

Identification of nutritional status and body composition in weightlifting athlete

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Abstract:

In a weightlifting competition, a person competes according to their weight group. Therefore, to maximize performance in certain competing classes, the body composition (somatotype) of a weightlifter is very important. However, body composition is strongly affected by several main factors such as nutrition and lifestyle. Weightlifting is Indonesia's leading sport in international competitions; therefore, optimizing the achievements of weightlifting athletes needs to be improved, through research to identify factors supporting the achievements of weightlifters. This research using quantitative descriptive method. The research was performed by observing and testing 35 weightlifters in the province that most often contributed weightlifting athletes Lampung Province, Pringsewu Regency. Body composition testing using the Omron Karada Body Composition tool. For lifestyle measurement, use medical history and habits questionnaire. The results of this study indicate that the average body composition of the sample has 24.38% of fat, and BMI reaches 29.32. The somatotype figure shows that 88% of the participants are in the endomorph category, and 22% are included in the mesomorph category. The obtained nutritional status figure shows that 3% of the participants are in the stunting category. Lifestyle analysis shows that 2% smoke, 3% drink alcohol, 71% consume caffeine and 100% exercise. The results of this study show that the most worrying item is the body composition specifically, the sample fat percentage is too high compared to that of an average weightlifter, which is approximately 16%. Weightlifters need to minimize the percentage of body fat and replace it with muscle mass to maximize their body weight with the muscle's ability to lift weights.

Key Words: Fat percentages; Muscle mass; Lifestyle; Nutrition Habits

Introduction

Weightlifting is a sport that is competed in the Olympics. With such a reputation, it can be seen that weightlifting is very competitive. Weightlifting is competed based on the athlete's weight group, with this rule indirectly the athlete's weight must have good quality, or in other words the athlete's body composition must be effective. The greater the muscle mass, the more effective it is in doing lifts in that weight group. Of course, what is most avoided is when an athlete has an excess fat percentage and has no impact on lifting strength during competition, it is very ineffective for an athlete in that weight group. On the other hand, the athlete's body composition is not only influenced by the load of the exercise performed, but there is the influence of nutritional intake. The quality of the athlete's body development will be more effective if there is a good combination of exercise and nutritional intake.

Identification of body composition began to be investigated by producing several conclusions such as the average Fat Mass (FM) of Indian athletes of 11 percent (Singh et al., 2019; Vidal Pérez et al., 2021). In addition, the correlation between the amount of Fat Free Mass (FFM) is closely related to the performance of weightlifting athletes in their class (Siahkoughian & Hedayatneja, 2010). In the end, weightlifters need an effective body to improve their performance (Zaras et al., 2020). Athletes must know the limits and follow the recommended good diet to achieve the ideal nutritional status (Özdemir, 2010). Ideal nutritional status helps athletes to maximize training results and the recovery process. Nutritional status shows that what is consumed meets the needs of athletes during exercise and other activities in one day. Even elite athletes in the United States should have a handbook wherever they go to ensure that what they consume meets their ideal nutritional status (Özdemir, 2010). Athletes should pay attention to exercise and diet, and determine a balanced volume and intensity of exercise, amount and type of food, daily weight lifting goals, fluid intake, vitamin and mineral intake, and total calorie intake and use of ergogenic products approved by the National Sanitary Foundation (NSF).) and the World Doping Agency (WADA) on the daily allowance recommended by the FDA (US Food & Drug Administration) (Bean, 2000; <http://www.fda.gov>, 2017). Weightlifters should determine their energy consumption (from 3000 to 10,000 kcal/day) taking into account their body weight, training needs, and their own body weight (USA Weightlifting Federation, 2013). However, data from gymnastic and football show that the nutritional status of Indonesian athletes is not yet good (Penggali et al., 2016, 2017). These data very worrying (especially because there is no definite data regarding the nutritional status of weightlifters in Indonesia) because

there is a close relationship between weightlifting athletes and body composition, which is influenced by the nutritional status of athletes. Therefore, this study is on nutritional status and its impact on body composition is important for the trainers and related stakeholders. Thus, the identification of the nutritional status and body composition of the athletes can be used as a reference for planning future plans.

So to increase the effectiveness of athletes, it is necessary to identify them to be an evaluation and benchmark for further athletes. In addition, nutritional identification is intended to determine the athlete's nutritional habits that are very likely to affect his body composition. Because the performance of weightlifting athletes is largely determined by body composition which is influenced by nutrition and exercise that athletes do every day. So the identification of body composition and nutrition is needed to answer the needs of weightlifters in order to maximize their performance. On the other hand, there are data showing that the nutritional status of the Indonesian people is not yet in good numbers, it is feared that this will also have an impact on the elite athletes in Indonesia.

Materials and methods

This study includes 35 weightlifters who are the members of the Gajah Lampung weightlifting club; all athletes have competed and won at the national level; some of them won medals at the Sea Games and international competitions. All research activities were performed at the Gajah Lampung weightlifting club training complex located in Priwngsewu Regency, Lampung Province, Indonesia. Research ethics was approved by the Health Research Ethics Committee, Ministry of Health, Bandung Health Polytechnic. Number letter No. 10 / KEPK / EC / IV / 2020.

There 11 anthropometric measurement components, i.e body weight (BW), height, skinfold, consist of triceps, biceps, subscapula, suprailiac, calf and girth of humerus and femur, and body circumference. Body fat percentage was measured using the Karada Scan Bio Impedance Analysis for which the athletes wore minimal clothing. Height measurement was done using a microtoa with 1 mm accuracy. Skinfold was measured with a Lange skinfold calliper. Body circumference measurement was done with a measuring tape with a 1 mm scale. All measurements were performed three time (except for the body weight and body percentage measurement) using previously calibrated measuring tools. The results of anthropometric measurements were categorized into three somatotype components, i.e., endomorph, mesomorph and ectomorph. Somatotype was calculated using the Heath Carter method as follows (JEL Carter, 2002). The data athletes' food intake were obtained using the interview method to determine what food the athletes consumed in 24 hours. In addition, fluid intake was determined using the semi quantitative fluid frequencies method. Furthermore, the data were configured with the athlete's daily energy requirement, which was determined from the basal energy requirement. The daily energy needs of the athletes were determined when the athletes performed a body composition test using the Karada tool. This tool provides other indicators such as the basal metabolic rate (BMR). BMR is a basic reference for calculating daily energy needs. BMR calculation includes the level of activities that the athletes performed in one day. After the calculation is complete, the athletes' daily energy needs are configured with what the athlete eats and drinks on that day.

Results

The results of anthropometric measurements aim to identify the nutritional adequacy level of athletes. From anthropometric and somatotype results, the nutritional adequacy level can be determined after being configured with the results of nutritional intake habits.

Table 1. Nutritional status

Variables	$\bar{X}(SD)$
BMR	1.531 ± 77.21
Total energetic need	3.356 ± 82.29
Total energetic need (%)	87.33 ± 12.11
Carbohydrates (%)	56.22 ± 4.27%
Lipids (%)	28.33 ± 6.61%
Proteins (%)	12.95 ± 2.66%

The nutritional status of the sample is categorized into the relatively safe category, i.e., the total energy needs reach 87%; however, the breakdown of nutrients consumed in protein tends to be low, considering that weightlifting requires considerable muscle development and muscle quality, which is improved by protein.

Table 2. Anthropometry

Variables	$\bar{X}(SD)$
Age (years)	22.87 ± 3.25
Weight (kg)	76.12 ± 18.40
Height (cm)	160.56 ± 4.79
BMI (kg/m ²)	29.32 ± 5.71
Body fat (%)	24.38 ± 7.24
Lean body mass (kg)	56.22 ± 9.77

Table 2 shows the anthropometric data of the samples consisting of body weight, height, and BMI. All weightlifters sampled in this study were categorized as obese, as shown BMI, which reached 29.32. In addition, the average age of the sample was 22 and belonged the youth category body fat and lean body mass of the sample were in the high category.

Discussion

Referring to the data shown in Table 1, the percentage of total energy need (TEN) for the standard nutritional intake was reached by only 77% of the sample; 33% of the participants did not reached the recommended TEN. This value needs to be increased immediately because that lack of energy during training or competition decreases muscle mass and muscle quality and increases risk of injury (Ainsworth et al., 1995; Paramitha et al., 2021). In addition, TEN, which reached an average of more than 3,000, was included in the average TEN of weightlifting, which ranged from 3,000 to 10,000 kcal per day (Augusto et al., 2006). However, when this value is compared with that in other countries, TEN for the average age of 21 years reaches 4,597 kcal (Durguerian et al., 2015, 2016); thus, this value needs to be re-evaluated by the coaching team because the percentage of athletes' nutritional adequacy has not been fulfilled and is still 33%. When this value was compared with the nutritional intake of Turkish weightlifters who competed in the Beijing Olympics, the daily intake of carbohydrates reached 47% and protein 22% (Özdemir, 2010). It can be seen that the difference in protein composition consumed by the sample is only 12.9%. This result should be a concern to the team of coaches and athletes in the future, considering that the impact of protein on the recovery process and development of muscle mass is very significant.

In weightlifting, nutrition is important, especially its effect on performance factors during training or body weight, which will affect where the athlete will compete (Durguerian et al., 2016, 2016; Effects et al., 2019; Siahkoughian et al., 2016; Siahkoughian & Hedayatneja, 2010; Singh et al., 2019). Nutritional intake in accordance with the direction of the expert team will make it easier for athletes to complete each stage of the training (Bindu Malla Scholar et al., 2017; Green, 2018; Papadopoulou & Papadopoulou, 2010; Slater & Phillips, 2011). In other words, the athletes will avoid excessive fatigue caused by nutritional deficiencies. If the athlete has adequate nutrition, the intensity and volume of training that has been designed by the coaching team will have an optimal impact on the athlete's physical development (Burke et al., 2004; Green, 2018; Özdemir, 2010; Penggalih et al., 2017; Serairi Beji et al., 2016; Slater & Phillips, 2011).

The development of a clear and planned strategy by the coaching team towards the target body weight that must be achieved by the athlete will affect TEN planning, which must be followed by the athlete. By planning and reaching target body weight every month, athletes and coaching teams will find it easier to monitor and evaluate training programs so that performance targets match the plan; thus, athletes are expected to achieve top performance at predetermined matches or competitions (Moon, 2013). This approach is expected to minimize strategies by the athletes and coaching teams that considerably reduce athlete's weight in a few days before the match or determination of the match number (Durguerian et al., 2015). Several athletes explained that athletes are asked to lose up to 10 kg of weight less than one week before the competition.

The details of nutrition consumed by the athletes also need to be considered especially in the form of carbohydrates. The athletes are strongly advised to consume carbohydrates before, during and after exercise. This is essential because carbohydrates are one of the body's main energy sources. Before exercising, simple carbohydrate sources can be digested five minutes before competition, which avoids the possibility of reverse hypoglycaemia. During exercise, carbohydrate consumption saves glycogen, delays the onset of fatigue (Spriet, 2019), and results in a lower proinflammatory cytokine index. After exercising, the intake of carbohydrate drinks is very important to accelerate the synthesis of muscle and liver glycogen (Jeukendrup, 2017). Some experts suggest that 7–10 grams/ kg of body weight is the amount of carbohydrates that should be consumed daily.

Another impact of nutritional intake by the athletes is the change in body composition (Ebada, 2013; Garthe et al., 2013). All samples are categorized as obese; this is reasonable because weightlifters have greater advantage if they have lower height but have the maximum body weight. This is advantageous because the shorter is the height of a person, the lighter is the athlete during the weightlifting process. Short arm length helps minimize gravity during the process of lifting the barbell. Therefore, many weightlifters tend to have a relatively shorter height but the maximum body weight (Siahkoughian, 2018).

Body weight has its own qualifications. Good weight in the context of a weightlifter is when an athlete has a greater body composition of muscle mass than fat. Higher muscle mass will increase the lift during weightlifting competitions, which will improve the performance of weightlifters. Therefore, identification of body composition is important to ensure that athlete's weight can improve his lifting performance.

Conclusions

The results of identification of nutrition and body composition of the weightlifters indicate that the athletes sampled in this study can still optimize their performance and achievements. In addition there are still some characteristics that have not been maximized such as nutrition and body composition of the athletes. Therefore, these characteristics need to be more ideal.

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