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Dietary Strategies of Modern Bodybuilders During Different Phases of the Competitive Cycle

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Abstract

Lenzi, JL, Teixeira, EL, de Jesus, G, Schoenfeld, BJ, and de Salles Painelli, V. Dietary strategies of modern bodybuilders during different phases of the competitive cycle. *J Strength Cond Res* XX(X): 000–000, 2019—Bodybuilders have used a wide array of nutritional strategies over the years. However, most information on the topic is anecdotal, with limited research about the nutritional habits of modern bodybuilders, especially those from new categories. Accordingly, we sought to compare the dietary routines of bodybuilders from the Men's Physique category during "bulking" and "cutting" phases, while attempting to identify the rationale underpinning these practices. Sixteen experienced male bodybuilding competitors were interviewed during bulking (10–12 weeks before competition) and cutting (1 week before competition) phases, wherein we quantified energy and nutrient intake and determined their rationale and sources of education. Dietary analysis revealed a low carbohydrate intake during bulking, with a further decrease (at $p < 0.05$) during cutting. A similar decrease (at $p < 0.05$) from bulking to cutting was shown in the intake of most macronutrients and micronutrients, although intake of protein and almost all the micronutrients was well above the recommendation throughout the competitive cycle. Most of the consumed supplements can be deemed unnecessary or without scientific support. Most athletes reported self-managing their diet and supplement program, without the assistance of nutrition professionals. As such, some of their professed nutritional habits obtained during interviewers were not consistent with the food diary information. Although some dietary strategies used by bodybuilders in the Men's Physique category are consistent with evidence-based practice, most can be considered extreme and lack scientific support. The source of education may help to explain their decision-making.

Key Words: nutrition, bodybuilding, supplementation, competition

Introduction

Unlike most sports, bodybuilding is judged based on physical appearance and structure whereby top placings require high degrees of muscularity and symmetry combined with low levels of body fat. Bodybuilders historically have used different strategies to achieve these outcomes (17,19). These strategies invariably involve rigorous exercise practices, such as endurance and resistance training, as well as dietary manipulations including energy restriction and supplementation that correspond to the given phase of an athlete's competitive cycle (3,23,34).

The 2 primary phases of a bodybuilder's competitive cycle are termed "bulking" and "cutting." Bulking takes place at the beginning of contest preparation, which typically extends until approximately 12–16 weeks before competition. During this phase, the athlete's diet usually contains more calories, mainly derived from a greater consumption of carbohydrate and protein (17,19). On the other hand, the cutting phase is initiated during approximately the last 2 months leading up to competition. Here, athletes typically use energy-deficient and nutritionally imbalanced diets in an effort to reduce body fat and highlight muscle definition (12). However, these strategies are commonly guided by the bodybuilder's practical experience and "gym lore" in the absence of scientific evidence, which may predispose him to undesirable health or performance consequences (27).

Curiously, current literature examining the dietary intake of bodybuilders is limited, and thus, the specific dietary strategies used by these athletes and their underpinning rationale remain poorly understood (27). A recent systematic review (30) comprising 18 studies showed that the average caloric intake during bulking presented the highest values (184 $kJ \cdot kg^{-1} \cdot d^{-1}$), while the lowest values were observed during cutting (123 $kJ \cdot kg^{-1} \cdot d^{-1}$). Similarly, it was demonstrated that mean carbohydrate intake was higher during bulking than during cutting (5.3 vs. 3.8 $g \cdot kg^{-1} \cdot d^{-1}$, respectively). Fat consumption was already below the recommended dietary allowances (RDAs) during bulking, and even lower during cutting (28 and 14% of daily energy consumption, respectively). On the other hand, mean protein intake remained relatively constant between the competitive periods ($\sim$2.5 $g \cdot kg^{-1} \cdot d^{-1}$), although it was substantially above RDA. Consumption of micronutrients such as folate, vitamins B6, C, and A exceeded the RDA by more than 1,000%, while others such as calcium, magnesium, and zinc were consumed in amounts substantially below RDA guidelines (30).

Although this review (30) provides interesting insights into dietary practices of competitive bodybuilders, the authors acknowledged that the quality of the included studies was generally

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poor and highlighted the need for further investigation into the topic given that only 3 of the studies were published in the past decade. In addition, a majority of the studies failed to specify the subjects' phase of training, and most neglected to account for the contribution of dietary supplements to food consumption, thereby compromising the accuracy of the analyses. Finally, the growing popularity of the sport has led to the creation of new categories, such as Men's Physique (aimed for male competitors seeking a more athletic-looking physique, in which the physical beauty, muscle symmetry, and aesthetic care, as well as stage presence, are the primary determinants in the judges' evaluation). As such, information about the nutritional strategies of athletes in these new categories is lacking.

Identifying the nutritional strategies adopted by modern bodybuilders during different phases of the competitive cycle and exploring their underlying rationale may provide nutrition professionals and sports scientists with better insight into the practices currently used in bodybuilding, which in turn can help to develop prescriptions for achieving results more effectively and with greater safety. Therefore, the purpose of this study was 2-fold: (a) to evaluate the dietary intake and supplement use of individuals competing in the Men's Physique category 10–12 weeks (i.e., bulking phase) before the competition and to compare these behaviors with findings 1 week before competition (i.e., cutting phase) and (b) to elucidate the rationale underpinning the nutritional practices adopted by these athletes, as well as the sources of education from which these practices were obtained.

Methods

Experimental Approach to the Problem

To investigate the problem, we performed a prospective study with a quasi-experimental design. Interviews were conducted by a member of the research team, in which subjects completed an in-person questionnaire describing their dietary and training habits throughout contest preparation (bulking and cutting). Height and body mass in these 2 different time points were also determined using a Health-O-Meter Professional scale (Model 500 KL; Pelstar, Alsip, IL, USA). Notes were taken during all interviews to identify the rationale underpinning the nutritional practices adopted by the athletes, as well as who was responsible for their nutritional counseling. Transcripts of the interview were provided to subjects to verify that the transcription accurately reflected their beliefs; any inaccuracies were subsequently corrected. The assessment initially occurred during the 10–12 weeks before the competition and was repeated 1 week before the contest.

Subjects

Sixteen experienced male physique competitors took part in the study. To participate, athletes were aged between 19 and 40 years old and had to be actively competing in bodybuilding championships in the Men's Physique category. Five subjects were national-level athletes, and the remaining 11 were competing in official state-level competitions at the time of data collection. Subjects without previous competitive experience were excluded from the study. Subjects' baseline characteristics are presented in Table 1. Nine subjects were physical education professionals, while the remaining subjects reported involvement in other non–fitness-related professions (systems analyst, business administrator, sales manager, etc). All subjects were fully informed of the study's potential risks and discomforts before providing their written informed consent. The study was approved by the Paulista University review board (approval number—87576218.4.0000.5512).

Table 1
Subjects' characteristics.*

Variables	
Age (y)	29 ± 6
Body mass at bulking (kg)	87.50 ± 09.27
Body mass at cutting (kg)	77.25 ± 04.31†
Height (m)	1.77 ± 0.06
BMI (kg·m^{-2})	28.04 ± 2.61
Training frequency (d·wk^{-1})	6 ± 1
Training experience (y)	8 ± 4
No. of contests in Men's Physique	4 ± 3

*BMI = body mass index.
†Refers to a significant difference compared with body mass at bulking (p = 0.0003).

Procedures

Nutritional Intake Analysis. Nutritional intake was assessed by three 24-hour food diaries undertaken on 3 separate days (2 weekdays and 1 weekend day), facilitated by a visual aid photo album of real foods. The diaries were completed both during bulking and cutting phases. The diaries were checked during the interviews by the research team, and subjects were questioned as to any perceived inconsistencies. Before completing diaries, subjects received training in how to properly record their nutritional intake in accordance with previously tested protocols (29). The absolute and relative energy, and the macronutrient and micronutrient intake were analyzed using nutritional software (Virtual Nutri, São Paulo, Brazil).

Statistical Analyses

Data were tested for normality using the Kolmogorov-Smirnov test and treated for basic descriptive statistics. Paired T-tests were used to compare body mass and nutritional intake variables between bulking and cutting. Effect sizes (ESs) were calculated using Cohen's d. Qualitative descriptors for ES interpretation were assigned as follows: <0.2, negligible effect; 0.2–0.39, small effect; 0.40–0.75, moderate effect; and >0.75, large effect. The 95% confidence interval (95% CI) was reported for energy and macronutrient intake. Data analysis was conducted in SAS 9.3 software. The level of significance was established a priori at $p \leq 0.05$.

Results

Body Mass, and Energy and Macronutrient Intake

Body mass significantly decreased from bulking to cutting phases (Table 1; p = 0.0003, ES = −1.41, 95% CI = −2.22 to −0.62). Absolute and relative energy and macronutrient intake are presented in Table 2 as per self-reported food records. A significant decrease occurred from bulking to cutting phases in absolute and relative energy intake (respectively, p = 0.003, ES = −0.93, 95% CI = −1.69 to −0.18; and p = 0.037, ES = −0.61, 95% CI = −1.35 to −0.12), absolute and relative fat intake (respectively, p = 0.010, ES = −0.79, 95% CI = −1.54 to −0.05; and p = 0.041, ES = −0.59, 95% CI = −1.33 to 0.14), and absolute and relative protein intake (respectively, p = 0.003, ES = −0.86, 95% CI = −1.61 to −0.12; and p = 0.051, ES = −0.44, 95% CI = −1.17 to 0.28). However, absolute and relative carbohydrate intake was

Table 2
Absolute and relative energy and macronutrient intake during bulking and cutting.*†

	Bulking	Cutting	ES	p
Energy (kJ)	13,553 ± 5,176	9,554 ± 3,166	−0.93	0.003
Energy·bw^{-1} (kJ·kg^{-1})	156.48 ± 60.47	124.19 ± 42.68	−0.61	0.037
CHO (g)	261.23 ± 172.02	178.29 ± 119.39	−0.56	0.128
CHO·bw^{-1} (g·kg^{-1})	2.98 ± 1.88	2.30 ± 1.54	−0.39	0.300
CHO (% total energy)	29.55 ± 9.35	29.21 ± 19.46	−0.02	0.948
PRO (g)	357.89 ± 89.62	273.29 ± 105.40	−0.86	0.001
PRO·bw^{-1} (g·kg^{-1})	4.16 ± 1.28	3.56 ± 1.43	−0.44	0.051
PRO (% total energy)	47.20 ± 10.46	49.11 ± 14.58	0.15	0.645
FAT (g)	79.44 ± 45.22	49.09 ± 29.12	−0.79	0.010
FAT·bw^{-1} (g·kg^{-1})	0.92 ± 0.53	0.64 ± 0.39	−0.59	0.041
FAT (% total energy)	21.41 ± 7.22	19.31 ± 10.40	−0.23	0.525

*ES = effect size; CHO = carbohydrate; PRO = protein.
†Data are expressed as mean ± *SD*.

similar across phases (respectively, $p = 0.128$, ES = −0.56, 95% CI = −1.29 to 0.17; and $p = 0.300$, ES = −0.39, 95% CI = −1.12 to 0.33). Despite wide heterogeneity, no significant changes occurred from bulking to cutting phases in the consumption of these nutrients as a percentage of total energy intake (all $p > 0.05$).

Micronutrient Intake

The consumption of fat-soluble and water-soluble vitamins, as well as minerals, was highly variable among subjects; the data are presented in Tables 3 and 4, respectively. Significant decreases (at $p < 0.05$) were noted from bulking to cutting phases for water-soluble vitamins B1, B2, and B9, while vitamin A was the only fat-soluble vitamin that decreased during this period. All minerals, except for selenium and sodium, significantly decreased (at $p < 0.05$) from bulking to cutting.

Nutritional Supplements

All athletes reported using nutritional supplements. Protein supplements (albumin and whey protein) were the most frequently consumed (81.2%), followed by branched-chain amino acids (BCAAs) and glutamine (68.8%), multivitamin/mineral complex supplements (56.3%), and omega-3 fatty acids (37.5%). Only 5 and 4 of the 16 subjects reported using creatine and caffeine, respectively (mainly as preworkout supplements). Approximately 56.3% of the subjects reported monthly nutritional supplement expenses between US $70 and US $120, while the remaining subjects reported expenses in excess of US $120.

Self-Reported Rationale and Sources of Education for Nutritional Intake

The majority of the athletes (81.2%) stated they used hypercaloric diets during their bulking phase, with the prevailing rationale that this phase required “greater energy to maintain quality/performance during training sessions.” Some of the responses also included “greater support for muscle anabolism, since muscle definition work will come later.” To achieve these stated goals, all subjects declared they increased consumption of carbohydrate- and protein-containing foods, while keeping fat consumption constant.

During the cutting phase, all subjects stated they used hypocaloric diets, based on the rationale that “they needed to improve muscle definition, and for that, it was necessary to decrease body fat while maintaining muscle mass.” In this phase, 10 of 16 stated they increased protein intake, while the other 6 stated they slightly decreased protein consumption. All subjects stated they decreased carbohydrate intake, with 5 of 16 professing to total carbohydrate restriction during cutting. Four athletes said they adopted a ketogenic diet, while 1 reported engaging in intermittent fasting during this period.

Of note, 5 of 16 athletes self-reported succumbing to an eating disorder in the past, with 4 confessing to a binge eating disorder, and the other admitting a body dysmorphic disorder. Only 6 of the 16 subjects sought the assistance of nutrition professionals to aid in their diet and supplement programming. The majority of the remaining athletes reported self-managing their diet and supplements under the premise that they had training in the physical education realm, while some engaged the use of bodybuilding coaches for this purpose. Bodybuilding, strength and conditioning websites, and forums were also reported as sources of nutritional education.

Discussion

Because of the need to achieve a lean, defined, and muscular body, bodybuilders resort to various dietary strategies that tend to vary according to their competitive cycle, practices that may or may not have scientific rationale. The paucity of information on the dietary intake of bodybuilders is especially notable over the past decade, and currently, no information exists on the topic for those competing in the new bodybuilding categories such as Men’s Physique. In this novel study, we fill important gaps in the

Table 3
Daily vitamin intake during bulking and cutting.*†

	Bulking	Cutting	ES	p
Vit A (μg)	594.20 ± 426.71 (32.5–1,494) [66.0%]	272.30 ± 319.30 (0–937.6) [30.2%]	−0.85	0.020
Vit D (mg)	4.70 ± 4.96 (0–13.75) [94.0%]	6.64 ± 9.96 (0–32.45) [132.8%]	0.24	0.448
Vit E (mg)	10.02 ± 13.69 (0–46.74) [66.8%]	6.51 ± 6.69 (0–23.12) [43.4%]	−0.32	0.292
Vit C (mg)	174.14 ± 114.55 (70.04–429.16) [193.3%]	162.24 ± 311.14 (0–1,173.04) [180.3%]	−0.05	0.989
Vit B1 (μg)	2.32 ± 1.40 (0.51–5.79) [193.3%]	1.26 ± 0.62 (0.44–2.61) [105.0%]	−0.97	0.006
Vit B2 (μg)	3.24 ± 1.51 (1.05–5.90) [249.2%]	1.44 ± 1.26 (0.04–3.85) [110.8%]	−1.29	0.0002
Vit B3 (mg)	135.40 ± 48.94 (55.97–39.21) [846.2%]	114.35 ± 57.74 (39.21–282.28) [714.7%]	−0.39	0.282
Vit B6 (mg)	4.28 ± 4.35 (0.19–12.65) [327.7%]	3.41 ± 3.57 (0–13.41) [262.3%]	−0.21	0.263
Vit B9 (μg)	150.59 ± 111.10 (0–363.26) [37.6%]	69.26 ± 119.75 (0–464.04) [17.3%]	−0.70	0.001
Vit B12 (μg)	5.34 ± 3.18 (1.04–10.79) [213.6%]	4.76 ± 4.92 (0–16.33) [190.4%]	−0.14	0.637

*ES = effect size; RDA = recommended dietary allowance.
†Data are expressed as mean ± *SD*, (range: minimum to maximum individual values) and [mean %RDA].

Table 4
Daily mineral intake during bulking and cutting.*†

	Bulking	Cutting	ES	*p*
Zinc (mg)	26.75 ± 14.86 (6.19–46.26) [243.5%]	14.86 ± 8.61 (5.78–30.46) [135.1%]	−1.16	0.002
Selenium (mg)	233.10 ± 254.95 (22.50–1,115.70) [423.8%]	169.54 ± 185.81 (0–670.69) [308.2]	−0.28	0.129
Potassium (mg)	5,069 ± 1,473 (2,273–7,320) [107.85%]	3,529 ± 1,420 (1,072–5,746) [75.1%]	−1.06	0.001
Magnesium (mg)	551.84 ± 247.60 (222.68–1,041.76) [131.39%]	300.07 ± 148.72 (104.10–524.17) [71.44%]	−1.23	0.0001
Sodium (mg)	1,878.69 ± 1,349.44 (90.20–5,657.54) [125.2%]	1,591.36 ± 1,175.00 (321.58–4,861.37) [106.1%]	−0.22	0.286
Calcium (mg)	718.74 ± 489.53 (109.51–1,660.73) [71.9%]	426.97 ± 340.70 (30.97–1,064.74) [42.7%]	−0.69	0.009
Iron (mg)	24.90 ± 17.12 (8.35–70.87) [311.2%]	13.05 ± 7.15 (2.07–33.37) [163.12%]	−0.90	0.009
Phosphorus (mg)	3,201.43 ± 861.34 (1,477.37–4,567.53) [320.1%]	2,288.43 ± 849.27 (1,291.91–4,037.02) [228.8%]	−1.06	0.0003

*ES = effect size; RDA = recommended dietary allowance.
†Data are expressed as mean ± *SD*, (range: minimum to maximum individual values) and [mean %RDA].

literature by providing insight into the dietary strategies of state- and national-level competitive bodybuilders in the Men's Physique category. Our results suggest there is a cause for concern about some of the used nutritional approaches because these are outside of generally prescribed evidence-based guidelines.

Mean energy intake during the bulking phase was shown to be within international recommendations (21), both on an absolute (13.5 ± 5.2 MJ·d^{-1}; 3,239 ± 1,237 Kcal·d^{-1}) and relative (156.5 ± 60.5 KJ·kg^{-1}·d^{-1}; 37.4 ± 14.4 Kcal·kg^{-1}·d^{-1}) basis. Moreover, the mean energy intake of subjects during bulking was in accordance with previous systematic reviews (30), with an absolute intake exceeding 13 MJ·day^{-1}, which is comparable with that of Rugby and Olympian Australian athletes (4,25). Nevertheless, 4 of the 16 athletes in the current study had a mean absolute energy intake below 116 kJ·kg^{-1}·d^{-1}; an amount considered inadequate according to the international recommendations for their age, body mass, and physical activity level. Maintaining an adequate energy intake when bulking may be of particular relevance because most of the athletes usually report (12) an increase in their training volume and intensity during this phase of the competitive cycle, and decreased energy availability has been shown to blunt accretion of fat-free mass or even result in a loss of lean tissue (18). Curiously, these same 4 athletes reported self-managing their diet and supplement intake without any professional help. On the other hand, all the 16 athletes presented a decreased absolute (−24%; 9.5 ± 3.2 MJ·day^{-1}; 2,283 ± 756 Kcal·day^{-1}) and relative (−13%; 124.2 ± 42.7 KJ·kg^{-1}·day^{-1}; 29.7 ± 10.2 Kcal·kg^{-1}·day^{-1}) energy intake during their cutting phase compared with bulking, which is also in agreement with previous reports (7,34) and systematic reviews (30), as athletes attempt to reduce body fat as low as possible just before competition. Such decreases in energy intake during cutting may help to explain the substantial reduction in body mass (−10.25 ± 6.47 kg; −11.16%) compared with bulking, whose decrease is also closely associated with other recent observations (7).

Evidence indicates that the speed of weight loss has an impact on the maintenance of fat-free mass. For example, some studies show a greater fat-free mass preservation with slower vs. faster weight loss, leading to a recommended weekly loss of 0.5–1% of body mass (11). The estimated weight loss in the present investigation of 0.93% per week aligned with this recommendation, which may have favored the preservation of fat-free mass, although this cannot be confirmed in the present investigation, since body composition was not assessed. Hence, the approach of Men's Physique competitors to energy intake and weight loss during different phases of the competitive cycle seems to be consistent with current evidence-based practice.

Of the macronutrients, only relative fat intake (21.4% of total energy) was within the international recommendations (21) and in agreement with systematic reviews (30) during bulking, although 6 of the 16 subjects failed to meet recommendations during this phase of the competitive cycle. Thirteen of the 16 athletes in the current study decreased their absolute fat intake from bulking to cutting phases, and hence, only 7 of 16 athletes met international recommendations immediately before competition. Despite the ~40% mean decrease in absolute fat consumption when cutting, its intake still accounted for ~19% of total energy consumed during this phase. This maintenance of relative fat intake from bulking to cutting may be explained by the observed decrease in the other macronutrients intake that occurred across phases. In addition, the reported adoption of ketogenic diets by some of the athletes during the cutting phase may also have contributed to the findings because these diets focus on reducing carbohydrates while keeping fat consumption high (33).

Protein intake when bulking was far above the American College of Sports Medicine recommendation (32) for all the athletes, and it was in agreement with the athletes' perceived habits stated during in-person interviews, as well as with previous investigations that assessed protein intake during this competitive phase (7,30,34). Despite recent evidence supporting the consumption of high-protein diets to further stimulate muscular hypertrophy (1,2), the mean intake of 4.16 g·kg^{-1}·d^{-1} in the current study substantially exceeds recent evidence-based recommendations showing that protein consumption beyond 1.62 g·kg^{-1}·d^{-1} does not further enhance resistance training-induced gains in fat-free mass (28,32). Notably, protein from supplements was not included in our calculations. Hence, it can be inferred that all the athletes had a protein consumption well above their muscle-building needs. These findings are unsurprising given that most athletes did not consult with nutrition professionals.

Despite most athletes stating in the personal interviews that they increased protein intake during cutting, statistical analysis from the food diaries showed the opposite, where 14 of the 16 athletes in fact decreased their protein intake, leading to a ~23 and ~13% mean reduction in absolute and relative protein intake, respectively. Even so, relative energy intake from protein remained unchanged and above international recommendations during cutting. High-protein diets have been advocated as a strategy to spare fat-free mass during energy restriction periods (32,35), In fact, a recent systematic review (18) suggests that a protein intake of 2.3–3.1 g·kg^{-1} of fat-free mass is potentially beneficial for lean athletes during periods of energy restriction. Therefore, the high protein consumption adopted by subjects during cutting might be a sound strategy to prevent a loss of muscle mass, although the absolute intake reported seems to be far above what is necessary to accomplish this goal. Moreover, recent evidence indicates that high-protein diets show a reduced efficacy in preserving fat-free mass as the magnitude of an energy deficit increases (6).

During bulking, almost all the athletes self-reported an increased carbohydrate intake. However, food diary analysis showed that mean carbohydrate intake was actually below international recommendations (6–10 $g \cdot kg^{-1} \cdot d^{-1}$) (32), with only 2 athletes meeting the recommended intake. Bodybuilders commonly aim to improve training volume to support increases in muscle mass during bulking (12). As such, an increased carbohydrate intake (~5 $g \cdot kg^{-1} \cdot d^{-1}$) during this phase is a hallmark of previous studies (3,7,23,30) consistent with evidence suggesting that carbohydrate availability influences resistance training performance (8,16). Hence, the low-carbohydrate availability during bulking noted by subjects in the current study should be considered counterproductive to achieving the goals of this phase. This is of particular concern considering that athletes may include aerobic exercise as part of their daily training protocol (15), which in turn could promote a greater decrease in muscle glycogen and thus further compromise resistance training performance (24). It is difficult to reconcile discrepancies between the athletes' perception of their intended behaviors vs. their actual nutritional practices relating to carbohydrate intake. It is conceivable that an involuntary change in subjects' eating habits may be a knee-jerk response to recent criticisms of high-carbohydrate diets (9). Another potential explanation may be related to shunning the advice of sports nutritionists as a source of education in favor of anecdotal evidence. Interestingly, although all the athletes stated an intent to decrease carbohydrate from diet during cutting, with some of them even claiming total carbohydrate restriction, food diary analysis showed that only 8 of the 16 athletes, in fact, reduced carbohydrate intake across the competitive phases. This may explain the lack of significant changes in both relative and absolute carbohydrate intake, despite the moderate ~32% mean decrease in absolute intake.

The only fat-soluble vitamin that significantly changed from bulking to cutting was vitamin A. On the other hand, except for ascorbic acid, niacin, and piridoxin (i.e., vitamins C, B3, and B6, respectively), all the other water-soluble vitamins significantly decreased across the competition phases. Strikingly, except for vitamin D, which was within adequacy (21) during bulking, and vitamins A, E and B9, which were below, most of the other vitamins were well in excess of prescribed adequacy (~200–800% above the RDA). An intake substantially above the RDA for some of the vitamins is in agreement with previous systematic reviews (30). Even with a decreased intake of some of these vitamins during cutting, most subjects remained within or above recommendations, except for vitamins A, E, and B9. Intake of niacin was above the upper limit across the competitive cycles. Of note is that these calculations were determined without taking into account the use of multivitamin supplements. These findings call into question the use of multivitamin supplements by most Men's Physique competitors. Mineral intake followed a similar behavior to that of vitamins, whereby only selenium and sodium did not significantly decrease from bulking to cutting phases. Nevertheless, except for calcium and potassium, which were below and within adequacy (21), respectively, all the other micronutrients were in excess of prescribed needs (~130–400% above the RDA) during bulking. Similarly, except for potassium and calcium, micronutrients remained either within or above adequacy during the cutting phase.

Protein supplements were used most often by athletes in this study. Given their extremely high protein intake from whole foods, the benefit of consuming supplemental protein is highly questionable. Amino acids, such as glutamine and BCAA, ranked second among the most-used supplements. These practices are dubious given that the prevailing body of evidence fails to support the use of either glutamine (20,22) or BCAA (10,36) for improving body composition. Moreover, any potential benefits would seemingly be nil considering the athletes' very high protein intake from diet and protein supplements. On the other hand, a minority of athletes reported supplementing with creatine and caffeine, which are among the few nutritional supplements scientifically recognized to improve resistance training performance (5,13,14,22,31). Once again, the athletes' sources of education may be a potential reason explaining these inconsistent behaviors.

Dietitians/sport nutritionists were not identified as primary sources of education/information by most of the athletes surveyed, which may help to explain the deviations from evidence-based practices such as low-carbohydrate and high-protein diets across the different competitive cycles, the excessive intake of many micronutrients, the use of various unnecessary nutritional supplements or those lacking scientific support, and mainly, the inconsistency between their food diary and self-report analysis. These findings suggest that physique athletes might benefit from seeking the assistance of nutritional professionals to help manage their nutrition/supplementation planning.

A limitation of the present investigation was its somewhat small sample size, which reduced statistical power to draw probabilistic inferences. Moreover, the use of 24-hour food diaries can be considered a potential limitation because this method is commonly associated with an underreporting and overreporting of some nutrients in non-bodybuilding populations (26,29). However, bodybuilders are known for their meticulous nutritional tracking and rigorous adherence to dietary plans (17). Hence, underreporting or overreporting may have been minimized, but perhaps not completely eliminated since a small number of subjects in the current study reported some type of eating disorder in the past. Still, the prevalence of underreporting or overreporting on self-report food diaries within the bodybuilding population is currently unknown and should be clarified. In addition, the only exercise variable assessed was the frequency of resistance training; all other indices of resistance and aerobic training programming were not reported, so it is unknown how they may be related to the athletes' dietary intake and energy expenditure. Finally, we did not collect information as to the use of anabolic steroids and other illegal muscle-building compounds. Thus, it remains to be determined as to whether and to what extent such use influences nutritional practices.

Practical Applications

Although some dietary strategies used by bodybuilders in the Men's Physique category are consistent with evidence-based practice, most can be considered extreme methods that lack scientific support and do not illustrate their self-reported intention. This may be partially explained by their sources of information, which relies more on personal experience and anecdote than research and the advice of trained nutritional professionals (i.e., dietitians). Future studies examining the dietary strategies of competitors in the new bodybuilding categories at multiple moments during the competitive cycle are needed to further our understanding of their practices and to help them achieve their goals more effectively and safely.

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