2017

NUTRITIONAL NEEDS IN COLLEGIATE FEMALE SOCCER ATHLETES

Alysa M. Brown

Follow this and additional works at: http://scholarworks.umt.edu/etd

Part of the Dietetics and Clinical Nutrition Commons

Recommended Citation
http://scholarworks.umt.edu/etd/10973

This Professional Paper is brought to you for free and open access by the Graduate School at ScholarWorks at University of Montana. It has been accepted for inclusion in Graduate Student Theses, Dissertations, & Professional Papers by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mail.lib.umt.edu.
NUTRITIONAL NEEDS IN COLLEGIATE FEMALE SOCCER ATHLETES

By:

ALYSA MARIE BROWN

Previous Degree, University of Montana - Western, Dillon, Montana, 2010

Professional Paper

Presented in partial fulfillment of the requirements

For the degree of

Masters in Athletic Training

The University of Montana

Missoula, MT

Official Graduation Date May 2017

Approved by:

Scott Whittenburg, Dean of the Graduate School

Graduate School

Valerie Moody, Chair

Health and Human Performance

Annie Sondag, Committee Member

Health and Human Performance

Laura Granlund, Committee Member

Dining Services Administration
© COPYRIGHT

by

Alys Marie Brown

2017

All Rights Reserved
# TABLE OF CONTENTS

Introduction...........................................................................................................................................1
Nutritional Knowledge of College Athletes..........................................................................................1
Special Considerations for the College Female Athlete.................................................................3
Nutrition and Training Cycle..............................................................................................................4
Current Macronutrient Recommendation for the Competitive Athlete......................................5
Current Micronutrient Recommendation for the Competitive Athlete........................................6
Water V. Sport Drinks.........................................................................................................................8
Fluid Replacement before Exercise..................................................................................................9
Fluid Replacement during Exercise.....................................................................................................9
Fluid Replacement after Exercise.......................................................................................................10
Carbohydrates.....................................................................................................................................11
Sugar and how it Impacts Athletic Performance ..............................................................................13
Plant Protein V. Animal Protein...........................................................................................................15
Fad Diets ...............................................................................................................................................16
Snack Options for the Locker Room....................................................................................................17
Resources for the Collegiate Athlete..................................................................................................18
Pre-Season Plate..................................................................................................................................19
In-Season Plate....................................................................................................................................20
Post-Season Plate...............................................................................................................................21
Summary...................................................................................................................................................22
References...............................................................................................................................................23
Many times, athletes do not have enough time to meet their nutritional needs. They are busy going to school, attending meetings, lifting weights, receiving treatments and attending practices and may forget to eat or simply do not have enough time. Several studies suggest nutritional knowledge and habits directly impact how well an athlete will perform. Due to the rigorous training regimen of a collegiate athlete, they should be fueling their bodies throughout the day to maximize their performance. The Women’s soccer team at the University of Montana is no different than any other collegiate soccer team.

The purpose of this professional paper project was to review the literature about nutritional practices of collegiate athletes to better understand what is currently recommended. In the second half of this paper, nutritional recommendations for each phase of the training cycle are provided. There is also a resource guide for the competitive athlete that includes recommendations on where to obtain reliable nutritional information. The outcome of the project is to provide recommendations to optimize nutritional practices for collegiate soccer players here at the University of Montana.
Introduction

The number of collegiate athletes has increased tremendously over the last decade, with more than 444,000 men and women playing on 18,000 teams.\(^1\) The number of female student athletes participating in collegiate sports has increased in the last decade to over 190,000.\(^2\)

The ability of student athletes to focus and play at their optimal peak is based on their performances on and off the field. It is very important, as a coach, athletic trainer and strength and conditioning coach to understand the importance of proper nutrients for a student athlete to perform at the optimal level. While it is important to meet nutrient recommendations, certain macro/micronutrients play a bigger role in brain function and athletic performance than others. \(^1\)

Evidence shows that the nutritional knowledge of collegiate athletes is minimal.\(^3\) Dietary actions may affect health status and athletic performance. With the availability of fast food restaurants and the lack of available healthy fast foods the problem facing college athletes increases. College athletes have little time when it comes to meal preparation due to their busy schedule. Even if they do have the availability of a residence hall dining service, they may not have the knowledge needed to determine proper food choices. This paper provides an overview of proper nutritional needs, knowledge and resources for collegiate athletes. It also outlines proper nutritional needs for the female collegiate soccer player for: pre-season, in-season and post-season. A list of reliable resources is included for athletes to help them better understand proper eating habits.

Nutritional Knowledge of Collegiate Athletes

Recent research indicates that when the athletes knowledge increases, nutritional quality of food choices improves.\(^4\) However, while many nutritional resources are readily available to athletes it may be unreliable which contributes to the problem of athletes making poor dietary
choices. Nutritional Education and Training (NET) programs are available to children in most public schools, yet few college athletes understand the basic concepts of nutrition.

In a study done by Rosenbloom et al., 237 college aged men and 91 women athletes completed a self-administered nutrition knowledge questionnaire during their yearly physical. The average age was 19 years; approximately 30% of the sample was freshman, 25% were sophomores, 23% were juniors, and 22% were seniors. The athletes participated in sports including football, track and field baseball, swimming, basketball, golf, softball and volleyball. Among these athletes, 63% of men and 54% of women knew that carbohydrates and fat are the main energy source for activity; 74% of men and 75% of women knew that eating carbohydrates would not make them fat. Although 46% of men and 49% of women knew that high-fat meals should not be eaten 2 to 3 hours before an event, more than 30% of the athletes did not know the correct response. Over half of the athletes, 63% of men and 71% of women, believed that sugar eaten before an event adversely affects performance.

Forty-seven percent of men and 43% of women believe that protein is the main energy source for the muscle; in addition, 35% of women believe that protein supplements are necessary. Jacobson et al. found that 21% of collegiate athletes thought protein was an immediate energy source and 13% of the respondents thought protein increases muscle size.

Among the athletes, 94% of men and 92% of women knew that dehydration decreases performance. Much of these athletes, 96% of men and 95% of women, also knew that fluids should be replaced before, during and after exercise. Most athletes, knew that thirst is not an adequate indicator of fluid needs and about 20% of athletes were in agreement that sports drinks are better than water.

Most of the athletes, 67% of men and 53% of women, believe vitamin and mineral
supplements increase energy. In another study done by Jacobson and Aldana, 77% of collegiate athletes believed vitamin and mineral supplements contributed to energy. Multiple other studies done found that most athletes believed that vitamins provided energy but athletes lacked the knowledge about proper use of supplements.

These results suggest that both male and female athletes need to be educated on proper nutrition and need assistance in making proper dietary decisions. In this study, college athletes recognize the importance of carbohydrates and fluids in performance. The role of protein seems to be unclear to these collegiate athletes as well as the proper use for vitamin and mineral supplements. Professionals could help educate the athletes on protein as a fuel in exercise as well as its role in building muscle.

**Special Considerations for the Collegiate Female Athlete**

Female athletes are more vulnerable to nutrition related issues than male athletes which include: nutrient deficiencies, eating disorders, body image issues, and weight management problems. It is critical that female athletes understand the importance of nutrition so they are not vulnerable to some of these issues.

In previous studies, evidence shows that the average female athlete has a deficit in energy intake, low carbohydrate intake, and a combination of carbohydrate intake under 60% of total energy and a fat intake greater than 30% of total energy. This means that female athletes are not eating enough food, not eating enough carbohydrates, and are eating too much fat in their diet. With a low intake of carbohydrates and deficit in energy intake, several micronutrients are often inadequate among female athletes, most notably calcium, iron and zinc.

To ensure that the female athlete does not become calcium deficient, drinking a glass of milk, eating a serving of Greek yogurt, cheese or Whey Protein will help decrease the likelihood that
the athlete will develop a deficiency in calcium. The athlete implements leafy greens, pumpkin seeds, nuts or beans, and red meats into their diet, they will meet the requirement for iron and zinc.

Compared to the average diet, a student athlete needs to increase the proportions of their carbohydrates and decrease their fat intake. The female soccer athlete recommendations for carbohydrate increase from 50 - 60% to 70%, and decrease for fat from 30-35% to 15%, while protein stays the same at 15% to 20%. In order to consume the recommended amount of carbohydrates, it is suggested that the athlete breaks up the portions into 5 to 6 smaller meals a day rather than 3 big meals. Snacks are recommended throughout the day to provide the athlete with nutrient-rich carbohydrates as well as help with recovery from exercise.

To recover properly from training or competition, it is important to know when to eat the correct foods and what the right foods are to use for snacking. Athletes believe that they may be taking in sufficient amount of nutrients in order to reach their peak performance, however research suggests that collegiate athletes do not have enough nutritional knowledge in order to maintain their athletic performance.

**Nutrition and Training Cycle**

The past decade has seen an increase in studies that show how important nutrition is to the performance of collegiate athletes. This is a dynamic area of science and practice that continues to flourish in both the scope of support it offers to athletes and the strength of evidence that underpins its guidelines. Nutritional recommendations are needed to meet the demands of the athletes ever changing and physical demands. Since most competitive athletes follow a periodization program in which their training demands change through the year, it makes sense that nutritional practices should change based on the fuel demands of the different activities.
During high intensity training, adequate energy needs to be consumed to maintain body weight, maximize training effects, and maintain overall health. There are many factors to consider including the athletes’ health, sport, nutritional needs, food preference, and body weight and body composition goals.

Most athletes need to eat a well–balanced diet made up of carbohydrates, fats, protein, and vitamin and minerals, in sufficient quality to cover their daily energy expenditure. The three macronutrients, carbohydrates, proteins and fat, are all important in different quantities based on the training calendar. In addition to macronutrients recommendations, micronutrients such as iron, vitamins, minerals, and fluids should also be considered.¹³

**Current Macronutrient Recommendations for the Competitive Athlete**

Carbohydrates provide 60 – 70% of the daily energy intake for competitive athletes. The higher the activity intensity, the greater demand the body has on the carbohydrate stores. When the body does not have the proper nutrients it needs to function, fatigue is often a side effect of a depleted glycogen store.¹⁴ Ingesting high levels of carbohydrates provides substrates to refuel the body’s glycogen stores in the muscle and liver. It also helps by decreasing the amount of fat consumed because carbohydrate foods are usually “bulky” in content compared to foods that are high in fat. Therefore eating the recommended 6-10 g/kg body weight per day¹⁴ helps athletes match their energy intake with their expenditure and control their body mass.¹⁵ The daily recommendation differs based on the athletes total daily energy expenditure, type of sport performed, sex of the athlete, and environmental conditions.¹⁴

The second macronutrient that is essential for optimal performance is protein. The importance of dietary – protein is to provide a substrate for the synthesis of contractile and metabolic proteins. It is also important in enhancing structural changes in non-muscle tissues.
such as tendons and bones. Protein recommendations increase with activity level. Endurance athletes have a protein consumption recommendation of 1.2 – 1.4 g/kg body weight, while those engaging in resistance training and strength training have a recommendation of 1.6-1.7 g/kg body weight per day. Generally, protein intake is met through diet alone without the use of protein or amino acid supplements. Research shows that anything over 2.0g/kg of protein has no significant effect on the body and athletes may decrease their performance based on consuming more protein than carbohydrates needed.

The last macronutrient is fat, which should not be restricted in the athletes’ diet. Numerous studies indicate that 15% of energy from fat does not benefit performance any differently than if there is 20 – 25% of energy from fat. However athletes need to be aware of consuming too much fat, which might mean they are not be consuming the right amount of carbohydrates. Fats are essential in a healthy diet to provide energy, essential elements of cell membranes and facilitate absorption of fat soluble vitamins. The recommendation of fats is divided into saturated and unsaturated fats or essential fatty acids. The recommendation for saturated fatty acids does not exceed more than 10% of the daily energy intake. The remainder of the fat content is provided through monounsaturated fatty acids (15%) and polyunsaturated fatty acids (6%).

Current Micronutrient Recommendations for the Competitive Athlete

Micronutrients play a role in energy production, hemoglobin synthesis, and maintenance of bone health, adequate immune function and the protection of body tissues from oxidative damage. They are also essential after exercise, in building and repairing muscle tissue. During exercise, many of the metabolic pathways in which the micronutrients are required alter the need for vitamins and minerals. Exercise also increases the turnover of the micronutrients, making it essential that they are replenished in one’s diet. Athletes at greater risk of micronutrient
deficiencies are those who restrict energy intake or use severe weight-loss strategies. Eliminating one or more food group from the diet or even consuming a high carbohydrate diet with low micronutrient density puts the athlete at risk of being micronutrient deficient. Athletes that are excluding food groups may need to use a multivitamin and mineral supplement to improve overall micronutrient status.\[11\]

Fluid is a micronutrient that is often overlooked by many athletes. The importance of fluids is to keep the body hydrated as well as keeping the body at the right temperature.\[13\] Being properly hydrated going into a bout of exercise contributes to optimal health and performance.\[14\] Athletes need to replenish water loss not only from exercise, but from respiration, gastrointestinal, and renal function. Dehydration refers to the process of losing body water and leads to hypohydration. A fluid deficit of >2% body weight compromises cognitive function and aerobic exercise performance, particularly in hot weather.\[14\]

Before exercise, the goal of the athlete is to be euhydrated and with normal plasma electrolyte levels. When hydrating prior to exercise, the athlete should slowly drink 5 – 7 mL/kg of their body weight at least 4 hours prior to exercise. If the athlete does not produce urine, or their urine is dark or highly concentrated, the athlete should again slowly drink fluids.\[17\] Hydrating several hours before exercise allows time for any excess fluids to be excreted through urine output.\[14\]

During exercise athletes should attempt to drink enough fluid to maintain fluid balance or to prevent excessive dehydration (2% BW loss from water deficit). The amount and rate of fluid replacement is determined by the athletes sweat rate, duration of exercise, and opportunities to drink.\[17\] Optimal hydration can be facilitated by drinking 150 to 350 mL of fluids at 15 to 20 minute intervals once exercise has started. When high intensity exercise lasts longer than 1 hour,
a fluid that contains a carbohydrate concentration of 4% to 8% is recommended. This type of drink is going to contain sodium, which enhances palatability and the drive to drink, therefore increasing the amount of fluid consumed.  

Most athletes do not consume enough fluids during exercise to balance the amount of fluid lost during exercise. An effective way to determine how much an athlete needs to drink after exercise is to weigh them before exercise, and then weigh them again after exercise. For every kilogram of body weight lost, the athlete should drink approximately 1.5 L of fluid to replenish themselves to normal hydration. Whether athletes chose to drink water or a sports drink, they should understand what they are putting into their bodies and what will help them replenish most effectively.

**Water V. Sport Drinks**

Drinking fluids before, during and after exercise is crucial for the body to properly recover from a bout of exercise. The activity, activity level, time of day, how much time the athlete has available to rehydrate and the type of fluid being replaced play a key role in recovery. When going into a competition, it is very important to start the exercise euhydrated and fluid consumption should match sweat losses.

A hydration protocol for athletes needs to be established and this should include a rehydration strategy, rest breaks, fluid access, environmental factors, acclimatization, exercise duration, and exercise intensity. A hydration protocol is important in a sport such as soccer, due to the fact that there are not a lot of hydration opportunities and they must happen at specific times; therefore the athlete needs to consume maximum hydration during those times.
**Fluid Replacement before Exercise**

Another recommendation is to ensure proper pre-existing hydration. The athlete should consume 500 - 600 mL of water or a sports drink 2-3 hours before exercise and 200 -300 mL of water or sports drink 20 minutes before exercise. Fluid replacement should approximate sweat and urine losses and at least maintain hydration at less than 2% body weight reduction. Everyone will vary based on sweat rate, intensity, and duration of the exercise.\(^{17}\)

Any fluid shortage prior to exercise can potentially influence thermoregulation during the next exercise session if adequate fluid replacement is not maintained. Complete restoration of a fluid volume deficit cannot occur without electrolyte replacement (primarily sodium) in food or beverages. Electrolytes, primarily sodium chloride, and to a lesser extent potassium, are lost in sweat during exercise. When meals are consumed, adequate amounts of electrolytes are present so that the composition of the drink becomes unimportant. However, it is important that fluids be available during meal consumption since most persons rehydrate primarily during and after meals. To avoid the detrimental effects of dehydration during exercise, individuals appear to benefit from fluid ingestion prior to exercise.\(^{20}\)

**Fluid Replacement during Exercise**

Without adequate fluid replacement during prolonged exercise, rectal temperature and heart rate will become more elevated compared with well-hydrated condition. To minimize the potential for thermal injury, water losses due to sweating during exercise needs to be replaced at a rate equal to the sweat rate. Inadequate water intake can lead to premature exhaustion.\(^{20}\)

When athletes fail to replenish with fluids effects such as impaired heat dissipation can occur, which elevates body core temperature to dangerously high levels. During exercise the goal is to avoid dehydration of >1%, start drinking early, as thirst is a bad indicator of hydration.
Drinking at regular intervals is critical to attempt to replace all that is lost through sweat. If the bout of exercise exceeds 1 hour, a carbohydrate drink should be included in the fluid intake.\textsuperscript{21}

**Fluid Replacement after Exercise**

After the bout of exercise is complete, the goal of fluid replacement is to regain euhydration. The best choice for post-exercise fluid is water with NaCl. Fluids that should be avoided are fruit juices, sodas, alcohol, and caffeinated beverages. Depending on the athlete’s status before activity and how much is consumed during activity, it may take anywhere from 12 - 24 hours to rehydrate. To reach euhydration, the athlete must replace more than the amount of weight loss.

The post exercise drink should contain water to restore hydration, carbohydrates to replenish glycogen stores and electrolytes to speed rehydration. Post-exercise hydration should aim to correct any fluid loss accumulated during exercise. The availability of ingested fluids depends on the rates of gastric emptying and intestinal absorption. The rate of emptying is determined by the volume and composition of fluid consumed.\textsuperscript{21}

The Gatorade Sports Science Institute has come up with a drinking do's and don'ts to help athletes avoid dehydration. Things to think about before you start your exercise are to start your exercise hydrated, weigh yourself before and after exercise to determine how much fluids are needed to rehydrate the body after exercise. Another thing that is crucial is to ingest fluids that contains sodium during exercise as well as drink plenty of fluids during meals after exercise. During meals, restricting salt in the diet after exercise will slow down the rate at rehydration status is accomplished. Another important thing to remember is, don't delay drinking during exercise or use dehydration to lose weight. These are simple tips for the athlete to remember to decrease the likely hood of becoming dehydrated.\textsuperscript{22}
In a study of low intensity heat for 90 - 110 minutes, plasma volume was not restored until after 60 minutes in individuals that consumed water + glucose capsule. While those who consumed water + NaCl capsules, plasma volume was restored within 20 minutes from the end of their bout of exercise.23

Fluid consumption is important before, during and after exercise to keep the body hydrated. Another important nutrient to energize the body for exercise is the consumption of carbohydrates before and after exercise.

**Carbohydrate**

Carbohydrates are the most effective source of energy that provide the substrate glucose necessary for glycogen replacement that the body needs for optimal performance.24,16 Carbohydrates are classified as either complex carbohydrates or simple carbohydrates. Complex carbohydrates are found in whole, unprocessed foods, including fruits, vegetables, legumes and whole grains. Simple carbohydrates are considered sugars and starches that have been refined and stripped of their natural fiber and nutrients.25

Complex carbohydrates are healthier than simple carbohydrates because they are more nutrient dense. Whole grains, fruits, vegetables and legumes are highly nutritious foods that are rich in antioxidants, fiber, vitamins and minerals. Simple carbohydrates contain "empty" calories, meaning they have calories, but very little nutritional value.25 Simple carbohydrates are digested very quickly, which cause a spike in blood sugar. Complex carbohydrates, or fiber rich, take much longer to break down and this will help keep blood sugar levels steady, as sugar reaches the blood stream gradually.25 Complex carbohydrates provide sustained energy and help the athlete feel full for a longer period of time.25
The healthiest carbohydrates come from foods that are in their whole, unprocessed form. Some of the complex carbohydrates that athletes should include in their diet are whole grains, legumes, vegetables, fruits, and nuts and seeds. Simple carbohydrates that need to be avoided are sugary beverages, desserts and sweets, white bread, and white pastas.

Prior to both endurance and strength exercises, complex carbohydrates are to be consumed to ensure adequate quantities of muscle glycogen are present during exercise. Carbohydrate metabolism during exercise is very important to reach the optimal level for the athlete and depleted glycogen stores impact performance negatively. Muscles require carbohydrate as a fuel source during exercise. The frequency, intensity, duration and type of exercise determines the amount of carbohydrates required. During exercise, carbohydrates can come from sources such as endogenous production of glucose by the liver (gluconeogenesis), blood glucose, muscle and liver glycogen stores, and foods consumed during exercise.

The amount of gluconeogenesis that occurs during exercise depends on the available carbohydrate reserves before exercise begins; the amount of carbohydrates provided during exercise; the type, duration and intensity of the exercise bout; the exercise environment; and level of endurance training. Research has focused on post exercise carbohydrates intake with the goal of restoring muscle and liver glycogen following a bout of exercise. Easily digestible carbohydrates consumed within 2 hours of the end of exercise is considered the 'window' of opportunity. The consumption of carbohydrates during this 'window' is considered to be an effective dose to restore exercise depleted glycogen stores that occurred during exercise.

Many athletes have a challenging time eating enough food to account for the energy demands of very high volumes of training. Inadequate total caloric intake often results in less than optimal carbohydrate consumption and results in poor performance. There are three reasons why
athletes may have a difficult time consuming enough carbohydrates: 1) stress of hard training can
decrease appetite, 2) consuming a large volume of food can cause gastrointestinal distress and
interfere with training, 3) athlete may be spending so much time training that few rest hours are
available for replenishment. 27

When athletes don't have the time to fuel their bodies with the proper nutrients they may rely
on foods that are easy and lack the nutrients needed for proper replenishment. Sugar is a product
of carbohydrate and if utilized properly can be beneficial to the athlete.

**Sugar and How it Impacts Athletic Performance**

Sugar is one of three classes of a carbohydrate. Sugar can be an individual molecule or a
short chain molecule. Sugar is added to many foods to make the food taste sweeter which makes
it taste better. Consuming an unhealthy amount of sugar can lead to many health problems. Like
many things in life, there is a fine line between too much sugar and just the right amount of sugar
and for those athletes looking to maximize their athletic performance, regulating sugar intake is
essential. 28

The consumption of some sugar is okay, but many abuse the use to make their foods taste
better. Sugar gives a rush that eventually leads to a crash, due to the rapid rise in glucose and
insulin levels. When they experience sugar crashes, athletes are unable to maintain an elevated
level of performance.

The human body has approximately five liters of blood and only one teaspoon of sugar per
day is needed to maintain normal, non-athletic activities. 28 When sugar enters into the
bloodstream, the pancreas secretes a hormone called insulin. The main role of insulin is to
regulate the amount of nutrients circulating in the bloodstream. 29 Insulin is mostly drawn in to
blood sugar management, but it also affects the metabolism rate of fat and protein. When we
consume a meal that contains carbohydrates, the amount of blood sugar in the blood stream increases, and the cells in the pancreas sense this increase which will release insulin into the blood. The insulin travels around the bloodstream, telling the body's cells that they should pick up sugar from the blood. This will lead to a reduction of sugar in the blood, and puts it where it is intended to go, into the cells for use or storage. This is important for athletes, because high amounts of sugar in the blood can have toxic effects, causing severe harm if not treated correctly.

If athletes consume too much sugar, sometimes cells stop responding to the insulin like it is suppose to. When one becomes resistant to the insulin, the pancreas starts producing even more insulin to bring the blood sugar levels down. This leads to a high insulin levels in the blood, called hyperinsulinemia. This can continue to develop for a long time and the cells become increasingly more insulin resistant, and both insulin and blood sugar levels go up. If this continues for a long period of time, the pancreas may not be able to keep up and the cells in the pancreas may become damaged. This leads to decrease insulin production, so there are low amounts of insulin and cells that don't respond to the little insulin that is available. Everybody's pancreas reacts differently to insulin and each person needs to know and understand there body.

There is no definitive recommendation for consumption of sugar, but the rule of thumb is to avoid sweets, soda, and not to add sugars to foods. Staying within the 40 - 60 grams of sugar per day is recommended by some doctors, but those athletes who are participating in intense physical activity requires an increase in daily sugar intake.

If too much sugar or even the wrong kind of sugar is consumed it can have a negative effect on the athlete’s performance. This is something that can be manipulated and changed by the athlete during the training cycle. Another important aspect of training to optimize performance is
the intake of proteins. Just like sugars, there are various sources of proteins that can provide energy to boost the performance level for athletes.

**Plant Protein V. Animal Protein**

Proteins are composed of building blocks called amino acids (AA). A substantial proportion of cells, muscles and tissues are built from AA, which means AA are very important in the function and structure of bodies. AA have an influence on the function of organs, glands, tendons, and arteries and play a key role in the transport and storage of nutrients.\(^{30}\)

They are also important in healing wounds and repairing tissues, especially in the muscles, bones, skin and hair. AA are important for the removal of all kinds of waste deposits produced in connection with the metabolism. Feeding the body with the correct type of protein is essential for providing the body with the essential AA. The consumption of protein post exercise increases circulating insulin and activates many enzymes responsible for the cellular carbohydrate uptake. Protein type such as on why protein, casein protein, branched chain amino acid (BCAA) dairy milk and soy protein have been researched extensively and show that each break down in the body differently.\(^{26}\)

Due to the complete complement of indispensable amino acids, animal protein delivers the necessary amino acids for protein synthesis that plant protein cannot. Animal source of protein such as: fish, meat, poultry, eggs or dairy products, provides the body with the essential AA our body needs to function correctly. Plant proteins such as fruits, vegetables, soy, grains, nuts and seeds may lack one or more of the essential AA.\(^{31}\) Research has shown that soy proteins appear to be more effective that dairy protein in terms of building muscle mass due to the rate of digestion and absorption (slow for milk and rapid for soy).\(^{26}\)
Animal protein supplements have been considered the optimal pre- and post-exercise nutrients for athletes, although certain plant proteins in combination with carbohydrates may be equally effective. Protein supplements, whether it be an animal protein or plant protein, will not be solely responsible for significant performance enhancements. In order to enhance optimal performance, athletes want to ensure they are consuming adequate carbohydrates, proteins and fats throughout the day.

Athletes want to avoid going into a bout of exercise without the proper nutrients needed to fuel the body. Another thing athletes want to avoid are diets that are going to limit the adequate amount of nutrients they need to perform at a optimal level. Fad diets or cleanses have been known to recommend cutting calories in order to get a quick fix for weight loss. Participating in fad diet for weight loss is detrimental to athletes' performance and can cause the athlete to be depleted in many macro and micro nutrients categories.

**Fad Diets**

A quick fix is something everyone is looking for and that is where fad diets come into play. Fad diets are short-term quick fixes that set many dieters up for weight-loss failure. Fad diets promote rapid weight loss, quantities and limitations of food, specific food combinations, rigid menus, and no need to exercise.

One fad diet that is hitting the market is to exclude gluten from the diet. People chose to exclude gluten from the diet for personal reasons and others need to due to an autoimmune disorder. Gluten insensitivity is referred to as Celiac Disease, an autoimmune disorder in which the immune system responds abnormally to gluten. Eating gluten causes the immune system to destroy the villi in the small intestine. The villi are finger-like parts of the small intestine that
absorb the nutrients and without the villi the body is unable to get the nutrients it needs. To get properly diagnosed for gluten sensitivities blood work is required.

Another popular fad diet is low caloric intake by fasting for a period to “detox” the body. For example, Isagenix 30-day cleansing & fat burning system starts with drinking certain fluids multiple times during the day. During the 30-day detox, there is a total of 4 cleanse days and 26 shake days. A shake day is where for two meals, an Isagenix shake is consumed and then dinner is a 400 – 600 calorie meal. During the day, Isa Snacks and the companies Natural Accelerator, are consumed along with lots of water. A cleanse day is designed to give the liver a break and to eliminate all the toxins from the body. If 30 days is too long, then there is a 3 day juice cleanse. The iZO Juice Feast is a home-delivered liquid –only juice detox cleanse that is designed to fully detox the body. Another fad diet that is being used around the country is Garcinia Cambogia. Garcinia camobogia, is a tropical fruit known as the Malabar tamarind, and has become a very popular weight loss supplement. It is known to block the body’s ability to make fat and suppresses the appetite. The active ingredient in the fruit’s rind is hydroxy citric acid, or HCA. HCA blocks an enzyme called citrate lyase, which the body uses to make fat. It also raises levels of the brain chemical serotonin, which may help suppress the appetite.

These three diets are examples of fad diets that are popular today. Fad diets, are just that, short – term quick fixes that may set many back from their weight loss goals. Most fad diets leave the body starving, which leads to failing at dieting. Healthy eating plays a significant role in weight loss and overall good health.

**Snack Options for the Locker Room**

The Women's soccer coaches at the University of Montana provide snacks for the athletes that are readily available for practices. In the past, the coaches have provided an assortment of
cereals, oats and honey bars, apples, peanut butter, an assortment of bread, an assortment of crackers, and an assortment of fruit leathers. After each home game the athletes are also provided and assortment of Pizza Hut Pizza and pasta, as well as an assortment of Wheat Montana Bread.

Evidence shows, that most of the cereals, crackers, fruit snacks, and granola bars that the coaches are providing for the athletes contains a significant amount of added sugar that may not be benefiting the athlete’s performance. Other options coaches can provide for their athletes include: an assortment of fresh fruits and vegetables, pretzels, plain Greek yogurt, raisins, applesauce, cheese sticks, jerky sticks, pistachios, mixed nuts, and pumpkin seeds.

If athletes are having a challenging time knowing and understanding what to put in their bodies to perform at an optimal level there are many resources that are out there to help them.

**Resources for the Collegiate Athlete**

At the University of Montana there is a full time Registered Dietician that can help the athlete with their day to day eating habits. To contact Laura Granland, call the UM dining services at 1(406) 243-6325 to make an appointment. There are many resources online that can also help guide the athlete to a better lifestyle. Listed below are some websites that are useful and reliable for collegiate athletes.

- Nutrition Guide for the Female Footballer
  - [www.fifa.com](http://www.fifa.com)
- Nutrition and Performance Resources
  - [www.ncaa.org](http://www.ncaa.org)
- Eat Right
  - [www.eatright.org](http://www.eatright.org)
- Nutrition and Athletic Performance
  - [www.eatrightpro.org](http://www.eatrightpro.org)
Pre-Season Plate

The athlete’s pre-season plate is going to contain a moderate - high intake of carbohydrates, moderate intake in fats as well as proteins. During pre-season the athlete is going to be exercising at a similar routine as the in-season. The only difference is that the athlete will not be participating in games, but they will be engaging in strength and endurance training. Due to the strength and endurance training, the athletes carbohydrates and protein will be increased in order to have the adequate amount of energy to partake in the exercise and recover correctly.
In-Season Plate

The athletes in-season plate is going to consist of a high intake of carbohydrates and moderate in fat as well as protein. During in-season, athletes are competing in games with short periods to recover before their next game. A high carbohydrate, moderate fats and protein will encourage the proper restoration of glycogen before and after exercise.
**Post-Season Plate**

During the post-season the athletes plates consists of a moderate intake in carbohydrates, fats and proteins. This is the time of the year where athletes are on their own. This time of the year is used to relax and disconnect from the season. It is still important for the athlete to stay active and fuel their bodies properly in order to return to pre-season and transition easier. The athletes need to compensate for their temporary life-style change by altering the carbohydrate, fats and protein intake to accommodate the activity level.
Summary

While researching the nutritional needs and knowledge of female soccer athletes, studies indicate that athletes are unsure of the differences between “healthy” and an “unhealthy” foods. Specific recommendations should be made for female soccer athletes include consuming a higher percentage of carbohydrates in – season due to the high intensity and high duration of exercise. The consumption of carbohydrates, proteins and fats are essential for a healthy diet, as well as the consumption of fluids to maintain proper hydration during exercise. Athletes should take the time to prep and store their food, to insure they are consuming enough calories to fuel their exercise.
References


NUTRITIONAL NEEDS IN COLLEGIATE FEMALE SOCCER ATHLETES

Reliable Sources
-
- Nutritional Guide for the Female Footballer
  - www.fifa.com
- Nutrition and Performance Resources
  - www.ncaa.org
- Eat Right
  - eatright.org
- Nutrition and Athletic Performance
  - eatrightpro.org
- Nutrition Services
  - www.umt.edu

Fluid Intake
Any fluid shortage prior to exercise can potentially influence thermo-regulation during the next exercise session if adequate fluid replacement is not maintained.

To ensure proper pre-existing hydration, and the athlete should consume 500 - 600 mL of water or a sports drink 2-3 hours before exercise and 200 - 300 mL of water or sports drink 20 minutes before exercise.

Fluid replacement should approximate sweat and urine losses and at least maintain hydration at less than 2% body weight reduction. Everyone will vary based on sweat rate, intensity, and duration of the exercise.

Snack Ideas
- Trail Mix
- Fruit snacks
- Applesauce
- Pumpkin Seeds
- Pretzels
- Yogurt
- Raisins
- Jerky

- Alysa Brown
Carbohydrates

Most effective source of energy that provides the substrate glucose necessary for glycogen replacement that the body needs for optimal performance.

Carbohydrates are classified as either a complex or simple carbohydrate. Complex carbohydrates are found in whole, unprocessed foods, including fruits, vegetables, legumes and whole grains. Simple carbohydrates are considered sugars and starches that have been refined and stripped of their natural fiber and nutrients.

Complex carbohydrates are healthier than simple carbohydrates because they are more nutrient dense.

Whole grains, fruits, vegetables, and legumes are highly nutritious foods that are rich in antioxidants, fiber, vitamin and minerals.

Sugar

One of three classes of carbohydrates. Sugar is added to make food taste better. Sugar gives a rush that eventually leads to a crash, due to the rapid rise in glucose and insulin. When sugar enters into the bloodstream, the pancreas secretes a hormone called insulin. The main role of insulin is to regulate the amount of nutrients circulating in the bloodstream. Insulin is mostly drawn in to blood sugar management, but it also affects the metabolism rate of fat and protein. If too much sugar is consumed over a period of time, the cells in the body can become resistant to insulin.

Plant V. Animal Protein

Animal protein supplements have been considered the optimal pre- and post-exercise nutrients for athletes. Research has shown that soy proteins appear to be more effective than dairy protein in terms of building muscle mass due to the rate of digestion and absorption.