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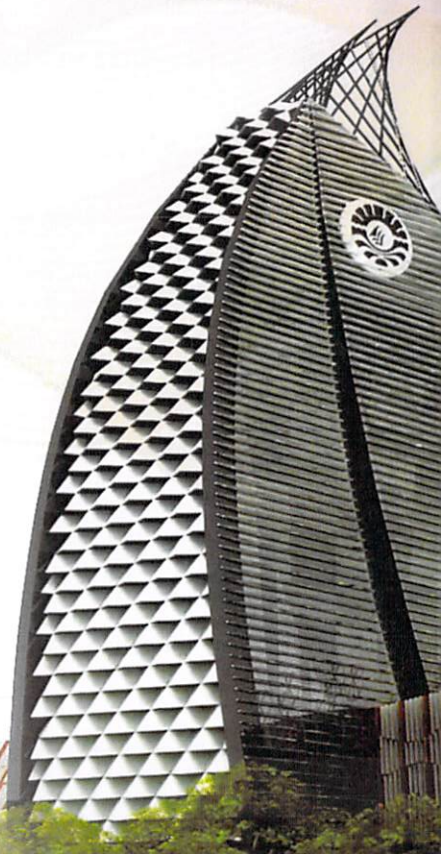

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The Effect of Body Fats Percentage on Cardiovascular Resistance for Futsal Athlete

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***Abstract*—This study aims to determine the effect of body fat percentage on cardiovascular endurance for futsal athletes. This study is an experimental design. The population in this study were Futsal athletes of Faculty of Sports Science, Universitas Negeri Makassar. There were ten Futsal athletes selected by purposive sampling technique. The data analysis technique used is descriptive statistics. Examining the reliability of the data, the researchers did a normality test before calculating the t-test. The results showed that the greater level of body fat the sample had, the lower the cardiovascular endurance of the sample and vice versa, the lower the body fat percentage the sample had, the higher the cardiovascular resistance of the sample. This can be proven from the results of descriptive analysis obtained (1) Fat percentage, obtained an average value of 19, standard deviation of 2.88, minimum value of 5.63, maximum value of 23.80, range 8.40 (2) cardiovascular endurance, obtained average value of 40, standard deviation of 5.63, minimum value of 33.60, maximum value of 51.60, range of 18.00. For testing the normality of the data obtained (1) the percentage of fat obtained asymp = 0.605 (p>0.005), then this shows that the fat percentage data follows a normal distribution or normally distributed (2) cardiovascular endurance Asymp = 0.995 (p>0.005), this shows that the cardiovascular endurance data follows a normal distribution or normal distribution. Then to test the hypothesis testing using the SPSS statistical program, the average value of t count (t) = 20.797 * 22.490 (p≤ 0.005), means that there is an effect on body fat percentage on cardiovascular endurance in futsal athletes from Faculty of Sports Science, Universitas Negeri Makassar's students.**

Keywords—effects, body fat, endurance, cardiovascular

I. INTRODUCTION

Sports means something related to exercise or can be said to be physical [1]. Sports physiology states that exercise is a series of organized and planned physical movements carried out by people consciously to improve their functional abilities by the purpose of doing sports [2]. Sport is a series of organized and planned sports performed by people consciously to achieve a specific purpose and purpose.

The percentage of body fat is the ratio of body fat to body composition [3]. Someone who has the same weight and height is not necessarily the same fat percentage because the amount of fat in our body also depends on daily activities and daily diet. If someone has a fat percentage or has excessive fat content dramatically affects the resistance of a person while doing the exercises, large fat deposits will not be efficient in the use of energy because it will require oxygen greater than energy from glucose and glycogen [4]. Body fat cannot be seen from the size or shape of a person, because not all thin people are free of fat. It could be that in a thin person's body there is a pile of fat they do not realize because they only see a small size of the body. Generally, fat is needed by the body, primarily as an energy reserve. However, too much presence in the body will undoubtedly endanger health.

Athletes or players who have the same techniques and tactics when competing, the most crucial thing to win or lose is the cardiovascular endurance that the athlete has. If in an event the athlete is going on his cardiovascular endurance is down or weakened, the techniques and tactics he has will not develop even will not be able to be shown at all. Some factors that influence the cardiovascular endurance of an athlete or player are physical activity and body fat percentage. Physical activity is a factor that influences cardiovascular endurance because when we do physical activity, the strength of the heart and lung muscles will be trained. Regarding body fat percentage, endurance sports athletes must not consume fat excessively because the result of consuming excessive fat will add to the exercise energy costs. It also provides less effective gradients to dissipate the heat generated during prolonged metabolism during intense training [5].

II. METHOD

This study aims to find out the scientific evidence that is done systematically to express and provide answers to the problems raised in a study. The direction and purpose of disclosing facts or truths are adjusted to those specified in the study to achieve the expected goals. Variables in this study are the object of research observations, often referred to as factors that play a role in research or symptoms to be studied. Variables are constructs or traits that will be studied that have varying values [6], [7]. Variables are symbols or symbols on which we place the distribution of values or numbers. Variables are everything in the form of what is determined by the researcher to be studied so that

information is obtained about it, then conclusions are drawn. Furthermore, the research variable is the object of research or what is a concern of a research point.

The population is a generalization area consisting of objects or subjects that have certain qualities and characteristics set by researchers to be studied and then conclusions are drawn. Population is the whole research subject. The sample is partially taken from the entire object under study and is considered to represent the entire population. Samples are partially, or representative of the population studied. The sampling technique used in this research is a Purposive sampling technique which is the selection of sample members based on specific goals and considerations of the researcher. Based on the description above, the sample in this study was ten futsal athletes. Data collection techniques in this study were the levels of body fat percentage before doing the exercise as well as data on cardiovascular endurance ability in futsal athletes of the student's faculty of Sports Science, Universitas Negeri Makassar, Makassar, Indonesia.

III. RESULTS

Descriptive data analysis is intended to get an overview of the research data. Descriptive analysis is carried out for recovery data by measuring the pulse so that it is easier to interpret the results of the data analysis. The description of the data is intended to be able to interpret and give meaning to the data in a row as in the following table.

TABLE I. SUMMARY OF RESULTS OF DATA ANALYSIS ON BODY FAT PERCENTAGE AND CARDIOVASCULAR ENDURANCE.

Descriptive Statistic								
	N	**Range**	**Min**	**Max**	**Sum**	**Mean**	**SD**	**Variance**
BFP	10	8.40	15.40	23.80	190	19	2.88	8.35
CE	10	18.00	33.60	51.60	400.90	40	5.63	31.78
Notes: BFP: Body Fat Percentage CE: Cardiovascular Endurance								

From Table 1 above, we can get an overview of fat and cardiovascular endurance as follows:

- Body fat percentage obtained an average value of 19, the standard deviation of 2.88, the minimum value of 15.40, the maximum value of 23.80, the range of 8.40.
- Cardiovascular endurance obtained an average value of 40, a standard deviation of 5.63, a minimum value of 33.60, a maximum value of 51.60, a range of 18.00.

The results of the analysis above are general data on body fat with cardiovascular endurance data in futsal athletes from UNM FIK students. The data above does not reflect the relationship or influence between variables in this study. The purpose of this study is to prove whether there is significant influence between the independent variables, namely the proportion of body fat (X) with the comparison variable namely cardiovascular endurance (Y), then further testing is needed by the normality test of the data.

A. Data Normality Test

One of the assumptions that must be fulfilled so that parametric statistics can be used is that the data follows the normal distribution when testing turns out the data is typically distributed, meaning that parametric statistical analysis has been fulfilled. To find out whether the test data on body fat percentage and cardiovascular endurance are normally distributed, then testing is done using the Kolmogorov Smirnov test. The results of the normality test data can be seen in table 2.

TABLE II. SUMMARY OF THE RESULTS OF NORMALITY TEST DATA HYPOTHESIS TEST SUMMARY

Null Hypothesis	Test	Sig	Decision
The distribution of fat percentage is normal with mean 19.00 and a standard deviation of 2.89	One-Sample Kolmogorov Smirnov Test	.605	Retain the null hypothesis
The distribution of cardiovascular endurance is normal with mean 40.00 and a standard deviation of 5.64	One-Sample Kolmogorov Smirnov Test	.995	Retain the null hypothesis

Asymptotic significances are displayed. The significance level is .05. Based on Table 2 above, it can be obtained an illustration that the normality testing of data is as follows:

- The fat percentage obtained by the Asymp value = 0.605 (P> 0.005), then this indicates that the fat percentage data follows a normal distribution or normal distribution.
- Cardiovascular endurance is obtained by the Asymp value = 0.995 (P> 0.005), so this indicates that cardiovascular endurance data follows a normal or normal distribution.

B. Hypothesis test

The hypothesis carried out in this study needs to be tested through empirical data obtained in the field through tests and measurements of the variables examined. Furthermore, the data were processed statistically. The hypothesis testing of this study is the T-test, that there is an effect of body fat percentage on cardiovascular endurance in futsal athletes of the student's faculty of Sports Science, Universitas Negeri Makassar. The statistical hypothesis that was tested: H0: $\mu A1 - \mu A2 = 0$ H1: $\mu A1 - \mu A2 \neq 0$. Finding out the effect, the SPSS statistical program was used. A summary of the results of data analysis can be seen in Table 3 below.

TABLE III. SUMMARY OF DATA ANALYSIS RESULTS

Variable	N	T	df	Sig
A1 – A2	10	20.797*22.490	9	0.000

From the results of the table 3 analysis, the above shows that the results of data analysis, obtained an average value of t count (T) = 20.797 * 22.490 ($P \leq 0.005$), meaning that there is an effect on body fat percentage on cardiovascular endurance in futsal athletes at UNM FIK students. The results of the exercise influence between the initial test and the final test and the effect of the final test exercise with the initial test on the dependent variable. To test the hypothesis, it needs to be examined further by giving an interpretation of the relationship between the results of the analysis achieved with the theories that underlie this research. There is an

effect of body fat percentage on cardiovascular endurance in futsal athletes from UNM FIK students.

The results obtained when associated with the frame of mind and the underlying theories. Basically, the results of this study support the existing theory. The percentage of body fat is the ratio of body fat to body composition [3]. In simple terms, body composition is divided into 2, namely, fat mass (fat mass) and fat-free (non-fat body mass). Regarding body fat percentage, endurance sports athletes must not consume fat excessively because the result of excessive fat consumption will increase the energy cost of exercise. This also provides a less active gradient for dissipating the heat produced during prolonged metabolism during intense exercise [5].

Cardiovascular endurance is the ability of the heart, lung and blood vessels to function optimally in a state of rest and work in taking oxygen and channeling it to active tissue so that it can be used in the body's metabolic processes [8]. Therefore cardiovascular endurance is considered the most basic component of physical fitness[9]. One of the most influential elements in futsal is cardiovascular endurance because athletes who have poor cardiovascular endurance will find it difficult to develop their best abilities. If in an event the athlete is going on his cardiovascular endurance is down or weakened, the techniques and tactics he has will not develop even will not be able to be shown at all. Factors that affect cardiovascular endurance are body fat percentage. Athletes may not consume fat excessively because it will increase the energy cost of the exercise.

In this study the measurement of body fat percentage using the Body Fat Monitor tool, the selection of the tools used in this study considering that the device has accurate, fast, and practical results. In the use of this tool, personal data is needed for each sample, namely height, weight, and age of each athlete. So, before the measurement of body fat percentage, the body height and body weight of each athlete is measured first. After the measurement of body fat percentage, the body fat percentage of athletes who have excessive fat content or in this case can be said to have a fat body and athletes who have a lower percentage of body fat or can be said to have normal or ideal fat levels. Then the two measurement results are grouped into 2.

Then for the next stage in measuring cardiovascular endurance or the ability of VO2max for each sample using a multi-stage running method (Bleep Test) [10]. The results of this study showed that athletes who had excessive or fat body fat tend to have bad VO2max values compared to athletes who have a normal or ideal percentage of body fat that has good VO2max value or ability [11]. The factors that influence cardiovascular endurance are body fat percentages; athletes may not consume fat excessively because it will increase the energy costs of training, especially for endurance sports. Based on the results of the research, it is shown that the lower the body fat percentage possessed by the athlete, the stronger the cardiovascular endurance it has.

IV. CONCLUSION

Factors that affect cardiovascular endurance are body fat percentage. Athletes may not consume fat excessively because it will increase the energy cost of the exercise. Based on the results of data analysis and discussion, conclusions can be made as a result of this study, as follows: There is an effect of body fat percentage on cardiovascular endurance in futsal athletes of UNM FIK students.

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