8 (1) (2021) 17 - 23

Journal of Physical Education, Health and Sport

http://journal.unnes.ac.id/nju/index.php/jpehs

Correlation Between Nutritional Status, Energy Intake, and VO2Max Level in Female Futsal Player

Cindy Wulandari[1]✉, Siti Sulandjari[2]

Sports Education Study Program, School of Postgraduate Studies, Indonesia University of Education, Indonesia[12]

History Article

Received June 2021
Approved July 2021
Published vol 8 no 1 2021

Keywords

Nutritional Status; Energy Intake; VO2Max Level; Female Futsal

Abstract

The purpose of this study was to discover the correlation between nutritional status, intake of energy, and VO2Max level in female futsal players. The method used is quantitative correlation with the research design of Cross Sectional Study. The subjects in this study used female futsal players from Antartika Senior High School Sidoarjo with an age range of 15-18 years with a total of 30 people. Data were collected using measurements of height and weight, food recall 2x24 hours, and Multistage Fitness Test (MFT). Data analysis used Rank Spearman, the results of the correlation test using Spearman's Rank obtained the results of r= 0.646 and p= 0.000 which was interpreted as a significant correlation between nutritional status and energy intake with a strong correlation strength and a positive correlation direction. Based on the results of the study, it can be concluded that there is a correlation between energy intake and VO2Max with nutritional status. However, there is no correlation between energy intake and VO2Max (r=0.080 and p= 0.674).

How to Cite

Wulandari, C., & Sulandjari, S. (2021). Correlation Between Nutritional Status, Energy Intake, and VO2Max Level in Female Futsal Players. *Journal of Physical Education, Health and Sport*, 8 (1), 17-23.

✉ Correspondence Author:
E-mail: cindy30wulandari@gmail.com

p-ISSN 2354-7901
e-ISSN 2354-8231

INTRODUCTION

Futsal is a type of soccer sport game that has undergone an evolution of games and regulations. Currently, the game of futsal is popular among the public, not only as a recreational sport, but this game has become a place for healthy competition between communities. Maryami (2016) states that futsal competitions are available at regional, national, and international levels and have been widely implemented as a form of effort to improve achievement.

In the game of Futsal requires good physical endurance to support performance in playing on the field. This is because the futsal game has dynamic characteristics due to its fast movement when attacking and defending (Lhaksana, 2011). Furthermore, Lhaksana (2011) explains that the condition of high physical endurance is needed in futsal games to carry out activities continuously for a relatively long time. Endurance is one component of physical fitness. Physical fitness according to Suhartoyo et al. (2019) is one of the supporting factors in achieving achievements. In line with the opinion of Salamah et al. (2019) which states that good physical fitness can support athletes› abilities, because creating high athlete achievement requires good physical fitness and stamina.

Futsal game uses a combination of aerobic and anaerobic, so that in practice futsal players need oxygen (O2) supply. With this, one of the efforts to determine the level of endurance of the players can be known through the VO2Max value. Sugiarto (2012) states that a high VO2Max value will prove that the body›s resistance when doing sports activities is also high, meaning that it will not get tired quickly after doing various physical activities. Players who do not have a good VO2Max will experience a decrease in stamina and will affect playing performance on the field (Debbian & Rismayanthi, 2016).

The VO2Max value is influenced by several factors, one of which is nutritional status (Wagner in Eviana (2016)). Cornia & Adriani (2018) in their research also states that there is a relationship between nutritional status and VO2Max value. A measure of nutritional status is needed by an athlete in achieving achievement. According to Irianto in Adnyani (2019), good nutritional status can maintain fitness and health degrees, as well as support the athletes› achievements. Nutritional status is a picture that can be used to determine the condition of a person›s body. Ulfa et al. (2017) argues that nutritional status is said to be good if it is directly proportional to physical fitness.

Nutritional status can be interpreted as an indicator of whether or not the daily food supply is good or bad. Susetyowati (2016) explained that nutritional status is a measure of the consumption of nutritional intake and the body›s ability to use these nutrients. Nutritional status is said to be normal if the quality and quantity of food intake meet the body›s needs (Pujiati, Arneliwati, & Rahmalia, 2015). Food intake is obtained through the consumption of carbohydrates, fats and proteins which will later become the energy needed to perform physical activity. The fulfillment of the right energy intake will support the athlete›s performance to be maximal (Zoorob in Adisoejatmien et al. (2018)). In line with Maulana (2016)›s statement that a person›s nutritional status is determined by a combination of certain nutritional measures related to macronutrient intake, namely carbohydrates, fats, and proteins. These nutrients are needed by players to fulfill daily nutrition which will be used for physical activity and can support physical fitness.

Research related to the correlation between nutritional status and energy intake with VO2Max level has been carried out by previous researchers several times, but in this study there were fundamental differences and updates from previous studies. This study discusses the correlation between nutritional status, energy intake and VO2Max level in female futsal players in Sidoarjo. This discussion will be interesting because in general futsal is dominated by male players, especially in Sidoarjo there is still no research related to the topic to be discussed. The popularity of female›s futsal is currently increasing rapidly, especially in Sidoarjo, this is evidenced by the many high schools that provide female›s futsal extracurriculars, one of which is the Antartika Senior High School Sidoarjo. Antartika Senior High School is a high school that has won many achievements in the female›s futsal sport since 2015.

Based on the description above, the purpose of this study was to determine the correlation between nutritional status, energy intake, and VO2Max level for female futsal players in Sidoarjo, especially for members of the female futsal team of Antartika Senior High School Sidoarjo who had achieved many previous achievements.

METHOD

This research uses correlational quantitative research with a correlational research design

with the type of Cross Sectional Study. The subjects in this study were female futsal players at Antartika Senior High School Sidoarjo with an age range of 15-18 years with a total of 30 people. The instrument used to measure the nutritional status of the research subjects used a digital scale with an accuracy of 0.05 kg and a microtoise with a height of 2 meters with an accuracy of 1 millimeter. Measurement of energy intake was carried out using a food recall form instrument which was carried out 2 times. Meanwhile, to find out VO2Max level, a Multistage Fitness Test (MFT) was carried out with the support of a tape recorder or speaker, MFT audio, and the Multistage Fitness Stage (MFT) form to record the levels successfully taken by the research subjects.

Data collection related to nutritional status and VO2Max level was carried out at the same time, while data on energy intake was carried out for 2 days, on weekdays and weekends. The research data that has been obtained will be analyzed with the help of the SPSS version 22.0 program. The correlation test was carried out using the Spearman Rank test because the research subjects were 30 people with statistics at a significance level of 0,05. There is no specific guidelines for nutritional status, energy intake, and VO2Max on female futsal players. Based on the Permenkes RI No. 2 of 2020 concerning "Child Anthropometric Standards" states that the nutritional status of adolescents is declared good if the BMI/U shows -2 SD to +1 SD. The total energy expenditure (TEE) and the requirements of each soccer player are definitely different, it can be divided into three main contributions: basal metabolic rate (BMR), diet-induced thermogenesis (DIT), and activity energy expenditure (AEE) (Dobrowolski et al., 2020). According to the Widyakarya Nasional Pangan dan Gizi (2012), the recommended energy intake is 90% - 120% of the RDA. Futhermore, ideal VO2Max score for female athlete is between 35 - >41 ml/kg/min (Heywood, 1998).

RESULTS AND DISCUSSION

Based on research data on female futsal players at Antartika Senior High School Sidoarjo as many as 30 people, the results of nutritional status were obtained as shown in the table below. The majority of players' nutritional status was in the good or normal nutritional category (83.3%). Besides that, there are 2 players with overweight nutritional status (6.7%) and 3 people with obesity nutritional status (10%).

Table 1. Frequency Distribution of Nutritional Status

Nutritional Status (IMT/U)	Total	
	n	%
Severly Thinnes (Gizi Buruk)	0	0%
Thinnes (Gizi Kurang)	0	0%
Normal	25	83,3%
Overweight (Gizi Lebih)	2	6,7%
Obese (Obesitas)	3	10%
Total	30	100%

The results of data **Table 2** recap of energy intake obtained by food recall 2x24 hours can be concluded that the data obtained is very varied. Most of the research subjects were classified as severe deficit (33.3%) and moderate deficit (23.4%). Research subjects who meet the needs of energy intake in accordance with the needs are counted as many as 5 people (16.7%) while the category of mild and over deficits is 13.3% or as many as 4 people. So from these results it can be said that the majority of female futsal players have energy intake <70% RDA or classified as severe deficit.

Table 2. Frequency Distribution of Energy Intake

Energy Intake	Total	
	n	%
Severe Deficit (Defisit Berat)	10	33,3%
Moderate Deficit (Defisit Sedang)	7	23,4%
Mild Deficit (Defisit Ringan)	4	13,3%
Normal	5	16,7%
Over (Lebih)	4	13,3%
Total	30	100%

Table 3. Frequency Distribution of VO2Max Level

VO2Max Level	Jumlah	
	n	%
Very Poor	6	20%
Poor	7	23,3%
Moderate	13	43,3%
Good	2	6,7%
Very Good	2	6,7%
Total	30	100%

In the **Table 3** above, there are results from the implementation of the Multistage Fitness Stage (MFT) carried out by all research subjects, it was found that most of the female futsal players at Antartika Senior High School had a moderate

VO2Max level value of 13 people (43.3%). In addition, several other players have VO2Max scores in the very poor (20%), poor (23.3%), good and very good categories of 6.7%. So it can be said that the VO2Max level of female futsal players is in the moderate category.

Correlation between Nutritional Status, Energy Intake, and VO2Max Level in Female Futsal Players

Table 4. Results of Rank Spearman Test

		Nutritional Status	Energy Intake	VO2Max Level
Nutritional Status	r	1,000	0,646	-0,427
	p	-	0,000	0,019
Energy Intake	r	0,646	1,000	0,080
	p	0,000	-	0,674
VO2Max Level	r	-0,427	0,080	1,000
	p	0,019	0,674	-

Based on the results **Table 4** of the significance level test and the correlation coefficient using the Rank Spearman test, it shows that there is a correlation between nutritional status and VO2max level with a p value = 0.019 and r value = -0.427, which means that it has sufficient correlation strength with a negative correlation direction.

The fitness parameter that is commonly used to determine the level of endurance is VO2Max. A good VO2Max level is an important thing that must be owned by players. Sinamo in Setiadi & Zaidah (2019) explained that VO2Max is a description of an individual's aerobic capacity in carrying out physical activities. One of the factors that can affect VO2Max is nutritional status.

Table 5 shows that normal nutritional status tends to have moderate VO2Max level, which is 40%, overweight status has less and moderate VO2Max level each 3.3%, while obese nutritional status has 10% very poor VO2Max level. Based on the results of the Spearman Rank correlation test, the value of p = 0.019 which states that nutritional status has a correlation with VO2Max level. These results are in line with research conducted by Cornia & Adriani (2018) that there is a relationship between nutritional status and physical fitness in Taekwondo UKM students, it says that the normal nutritional status makes the better physical fitness. Another study conducted by Pratama (2018) stated that nutritional status has a relationship with VO2Max in Wonosobo Beringin Putra Football Club Athletes, that the higher of nutritional status will make the physical fitness lower.

The correlation coefficient based on Spearman's Rank test analysis on nutritional status and fitness yields r = -0.427 so it can be interpreted that the direction of the correlation is negative with sufficient correlation strength. The direction of the negative correlation means that the higher the nutritional status value, the lower the level of fitness. This statement is in line with the research conducted by Laxmi et al. (2014) and Ekoparman & Widajadnja (2015) which state that nutritional status and physical fitness have a negative relationship. This is in line with research conducted by Pratama (2018) which explains that the higher the nutritional status will hamper the physical fitness of athletes. So an athlete must strive to maintain nutritional status in order to remain in the normal or good category.

In addition, data analysis related to energy intake and VO2Max level based on the results presented in **Table 6**, it can be concluded that there is no correlation between energy intake and VO2Max level in female futsal at Antartika Senior High School Sidoarjo. This is evidenced by the value of p = 0.674 and the value of r = 0.080. These results are in line with Amin & Lestari's research (2017) that there is no correlation between energy intake and cardiovascular fitness of the Amanatul Ummah Islamic boarding school students in Surabaya.

The data collection method in this study used a food recall of 2x24 hours, which could affect the results of the study because the data obtained were less than optimal. To obtain data on an individual's eating habits, a minimum of 2 24-hour recalls are required within a certain period of time (Penggalih, 2019). So it is better to use a data collection method with a longer frequency to get maximum results. In her book, Penggalih (2019) explains further regarding recalls performed on athletes, it is better to pay attention to the training schedule in one period. Differences in the type and duration of exercise will affect the energy needs of the athlete. The recall results obtained during high-intensity exercise will be different from those obtained when athletes train with light intensity. Penggalih et al. (2019) in his research related to the consumption patterns of adolescent soccer athletes in Indonesia using 3x24 hour food recall and semi-quantitative food frequencies as data collection instruments related to the athletes' food intake. The use of both methods is used to reconfirm the food intake that has been consumed.

Based on the data presented in **Table 7**, it can be seen that the female futsal team at Antartika Senior High School which has normal nut-

Table 5. Data Distribution of Nutritional Status and VO2Max Level

Nutritional Status	VO2Max Level							
	Very Poor	Poor	Moderate	Good	Very Good	Total	r	p
Severly Thinnes	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)		
Thinnes	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)		
Normal	3 (10%)	6 (20%)	12 (40%)	2 (6,7%)	2 (6,7%)	25(83,3%)	-0,427	0,019
Overweight	0 (0,0%)	1 (3,3%)	1 (3,3%)	0 (0,0%)	0 (0,0%)	2 (6,7%)		
Obese	3 (10%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	3 (10%)		
Total	6 (20%)	7 (23,3%)	13 (43,3%)	2 (6,7%)	2 (6,7%)	30 (100%)		

Table 6. Data Distribution of Energy Intake and VO2Max Level

Energy Intake	VO2Max Level							
	Very Poor	Poor	Moderate	Good	Very Good	Total	r	p
Severe Deficit	1 (3,3%)	6 (20%)	2 (6,7%)	0 (0,0%)	1 (3,3%)	10(33,3%)		
Moderate Deficit	2 (6,7%)	0 (0,0%)	5 (16,7%)	0 (0,0%)	0 (0,0%)	7 (23,4%)		
Mild Deficit	0 (0,0%)	0 (0,0%)	3 (10%)	1 (3,3%)	0 (0,0%)	4 (13,3%)	0,080	0,674
Normal	0 (0,0%)	1 (3,3%)	2 (6,7%)	1 (3,3%)	1 (3,3%)	5 (16,7%)		
Over	3 (10%)	0 (0,0%)	1 (3,3%)	0 (0,0%)	0 (0,0%)	4 (13,3%)		
Total	6 (20%)	7 (23,3%)	13 (43,3%)	2 (6,7%)	2 (6,7%)	30 (100%)		

Table 7. Data Distribution of Nutritional Status and Energy Intake

Nutritional Status	Energy Intake							
	Severe Deficit	Moderate Deficit	Mild Deficit	Normal	Over	Total	r	p
Severly Thinnes	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)		
Thinnes	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)		
Normal	10(33,3%)	7 (23,4%)	4 (13,3%)	4 (13,3%)	0 (0,0%)	25(83,3%)	0,646	0,000
Overweight	0 (0,0%)	0 (0,0%)	0 (0,0%)	1 (3,3%)	1 (3,3%)	2 (6,7%)		
Obese	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	3 (10%)	3 (10%)		
Total	10(33,3%)	7 (23,4%)	4 (13,3%)	5 (16,7%)	4 (13,3%)	30 (100%)		

ritional status has the majority of energy intake classified as a severe deficit of 33.3% and for the moderate deficit category of 23.4%, while for the mild and normal deficit categories, each by 13.3%.

The results of the correlation test using Spearman's Rank obtained the results of r= 0.646 and p= 0.000 which was interpreted as a significant correlation between nutritional status and energy intake with a strong correlation strength and a positive correlation direction. It is called a positive correlation because high energy intake will lead to high nutritional status as well. These results are in line with research related to the relationship between energy intake and nutritional status of SMA Negeri 4 Manado students conducted by Reppi et al. (2015) with statistical test results showing the value of p= 0.000 and the correlation coefficient r= 0.567. So that there is a relationship between energy intake and nutritional status of SMA Negeri 4 Manado students with a moderate relationship category and a positive correlation direction.

Energy intake is closely related to nutritional status. Nutritional status is a description of individual conditions obtained from the intake and utilization of nutrients by the body (Susetyowati, 2016). Poor food intake patterns will have an impact on a person's nutritional status. This is in line with the opinion of Dwira (2017) which states that one of the factors that cause poor nutritional status and over nutritional status in adolescence is the wrong eating factor, such as consumption of foods that are high in fat, salt, sugar, but rarely consume vitamins and fiber. especially those from vegetables and fruits. Reppi et al. (2015) argues that excessive energy intake will lead to weight gain, overweight, and obesity. Foods with a high energy density without being balanced with fiber consumption will also cause a bad effect on energy balance. A balanced diet is highly recommended for all people. The intake of nutrients consumed will determine the health status of each individual (Karim, 2017).

CONCLUSION

Based on the results of the research that has been done, it can be concluded that there is a correlation between nutritional status and VO-2Max level with sufficient correlation strength and negative correlation direction. In addition, nutritional status and intake of energy also have a significant correlation with the strength of a strong correlation and a positive direction of correlation. However, there is no significant correlation between energy intake and VO2Max level, as evidenced by the p value = 0.674.

REFERENCES

Adisoejatmien, A. D., Pontang, G. S., & Purbowati. (2018). Hubungan Antara Asupan Energi Dan Zat Gizi Makro Dengan Kesegaran Jasmani Pada Atlet PPLOP Provinsi Jawa Tengah. Jurnal Kesehatan Dan Gizi, 10(23).

Adnyani, A. . E. P. (2019). Hubungan Tingkat Konsumsi Energi dan Status Gizi dengan Kebugaran Jasmani Atlet di Klub Sepak Takraw Rumah Compos Monkey Forest Ubud. Retrieved from http://repository.poltekkes-denpasar.ac.id/id/eprint/2731

Amin, N., & Lestari, Y. N. (2017). Hubungan Asupan Energi dan Zat Gizi dengan Kebugaran Jantung Paru Santri Pondok Pesantren Amanatul Ummah Surabaya. Medical and Health Science Journal, 1(1). Retrieved from https://journal2.unusa.ac.id/index.php/MHSJ/article/view/590/522

Cornia, I. G., & Adriani, M. (2018). Hubungan Antara Asupan Zat Gizi Makro dan Status Gizi dengan Kebugaran Jasmani Mahasiswa UKM Taekwondo Relationship between Macronutrient Intake , Nutritional Status and Physical Fitness among College Student s in Student ' s Taekwondo Club. Amerta Nutrition, pp. 90–96. Retrieved from 10.2473/amnt.v2i1.2018.90-96

Debbian, A., & Rismayanthi, C. (2016). Profil Tingkat Volume Oksigen Maskimal. Jurnal Olahraga Prestasi, Vol. 12, pp. 19–30.

Dobrowolski, H., Karczemna, A., & Wlodarek, D. (2020). Nutrition for Female Soccer Players—Recommendations. Medicina, 26(1). https://doi.org/https://doi.org/10.3390/medicina56010028

Dwira, D. H. (2017). Hubungan Pola Konsumsi Makanan Dengan Status Gizi Mahasiswa Semester Iv Jurusan Div Bidan Pendidik Di Universitas 'Aisyiyah Yogyakarta. Retrieved from http://digilib.unisayogya.ac.id/2666/1/NASKAH PUBLIKASI.pdf

Ekoparman, B., & Widajadnja, I. N. (2015). Hubungan Antara Indeks Massa Tubuh Dengan Tingkat Kebugaran Jasmani Mahasiswa Program Studi Pendidikan Dokter Universitas Tadulako Tahun Masuk 2012. Medika Tadulako, Vol. 2, pp. 55–66. Retrieved from http://jurnal.untad.ac.id/jurnal/index.php/MedikaTadulako/article/view/8020

Eviana, R. (2016). Hubungan Status Gizi Dengan Vo 2 Max Anak. Semarang: Universitas Diponegoro.

Hardinsyah, H., Food, T., Sulaeman, A., Soekatri, M., & Riyadi, H. (2012). Ringkasan Angka Kecukupan Gizi (AKG) yang dianjurkan bagi orang Indonesia 2012. In Rumusan Widyakarya Nasional Pangan dan Gizi (WNPG) X 2012. Bogor: Widyakarya Nasional Pangan dan Gizi (WNPG).

Heywood, V. (1998). Advance Fitness Assessment and Exercise Prescription. Retrieved October 7, 2020, from http://www.brianmac.co.uk/vo-2max.htm#vo2

Karim, M. A. (2017). Hubungan Asupan Makanan, Aktivitas Fisik Dengan Status Gizi Peserta Didik Kelas Vii Smp Negeri 5 Sleman. Universitas Negeri Yogyakarta.

Kemenkes RI. (2020). Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2020 Tentang Standar Antropometri Anak. Jakarta: Kemenkes RI.

Laxmi, C. ., Udaya, I. B., & Shankar, V. S. (2014). Effect of Body Mass Index on Cardiorespiratory Fitness in Young Healthy Males. International Journal of Scientific and Research Publications, 2(2). Retrieved from http://www.ijsrp.org/research-paper-0214/ijsrp-p2605.pdf

Lhaksana, J. (2011). Taktik & Strategi Futsal Modern. In D. Anggoro (Ed.), Taktik dan Strategi Futsal Modern. Jakarta: Be Champion (Penebar Swadaya Group).

Maryami, D. (2016). Profil Kondisi Fisik Pemain Putih Abu-Abu Futsal Universitas Negeri Yogyakarta (PAF UNY) Menuju Women Pro Futsal League Tahun 2016. Retrieved from http://eprints.uny.ac.id/id/eprint/46007

Maulana, M. A. (2016). Deskripsi Tingkat Konsumsi Energi Dengan Kebugaran Jasmani (Pada Siswa Putra Kelas V Dan Vi Sdn Pacing Kab. Mojokerto). Jurnal Kesehatan Olahraga, 4(3), 630–639.

Penggalih, M. (2019). Sistem Energi, Antropometri, dan Asupan Makan Atlet. Yogyakarta: Gajah Mada University Press.

Penggalih, M., Juffrie, M., Sudargo, T., & Sofro, Z. M. (2019). Pola Konsumsi Atlet Sepak Bola Remaja di Indonesia. Jurnal Gizi Klinik Indonesia, 15(3).

Pratama, A. W. P. (2018). Hubungan Status Gizi Dan Status Hidrasi Terhadap Vo2max Pada Atlet Sepakbola Beringin Putra Football Club Wonosobo. Retrieved from https://eprints.uny.ac.id/57882/1/Skripsi Full.pdf

Pujiati, Arneliwati, & Rahmalia, S. (2015). Hubungan Antara Perilaku Makan Dengan Status Gizi Pada Remaja Putri. Jurnal Online Mahasiswa, 2(1). Retrieved from https://media.neliti.com/

media/publications/187639-ID-hubungan-antara-perilaku-makan-dengan-st.pdf

Reppi, B., Kapantow, N. H., & Punuh, M. I. (2015). Hubungan Antara Asupan Energi dengan Status Gizi Siswi SMA Negeri 4 Manado. Jurnal KESMAS Universitas Sam Ratulangi, 3(1).

Salamah, R., Kartini, A., & Rahfiludin, M. Z. (2019). Hubungan Asupan Zat Gizi, Aktivitas Fisik, dan Persentase Lemak Tubuh dengan Kebugaran Jasmani. Media Kesehatan Masyarakat Indonesia, Vol. 18, pp. 14–18. https://doi.org/10.14710/mkmi.18.2.14-18

Setiadi, A., & Zaidah, L. (2019). Analisis Faktor Usia dan Indeks Massa Tubuh Terhadap Peningkatan VO2 Max pada Pemain Futsal di Madrasah Mu'allimin Muhammadiyah Yogyakarta. Retrieved from http://digilib2.unisayogya.ac.id/bitstream/handle/123456789/62/Naskah Publikasi ADI.pdf?sequence=1&isAllowed=y

Sugiarto. (2012). Hubungan Asupan Energi, Protein dan Suplemen dengan Tingkat Kebugaran. Media Ilmu Keolahragaan Indonesia, Vol. 2, pp. 94–101. https://doi.org/10.15294/miki.v2i2.2648

Suhartoyo, T., Budi, D. R., Kusuma, M. N. H., Syafei, M., Listiandi, A. D., & Hidayat, R. (2019). Identifikasi Kebugaran Jasmani Siswa SMP di Daerah Dataran Tinggi Kabupaten Banyumas. Physical Activity Journal Journal, 1(1). https://doi.org/https://doi.org/10.20884/1.paju.2019.1.1.1995

Susetyowati. (2016). Gizi dalam Daur Kehidupan. In Ilmu Gizi Teori & Aplikasi (pp. 182–183). Jakarta: Buku Kedokteran EGC.

Ulfa, N. ., Widajanti, L., & Suyatno. (2017). Perbedaan Status Gizi, Tingkat Konsumsi Gizi, Aktivitas Fisik Dan Kebugaran Jasmani (Studi Pada Siswa Yang Mengikuti Ekstrakurikuler Pencak Silat Dan Futsal Di Sekolah Menengah Kejuruan Teuku Umar Kota Semarang Tahun 2017). Jurnal Kesehatan Masyarakat (e-Journal), 5(4), 714–721. Retrieved from http://ejournal3.undip.ac.id/index.php/jkm

.