

Nutritional Considerations for Vegetarian Clients

It is well known that proper nutrition is an integral component of successful exercise and sports participation. The quantity and quality of nutrients consumed as well as meal timing can have a significant impact on measures of athletic performance or goal-specific milestones associated with routine exercise. That being said, personal trainers should become familiar with specific challenges and considerations related to clients who do not subscribe to optimal dietary strategies. In some cases, clients do not follow recommended dietary prescriptions for economical, social, religious, or other personal reasons; or they may have specific health or idealistic purposes such as is common of vegetarians. It is believed that a plant-based diet is a much healthier way to eat compared to the more common omnivorous diet. But many people do not fully understand plant-based diets, and some vegetarians actually make unhealthy food selection in their efforts to avoid animal products. A vegetarian's dietary intake can vary greatly depending on the individual's palate, dietary knowledge, access to food, and how strict the individual is on avoiding animal-based foods (e.g., meat, poultry, seafood, fish, eggs, or dairy). The following figure briefly describes the dietary measures engaged within the common forms of vegetarianism.

In many cases, the greater the level of restriction to a diet, the greater the risk for nutritional deficiencies as variety provides balance. With that said, there are well-balanced, vegetable-based diets that have been shown to provide numerous health and performance-related benefits. These benefits are most likely attributed to a higher intake of cardio-protective nutrients such as fiber, folic acid, potassium, magnesium, and numerous anti-inflammatory phytonutrients coupled with a lower intake of pro-inflammatory compounds commonly found in animal-based foods (e.g., saturated fat). However, one of the major problems for highly-active vegetarians is the bioavailability of

essential macro- and micronutrients as well as the energy density of many vegetable food sources. Bioavailability and energy values are often significantly lower when compared with animal food sources. To illustrate, numerous studies have shown that unstructured vegetarian diets among active people are commonly deficient in several nutrients including protein, iron, zinc, calcium, and vitamin B₁₂. Beyond simple nutritional deficiency, imbalanced/unguided vegetarian diets can negatively impact athletic performance by creating unfavorable changes in metabolic efficiency, altering the dynamics of various hormones, and even reducing bone mineral density (BMD).

It is understood that athletes expend large quantities of energy during training and competition, with total energy needs varying by sport. It has been estimated that athletes require anywhere from 16-30 kcals/lb of lean body mass to meet the high demands of elite-level sport participation. Interestingly, energy needs among vegetarian athletes may be even higher – fundamentally due to the thermic effects of ingested food. Specifically, research has shown resting energy expenditure to be about 11% higher in vegetarians when compared to non-vegetarians. Vegetarians will commonly consume large quantities of fiber as well as low-fat foods, so it is not uncommon for endurance athletes to be in a negative caloric balance; leading to catabolism and performance detriment. For vegetarian athletes who expend more than 1,000 kcal/day via training and have great difficulty maintaining weight, experts recommend consuming six (6) or more medium-sized meals and snacks every day that contain energy-dense plant foods such as nuts, avocado, dried fruit, and/or dairy products (if the diet allows).

As it relates to the risk for alterations in hormone activity, vegetarian athletes or very active clients

Vegetarian Diets:

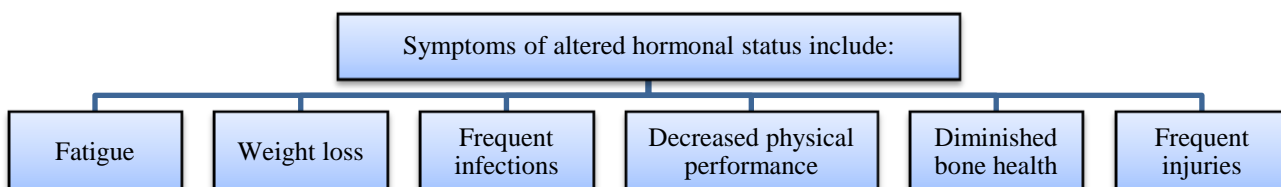
- **Semivegetarian:** consumes some but not all animal-based products
- **Lacto-vegetarian:** does not consume any animal products except for dairy foods
- **Ovo-vegetarian:** does not consume animal products except for eggs
- **Lacto-ovo-vegetarian:** does not consume animal products except for dairy foods and eggs
- **Vegan:** does not consume any animal products or foods that contain animal byproducts

are at an increased risk for issues related to low estrogen and/or testosterone. For example, one study of male athletes who engaged in a lacto-ovo-vegetarian diet over a period of six (6) weeks experienced a slight decrease in serum testosterone levels, although performance detriments were negligible. Other studies have shown female vegetarian athletes experiencing lower serum estrogen levels compared to their meat-eating counterparts. Some experts believe these reductions may simply be an energy-conserving adaptation consequent to engaging in high-volume exercise while in a negative caloric balance; whereas others understand that it may also be consequent to a high fiber intake combined with lower protein, fat, and zinc intake. Some research has shown that those following a vegetarian diet that includes significant dietary fiber lose greater quantities of sex hormones in the feces compared to those following a non-vegetarian diet. Overall, it is still unclear if it is the food composition or the total energy density of vegetable-based diets that causes the reduction of sex hormones; but either way, it commonly leads to reductions in health and performance. In order to maintain hormonal balance, vegetarians must ensure they follow a well-balanced diet that matches their energy needs.

As it relates to diminished bone health, scientists believe that vegetarian athletes may be at an elevated risk for osteoporosis due to energy imbalances, relatively low calcium intake, and hormonal alterations. Studies have shown that endurance athletes who follow restrictive eating patterns have the potential to develop osteopenia within one year, increasing the risk for stress fractures by up to 800%. Furthermore, inadvertent dietary restriction of calcium for

only nine (9) weeks has been shown to elevate the rate of bone turnover and bone mass losses. Obviously, vegetarians must make educated decisions related to food choices that are rich in calcium.

Now, it may sound like active vegetarians are presented with tough obstacles to overcome to ensure they perform as well as their non-vegetarian counterparts, but research does show that proper monitoring and supervision of nutritional intake can greatly help vegetarian athletes stay competitive and on top of their game. A balanced plant-based diet can provide the same quality of fuel for athletes as a meat-based diet (provided vegetarians seek out other sources of certain nutrients that are more commonly found in animal products) according to a presentation at the 2013 Institute of Food Technologists (IFT) Annual Meeting & Expo. Research compiled by Dilip Ghosh, Ph.D., director of Nutriconnect in Sydney, Australia, demonstrates that the key to success for vegetarian athletes is to find ways within their diet to reach the acceptable macronutrient distribution for all athletes. He explains that vegetarians must embrace non-meat sources of iron, creatine, zinc, vitamin B₁₂, vitamin D and calcium because the main sources of these nutrients are typically animal products. Vegetarian women, in particular, are at increased risk for non-anemic iron deficiency, which may limit endurance performance. In addition, vegetarians as a group have lower mean muscle creatine concentrations, which may affect power or strength-based performance. Vegetarians need a planned approach to nutritional sufficiency. The following recommendations can be used to guide decisions and ensure adequate nutrient intakes.



Summary nutritional recommendations for vegetarians:

- **Ensure energy balance**
 - Vegetarian athlete may need up to 10% more energy due to high fiber intake and low nutrient bioavailability. Energy intake must match energy expenditure.
- **Ensure hormone balance**
 - Not meeting total energy or select nutrient needs negatively impacts hormonal dynamics. Loss of, or irregularities in the menstrual cycle among female athletes is a major red flag of hormonal disturbance. Reduced testosterone is also problematic for BMD and overall performance among males and females. Resistance training may aid to supplement serum concentrations.
 - For vegetarian athletes who present with symptoms related to hormonal issues, a reduction of the training load with the addition of more energy-dense foods can help. Hormonal functions should be continually monitored by a qualified professional with the combined presence of restricted eating and high-intensity sport participation.
- **Maximize protein intake**
 - Adequate protein is needed for efficient growth and repair of bodily tissues. Again, vegetarian athletes may benefit from an estimated 10% increase in their protein intake compared to non-vegetarians due to the reduced digestibility of plant proteins.
 - With the exception of soybeans, eggs, and dairy products, other vegetarian choices lack a number of essential amino acids (EAs) necessary for maximizing protein synthesis. Most plant foods must be properly combined to attain all of the EAs. Examples include rice and lentils or peanuts and wheat bread. Appropriate protein content will allow for optimal training adaptations as well as recovery.
- **Be cognizant of calcium and vitamin D needs for bone health**
 - Vegetarian athletes are recommended to include 3-4 serving of dairy foods such as skim milk, Greek yogurt or cottage cheese to fulfill daily calcium needs. Quality non-dairy selections include calcium-fortified cereals, tofu, almonds, legumes, and collard greens.
 - Vitamin D enhances the intestinal absorption rate of calcium; therefore, low serum levels (<40 ng/ml) can also increase the risk for stress fractures as detailed previously. Vitamin D is naturally synthesized with exposure to sunshine; good dietary sources include fortified dairy foods as well as fatty fish.
 - It is also believed that calcium deficiency may have a part to play in muscle cramping and muscle weakness during exercise due to its role in muscular contractions.
- **Be cognizant of B₁₂ and iron needs for energy during exercise and nerve health**
 - Vitamin B₁₂ is only found naturally in animal products, so fortified soy or breakfast cereals are good dietary choices for vegetarian athletes. Vitamin B₁₂ is essential for maintaining red blood cell (hemoglobin) and nerve fiber health. Deficiency leads to premature fatigue during exercise and potential nerve damage. There is also a correlation between low serum B₁₂ concentration and increased bone turnover and risk for fractures.
 - Iron is a major component of hemoglobin, therefore making it a key factor in transporting oxygen to various tissues and working muscle. Iron-deficiency anemia results in premature fatigue during exercise due to a lack of oxygen availability in trained tissues. Non-heme iron is found in several plant-based foods, but absorption is about 20% lower compared to the heme iron found in animal products. Therefore, vegetarian iron sources should be coupled with foods rich in vitamin C as this has been shown to nearly triple the absorption rate.
- **Be cognizant of zinc needs for immune health**
 - Zinc deficiency is quite common among vegetarian athletes. This is most likely due to losses in urine and sweat from heavy training coupled with a low absorption rate when consumed in

plant foods. A study examining female distance runners demonstrated that half of the participants failed to adhere to the RDA for zinc (12 mg/day) when they were on a restricted diet.

- An altered zinc status will compromise immune function, the basal metabolic rate, and even thyroid hormone function; all of which have a significant impact on performance. Vegetarian athletes must consume adequate quantities of zinc-rich plant sources such as beans, whole grains, lentils, soy or peanut butter.
- **Consider use of select dietary supplements**
 - Beta-alanine and creatine monohydrate may be warranted.
 - Creatine levels are commonly lower among vegetarian athletes, reducing their ability to rapidly resynthesize ATP for explosive efforts.
 - Supplemental beta-alanine can boost muscle carnosine storage (significantly lower among vegetarians), which helps reduce muscle fatigue associated with acidosis.

Complying with recommended guidelines and monitoring food intakes will help ensure vegetarian athletes and very active exercisers are maintaining the nutritional support needed for their physical work and recovery. Periodic evaluations can aid in the process of monitoring the diet and adjustments can be made based on objective data. The largest error is assumption. Without qualifying intakes and sufficiency the risk for inadequacy and subsequent performance consequences increase.