Review and Commentary of the Nutritional Recommendations, Weight Management Regulations, Weight Management Practices, and the Potential of Disordered Eating Patterns in High School Age Wrestlers

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ABSTRACT
The purpose of this article is to review the nutritional recommendations, the weight management practices, and the weight management regulations of high school wrestlers. Serving as a commentary on how these influences coupled with the perceived demand for lean body composition for better performance can relate to disordered eating patterns in high school wrestlers. Wrestling creates a high caloric demand while at the same time wrestlers practice restrictive dietary behaviors. Extreme weight loss behaviors performed by wrestlers have been observed. Nutritional recommendations are primarily made by athletic coaches who are not properly trained in nutrition and weight management. This can lead to the acceptance by the wrestler to practice poor behaviors related to food and nutrition. There is a need to properly evaluate and educate the coaches and athletes on nutrition, and weight management. Such education is necessary for the health of the athlete as they progress through the season, and through growth and development.

Keywords: wrestling, sport nutrition, eating disorders, high school athletics

INTRODUCTION

Wrestling is a combat sport that uses weight categories, or weight classes that each wrestler competes within. Wrestlers can expend an extensive number of calories through practice, workouts, and competitions. Many wrestlers participate in unhealthy weight management practices to be able to compete at certain weight classes with

the hope of improved performance. Some of these behaviors may lead to health-related problems as the wrestler continues to participate in poor behaviors during growth and development. Common unhealthy weight loss techniques include reduced caloric intake, increased energy expenditure, diet restrictions, and other methods that can be unorthodox (8). The potential to develop disordered eating patterns or distorted body-image may result from the weight management behaviors that wrestlers practice. Depending on the athlete's goals, the extreme diet restrictions coupled with the increase expenditure can last for several months, and become problematic to the health status of the athlete. With the tremendous negative balance of caloric intake and exercise expenditure wrestlers face, it is crucial for this group of athletes to meet their estimated energy requirements to ensure proper recovery, help retain muscle mass, help prevent injuries, improve performance, and to ensure proper growth and development. This article reviews literature to investigate the nutritional recommendations, weight management practices, weight management regulations, and dietary behavior of high school age wrestlers. Also, serving as an expert commentary to bridge the gap between current weight management regulations and the products of the strict competitive nature of the sport.

REVIEW OF LITERATURE

Investigating nutrition recommendations for athletes and specifically weight class athletes, such as wrestlers, is important for a better understanding of the potential behaviors. To provide proper nutrition counseling it is crucial to review evidence based recommendations for nutrition and weight management for this sport.

Sport Nutrition Recommendations

Nutrition plays a crucial role in any athletes' performance, nevertheless, there is not one specific diet that proves to be beneficial for all athletes. Just like the average person, each athlete has body size specific and individualized needs. Athletes have increased energy and water requirements compared to sedentary individuals (16). Dietary intake should be well balanced to ensure proper health. The body utilizes carbohydrates, proteins, and fats to produce energy for the body (10). These are the macronutrients that are crucial for performance. Adequate calorie consumption to support periods of rapid growth is of greatest concern when considering nutrition to maximize performance of adolescent athletes (15). It has been reported that although young athletes generally have adequate protein intake they often do not consume enough carbohydrates, and have suboptimal hydration status both before and during training (6). Figure 1 illustrates the estimated energy requirements for high activity athletes defined as 3-4 hours of exercise a day for 5-6 days a week (7).

Carbohydrates

Carbohydrates are the body's initial and readily available energy source supplying glucose molecules circulating in the blood or being stored as glycogen in muscle cells and the liver (16). It is important for athletes to consume adequate amounts of carbohydrates so that the body does not begin to utilize body tissues as an energy source. Carbohydrate deficit can cause the body to burn more calories, and lead to catabolizing lean muscle mass as an energy source (16). Restricting carbohydrates in the diet is a practice that is common among wrestlers who are trying to lose weight (8). A diet deprived of carbohydrates will lead to depleted glycogen stores, and the body will not recover properly (10). Depleted stores of glycogen will lead to utilizing fat and protein as an energy source quicker than if the body had adequate glycogen stores (16). The body will initially burn stored fat, but then muscle proteins will be compromised for energy. This can negatively affect the athlete's performance, as well as, increase the potential for early fatigue or injury (1).

Protein

While some athletes believe that high protein intake correlates with increased muscle mass research shows that this is not the case (16). Rather, training with adequate intake of protein is what provides increased muscle mass. Dietary proteins are the building blocks for the muscle growth (16). Nevertheless, there is a threshold on protein synthesis (18). This means that if an athlete is training and consumes excessive protein the body will only utilize the protein to satisfy its needs, and will not store the excess protein in similar fashion as glucose stored as glycogen. In addition, excessive protein intake can be stressful to the kidneys requiring more intracellular water stores to help with filtration which may cause the body to become dehydrated (9). Excessive protein can also lead to digestive

problems and decrease appetite (16). While there is a need for adequate protein intake often athletes in the United States exceed their body's needs (16).

Fats

The dietary recommendations of fat intake for athletes are similar to non-athletes (15). It is important that athletes have adequate fat intake to promote health; by maintaining energy balance, replenishment of intramuscular triacylglycerol stores, and adequate consumption of essential fatty acids (7). Dietary lipids are essential for absorption of fat-soluble vitamins A, D, E and K, as well as, synthesis of cholesterol and other sex specific hormones (15). Generally, it is recommended that athletes consume a moderate amount of fat, or about 30% of their daily caloric intake (7). For athletes attempting to decrease body fat, such as wrestlers, it has been recommended that they consume 0.5 – 1.0 grams/kilogram/day of fat (7). The reasoning for this is that some weight loss studies indicate that individuals who are most successful in losing weight and maintaining the weight loss are those who ingest less than 40 grams of fat in their diet (7). Fat intake should consist of heart healthy fats such as a variety of unsaturated fatty acids to promote health. Wolfram (20) recommends including fatty fish such as tuna, salmon, sardine, and trout as sources of healthy fats. Other sources highlighted by Wolfram (20) include walnuts, flaxseed, canola oil, olive oil, and avocados.

Water

Water is the most crucial aspect of performance and recovery for any athlete. Although, water does not provide any calories, water is the medium that the body uses to help communicate between cells, and helps control body temperature (16). It is essential to have adequate water intake for optimal performance. If water is lost and not replaced the dehydrated athlete may suffer from heat exhaustion, heat stroke or have increased risk of injury due to fatigue (16). Recommendations suggest that during exercise drinking eight ounces of hydrating fluid or one cup every twenty minutes is ideal. After exercise, two cups of water are needed to replace every pound of weight lost (16). Latest science recommends that athletes monitor urine color to stay on top of their hydration status aiming for a lemonade colored urine.

Vitamin and Minerals

It is also very important for athletes to meet vitamin and mineral requirements. However, physical activity does not increase the need beyond what is supplied through diet (16). As activity increases so does the demand for food, and in turn the demand for vitamins and minerals. Diet alone can usually meet increased needs rather than supplements. The loss of sodium and potassium is increased due to heavy sweating, but sodium is plentiful in our diet (16). The use of salt tablets is not recommended (16). Potassium can be supplied by including potassium rich foods in the diet. For example, avocados, spinach, sweet potatoes, or bananas. Adequate intake of calcium will ensure optimal bone health, muscle health, help prevent fractures, and help with proper growth and development.

Weight Management Regulations

Coaches and wrestlers often believe that the best wrestling weight is below the wrestler's preseason weight to achieve a competitive advantage (4). To compete at the lowest possible weight class, wrestlers have been known to use unsafe weight loss practices including excessive vigorous exercise, fluid restriction, wearing vapor-impermeable suits, staying in hot environments, laxatives, emetics, diuretics, and even self-induced vomiting (4). These practices can have a negative impact on cardiovascular function, thermal regulation, renal function, electrolyte balance, body composition, muscular endurance, and strength. Weight management regulations are somewhat of a new development beginning in 1997 in collegiate amateur wrestling after the death of three healthy collegiate wrestlers (4). Gibbs et al. (4) stated that the wrestlers relied on rapid weight loss methods which promoted dehydration through perspiration. In addition to severely restricting food and liquid intake, the athletes increased their water loss with the use of vapor-impermeable suits while wrestling, or workout out in heated environments. In all three cases, this led to multiorgan failure (4).

There are now regulations in place to help prevent poor weight management practices in high school wrestling (11). Each state sets its own standards, but state associations typically follow the rules established by the National

Federation of State High School Associations, or NFHS. The change implemented now requires wrestlers to be assessed before the start of the season. At that time, each athlete's current weight and body fat percentage will be recorded, and a safe minimum weight is determined (11). The California Interscholastic Federation uses bioelectrical impedance scales to determine each wrestler's body fat percentage. A refractometer is utilized to determine hydration levels through analysis of urine. Once the certified minimum weight is determined, each individual's body fat percentage is considered. If body fat percentage is above 7% then the bioelectrical impedance results are used to determine the minimum weight class for the wrestler (21). For any wrestler who has a body fat percentage at the time of initial assessment below 7% a waiver is required to establish a certifiable wrestling weight class; if a physician attests that the athlete is naturally at a sub-7% body fat level a waiver can be issued (21). No wrestler may compete until the athlete has had a certified minimum wrestling weight determined by the NWCA optimal form. Body fat above 7% is ideal for optimal strength and performance.

Throughout the wrestling season there are growth allowances in place to allow natural growth of these developing athletes (21). However, the growth allowance does not change the minimum weight class (21). In conjunction to these weight class rules, there is a weight loss per week limit of 1.5% of body weight at the time of initial assessment (21). Certain state, for example Ohio, has established regulations to prevent potential harmful weight loss techniques. Crash dieting, use of diuretics, and the use of sweat boxes, or any type of heat devices for weight reduction including clothing, and temperatures cannot exceed 80 degrees Fahrenheit at the start of practice (12).

Weight Management Practices

A study was done to evaluate weekly weight changes in wrestlers with 716 participants. Subjects lost on average 4kg or 8.8lbs a week (8). The most frequently used weight loss methods included: increase exercise, food restriction, gradual dieting, and heated wrestling rooms (8). In another study, the dieting group had greater weight fluctuations, more postseason weight gain, increased incidence of eating disorders, used fasting more often, restricted fluid and food more often, used dehydration methods, and laxatives more often to promote weight loss (14). The dieting group also experienced significantly more negative emotions during and following binging (8). According to the National Eating Disorder Association, or NEDA, these behaviors closely resemble eating disorder behavior. Anorexia Nervosa is described as self-starvation and excessive weight loss; symptoms include: intense fear of weight gain, obsession with weight, and self-esteem overly related to body image (2). NEDA described bulimia nervosa as frequent episodes of over consumption followed by behaviors to prevent weight gain, such as self-induced vomiting, use of laxatives, and over exercise induced purging (3). These eating disorders described by NEDA align with the findings of Larkin et al. (8) and Shriver et al. (14) in their research studies. Prolonged exposure to these harmful practices can lead to distorted body image, and further the development of eating disorders through early adulthood.

DISCUSSION AND CONCLUSION

Athletes in sports that are particularly weight conscious, such as wrestling, need to pay adequate attention to nutrition behaviors. Wrestlers are expending a tremendous amount of energy, and may practice excessive dieting which can create a potential harm if weight management is not done properly. Decreased performance in competition, decreased performance in the classroom, increased risk of injury, and increased risk of disordered eating patterns are potential effects of improper weight management behaviors. It is important to evaluate the athletes' knowledge of nutrition, their current behaviors, and determine how the athlete values their diet's role on performance athletically, academically, to their overall health, and growth and development. Assessment of these influential factors will help create positive behavior change by providing adequate knowledge, skills, resources, and support that is necessary for proper weight management practice, and is essential to promote healthy lifestyles. The three deaths of colligate wrestlers discussed prior, and the research of Larkin (1990) and Shriver (2009) illustrates the need for proper evaluation and education of high school wrestlers to prevent harmful behaviors. In addition, an evaluation of coach's knowledge on these areas and recommendations for developing health athletes may be beneficial for lasting impact.

The benefits of evaluating current coaches' nutrition knowledge and recommendations hold some ground when

considering their influence on the athletes' behavior. Coaches are the primary source for weight management instructions for athletes (8). Coaches in sports that weight management is a large component to the culture of the sport can have an even greater impact on the athlete's behavior (17). Most coaches do not have the training in nutrition to properly guide their athletes (6). If a coach suggests a diet plan for a wrestler the wrestler should visit a dietitian who specializes in teen athletic performance (5). A Board-Certified Sports Dietitian, or CSSD is a registered dietitian who has earned the premier professional sports nutrition credential from the Academy of Nutrition and Dietetics (19). Coaches, peers, and family members should not provide information on diet, body composition, weight, or weight management practices and should refrain from making comments on or participating in the monitoring of body composition and weight. There is a need to investigate the recommendations being made from coaches, and how they correlate with the Academy of Nutrition and Dietetics recommendations (19). Implementing and requiring educational programs for current and future coaches may be beneficial for lasting impact. Regulations are in place to help prevent unhealthy weight loss throughout the duration of the competitive season, and pre-competition weigh-ins serve as a regulatory measure. However, the enforcement of behavior related regulations, such as the inhibition of heated wrestling environment, once the competitive season begins still need further investigation. The combination of high caloric demand, increased energy expenditure, poor weight management practices, and nutrition recommendations being provided by coach not trained in nutrition and development increases potential to harm the athlete. Poor weight practices, poor nutritional practices, poor performance of the student-athlete, and increased prevalence of disordered eating are just a few consequences.

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