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Program Pendampingan Gizi Intensif pada Atlet Bela Diri terhadap Peningkatan Komposisi Tubuh dan Total Asupan Energi

Intensive Sports Nutrition Program Improving Body Composition and Energy Intake among Elite Combat Sport Athletes

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ABSTRAK

Latar Belakang: *Gizi olahraga merupakan aspek penting dalam mengatur asupan makanan dan komposisi tubuh untuk mencapai performa yang optimal. Studi epidemiologis menunjukkan sebagian besar asupan atlet tidak adekuat dan dapat mempengaruhi komposisi tubuh yang ideal.*
Tujuan: *Tujuan dari penelitian ini adalah untuk menganalisis pengaruh pendampingan gizi olahraga terhadap komposisi tubuh dan asupan energi atlet bela diri.*
Metode: *Pendampingan gizi intensif dilakukan selama empat bulan (Juni- September 2019). Pengukuran komposisi tubuh dilakukan 2 kali, yakni sebelum dan sesudah intervensi dengan menganalisis hasil pengukuran dari alat BIA (Bio Impadance Analyzer)tipe MBCA (Medical Body Compotiton Analyzer) 515/514 merk seca©. Variabel yang dianalisis diantaranya, total asupan kalori sehari diukur menggunakan instrumen Recall-24 jam, komposisi tubuh diukur dengan alat BIA yakni Fat Mass (FM), Fat Free Mass (FFM) dan Skeletal Muscle Mass (SMM). Pendampingan gizi dilakukan oleh ahli gizi olahraga yang mengunjungi 24 responden setiap bulan dan memberikan materi pendidikan gizi, memberikan makanan sehat dan memberikan konseling permasalahan gizi atlet.*
Hasil: *Hasil penelitian ini menunjukkan adanya peningkatan secara signifikan pada asupan energi total (1496,2±654,4 menjadi 1688,5±679,8, p= 0,002). Pada komposisi tubuh terjadi peningkatan pada FFM yakni (56,57 ± 9,91 kg vs 57,01 ± 9,53, p = 0,032) dan tidak ada perbedaan signifikan dalam variabel FM dan SMM.*
Kesimpulan: *Kesimpulan dari percobaan ini adalah pendampingan gizi secara intensif dapat meningkatkan asupan energi total, dan FFM pada atlet beladiri.*

Kata Kunci : *Komposisi Tubuh, Pendampingan Gizi, Asupan Energi*

ABSTRACT

Background: Sports nutrition is very urgent to improve nutrition knowledge, dietary intake, and body composition to achieve optimum athletic performance. Epidemiological studies showed most athletes lack of getting adequate intake and maintaining ideal body composition.
Objective: This study aimed to analyse the effect of sports nutrition education on body composition and energy intake among elite combat sports athletes.
Methods: Intensive sports nutrition was conducted for four months June until September 2019. Body composition was assessed 2 times, before and after intervention using bioelectric impedance analysis (BIA), with Seca © brand 515/514 type of stainless-steel electrodes. energy intake with recall 24 hours before and after the intervention. The variables studied were Fat Mass (FM), Fat-Free Mass (FFM), Skeletal Muscle Mass (SMM), and energy intake. The professional sports nutritionist and dietitian visited 24 subjects every month by teaching nutrition education, bringing healthy food, and facilitating counselling about sports nutrition.
Results: Energy intake increased significantly (1496.2 ± 654.4 to 1688.5 ± 679.8, p = 0.002). FFM and increased significantly pre to post (56.57 ± 9.91 kg vs 57.01 ± 9.53, p = 0.032) respectively, meanwhile no significant differences in the FM and SMM variables.
Conclusion: Our findings indicate that intensive sports nutrition improved energy intake and FFM among elite combat sports athletes.

Keywords: Body Composition, Sports Nutrition Education, Energy Intake

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INTRODUCTION

Self-defence is a sport with the characteristics of body contact either with kicks or punches[1]. There are several branches of martial arts, including *Pencak Silat* and *karate*. *Pencak Silat* and *karate* have several similarities, one of which has two categories to be contested. The categories competed in the sports of *Pencak Silat* and *karate* are art and competition in silat, while in *kata karate* and *Kumite*. Art in *Pencak Silat* and *kata* in *karate* are competition categories that show the moves and the beauty of movement, while matches in *Pencak Silat* and *Kumite* in *Karate* are the categories of sparring that make physical contact to find the most points. The characteristics of the movement of these two sports are movement with a fast duration and high intensity so that the energy use in this sport is anaerobic energy system [2].

Nutrition has a role in reducing fatigue levels, suppressing injury, accelerating the recovery process, optimizing energy savings, increasing endurance and maintaining athlete's health. Energy intake in athletes is useful for endergonic (energy storage) and exergonic (energy use) reactions during training. The energy produced by food will be converted into ATP (Adenosine Triphosphate) as fuel during physical activity[3]. ATP is used by all cells in the body including for the contraction of muscle cells during exercise. Energy intake in athletes will have an impact on body composition. Body composition is not only important for producing strength, agility and performance of martial arts athletes but is generally an indicator of nutritional status and health status of athletes[4].

The main problems that are often encountered in *martial arts* athletes are usually related to weight management and inappropriate dietary patterns to maintain body weight[5]. In martial athletes who have high intensity training demands a sufficient supply of energy to support the body's performance when training[6]. Nutritional knowledge in athletes has a major influence on nutritional quality including food selection and dietary patterns[7]. The training program combined with an intensive nutritional program can form the morphology of the athlete's body including the ideal body composition according to the type of sport and the needs of the athlete [8,9].

Nutrition assistance is an activity in the form of services for families or individuals in preventing or overcoming nutritional problems[10]. Nutritional assistance that is carried out to athletes is included in the form of health promotion activities that aim to change the athlete's behaviour. The expected output in general is the ideal body composition for athletes so that it can support performance. In accordance with Green's behaviour theory, health behaviour is formed if health promotion includes 3 factors, namely *predisposing factors, enabling factors,* and *reinforcing factors*[11]. According to Rossi., *Et.al,* 2017; Abood et.al, 2004; and Valliant et.al, 2012, giving intervention in the form of education and nutritional assistance to basketball and volleyball athletes will result in increased knowledge related to nutrition, and there are changes in body composition[12,13, 14.] Research was conducted on martial athletes because most athletes have dietary restrictions to reduce energy. This is by the research of Farapti et al (2020) that almost all martial athletes implement a weight loss program the day before competing[15]. This is the background for this study to see how the effect of intensive nutritional assistance on body composition and total energy intake of martial athletes.

METHODS

Sample and Population

In this study, there were 12 athletes and 16 *Pencak Silat* athletes, with a total of 28 people, respectively. These two sports were chosen because they have several similarities, including: 1) the frequency of training and the duration of the training, namely in one day there were 2 training times with a duration of 2-3 hours. 2) both were types of *martial arts* which have 2 competing categories, in *Karate* it was called *kata* and *Kumite* and in *Pencak Silat* it was called art and sparring. The two categories of competition in each sport have almost the same characteristics.

The sampling technique used was saturated sampling technique. The sample in this study amounted to 28 people with 12 people from the *karate* sport and 16 people from the *Pencak Silat* sport. The inclusion criteria in this study where athletes must be in good health, be athletes of *karate* and *Pencak Silat*, and were willing to take part in the research until the end. During the study, 4 people *dropped out* because they did not take anthropometric and body composition measurements at the end of the study. Respondents who were sampled were 24 people with a composition of 12 people from the *karate* sport and 12 people from the *Pencak Silat* sport.

Research Design

The design used in this study was a pre-experimental design with the *one group pre-test post-*

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test design method because body composition and calorie intake were measured before and after the intervention. This study wanted to see how the effect of nutritional assistance on changes in body composition and calorie intake in athletes. The research was carried out in the sport of *karate* and Pencaksilat Puslatda East Java which took place in the East Java Dispora.

Nutrition assistance is carried out in the form of nutrition education and counselling conducted to respondents, trainers as well as catering parties. In this case the trainer and catering were involved as *enabling factors,* and *reinforcing factors* because they were supporting elements that could help the success of nutrition assistance activities. Assistance activities were carried out once in 1 month for 4 months starting from June to September 2019. The material presented during the education at each meeting includes the introduction of *sports nutrition,* body composition and performance, food safety and calculating the adequacy of intake. The method of delivering education was carried out by lectures and discussions by resource persons, besides that the athletes were also provided with *leaflets* that have been prepared related to the material discussed. After the educational activity, it was continued with intensive counselling for each athlete related to athlete's development and problems experienced by athletes regarding nutrition. During the four nutritional mentoring meetings, athletes were also given *snacks* in the form of brown bread and fruit juices high in antioxidants as a reference for athletes in choosing healthy *snacks.* The target to be achieved in this nutrition assistance activity is the existence of an ideal athlete body composition and adequate calorie intake. Monitoring was carried out twice, namely the beginning and end of the program through measuring body composition and calculating calorie intake.

Athlete's intake was known through a -24-hour *recall* instrument which was carried out once before the intervention and one time after the intervention with a -24 hour *recall* interview conducted by researchers on athletes regarding what foods were consumed during the last 24 hours. The results of the athlete's intake during the last 24 hours were analysed using *Nutrisurvey software* so as to produce the athlete's energy intake in 1 day. Anthropometric and body composition measurements were carried out before the study began to see the athlete's baseline condition and at the end of the study to see the results of the intervention. The first anthropometric measurement to see height using *microtoise*. Furthermore, body composition measurements were carried out using the MBCA tool before the study and after the study to see *pre* and *post.*

Variable

The independent variable in this study was intensive nutritional assistance for 4 months which was carried out 4 times. The dependent variable the total energy intake of athletes in a day, the body composition of athletes include fat mass (Fat *Mass)*, fat-free mass (*Fat Free Mass*) and skeletal muscle mass (*Skeletal Muscle Mass*). Other variables studied were athlete's characteristics such as age, gender, education and occupation as well as anthropometric data.

There were two types of data processing and analysis, namely univariate and bivariate. Data on the characteristics of respondents including age, gender, education and occupation were analysed using the univariate method. Bivariate analysis using the T-Paired test was used to see the effect of total energy intake and body composition *pre-post* between sports and as a whole.

RESULTS AND DISCUSSION

This study involved respondents who were athletes in the martial arts (*Pencak Silat* and *karate*) with an average age of 21 years. These characteristics were generally similar to research by Farapti et al (2019) in martial arts athletes (*karate*, *Pencak Silat*, judo and wrestling) with an average age of 23 years, Radonavic et al (2012) on judo athletes with an average ages 20 years [15,16]. For young athletes, which was around 20 years, was the most productive age to produce the highest achievement [15]. Based on gender, respondents consisted of 17 people (70.8%) men, namely 8 people with the *Pencak Silat* sport and 9 people from the *karate* sport while 7 people (29.2%) were female respondents, namely 4 people from *Pencak Silat* and 3 people. people from *karate*. In the last education variable, it was found that on average 15 respondents (62.5%) had the last high school education and the remaining 9 people (37.5%) had bachelor / diploma graduates. Meanwhile, for other jobs besides being athletes, on average 17 respondents did not have other jobs (70.8%) and for respondents who were private workers were 6 people (25%) and as many as 1 civil servant (1%).

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Table 1. Characteristics of Respondents

Variable	Total (24)		Pencaksilat (12)		*Karate* (12)	
	N	%	n	%	n	%
Age (mean ± SD)	21.21 ± 2.34					
Gender						
Man	17	(70.8%)	8	(33.3%)	9	(37.5%)
Women	7	(29.2%)	4	(16.67%)	3	(12.5%)
last education						
High school	15	(62.5%)	8	(33.3%)	7	(29.17%)
PT	9	(37.5%)	4	(16.67%)	5	(20.83%)
Another job						
Nothing	17	(70.8%)	8	(33.3%)	9	(37.5%)
Private employees	6	(25%)	3	(12.5%)	3	(12.5%)
Government employees	1	(1%)	1	(4.17%)	0	(0%)

The body composition seen by respondents was defined by the variable *fat mass* (FM%), *fat free mass* (FFM) and *skeletal muscle mass* (SMM). In the FM variable, it was known that the average *fat mass* before was 15.34%, while after the intervention was 15.06%. Based on the results of different tests, it was found that there was no effect of intervention on the *fat mass* variable with p = 0.474. However, when viewed from the data of each sport, the average reduction in *fat mass* in the sport of martial arts were greater than that of *karate*, namely the difference between the average before and after the program of 0.54%, with a different test of p = 0.271. FM values that were too high will have an impact on the speed and *power of the* athletes that were less than optimal [16,17]. This condition was important to pay attention to in sports that used *speed* and *power*, one of which was martial arts

In the *fat free mass* (FFM) variable, it was found that the average before the intervention was 56.57 kg, while after the intervention the average was 57.01 kg with an increase of 0.44 kg. There was no significant difference in the FFM variable when viewed in each sport. But in different tests carried out on the total FFM variable of the two sports, it was found that there was an influence between the intervention and changes in fat free mass (FFM) with a t test value of p = 0.032. These results were in accordance with the research of Rossi et al (2017) on baseball athletes with a change in FFM from 69.9 kg to 72.1 kg after intervention in the form of nutrition education. Research by Valliant et al (2012) with intervention in the form of nutritional assistance for volleyball athletes with a significant increase in FFM from 75.5 ± 13.1 to 77.3 ± 18.5[14].

In the *skeletal muscle mass* (SMM) variable, the average value before the intervention was 27.49 kg and after the intervention was 27.75 kg with an average increase of 0.26 kg. Through different tests carried out on the SMM variable, it was found that there was no influence between the intervention and changes in skeletal muscle mass (SMM) with a t test value of p = 0.05. Optimal muscle mass will make it easier for the body to move bones and skeletons through the energy produced by metabolism[18,19]. When viewed according to the sport, significant results were obtained from sports *karate*. This was due to the fact that based on the SMM value of each sport, the athletes of *Pencak Silat* were greater than *karate*. In general, professional athletes with heavy intensity training routines, the SMM value will be close to optimal so that it was quite difficult to increase the QMS value [20].

Furthermore, the *total energy intake* variable resulted in a significant difference between before and after the intervention as a whole and in each sport. The total mean value before intervention was 1496.2 kcal and after intervention was 1688.5 kcal (*p* = 0.002). These results were the same as research by Rossi et al (2017) with an increase in *energy intake* from 2878 kcal to 3366 and Valliant et al (2012) research 1756.0 ± 557.5 kcal to 2178.4 ± 491.8 kcal, it can be seen that there was an increase in the amount of energy intake significantly each sport after intervention [21]. The increase in *energy intake* will then have an impact on increasing body mass including *Fat Free Mass.* Proper diet including *energy intake* in athletes functions for optimizing the energy balance and body composition [22].

The limitation in this study was the measurement of body composition and *recall* which was only carried out 2 times, namely before the program and after the program so that it could not describe the progress of each mentoring. In addition, the intake variable in this study was only limited to measuring calories in a day, not including other nutrients.

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Table 2. Effects of Interventions on FM, FFM and Energy Intake

Variable	Total (24)	Pencaksilat (12)	*Karate* (12)
FM (%)			
before	15.34 ± 7.14	12.15 ± 5.96	18.54 ± 6.98
after	15.06 ± 6.77	11.61 ± 5.57	18.51 ± 6.22
Paired t-test	0.474	0.271	0.971
FFM (Kg)			
before	56.57 ± 9.91	60.16 ± 9.66	52.99 ± 9.17
after	57.01 ± 9.53	60.49 ± 9.41	53.51 ± 8.65
Paired t-test	0.032	0.134	0.133
SMM (kg)			
before	27.49 ± 5.58	29.58 ± 5.48	25.41 ± 5.05
after	27.75 ± 5.31	29.61 ± 5.41	25.88 ± 4.71
Paired t-test	0.05	0854	0.026
Energy Intake (kcal)			
Before	1496.2 ± 654.4	1214.2 ± 426.79	1778.22 ± 734.6
After	1688.5 ± 679.8	1421.1 ± 495.66	1956 ± 751.3
Paired t-test	0.002	0.019	0.044

CONCLUSION

Intensive training program with nutritional assistance carried out to *Karate* and *Pencak Silat* athletes of Puslatda East Java for 4 months. Through this research, it was found that there was a decrease in *Fat Mass* and *Skeletal Muscle Mass,* but not significantly. In addition, there was a significant increase in the average value of *Fat Free Mass.* This was associated with an increase in energy *intake* after the intervention, which will generally increase body mass and have an impact on the energy balance system.

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