

Description of body image perception and its relation to nutrient intake in bodybuilders

Mohd Sarli^{1,2*}, Hadi Riyadi¹, Budi Setiawan¹, and Rahmi Dzulhijjah³

¹Department of Community Nutrition, Faculty of Human Ecology, IPB University, 16680 Bogor, Indonesia

²Instalasi Gizi RSUD Arifin Achmad Provinsi Riau, 28115 Pekanbaru, Indonesia

³Nutrition Study Program, Institut Kesehatan Helvetia Pekanbaru, 28115 Pekanbaru, Indonesia

Abstract. Background: The problem of body dissatisfaction affects the perception of body image in bodybuilders. Objective: This study aims to determine the perception of body image and its relationship with nutrient intake in bodybuilders. Methods: A cross-sectional study was conducted involving 70 bodybuilders during the cutting phase of their training. Energy and nutrient intake data were collected through 24-hour Food Recall interviews for 2 days. Muscle mass and fat mass data were obtained by Bioelectrical Impedance Analysis (BIA). Body image perception data using the Bodybuilder Image Grid. Statistical analysis uses Spearman rank analysis. Results: Most bodybuilders were in early adulthood (aged 26-45 years), highly educated, employed in permanent jobs, and had incomes in the high category. The BMI was classified as normal, while the Fat-Free Mass Index (FFMI) in the competitive group was predominantly average, and in the non-competitive group, it was mostly below average. The group of non-competitive bodybuilders felt dissatisfied with their body shape based on fat mass and muscle mass, which was different from the group of competitive bodybuilders who felt satisfied with their body shape based on body fat mass. It was found that carbohydrate intake was associated with body image perception, particularly in relation to fat mass ($p < 0.01$). Conclusions: Bodybuilders want a leaner body (low body fat mass percentage) and muscularity (high muscle mass percentage) by adopting a low carbohydrate and fluid diet.

1 Introduction

Bodybuilding is a sport focused on physical appearance, emphasizing muscle development, and is popular among men [1]. Unlike other performance sports, bodybuilding is judged based on appearance rather than athletic ability. Bodybuilders pose on stage and are evaluated on their muscles [2]. Since bodybuilders spend most of their time shaping and building muscle, nutritional recommendations are essential [3]. However, the increasing desire to be more muscular is associated with eating disorders [4] symptoms of body dissatisfaction [5], and an impact on quality of life [6, 7, 8]. This is related to sports that focus on weight, where

* Corresponding author: mohdsarli.indonesia@gmail.com

eating disorders are more common [4]. This is because weight affects athlete performance, and athletes have a fear of gaining weight, which can lead to the origin of body image and weight-related disorders [4, 8].

Body image perceptions are related to diet and training programs [9]. According to [10], men increasingly experience body image dissatisfaction due to media portrayals of unattainable muscular physiques. Given the socio-cultural emphasis on muscle, many men aspire to represent bodybuilders. The drive for muscle development is evident among boys and men [11].

Generally, existing and previous research examines the relationship between nutritional intake and nutritional status in bodybuilding. However, there has been limited research in Indonesia exploring the relationship between nutrient intake and body image perception in bodybuilding. Bodybuilders undergo two phases before competing, with nutritional intake during the cutting phase often overlooked in comparison to the bulking phase. This is related to the bodybuilder's self-perception, particularly in terms of muscle mass and fat mass. The use of images can provide valuable information to nutritionists regarding body perception during the cutting period. Therefore, we aim to determine the perception of body image and its relationship with nutrient intake in bodybuilders.

2 Materials and methods

A cross-sectional study was conducted using measurement and interview methods during the cutting phase of bodybuilders (bodybuilding cycle for body fat reduction). The research was conducted from January to August 2023. The respondents in this study were men registered with the Bodybuilders Association, Riau Province. Respondents were selected using purposive sampling, with the criteria of engaging in physical activity or exercise related to muscle hypertrophy and were willing to participate as a research sample.

A total of 70 bodybuilders as respondents, consisting of 33 competitive bodybuilder respondents and 37 non-competitive bodybuilders. Competitive bodybuilders are those who are active and or have participated in bodybuilding contests and engage in physical activities or exercises related to muscle hypertrophy. Non-competitive bodybuilders are those who have never participated in bodybuilding contests but engage in physical activities or exercises related to muscle hypertrophy and reducing body fat. Bodybuilder Image Grid (BIG) Scale is an instrument consisting of 30 male figure silhouettes used to measure body image perceptions, particularly among bodybuilders. The BIG Scale participants select four self-perceived figures: (a) representing their current body shape, (b) representing their ideal body shape, (c) representing their most attractive body shape, and (d) representing the most attractive body shape to the opposite sex. In the Bodybuilder Image Grid Scale, body fat percentage increases from left to right, ranging from 3.5% to 36.0%. The Bodybuilder Image Grid instrument used in this study is completely presented in Figure 1.

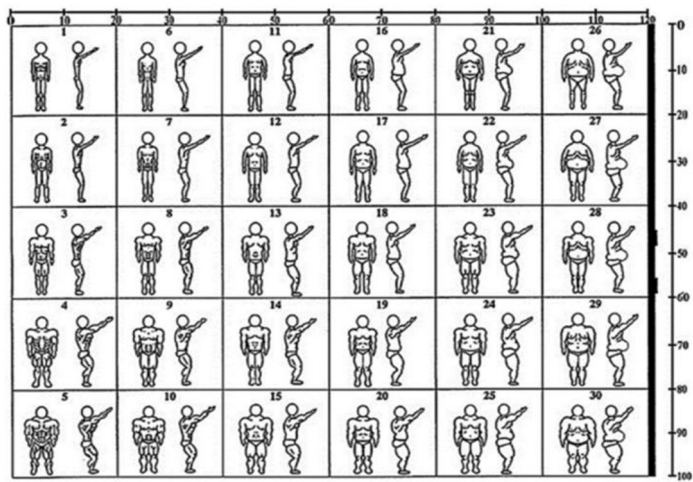


Fig. 1. Bodybuilder Image Grid [12]

3 Results and discussion

The demographic characteristics of the study, based on age, showed that most participants were in early adulthood (26-45 years old). In early adulthood, muscle building behavior is considered to be of high prevalence [13]. This behavior is common among young people, especially early adult men. The majority of respondents in both competitive (100%) and non-competitive (91.9%) groups were highly educated, with at least an elementary education. Participants in both groups were employed in permanent jobs at 60.6% in the competitive group and 78.4% in the non-competitive group. The income of respondents in the competitive group (63.6%) and non-competitive group (56.8%) fell into the high category (\geq UMR Pekanbaru City). Other individual characteristic data, such as BMI, classified 45.5% of the competitive group and 43.2% of the non-competitive group were classified as normal. FFMI (Fat-Free Mass Index) in the competitive group was predominantly in the Average category (24.2%), while the non-competitive group, it was predominantly in the below average category (64.9%).

Fig. 2 shows the percentage of body fat mass in bodybuilders using the Bodybuilder Image Grid Scaled instrument. Perception assessment in BIG has four types of viewpoint categories: current assessment, ideal assessment, most attractive assessment according to oneself, and most attractive assessment according to the opposite sex. The following is Fig. 2, which illustrates the description of body image perception based on fat mass components in bodybuilders using the Bodybuilder Image Grid Scaled instrument.

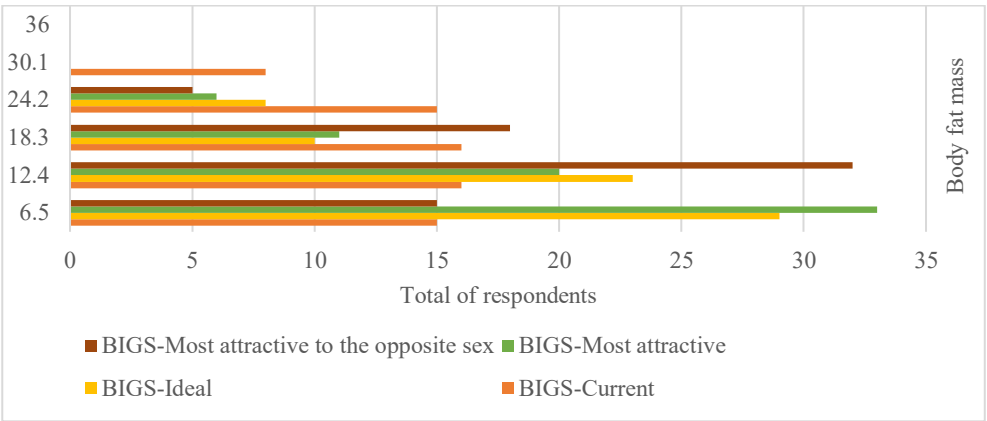


Fig. 2. The description of body image perception based on fat mass components

Based on the current perception assessment for fat mass, respondents chose columns 2 and 3, which have body fat percentages of approximately 12.4% and 18.3%, respectively. For the ideal and attractive body fat percentage according to themselves, most respondents chose column 1, indicating a body fat percentage of around 6.5%. Meanwhile, when assessing body fat percentage from the most attractive perspective according to the opposite sex, most respondents selected column 2 (12.4%).

Body shape dissatisfaction in bodybuilding is associated with other behavioral symptoms, including decreased social activity, work-related issues, strict adherence to exercise and diet schedules, and avoidance of body-exposing activities, such as in the locker room after exercise or swimming [14]. The following is a Fig. 3, which illustrates the description of body image perception based on muscle mass components in bodybuilders using the Bodybuilder Image Grid Scaled instrument.

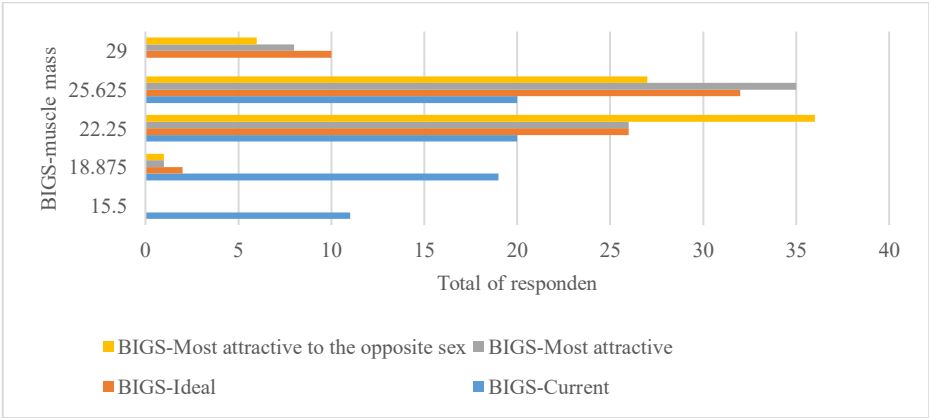


Fig. 3. The description of body image perception based on muscle mass components in bodybuilders

The assessment of respondents' perceptions regarding their current muscle mass, ideal muscle mass, and the most attractive muscle mass, as indicated in line 4, shows that the ideal muscle mass is 25.6%. Meanwhile, when assessing perceptions of the most attractive muscle mass according to the opposite sex, many respondents most often chose line 3, which corresponds to a muscle mass of 22.2%. This indicates that respondents desire a muscular body with increased muscle mass. The goals of recreational bodybuilders differ significantly from those of professional bodybuilders, as they typically strive for a more toned and muscular physique to enhance their self-esteem and self-acceptance [16]. The findings from

the research indicate that personality characteristics observed in both male and female professional and recreational bodybuilders revealed elevated levels of neuroticism, perfectionism, obsession, and a desire for control. Additionally, these bodybuilders exhibit higher levels of depression and anxiety compared to strength athletes who do not engage in bodybuilding [17]. The significant cultural impact on body image emphasizes how societal standards can affect a person's mental health. Western societies, which tend to favor slim physiques, contrast with ideals found in non-Western cultures. Moreover, the results highlight regional differences within the same culture and society that influence perceptions of body image [18].

Based on the Spearman test results analyzing the relationship between nutritional intake and body image perception in bodybuilders, it was found that carbohydrate intake was significantly associated with body image perception, particularly in relation to fat mass ($p < 0.01$). These results are strengthened by the findings of [6], which indicate that bodybuilders during the cutting phase reduce their carbohydrate intake, with some even limiting total carbohydrates.

Table 1. Relationship between nutrient intake and body image perception among bodybuilders.

Variable	Bodybuilders' Body Image Perceptions			
	Components of Fat Mass		Components of Muscle Mass	
	r	p	r	p
Energy Intake	-0.058	0.635	-0.009	0.943
Protein Intake	-0.059	0.628	0.062	0.612
Fat Intake	-0.117	0.335	0.098	0.418
Carbohydrate Intake	-0.253	0.034(*)	0.047	0.701
Fluid Intake	-0.071	0.560	-0.240	0.046*

*Spearman rank analysis. Significant is set at p -value < 0.05 .

Additionally, a relationship was found between fluid intake and body image perception in bodybuilders, specifically in relation to muscle mass. The results of this study differ from those reported in [7], which found no difference in fluid intake between male and female bodybuilding athletes during competition preparation. This discrepancy may be attributed to respondents' belief that reducing fluid intake can help in the formation of dry muscle mass. Respondents indicated that reducing fluid intake during the cutting phase can help build dry muscle. The dry muscles referred to by respondents is the appearance of body curves that seem to have mass. They believe that reducing fluids, including water and foods containing water, is a viable option. There is also an assumption among respondents regarding the use of diuretics to remove water from the body.

4 Conclusion

The findings of this study indicate that bodybuilders desire a leaner body (low body fat mass percentage) and greater muscularity (high muscle mass percentage) by adopting a low carbohydrate and low-fluid diet. It was found that carbohydrate intake was related to the assessment of body image perception based on fat mass ($p < 0.01$). Bodybuilders should adopt a balanced diet and need to meet their fluid requirements.

References

1. M.J. Maier, F.B. Haeussinger , M. Hautzinger, A.J. Fallgatter, A.C. Ehlis, Excessive bodybuilding as pathology? A first neurophysiological classification. World J. Biol. Psychiatry. **18**, 1 (2017). <https://doi.org/10.1080/15622975.2017.1395070>.

2. L.M. Rossow, D.H. Fukuda, C.A. Fahs, J.P. Loenneke, J.R. Stout, Natural bodybuilding competition preparation and recovery: a 12-month case study. *Int J Sports Physiol Perform.* 8,5 (2013). <https://doi.org/10.1123/ijsp.8.5.582>.
3. E. Duiven, L.J.C. van Loon, L. Spruijt, W. Koert, O.M. de Hon, Undeclared doping substances are highly prevalent in commercial sports nutrition supplements. *J Sports Sci Med.* 6,1 (2021).
4. J. Sundgot-Borgen, N.L. Meyer, T.G. Lohman, T.R. Ackland, R.J. Maughan, A.D. Stewart, W. Müller, How to minimise the health risks to athletes who compete in weight-sensitive sports review and position statement on behalf of the ad hoc research working group on body composition, health and performance, under the auspices of the IOC medical commission. *BJSM.* 47, 16 (2013). <https://doi.org/10.1136/bjsports-2013-092966>.
5. J. Chapman & T. Woodman, Disordered eating in male athletes: A meta-analysis. *J. Sports Sci.* 34, 2 (2016). <https://doi.org/10.1080/02640414.2015.1040824>.
6. J.L. Lenzi, E.L. Teixeira, G. de Jesus, B.J. Schoenfeld, V. de Salles Painelli, Dietary Strategies of Modern Bodybuilders During Different Phases of the Competitive Cycle. *J Strength Cond Res.* 35, 9 (2021).
7. A.J. Chappell, T. Simper, M.E. Barker, Nutritional strategies of high-level natural bodybuilders during competition preparation. *J Int Soc Sports Nutr.* 16, 35 (2019). <https://doi.org/10.1186/s12970-018-0209-z>.
8. M.J. Maier, F.B. Haeussinger, M. Hautzinger, A.J. Fallgatter, A.C. Ehli, Excessive bodybuilding as pathology? A first neurophysiological classification. *World J. Biol. Psychiatry.* 18, 1 (2017). <https://doi.org/10.1080/15622975.2017.1395070>.
9. D. Mitchison & J. Mond, Epidemiology of eating disorders, eating disordered behaviour, and body image disturbance in males: A narrative review. *Journal of Eating Disorders.* 3, 20 (2015) :1-7. <https://doi.org/10.1186/s40337-015-0058-y>
10. S. Griffiths, P. Hay, D. Mitchison, J. Mond, S.A. McLean, B. Rodgers, S.J. Paxton, Sex differences in the relationships between body dissatisfaction, quality of life and psychological distress. *Australian dan New Zealand Journal of Public Health.* 40, 6 (2016). <https://doi.org/10.1111/1753-6405.12538>
11. D. Tod, D. Edwards, I. Cranswick. Muscle dysmorphia: Current insights. *Psychology Research and Behavior Management.* 9, 1(2016). <https://doi.org/10.2147/>
12. P.A. Quatromoni, A tale of two runners: A case report of athletes' experiences with eating disorders in college. *Journal of the Academy of Nutrition and Dietetics.* 117, 1 2017.
13. T.C. Pickett, R.J. Lewis, T.F. Cash, Men, muscles, and body image: Comparisons of competitive bodybuilders, weight trainers, and athletically active controls. *British Journal of Sports Medicine.* 39, 4 (2005). <https://doi.org/10.1136/bjsm.2004.012013>
14. B.D. Hale, D. Diehl, K. Weaver, M. Briggs, Exercise dependence and muscle dysmorphia in novice and experienced female bodybuilders. *J. Behav. Addict.* 1, 1 (2013).
15. A. Devrim, P. Bilgic, N. Hongu. Is There Any Relationship Between Body Image Perception, Eating Disorders, and Muscle Dysmorphic Disorders in Male Bodybuilders?. *American Journal of Men's Health.* 12, 5 (2018).
16. C. Davis C & L. Scott-Robertson, A psychological comparison of females with anorexia nervosa and competitive male bodybuilders: body shape ideals in the extreme. *Eating Behaviors.* 1, 1 (2000).

17. V. Swami, L. Steadman, M.J. Tovee. A comparison of body size ideals, body dissatisfaction, and media influence between female track athletes, martial artists, and non-athletes. *Psychology of Sport and Exercise*. **10**, 6 (2009).
18. M. Abdoli, M. Scotto Rosato, A. Desousa, P. Cotrufo, Cultural Differences in Body Image: A Systematic Review. *Social Sciences*. **13**, (6) (2024). <https://doi.org/10.3390/socsci13060305>