# Relationship of Nutritional Status Toward Cardiovascular Resistance of Badminton Players

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**Abstract.** The purpose of this study was to determine the level of nutritional status and cardiovascular endurance of badminton players at SMA Negeri 3 Takalar and to determine whether there was a relationship between nutritional status and cardiovascular endurance of badminton players in SMA Negeri 3 Takalar. This type of research is descriptive and correlational research. The population in this study were badminton players at SMA Negeri 3 Takalar who had the same age level, namely 16-19 years with a sample size of 20 players and the sampling was using total sampling or sampling techniques where the sample size was the same as the population. The research data were analyzed statistically using the SPSS application with a significance of 95% (0.05). Based on the results of descriptive analysis, the mean value of nutritional status and cardiovascular endurance of badminton players in SMA Negeri 3 Takalar was 19.74 and 76.75. The data normality test shows that the nutritional status data is obtained p (0.147)> 0.05, while the cardiovascular endurance data is obtained p (0.113)> 0.05, the results can be concluded that the research data is normally distributed. From the research results show: (1) The nutritional status of SMA Negeri 3 Takalar badminton players is dominant in the normal category (2). The level of cardiovascular endurance of the badminton players at SMA Negeri 3 Takalar is dominant in the normal category (3). There is a significant relationship between nutritional status and cardiovascular endurance of badminton players at SMA Negeri 3 Takalar.

**Keywords**: Status, Nutrition, Endurance, Cardiovascular, badminton players at SMA Negeri 3 Takalar.

## INTRODUCTION

At SMA Negeri 3 Takalar, there are various problems experienced by extra-curricular members, such as the lack of attention from members to consume nutritious food and in the training process which shows that some members feel tired easily which of course can have a bad impact on the team's performance during matches. Providing proper nutrition to adolescent athletes will have an impact on the athlete's appearance during training and competition. Nutrition will greatly help athletes improve performance through the energy produced, delay fatigue (fatigue), increase strength and focus and accelerate the recovery process. Zahra (2020: 91)

Nutritional status according to Mardalena, (2017: 147), that the state of the human body is a result of food consumption and use of nutrients. The categories of nutritional status are divided into three, namely over nutrition, good nutrition and less

nutrition. Nutritional intake is needed to provide energy when an athlete performs various physical activities, the availability of nutrients in the body will also affect the endurance ability of the heart and lungs, Pertiwi (2012: 204)

In carrying out daily activities, the body needs sufficient energy to carry out activities, be it light activities such as relaxing at home and especially in strenuous activities such as work or exercise. Energy is obtained from nutritional intakes or food which is of course nutritionally balanced. Balanced nutrition is needed for the body, especially in the food that is eaten every day. Foods that contain many nutrients can produce energy for the body, such as those classified into six groups, namely carbohydrates, fats, proteins, vitamins, minerals and water.

A person's aerobic endurance varies so that something can be increased significantly and not significantly. The influencing factors are influenced by several factors, namely (1) internal factors: genetics, age, gender and others, and (2) external factors: diet, smoking, lack of rest. Satria (2018: 46). The need for oxygen by working muscles. To be able to supply a strong demand for oxygen, properly functioning lungs, including capillaries and blood vessels are needed. An athlete who is used to exercising, oxygen consumption will increase 20 times when doing maximum intensity training Ghalda et al (2019: 176). The level of cardiovascular endurance in sports is very necessary because it can affect the quality of a player.

Cardiovascular endurance is the ability of the lungs, heart and blood vessels to deliver a certain amount of oxygen and nutrients to cells to meet the needs of physical activity that lasts a long time. Cardiovascular endurance is the ability of a person's organism to fight fatigue that occurs when carrying out activities for a long time. Good endurance possessed by a player will affect the development of the player's skills. There are still many players who have a poor fitness level, possibly because of the lack of understanding and awareness of the players about the importance of physical fitness to the quality of playing to achieve achievement. Endurance is the body's ability and ability to carry out sports activities for a long time without experiencing significant fatigue. The players are required to have a good level of endurance Indrayana (2019: 41). VO2Max is the maximum oxygen uptake in milliliters, which can be utilized in one minute per kilogram of body weight Warsono (2017: 1002). Endurance is influenced by food intake, age, sex, nutritional status, body composition, genetics, physical activity, and Saharan exercise (2019: 30).

The energy needed to carry out badminton sports activities is mostly found in foods which of course contain balanced nutrition. Balanced nutrition is needed for the body, especially in the food that is eaten every day. Everyone needs different amounts of food (nutrients), depending on age, weight, gender, physical activity, environmental conditions and certain conditions. Good nutritious food, of course, is very necessary for doing training activities and during matches. With a good nutritional status, it is necessary to maintain the degree of fitness and health, as well as support the

development of sports achievements (2019: 2). Nutrition is anything that is consumed by humans that contains nutritional elements, namely carbohydrates, vitamins, minerals, fat, protein and water (Mitayani, 2010).

Endurance in terms of fitness in the world of sports is known as the ability of the athlete's body organs to fight fatigue during activity or work. Resistance training is influenced by and has an impact on the quality of the respiratory and circulatory system. Therefore, the factor that affects resistance is the maximum ability to meet oxygen consumption Saleh (2014: 11). Cardiovascular fitness is very important to support muscle work by taking in oxygen and distributing it to all active muscle tissue, so that it can be used for metabolic processes. Therefore, cardiovascular fitness is considered to be the most essential component of physical fitness. The goal of improving cardiovascular fitness for each individual varies, depending on one's needs and condition. Larasati argues (2020: 41) The intake of high-fat foods is associated with low glycogen levels which will cause decreased cardiorespiratory resistance. Fat is not widely used because lactic acid that occurs from anaerobic glycolysis inhibits the excretion of fatty acids from triglyceride deposits in the fat tissue. This causes the levels of fatty acids in the blood to be insufficient to stimulate the b reakdown of fatty acids in the muscles which results in fatigue.

## METHODS

The research method is a structured or systematic way used by researchers with the aim of getting the right answers to the questions on the object of research. The design of this study is to use quantitative research, while the approach used is a correlational approach. This type of approach aims to see whether the two variables have a relationship or correlation or not. Departing from a theory, the ideas of experts, or the understanding of researchers based on their experiences, then developed into problems that are proposed to obtain justification (verification) in the form of support for empirical data in the field.

Population is a generalization area consisting of: objects / subjects that have certain qualities and characteristics that are determined by the researcher to study and draw conclusions (Sugiyono, 2013: 61). In this study, the population used as the research object is the badminton players of SMA Negeri 3 Takalar. which numbered 41 people. The sample is part of the number of characteristics possessed by the population. The sampling technique used in this study was total sampling. Total sampling is a sampling technique where the number of samples is the same as the population (Sugiyono, 2013: 68).

Operational Definition Variable is a variable which is an explanation of each variable used in research on the indicators that make it up. There are 2 variables in this study, namely, the independent variable (nutritional status) and the dependent variable (cardiovascular endurance).

The operational definition of the research variables is as follows:

1. Independent variable (x), the nutritional status referred to in this study is the energy balance between intake and output, complete with body mass index.

2. The dependent variable (y), cardiovascular endurance referred to in this study is the heart ability of badminton players at SMA Negeri 3 Takalar to do activities tirelessly by doing this Harvard step test for 5 minutes.

## RESULTS AND DISCUSSION

### *Descriptive Analysis of Nutritional Status of Badminton Players at SMAN 3 Takalar (X)*

Descriptive analysis of the nutritional status of badminton players at SMAN 3 takalar is intended to get an overview of the research data as in the following table:

Table 1.
Descriptive analysis of nutritional status of badminton players at SMAN 3 Takalar

| Analisis Deskriptif Statistik | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Variabel** | **N** | **Rata-rata** | **SD** | **variansi** | **rentang** | **Min** | **Max** | **Sum** |
| Umur | 20 | 16.65 | 0.48 | 0.239 | 1.00 | 16.00 | 17.00 | 333.00 |
| Tinggi badan | 20 | 161.40 | 4.98 | 24.884 | 20.00 | 150.00 | 170.00 | 3228.00 |
| Berat Badan | 20 | 51.45 | 11.20 | 125.524 | 45.00 | 40.00 | 85.00 | 1029.00 |
| Status Gizi (IMT) | 20 | 19.74 | 3.38 | 11.484 | 13.40 | 16.00 | 29.40 | 394.90 |

From table 1. above can be obtained an overview of the results of the analysis descriptive statistics for the overall nutritional status variable obtained the maximum value = 29.40; minimum value = 16.00; average (mean) = 19.74; standard deviation = 3.38. The description of the results of nutritional status for badminton players at SMA Negeri 3 Takalar can be seen in the table below:

Table 2. Frequency distribution of nutritional status of badminton players at SMAN 3 Takalar

| Interval | Category | Frekuensi | % |
|---|---|---|---|
| < 17,0 | Very thin | 4 | 20 |
| 17,0 – 18,5 | Thin | 5 | 25 |
| >18,5 – 25,0 | Normal | 10 | 50 |
| >25,0 – 27,0 | Fat | 1 | 5 |
| >27,0 | Very fat | 0 | 0 |
| **TOTAL** | | 20 | 100 |

### Cardiovascular endurance for badminton players at SMAN 3 Takalar

Descriptive analysis of Cardiovascular Endurance of badminton players at SMAN 3 takalar is intended to get an overview of research data as in the following table:

Table 3. Descriptive analysis of Cardiovascular Endurance of Badminton Players

| **Analisis Deskriptif Statistik** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Variabel** | **N** | **Rata-rata** | **SD** | **variansi** | **rentang** | **Min** | **Max** | **Sum** |
| Jumlah Waktu (detik) | 20 | 242 | 51.60 | 2663.082 | 168.00 | 132.00 | 300.00 | 4857.00 |
| 2x (Jumlah DN1,DN2,DN3) | 20 | 316 | 35.26 | 1243.621 | 128.00 | 232.00 | 360.00 | 6328.00 |
| (Hasil) Daya tahan Kardiovaskular | 20 | 76.75 | 17.31 | 299.776 | 60.00 | 49.00 | 109.00 | 1536.00 |

From the table above can be obtained an overview of the results of descriptive statistical analysis for the variable Cardiovascular Endurance obtained a maximum value = 109.00; minimum value = 49.00; average (mean) = 76.75; standard deviation = 17.31. The description of the results of Cardiovascular Endurance in SMA Negeri 3 Takalar badminton players can be seen in the table below:

Table 4. Frequency distribution of nutritional status of badminton players

| Interval Nilai | Kriteria | Skor | Frekuensi | % |
|---|---|---|---|---|
| <50 | Very less | 1 | 0 | 0 |
| 50-64 | Less | 2 | 3 | 15 |
| 65-79 | Moderate | 3 | 7 | 35 |
| 80-89 | Well | 4 | 5 | 25 |
| 90> | Very good | 5 | 5 | 25 |
| TOTAL | | | 20 | 100% |

The data analysis test in this study was used to test the research hypothesis and test for normality. The results of the normality test and hypothesis testing are presented below:

**Research Data Normality Test**

To continue the next test, either the parametric test or the non-parametric test, the normality test of the research data must be carried out. To find out whether all variables are normally distributed or not, if p> 0.05 (5%) the distribution is declared normal, and if p <0.05 (5%) the distribution is said to be abnormal then the test is done using the Kolmogorov Smirnov Z test ( KS-Z). The results of the data normality test can be seen in table 5. as follows :

Table 5. Summary of the results of the research data normality test

| Variabel | Absolut | Positif | Negatif | KS-Z | P | Sig. 5% | Ket |
|---|---|---|---|---|---|---|---|
| Status Gizi | 0.147 | 0.147 | -135 | 0,147 | 0,200 | 0,05 | Normal |
| Daya Tahan kardiovaskular | 0.113 | 0.113 | -120 | 0,113 | 0,200 | 0,05 | Normal |

From the results in the table above, it is known that the nutritional status data is obtained p (0.147)> 0.05, while the cardiovascular endurance data is obtained p (0.113)> 0.05. The results can be concluded that the research data is normally distributed.

**Linearity Test**

The aim of the linearity test is to determine the relationship between the independent variable and the dependent variable is linear or not. The criterion for

linearity testing is if the value of Fcount <F table, then the relationship between the independent variable and the dependent variable is linear. Conversely, if the value of Fcount> Ftable is declared non-linear. The summary results of the linearity test are presented in the following table:

Table 6. The results of the research data linearity test

| Hubungan | Df | Fhitung | Ftabel | *P* | Sig 5% | Keterangan |
|---|---|---|---|---|---|---|
| X dengan Y | 1 :18 | 5.643 | 2.376 | 0,012 | 0,05 | Linear |

The results of the linearity test for the variables (X) and (Y) table above, it can be seen that the value of Fcount <F table (2.376) with a significance value of P> 0.05, which means that the relationship between variables (X) and (Y) is linear.

### Correlation Testing

Analysis of research data used to test the self-hypothesis of simple regression analysis. The results of the simple regression analysis are as follows:

| Variabel | Rhitung | R. square | *P* | Ket |
|---|---|---|---|---|
| Status Gizi ($X_1$)<br><br>Daya Tahan (Y) | 0.489 | 0,239 | 0.012 | Signifikan |

To clarify the effect of independent variables on the dependent variable, a simple regression analysis was carried out on the relationship of nutritional status to endurance Based on the results of the above analysis, the variable coefficient of the relationship between nutritional status and endurance has a positive value. The test for the significance of the coefficient was carried out by means of nutrition on cardiovascular endurance in badminton players at SMA Negeri 3 Takalar by consulting the price of r count = 0.489 with r (0.05) (17) = 0.239. This result means that the value of r count> r table thus Ha is accepted, or it can be said that "there is a relationship between nutritional status and cardiovascular endurance in badminton players at SMA Negeri 3 Takalar"

Based on the results of the above analysis, the variable coefficient of the relationship between nutritional status and endurance has a positive value. The test for the meaning of the coefficients was carried out by means of nutrition on cardiovascular endurance in badminton players at SMA Negeri 3 Takalar by consulting the value of r count = 0.489 with r (0.05) (17) = 0.239. This result means that the value of r count> r table is accepted, or it can be said that "there is a relationship between nutritional status and cardiovascular endurance in badminton players at SMA Negeri 3 Takalar".

In general, a badminton player needs about 4,500 kilo calories of energy per day or 1.5 times the energy needs of a normal adult with relatively the same body posture,

this is because badminton players can be categorized as someone who does strenuous physical activity. (Bryantara, 2016).

For this reason, the body must have sufficient energy reserves so that it can be mobilized to produce energy. Energy reserves in the form of glycogen will be stored in the muscles and liver, if the glycogen reserves in the athlete's body are small, the athlete will tire easily due to exhaustion. Factors that affect individual physical fitness include age, gender, genetics, Body Mass Index (BMI) status, and physical activity, but for the physical fitness level of an athlete the most influential are age and Body Mass Index (BMI) status. MOH RI, 2005). This is in accordance with the opinion of Wiarto (2015: 63) saying that "someone who has excess fat in his body will consume less oxygen than someone who has an athletic body and is not much fat. According to Kristanti quoted by Budiarto (2012), he said that every increase in BMI of 1 kg / m2 is followed by

Decrease in VO2max by 1.30 ml / kgBW / minute. Athletes who have a (normal) BMI will certainly have a good VO2max level to support performance during training and competing. Improper nutrition can contribute to the negative effect of strenuous activity on immunocompetence, but excessive intake can also impair immune function. Damage to the immune system has also been linked to excess fat intake.

Based on the results of this study, it is known that most of the nutritional status of badminton players at SMA Negeri 3 Takalar is mostly normal. Thus, this becomes an important asset for schools to improve their ability to play with the support of normal nutritional status. Athletes, especially badminton players, are required to have a good nutritional status, because nutritional factors (69.8%) were found to have the greatest impact on an athlete's performance and 72.5% coupled with the training of Penggalih et al, (2017). Nutritional status is a description of the adequacy of nutrients in the body. With athletes having sufficient carbohydrates, protein and fat, the athlete will get enough energy to train and compete in badminton. Therefore nutritional status has a positive and significant relationship with physical activity, which means that the better the nutritional status of athletes will have a good effect on physical activity. This was stated by Larasati (2020: 37) that nutritional status reflects food intake. Adequate food intake will produce optimal nutritional status.

The combination of balanced nutritional intake and normal nutritional status will support optimal cardiorespiratory resistance. Optimal nutritional status can guarantee increased physical and intellectual abilities as well as work productivity. Regulating the balance of nutrients between intake and body needs is very important because deficiency or excess of nutrients affects health conditions and nutritional status. With this normal nutritional status, athletes will obtain optimum health and physical abilities that allow them to endure hard physical training and be able to maintain good performance during the Siregar competition (2019: 54).

**CONCLUSION**

Based on data analysis and discussion, the following results were obtained: There is a significant relationship between nutritional status and cardiovascular endurance of Badminton players in SMA Negeri 3 Takalar.

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