

**The Contents of Sagu: Increasing Pencak Silat Athletes' Endurance****Nadia Hasti Gandhi^{1✉}, A. Heri Riswanto², Rasyidah Jalil³**Physical Education, Faculty of Teacher Training and Education, University of Muhammadiyah Palopo, Jl. Jenderal Sudirman, Palopo City, Indonesia¹²³**Article History**

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Abstract

Pencak silat is a traditional sport that is identical to a match number using full body contact physical activity. while endurance (VO₂max) serves to maintain physical condition during the match so that the body does not experience excessive fatigue. To support the gaining of good endurance, it is necessary to consume many sources of energy. This study aims to determine the effect of the nutritional content of sagu in increasing the endurance of pencak silat athletes. The nutritional content of 100 gram serving of sagu consists of 357 calories, 1.4 grams of protein, 0.2 grams of fat, 85.9 mg of carbohydrates. The sample in this study is 10 pencak silat athletes from Palopo City, which were carried out at the training location at the Palopo Madrasah Tsanawiyah Multipurpose Building and Muhammadiyah Palopo University Sports Field. The method used in data collection is an experiment using a one-group pre-test and posttest design and the test instrument used is the Multistage-fitness test (MFT) running 20 M back and forth. The result of this study is that the nutritional content of sagu is able to increase the endurance of pencak silat athletes without giving any side effects.

How to Cite

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INTRODUCTION

Physical education aims to improve human performance through selected and intact physical activity media. To achieve the desired results, the improvement of skills and knowledge that can be maintained when combined with knowledge of physical activity and contribute to the educational mission of the school to provide a balanced approach in educating children holistically (Mustafa & Dwiyogo), and designed to improve physical fitness, develop motor skills, knowledge, healthy living behavior, sportsmanship, and emotional intelligence. The learning environment is carefully arranged to promote the growth and development of all physical, psychomotor, cognitive, and affective domains of each student (Mashud, 2019). Physical education fosters the quality of physical fitness with a dynamic health state that can handle the physical demands to carry out daily activities even with additional physical activity without feeling tired (Panggraita, Tresnowati, and Putri 2020) as well as the level of physical fitness that is closely correlated with each age group (Rasyidah Jalil et al., 2022).

One of the traditional sports which is passed down from the ancestors of the Indonesian is pencak silat which has elements of art and moves that can increase endurance and physical fitness as well as aspects related to conditions that require a fighter to defend himself when in a threatened or dangerous condition (Syaifullah and Doewes 2020). Pencak silat is an activity that combines both elements of art and moves. There is a component of pencak silat that can be clearly achieved, especially the component of physical ability because every series of movements is an aerobic movement that can train and improve cardiovascular function (VO₂Max), as experts believe that dynamic physical activity or aerobic movement can increase the level of physical activity, a person's maximum aerobic metabolism (Dahlan & Patawari).

Endurance is one of several elements that exist in physical fitness. For an athlete, endurance is an important component that requires muscle capacity to withstand or overcome fatigue for a long time and the higher the endurance, the higher the physical ability and productivity (Mashud, 2019). Endurance is also the most important element of physical condition because it is the basis of other elements of physical condition (Ihsan, Sepriadi, and Suwirman 2018).

Endurance can be measured by the level of VO₂max achieved. Adequate energy and nutritional intake also affects an athlete's

performance (Natural & Murbawani). Carbohydrates are the main source of energy to meet nutritional needs and are needed to form liver and muscle glycogen (Herita Warni et al.). Maximum oxygen uptake (VO₂max) that may be affected by body composition as well as body fat percentage is a commonly used to measure the body composition. A person's physical fitness will benefit by maintaining body fat levels within the normal range, especially the cardiorespiratory endurance, which is the most important aspect of physical fitness (Kurnia, Kasmiyetti, and Dwiyanti 2020).

An important element in creating a better civilization is human resources. Quality human resources help build a better civilization, both physically and spiritually. It would be nice to start with healthy food and also meet the body's intake needs in an effort to improve the quality of human resources. *Mens Sana In Coprore Sano*, which means "In a healthy body there is a strong soul" is a short statement of a Roman poet. Another aspect of Maqashid Ash-Sharia (reason for creating laws) called *hifdz an-nafs* is maintaining physical well-being (maintaining the body). Maqashid Ash-Syariah seeks to understand the good while avoiding evil (Cell et al. 2021).

Indonesia, which is an agricultural country, has a large forest area which is one of the centers of biodiversity and food sources. Sagu (Metroxylon) is one of the traditional food products of indigenous peoples' culture that is passed down from previous generations (Ihsan, Sepriadi, and Suwirman 2018) and as a useful food source (Kadir et al.). This palm group plant contains high starch and has long been the staple food of the Papuan so that all parts of this plant are used for human needs (Suebu, Tanjung, and Suharno 2020).

North Luwu Regency in South Sulawesi has the largest sagu cultivation. Therefore, sagu can be grown as a food crop in the coastal area of North Luwu. Sagu plants thrive in the coastal area of northern Luwu due to good soil conditions caused by the high wet sagu starch production in the area, which exceeds 250 kg/tree (Kamma, Rampisela, and Rashid 2021). Sagu trees with low stems, midribs and the ends of the stems are removed from the trunk until only the sagu stems are left or can be called logs. To make shipping easier, the logs are broken into several pieces, one log has a diameter of 45 cm, a bark thickness of 3.1 cm, and a weight of about 120 kg. Sagu trees have a height range of 20 to 30 meters. From one sagu tree, 150-300 kg of starch can be produced, which has a high carbohydrate content but low protein (Ernawati, Heliawaty, and Diansari 2018). The test results of the nutritional content of sagu

per 100 grams consist of 357 calories, 1.4 grams of protein, 0.2 grams of fat, 85.9 mg of carbohydrates.(Ansori 2022)

Sagu contains more carbohydrates than some other carbohydrate sources. Sagu contains more calories per serving than some other forms of carbohydrates, such as potatoes, rice, cassava, and sweet potatoes (gembili and sweet potatoes). This shows that rice, which has historically been the main source of carbohydrates in Indonesia, can be activated by sagu. In terms of calcium value and iron concentration, rice performs better than other mineral sources.(Dewayani et al. 2022).

METHODS

Experimental research is research conducted to ascertain the causal relationship between variables. The treatment given to the subject or object of research is one of the main aspects of experimental research(Alvin Kurnain, 2020). The approach used in this study is a quantitative ap-

proach. This research is a quantitative research where this research will answer research problems with statistical evidence(Pink Ektyara 2022).

This study uses a One Group Pretest-Posttest design with a sample of 10 athletes using saturated sampling. The test instrument for this research used the Multistage-Fitness Test (MFT Test) or the Bleep Test. This research was conducted at the training location at the Palopo Madrasah Tsanawiyah Multipurpose Building and the Muhammadiyah Palopo University Multipurpose Field.

As for the data collection technique using the spss v26 program, the details of the analysis are as follows: (1) descriptive test, to view and search for data in research based on the mean, maximum value, and others. (2) normality test, to test the data that has been obtained is normally or not normally distributed. (3) difference and effect test, paired sample t-test to look for differences or influences from before and after treatment. (4) data percentage, to compare how big the percentage of pretest and posttest on the variables used.

Figure 1. Research Stages



Table 1. VO2max level classification norms (bleep test)

Female (units in ml/kg/min)						
age	13-19	20-29	30-39	40-49	50-59	60+
Very Poor	<25.0	<23.6	<22.8	<21.0	<20.2	<17.5
Poor	25.0-30.9	23.6-28.9	22.8-26.9	21.0-24.4	20.2-22.7	17.5-20.1
Fair	31.0-34.9	29.0-32.9	27.0-31.4	24.5-28.9	22.8-26.9	20.2-24.4
good	35.0-38.9	37.0-41.0	35.7-40.0	32.9-36.9	31.5-35.7	30.3-31.4
Excellent	39.0-41.9	37.0-41.0	35.7-40.0	32.9-36.9	31.5-35.7	30.3-31.4
Superior	>41.9	>41.9	>40.0	>36.0	>35.7	>31.4
Male (units in ml/kg/min)						
age	13-19	20-29	30-39	40-49	50-59	60+
Very Poor	<35.0	<33.0	<31.5	<30.2	<26.1	<20.5
Poor	35.0-38.3	33.0-36.4	31.5-35.4	30.2-33.5	26.1-30.9	20.5-26.0
Fair	38.4-45.1	36.5-42.4	35.5-40.9	33.6-38.9	31.0-35.7	26.1-32.2
good	45.2-50.9	42.5-46.4	41.0-44.9	39.0-43.7	35.8-40.9	32.3-36.4
Excellent	51.0-55.9	46.5-52.4	45.0-49.4	43.8-48.0	41.0-45.3	36.5-44.2
Superior	>55.9	>52.4	>49.4	>48.0	>45.3	>44.2

(Suharjana et al 2019)

RESULTS AND DISCUSSION

Explaining the results of descriptive statistical research, the number of samples (N) is 10, then the difference (range) of the maximum and maximum values is 21, the athlete with the lar-

gest (maximum) score of pretest 44 and posttest 44, while the athlete with the smallest score (minimum) pretest 23 and posttest 23 The average value or mean of the 10 total samples of pretest 32.62 and posttest 33.13 with a standard deviation of 7.101 for pretest and 7.196 for posttest.

Table 2. The results of the descriptive statistical research of pretest and posttest

Statistics	Pretest	posttest
N	10	10
Range	21	21
Min	23	23
Max	44	44
Std. Deviation	7,101	7,196
Very poor	2	2
Poor	4	3
Fair	2	3
good	2	2
Excellent	0	0
Superior	0	0

In experimental research, it is necessary to conduct a normality test to determine whether the population is normally or not normally distributed. Here are the results of the normality test as **Table 3**.

Table 3. Normality test results

Data group	Sig. (2-tailed)	Sig	Information
Pretest	0.200	0.05	Normal
posttest	0.200	0.05	Normal

The significance value (p) in the Kolmogrov-Smirnov test is 0.200 ($p > 0.05$), so based on the Kolmogrov-Smirnov normality test the data is normally distributed.

The X and Y hypothesis testing uses a paired sample t-test. In this study, the X variable is the nutritional content of sagu and the Y variable is endurance. The hypothesis that the author has determined is that there is a significant effect of the nutritional content of sagu on the endurance of pencak silat athletes. For further explanation, see **Table 4**.

Table 4. The results of hypothesis testing X against Y

	mean	N	Std. Deviation	Std. Error Mean
Pretest	32.62	10	7,101	2,246
Posttest	33.13	10	7,196	2,276

The initial test has an average value (mean) of 32.62 from 10 data. The data distribution (Std. deviation) obtained is 7.101 with a standard error

of 2.246

The final test has an average value (mean) of 33.13 from 10 data. The distribution of data (Std. deviation) obtained is 7,196 with a standard error of 2,276

Correlation or relationship between the two pretest data (pretest) and the final test (posttest). Pay attention to the Sig column in the correlations **Table 5**.

Table 5. Paired sample correlations

	N	Correlation	Sig.
Pretest & posttest	10	,999	,000

In the processed data, it can be seen that the significance value (p) in the Kolmogrov-Smirnov test is 0.00 ($p < 0.05$), meaning that the two data (variables) are correlated or related.

Because in sagu there are carbohydrates that serve as the body's main energy source. The more energy that is used when doing physical activity, the more carbohydrates will be needed by the body and to minimize the occurrence of excessive fatigue during activities or the body's endurance decreases.

Based on the theoretical study and framework above, it can be formulated the hypothesis of this research, namely that there is a significant effect of the nutritional content of sagu in increasing the endurance of pencak silat athletes.



Figure 2. Conducting initial data collection test (pretest)



Figure 3. Giving treatment to athletes



Figure 4.Final data collection test (posttest)

As it is known that the content of sago is very rich in nutrients so it is useful for athletes. The initial test has an average value (mean) of 32.62 from 10 data. The data distribution (Std. deviation) obtained was 7.101 with a standard error of 2.246. The final test had an average value (mean) of 33.13 from 10 data. The data distribution (Std. deviation) obtained was 7.196 with a standard error of 2.276. In the processed data, it can be seen that the significance value (p) in the Kolmogrov-Smirnov test is 0.00 ($p < 0.05$), meaning that the two data (variables) are correlated or related. This means that there is an influence of sago content towards endurance.

Because in sago there are carbohydrates which function as the body's main energy source. The more energy used when doing physical activity, the more carbohydrates the body will need and to minimize the occurrence of excessive fatigue during activities or the body's endurance decreases.

The existing theory supports the results of research conducted where the Food Ebook argues that the components of sago flour are carbohydrates, which make up approximately 92.5% of the dry matter. Sago contains higher carbohydrates than brown rice and corn, which is around 90.5% of the dry matter. Brown rice only contains about 75.0% carbohydrates and corn only 64.0%. The content of vitamins in sago is lacking, especially vitamins A, B and C. And the protein content in sago is low, only around 1%. Therefore, if sago is consumed as a staple food, it is necessary to add a certain amount of protein to improve its nutritional value. This will certainly be beneficial for athlete's endurance. (Ebookfood 2006).

From the results of previous research where Surya Chahyadi Jufri in 2021 that the Effect of Sago towards the endurance of athletes where sago is not very popular among athletes regarding its nutritional content and its benefits so athletes rarely consume sago as their basic requirement in increasing athlete endurance. This is also in line with (Setiowati's 2014) research which states that the more protein intake in sago, the greater the

muscle strength. Food intake, especially sago, has an effect on muscle mass through changes in protein synthesis, with an increase in sago protein intake causing an increase in protein balance in a positive direction which then causes an increase in protein synthesis. When doing exercise, muscle cells are damaged. This is where protein plays its role. To repair damaged muscle cells, protein synthesis will be increased. Muscle mass growth will occur when the rate of protein synthesis exceeds the rate of protein breakdown. Muscle protein synthesis takes place 24 to 48 hours after exercise. This process causes the muscles to grow bigger and stronger

CONCLUSION

The results of the research description above show that sago, which is a traditional food, can be used as a staple food for athletes because of the nutritional content in it which can increase the endurance of pencak silat athletes. Sago is one of the largest producers of carbohydrates for the formation of the body's main energy and the price is affordable and easy to find. Aspects due to the lack of understanding contained in sago makes sago unable to compete with rice as a traditional staple food source. Good endurance is influenced by the consumption of healthy and high-carbohydrate foods because they can produce abundant energy.

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