and fourth semesters of Sports Coaching Education FIK UNIMA as many as 105 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, 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 a speed test, and the results are sorted from the highest score to the lowest score. To determine the groups that represent high speed and low speed, sampling

is used using a presentation technique of 27% for the upper limit and 27% for the lower limit of the population. Thus obtained a sample of students who have high speed as many as 20 people and samples are taken randomly, then divided into two groups of 10 each for alternate leg bound exercises using obstacles and 10 people for alternate leg bound exercises without obstacles. Students who have a low speed as many as 20 people and samples are 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 four groups, each group containing 10 samples.

Sample Group Distribution

Group	Subject Group and Type of Treatment	Number of Subjects
I	The high speed group trained with Alternate leg bound using obstacles	10 people
II	The high speed group trained with Alternate leg bound without obstacles	10 people
III	The low speed group trained with Alternate leg bound using obstacles	10 people
IV	The low speed group 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 exercise method, and speed.

Each independent variable consists of 2 levels, namely the training method variable consists of alternate leg bound plyometric exercises with obstacles and alternate leg bound plyometric exercises without obstacles, and the speed variable consists of high speed and low speed. The training method variable is a manipulated variable, while the speed variable is an 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 the table below.

Factorial Experimental Design

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

Information :

A1 :	Altenate leg bound exercise using obstacles
A2 :	Altenate leg bound workout without a hitch
B1 :	High speed
B2 :	Low Speed
A1B1 :	Altenate leg bound workout using obstacles and high speed
A2B1 :	Altenate leg bound workout without obstacles and high speed
A1B2 :	Altenate leg bound workout using obstacles and low speed
A2B2 :	Altenate leg bound workout without obstacles and low speed

Research Instruments

In accordance with the types of variables involved in this study, both independent and dependent variables are required instruments. The instruments used in this study include:

Speed

The instrument used in this study was a 30 meter running speed test according to Albertus et al (2015: 130). Speed was measured by a 30 meter run test using a stop watch with an accuracy of 0.1.

30 meter running speed norm (latest sports developments, Jakarta 2003)

No	Norm	Performance
1	Very well	3.58 - 3.91
2	Well	3.92 – 4.34
3	Currently	4.35 – 4.72
4	Not enough	4.73 – 5.11
5	Not much	5.12 – 5.50

1. Tools and equipment

   a. Stop watch

   b. 30 meters straight track

   c. Start flag

   d. Whistle

2. Officer

   a. The starter in charge of giving the signal is ready, ready and yes

   b. Timer in charge of taking time when passing the finish

3. Implementation

   a. Athletes are ready to stand behind the starting line

b. With a ready signal, the athlete is ready to run with a standing start

c. With a cue, the athlete runs as fast as possible by covering a distance of 30 meters to cross the finish line

d. Speed is calculated from the moment of cue yes.

e. Athletes are declared failed if they pass or cross another track.

100 meter run

The results of the 100 meter run were measured using an instrument for a 100 meter running speed using a stop watch with an accuracy of 0.1.

1. Tools and equipment

   a. Stop watch

   b. 30 meters straight track

   c. Start flag

   d. Whistle

2. Officer

   a. The starter in charge of giving the signal is ready, ready and yes

   b. Timer in charge of taking time when passing the finish

3. Implementation

   a. Athletes are ready to stand behind the starting line

   b. With a ready signal, the athlete is ready to run with a standing start

   c. The starter gives a ready signal then the runner takes a squat stance. After calming down, the starter gives the ready signal and the runner lifts his knee off the ground.

   d. At the signal of a yes or a gun shot, the runner runs as fast as he can and at the same time the stopwatch is turned on

   e. Runners must run until they cross the finish line and when the runner reaches the finish line, the stopwatch is turned off

   f. The timer records the travel time of each runner.

   g. Athletes are declared failed if they pass or cross another track.

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 the speed and results of the 100 meter run. The measurements are as follows:

1. Speed Measurement

The speed data measurement was carried out on April 8, 2022 at the UNIMA satdion. Before students do the speed test, they are given an explanation of the intent and purpose of measuring speed. The data obtained for speed is the score of travel time achieved in a 30-meter run.

2. 100 Meter Run Result Measurement

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

The data analysis technique 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 analysis requirements, namely by testing the normality of the data with the Kolmogorov-Smirnov test, 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 hoc test (Tukey's test) (Kerlinger, 2004) to see which group is the best.

DISCUSSION

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 hoc test).

1. Test Requirements Analysis of Variance

a. 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. below.

Research Data Normality Test Results

One-Sample Kolmogorov-Smirnov Test		KLP1	KLP2	KLP3	KLP4
N		10	10	10	10
Normal Parameters, b	mean	12.7630	12.7430	13.9340	14.9620
	Std. Deviation	.62700	.44472	.66714	.57273
Most Extreme Differences	Absolute	.190	.202	.237	.236
	Positive	.190	.159	.237	.215
	negative	-.145	-.202	-.203	-.236
Test Statistics		.190	.202	.237	.236
asymp. Sig. (2-tailed)		.200c,d	.200c,d	.116c	.120c

Based on the table above shows that the results of data analysis from group 1 is 0.200, group 2 is 0.200, group 3 is 0.116 and 4 is 0.120. 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.

b. Variance Homogeneity Test

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.

Result of Homogeneity of Variance of Data

Levene's Test of Equality of Error Variancesa,b		Levene Statistics	df1	df2	Sig.
run100m	Based on Mean	.687	3	36	.566
	Based on Median	.661	3	36	.582
	Based on Median and with adjusted df	.661	3	29,295	.583
	Based on trimmed mean	.643	3	36	.592

The test result data tIt can be seen that the probability (P) = 0.592 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.

2. Hypothesis testing

For testing the hypothesis that has been proposed in this study, it can be seen in the summary of the results of the analysis of variance in the table below:

Summary of Analysis of VarianceTests of Between-Subjects Effects

Dependent Variable: Lari100m					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	34,016a	3	11,339	33,251	.000
Intercept	7398,944	1	7398,944	21697,748	.000
MethodLat	28,730	1	28,730	84.253	.000
Speed	2,540	1	2,540	7,449	.010
MethodLat * Speed	2,746	1	2,746	8052	.007
Error	12,276	36	.341		
Total	7445.236	40			
Corrected Total	46,292	39			

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.

Based on the results of the analysis of variance in table 4.3, it shows that there is a significant difference in the effect between the A1 training method and the A2 training method on the results of the 100 meter run with the calculated F count = 84, 253 > F table = 3.96 and the significance value p = 0.000 , at the significant level = 0.05. From these results, the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted, meaning that there is a significant difference 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 from the alternate leg bound exercise group using obstacles (A1), groups 1 and 2 have significantly different 100 meter running 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.

2) There is a significant difference between high speed and low speed 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 = 7.449 > from the F table value = 3.96 and the significance value of P = 0.010, at the significance level = 0.005. From these results, the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted, meaning that there is a difference between high speed and low speed on the 100 meter run. Furthermore, the Tukey test (attachment..) shows that the high-speed sample groups, namely groups 1 and 3, have significantly different results from the 100-meter run compared to the low-speed sample groups, namely groups 2 and 4. group 2.

3) There is an interaction between training methods and speed on the results of a 100 meter run

The results of the interaction analysis calculations in table 4.3 above show that, there is an influence of interaction factors between the plyometric training method and speed on the results of the 100 meter run in male students majoring in Sports Coaching Education with the obtained F count = 8052 < F table = 3.96 and the value significant p = 0.007 at the significant level = 0.05. From these results, the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted, meaning that there is an interaction between the plyometric training method and the speed of the 100 meter run. Thus, it can be concluded that, there is an interaction between the plyometric training method and speed 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

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.

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 = 84, 253 > 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 training but the other training uses obstacles, the other without obstacles and alternating leg movements perform different movements. same. 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 in 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 in 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 in 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 in 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 in 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.

2. There is a difference in the effect of high speed and low speed 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: calculated F value = 7.449 > F table value = 3.96 and P significance value = 0.010, at significance level = 0.005. Furthermore, from the Tukey test, it can be seen that there is a difference in the effect between the high-speed sample group and the low-speed sample group on the results of the 100-meter run.

This difference is caused by starting from when undergoing all the exercises to achieving an optimal sporting achievement, in this case an increase in 100 meter running results can only be achieved if a person has high speed, in addition to having excellent skills and physical abilities.

Therefore, according to the description above, high speed is better than low speed to improve 100 meter running results.

3. There is an interaction between plyometric training and speed on the results of the 100 meter run in male students majoring in sports coaching education.

From the results of statistical calculations, it is shown that the calculated F value = 8.052 < F table = 3.96 and the significant value of p = 0.007 at the significance level = 0.05. Based on these results, it can be concluded that there is an interaction between plyometric training and speed on the results of the 100 meter run. This suggests that plyometric training and speed 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.

Implication

In accordance with what has been stated in the conclusion of this study that there is an interaction between plyometric training methods and speed on the results of the 100 meter run. With this interaction, it means that these two types of training methods have different effects on the results of the 100 meter run when associated with different speed levels. In addition, the results of the interaction give direction to an implication that in applying the plyometric training method, whether it is an alternate leg bound exercise that uses obstacles or an alternate leg bound exercise without obstacles to improve the results of the 100 meter run, it is necessary to consider in terms of the characteristics of the subject which includes speed. From the results of the research between the given training method and one of these characteristics, it has shown an increase in the results of the 100 meter run. Therefore, before applying the plyometric training method, it is necessary to identify the speed level of the subject first, so that the results of the identification will become a benchmark in determining the training method.

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 a 100 meter run, it turns out that high speed has a better effect than low speed. 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 the speed level. 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 is only limited to exploring the effect of two levels of training methods and two levels of speed. 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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