# The Relationship between Vegetarian Diets and Injury Rates in Intercollegiate Athletes

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Submitted in Partial Fulfillment of the Requirements for the

Degree of Master of Education

May 2019

Graduate Programs in Education

Goucher College

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## Abstract

The purpose of this study was to determine if there is a relationship between athletic injury rates and style of diet, specifically omnivores and vegetarians. The researcher used a questionnaire to survey a group of NCAA Division III athletes at a small liberal arts college about their athletic injury history and dietary preferences. There was no indication that vegetarian style diets lead to more musculoskeletal injuries. Future research in this area should focus on larger sample sizes and look to eliminate extraneous threats to internal validity.

# CHAPTER I

## INTRODUCTION

For intercollegiate athletes, nutrition is one of the most important cornerstones of health and performance. It is imperative that student-athletes have the nutrients they need to be successful during training sessions and competition. For some athletes, however, intake of proper nutrients is not always easy due to dietary restrictions. For various reasons ranging from health concerns to ethical questions, vegetarian, semi-vegetarian, and vegan diets are becoming increasingly popular. While research has not demonstrated that vegetarian diets show any adverse health effects, restrictive and monotonous vegetarian diets have the potential to cause nutrient deficiencies with deleterious effects on health (McEvoy, 2012). Prospective studies have also demonstrated that vegan athletes with low calcium intakes are at higher risk of fractures (Appleby, Roddam, Allen & Key, 2007). Additionally, nutritional deficiencies can predispose athletes to severe musculoskeletal injuries as well as more severe conditions such as syncope, POTS, and various cardiovascular conditions. When an athlete is receiving the nutrients necessary to power his or her body for performance, they are decreasing the likelihood of injury. Therefore, the first step to preventing injury is to ensure that an athlete is receiving the correct amount of nutrients for their body and the demands of their sport.

The lack of education regarding nutrition among intercollegiate athletes is ubiquitous. There are numerous reasons for this, but usually the lack of interest on the part of the athlete, and lack of resources in the institution are key factors. Considering that student athlete's spend about twenty-five percent of their waking hours training for their respective sport, and the rest of the time engaging in schoolwork, it is essential that they find time to consume proper meals. This is a problem for many student-athletes who often sacrifice meals to finish assignments, catch up on

sleep, or workout. After a prolonged period, the habit of neglecting nutrition will catch up with the athletes, normally in the form of an injury or illness.

The researcher's interest in this topic has grown from years of watching talented student-athletes experience life-changing injuries. It is in her opinion, that proper nutrition is an often-overlooked component of the injury-prevention process. Especially in athletes with dietary restrictions, the need for nutrition education is imperative, as these athletes are often the most injured in her experience. Because of the researcher's interest in why certain athletes were constantly injured and others remained healthy, her interest in vegetarian nutrition proliferated.

## Statement of Problem

The purpose of this study was to determine if intercollegiate athletes practicing vegetarian style diets experience more injuries in one calendar year than athletes who practice omnivorous diets.

## Operational Definitions

Below are the definitions for all relevant variables and concepts used in this study:

***Vegetarian***: A person who does not eat meat, and sometimes other animal products, especially for moral, religious, or health reasons.

***Omnivore:*** A person that eats food of both plant and animal origin.

# CHAPTER II

# REVIEW OF THE LITERATURE

In this review of literature, the researcher will attempt to analyze the impact of various vegetarian diets on injury predictors in college athletes. Vegetarian diets have been shown to contain lower amounts of calcium, vitamin D, vitamin B-12, protein, and *n*-3 fatty acids, all of which have important roles in maintaining muscle and bone health. This can be problematic for athletes, who rely heavily on strength and bone mineral density (BMD) in order to be consistently proficient in their chosen sports. A decrease in BMD can have detrimental effects such as strains, sprains, fractures, and even more chronic disorders such as tendinitis and osteoporosis (Tucker, 2014). The present review details the evidence linking vegetarian diets and athletic injury predictors. Section one of this review will focus on the operational definition of the vegetarian diet and its subsets. Section two will speak to the potential for nutritional deficiencies in vegetarian diets, and section three will link those deficiencies to various predictors of injury such as BMD, nutrient provisions, and increased risk of fracture.

## Vegetarian Diets

Vegetarian diets are often varied in composition, involving a wide range of dietary practices and individual dietary restriction(s). In practice, a vegetarian diet is traditionally interpreted to mean an absence of meat. However, there are many variations of the vegetarian diet (Table 1), including lacto-vegetarian, vegan, pesco-vegetarian, etc.

**Table 1**

*Vegetarian Diets: Definitions*

| Type | Description |
|---|---|
| Flexitarian | Occasionally consumed animal flesh (meat, poultry) and fish, eggs, dairy |
| Pesco-vegetarian | Excludes animal flesh but does include fish |
| Lacto-ovo-vegetarian | Excludes all flesh; includes dairy and eggs only |
| Ovo-vegetarian | Excludes all flesh and eggs; includes dairy only |
| Vegan | Excludes all animal products |
| Macrobiotic vegetarian | Variable dietary restrictions; includes wild meat/game and fish in some variations of the diet |
| Fruitarian | Includes fruit, nuts seeds and some vegetables |

## Nutritional Concerns

Vegetarian and vegan diets have been promoted in recent years due to their alleged health benefits including, reduced risk of heart disease, lower low-density lipoprotein (LDL), blood pressure, type II diabetes and cancer (Appleby & Key, 2016). However, poorly constructed vegetarian diets have the potential to predispose individuals to macronutrient (protein, n-3) and micronutrient (vitamin B12 and vitamin D; iron, zinc, calcium, iodine) deficiencies. This becomes especially important if little attention is paid to compensating for the nutrients that are excluded by the elimination of animal products from the diet (Craig, 2009).

There has been on ongoing debate about whether athletes require greater amounts of protein to prepare their bodies for sport. The consensus has supported that athletes do in fact require more protein than the lay population (Phillips & Van Loon, 2011). The role of protein as a macronutrient is multifaceted in the athlete diet. Protein serves as a building block for exercise performance and a catalyst for exercise adaptation. Thus, without protein most athletes will fail to recover from workouts and will not see gains in lean muscle mass. This is important because vegetarian athletes, especially vegans, appear to consume less protein than their omnivorous

counterparts (Rogerson, 2017). Plant-based protein sources are often incomplete, missing essential branched chain amino acids (BCAA) than their animal-based equivalents. Therefore, the Academy of Nutrition and Dietetics (AND) have recommended that a range of plant-based proteins should be consumed by vegetarians in order to meet the protein and amino acid requirements for optimal performance (Table 2) (Craig, 2009). Including a range of these proteins into the vegetarian diet can ensure that adequate protein and BCAA are consumed to support recovery and adaptation to training.

**Table 2**

*High Protein Plant-Based Alternatives (Rogerson, 2017)*

| Food | Protein per 100g |
|---|---|
| Pumpkin seeds (dried, uncooked) | 30.2 |
| Lentils (red, split, uncooked) | 24.6 |
| Black beans (uncooked) | 21.6 |
| Almonds (raw) | 21.2 |
| Tempeh | 20.3 |
| Tofu | 17.3 |
| Oats (rolled) | 16.9 |
| Quinoa (uncooked) | 14.1 |

Due to an absence of marine-sourced fats, vegans and some vegetarian subsets appear to consume fewer *n*-3 fatty acids and possess lower serum *n*-3 fatty acid levels than omnivores (Clarys et al., 2014). *N*-3 fatty acids—also called Omega-3 fatty acids are polyunsaturated fatty acids with a double bond at the third carbon atom from the end of the carbon chain. These fatty acids are important for normal metabolism and vital to an athlete's ability to properly metabolize nutrients for energy. Therefore, an absence of these fats might have important health and performance implications. Unfortunately, for the vegan athlete population, recommendations for vegan-friendly docosahexaenoic acid (DHA) supplements to not appear in the literature at this time (Craig & Mangels, 2009).

Of utmost important concern for all athletes is achieving micronutrient sufficiency. Explicitly, the AND have indicated that special attention should be paid to achieving adequacy in vitamin B12, iron, zinc, calcium, iodine and vitamin D intakes when designing a vegetarian diet. (Craig, 2009).

Due to an absence of animal and dairy products, vegans are at an increased risk of developing vitamin B12 (cobalamin) deficiency. Plant-based sources of cobalamin are unusual, unless a plant has been contaminated by animal waste (Pawlak & Babatunde, 2016). Because of this, it is critical that vegetarian, especially vegan, athletes supplement vitamin B12. Cobalamin is essential for normal neurological function and DNA synthesis. Without the proper amount of Cobalamin, an athlete can experience changes to his or her red blood cells (RBC) and the development of neurological symptoms such as neuropathy and anemia. Long term deficiency can lead to irreversible neurological damage (Rogerson, 2017). Some sources of B12 supplementation include B12-fortified breakfast cereals, nutritional yeast, and specific B12 vitamins.

Considering the issues surrounding B12 supplementation in vegans, the iron status of vegetarians has received great attention recently. Research has found that specifically, female vegans appear to have lower iron stores than omnivores and are more prone to iron-deficiency anemia (Rogerson, 2017). For female athletes, this can inhibit performance and even disqualify someone from performance if the anemia symptoms are too great. Supplementation has been shown to correct such a problem and may be warranted for some female athletes if adequacy cannot be achieved in the diet. Achieving an iron-sufficient diet appears to be rudimentary for all female athletes, not only vegetarians.

Lastly, one of the most important nutrients for athletic success is calcium. While calcium is available in a wide variety of foodstuffs, it is most notably found in dairy products. Data indicates that vegans consume less calcium than omnivores and other vegetarians. This predisposes these athletes to fracture (Ho-Pham, Nguyen & Nguyen, 2009). This becomes particularly problematic for children and teenage athletes, where higher calcium requirements are necessary for bone development. It is also widely recommended that adequate calcium is necessary for blood clotting, nerve transmission, muscle stimulation, vitamin D metabolism and maintaining bone structure; all of which are essential to optimal athletic performance.

Overall, achieving nutrient sufficiency is an important concern for all athletes. The AND have indicated that attention should be paid to achieving adequacy in vitamin B12, iron, zinc, calcium, iodine and vitamin D intakes when planning a vegetarian, and especially vegan, diet. A poorly designed diet can be exceptionally detrimental to an athlete, who if not educated, is already at a higher risk of nutritional deficit than a lay person. This must be understood by an athlete seeking to adopt vegetarianism, and strategies to mitigate the risks of under-consuming nutrients must be present if this diet is to optimize health and performance. Table 3 compares the nutritional implications of several diets and provides recommendations for athletes and practitioners alike.

**Table 3**

*Diet Comparison (Rogerson, 2017)*

| Diet type | Possible dietary Issues | Possible sport-related issues | Recommendations |
|---|---|---|---|
| Omnivorous | Poor ad libitum diets can lead to nutrient deficiency.<br><br>Vitamin D deficiency possible (if sun exposure is poor / unlikely). | Male and female athletes with low energy intake at risk of nutrient deficiencies.<br><br>Calcium requirements increased during negative energy balance, amenorrhea and female athlete triad. | Energy intake should be scaled to activity level.<br><br>Depending on sport, 1.4–2.0 g · $kg^{-1}$ protein; 3–10 g · $kg^{-1}$ CHO; 0.5–1.5 g · $kg^{-1}$ fat (or, 30% energy) consumed daily.<br><br>Micronutrient-rich diet sufficient to achieve DRVs; Vitamin D3 supplement might be necessary. |
| Pesco-vegetarian | Same as omnivores plus:<br><br>Energy, protein. | Iron deficiency with and without anemia a risk in female athletes. | Same as omnivores, plus ensure that iron needs are met via a variety of food sources. |
| Lacto-ovo vegetarian & Lacto-vegetarian | Same as pesco-vegetarians plus:<br><br>Long chain *n*-3 (EPA, DHA), iron, zinc, riboflavin deficiencies more likely. | Same as pesco-vegetarians plus:<br><br>Reduced muscle creatine and carnosine stores a possibility in males and females. | Same as pesco-vegetarians plus:<br><br>EPA / DHA supplement (total 1–2 g · $day^{-1}$; 2:1 ratio) might be needed.<br><br>Increase iron (m = 14 mg & f = 33 mg · $day^{1}$) and zinc (16.5 mg & 12 mg · $day^{1}$) intakes due to reduced bioavailability of plant sources. |
| Vegan | Same as vegetarians plus:<br><br>Protein, fat, *n*-3, B12, calcium, iodine deficiencies also possible / likely in males and females. | Same as vegetarians plus:<br><br>Low bone-mineral density is an increased possibility in female athletes.<br><br>Achieving energy balance might be a problem for larger athletes. | Same as vegetarians plus:<br><br>Increase protein to 1.7–2.0 g · $kg^{-1}$ and up to 1.8–2.7 g · $kg^{-1}$ during weight loss phases (obtain from range of plant-based foods).<br><br>Nuts, seeds, avocados, oils to achieve 0.5–1.5 g · $kg^{-1}$ fat daily.<br><br>EPA / DHA (microalgae); vitamin D3 (lichen) & B12 supplements might be needed; iodine in some instances too.<br><br>1000 mg · $day^{-1}$ calcium from beans, pulses, fortified foods and vegetables. |

## Link to Injury Predictors

While vegetarian diets have not shown any adverse effects on general health, restrictive and monotonous diets may result in nutritional deficiencies which can lead to adverse effects for athletes. As described above, vegetarians, especially vegans, are at a greater risk of nutritional deficiency. While nutritional deficits have many implications, regarding vegetarian diets, compromised BMD is the most common occurrence. Total BMD is the result of a delicate balance between bone resorption by osteoclasts and bone formation by osteoblasts during continuous remodeling (Venderley & Campbell, 2006). A 2009 meta-analysis comparing vegetarians and omnivores showed 4% lower BMD at both the femoral neck and lumbar spine in vegetarian's relative to omnivores. A subgroup analysis revealed that the difference was even greater for vegans, who had a 6% lower BMD relative to omnivores (Ho-Pham et al., 2009). Unfortunately, few studies are available that examine vegetarian diets with fracture outcomes. However, a prospective study in the UK found that fracture risk was higher in vegans with low calcium intakes, but did not differ between meat eaters, fish eaters, or lacto-ovo-vegetarians (Appleby et al., 2007). While these studies do not speak specifically to athletes, they are vital to the education of vegetarian athletes, as they are placing more stress on their bones and need much more recovery to perform athletically than lay persons.

Poorly designed vegetarian diets may predispose individuals to nutrition deficiency regardless of their predilection, which can lead to detrimental health and performance outcomes. Indeed, the importance of calcium for the vegan athlete reflects its role in the maintenance of skeletal health during weight-bearing exercise, and increased calcium losses experienced during heavy perspiration (Ross, Taylor, Yaktine & Del Valle, 2011). In order to meet the recommended 1000 mg/day of calcium, vegan and dairy-restricting athletes should consume

plant-based sources of calcium such as beans, pulses and green vegetables in sufficient quantities. A supplement can also be introduced if a vegan diet cannot achieve sufficient calcium levels. Iron deficiency leading to anemia can also severely impact performance as it results in tiredness, fatigue, weakness, shortness of breath and reduced exercise tolerance (Longo & Camaschella, 2015). For athletes, these symptoms can be detrimental, and predispose athletes to even more severe consequences such as syncope, POTS, and various cardiovascular conditions. While there are many nutritional concerns regarding the implementation of a vegetarian diet, with proper education and planning, sufficient nutritional intake can be achieved. However, as discussed previously, if these concerns are not addressed, and supplementation does not occur, the affects may predispose athletes to increased risk of injury.

## Summary

Based on the research, there is ample evidence to suggest that improper planning of vegetarian diets can negatively affect factors related to musculoskeletal injuries. Much of the literature revealed that specifically, the vegan athlete population is at a higher risk of injury due to insufficient supplementation of excluded nutrients. These are topics the current literature continues to suggest for further research. Moving forward into action research, a positive directional hypothesis will most likely be considered. Overall, it is favorable to find that certain vegetarian diets, according to the literature, increase the prevalence of factors that predispose athlete's to injury.

# CHAPTER III

# METHODS

## Design

This study is a descriptive study using data to examine the injury rates of student athletes practicing vegetarian diets, compared to student athletes who practice omnivorous diets. The study used a survey to collect data regarding athletic injuries and type of diet. The diet options in the survey were, omnivore (meat, eggs, fish, anything that tastes good to me), ovo-lacto-vegetarian (not meat or fish, but milk and eggs), pescetarian (no meat, but fish, milk, and eggs) vegan (vegetables only, no animal products whatsoever), and other.

## Participants

The sample of participants was comprised of current student athletes at a private liberal arts college in Towson, Maryland. The participants were all NCAA Division III athletes, from 21 sports, and ranging from 18-23 years of age. The sports include: Basketball, Cross Country, Equestrian, Field Hockey, Golf, Lacrosse, Soccer, Swimming, Tennis, Track & Field, and Volleyball.

## Instrument

The instrument used in this study was a ten-item survey (see Appendix A), asking dietary habits and injury questions relating to the last 12 months. The survey was developed by the researcher and was not tested for reliability or validity.

## Procedure

The data collection period for this study took place over a 30-day period. Surveys were distributed to all current student athletes via email. All students were asked to fill out the survey anonymously. Students were sent a reminder email on day 14 and day 21 of the data

collection period. All responses from the survey questions were entered in an Excel spreadsheet and coded according to type of diet and injury responses. The diet and injury questionnaire was returned by 28 participants. Based on self-reported dietary habits, participants were grouped into two diet groups, omnivore (n=16) and vegetarian (n=12). Participants in the omnivore group were 12 males and 4 females, while the vegetarian group participants were 3 males and 9 females. A total of 22 participants reported they experienced a musculoskeletal injury

## CHAPTER IV

## RESULTS

Observing the data presented in Table 4 there were 27 total injuries disclosed. Of these total injuries, 16 were sustained by omnivores, and 11 were incurred by vegetarians. Table 4 shows the breakdown of injuries by diet.

**Table 4**

*Injuries by diet*

| | Fracture | Dislocation | Sprain | Strain | Tendinitis | Concussion | Inflammation | Other |
|---|---|---|---|---|---|---|---|---|
| Omnivores | 0 | 0 | 7 | 2 | 1 | 1 | 2 | 3 |
| Vegetarians | 1 | 1 | 2 | 0 | 0 | 3 | 1 | 3 |

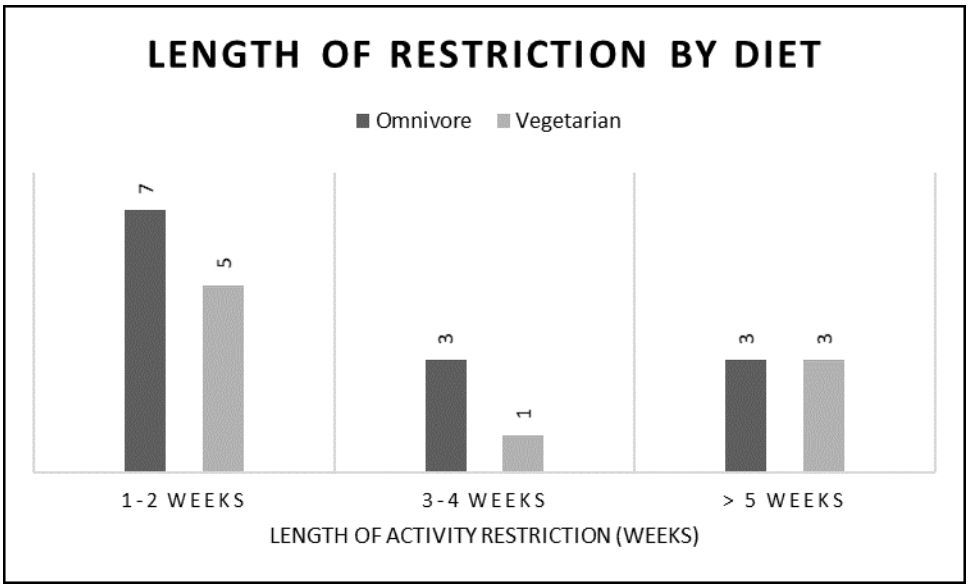
Reviewing the data presented in Table 4 there were 27 total injuries disclosed. Of these total injuries, 16 were sustained by omnivores, and 11 were incurred by vegetarians. These results do not support the research discussed previously. According to the literature, athletes practicing vegetarian style diets may be at a greater risk for injury due to changes that occur at the metabolic level (Clarys, et al., 2014). These metabolic changes are usually attributed to nutritional deficiencies present in vegetarians because of their dietary restrictions. However, the results of this study reveal that vegetarians in this particular athletic population are getting injured at relatively the same rate as omnivores. According to the data, there is no significant difference between the musculoskeletal injury rates of intercollegiate athletes who practice omnivorous diets and those who practice vegetarian style diets [$x(1,28) = 0.16p = 0.69$)].

Delving further into the data, while the injury rates themselves were not significant, the researcher wanted to know if there is a connection between diet and the length of activity restriction following an injury. The data analysis reveals that there is no significant relationship between the length of time one is restricted following a musculoskeletal injury and the type of

diet they practice (p= 0.73). Figure 1 outlines the relationship between diet and activity restriction in weeks.

**Figure 1**

*Length of Activity Restrictions by Diet*




The results of this study were also separated into injuries by body part. The researcher was interested to see if certain body parts are injured more often than others based on diet. Table 5 discloses the instance of musculoskeletal injuries specific to body part. Lower extremity injuries encompass the legs, groin, buttocks, hips, and back. The upper extremity includes injuries to the arms, shoulders, neck, chest, and torso. The head includes injuries to the face, skull, ears, and brain (including concussion).

**Table 6**

*Breakdown of Injuries by Body Region*

| | Lower Extremity | Upper Extremity | Head |
|---|---|---|---|
| Omnivore | 8 | 2 | 3 |
| Vegetarian | 3 | 3 | 3 |

Analyzing the results by injury, it is revealed that the most common injury suffered by the participant group was sprains (32.1%), followed by no injury (21.4%), and concussion (14.3%). This data is concurrent with national injury data, as sprains are the most commonly occurring athletic injury in the United States; specifically, ankle sprains (Appleby et al., 2007).

# CHAPTER V

# DISCUSSION

The results of this study demonstrated there is no significant relationship between diet and athletic injury rates. Both omnivores and vegetarians appeared to suffer a similar number of musculoskeletal injuries, similar types of injuries, and comparable lengths of activity restriction following injury.

## Implications

In addition, injuries by diet were not significant when comparing males and females or injuries by sports discipline. These results indicate that regardless of gender or sport, vegetarians and omnivores incur injuries at relatively the same rate.

## Theoretical Consequences

The theoretical consequences associated with athletes practicing vegetarian diets are not supported by this study. In Chapter 2 it was discussed that vegetarians may be at an increased risk of injury due to nutrient deficiencies incurred by excluding meat from the diet (Burden, Morton, Richards, Whyte & Gellar, 2015). In the research, vegetarian diets have been shown to contain lower amounts of major micronutrients and macronutrients which are important for maintaining muscle and bone health (Venderley, at al., 2006). A lack of nutrients in these major groups can be problematic for elite athletes, who rely heavily on strength and BMD to maintain proficiency in their sports. According to the literature, a decrease in BMD increases the risk of sustaining injuries such as strains, sprains, fractures, etc. However, the results of this study do not support the current literature. The results of this study reveal there is not a significant relationship between diet and athletic injury rates among the participants.

A discussion that also took place in Chapter 2 was that of proper supplementation for vegetarians to compensate for the lack of nutrients usually consumed through animal products. This relates to this participant group because with proper supplementation of nutrients, there would be no significant differences between vegetarians and omnivores at the metabolic level (Craig, 2009).

## Threats to Validity

Although it appears that the results of the study were not significant due to proper supplementation of nutrients by the vegetarian participants, these results are not generalizable due to the small sample size. There were not enough survey respondents to create significant data. Also, it can not be presumed that the athletes in this study sustained an injury based solely on their dietary restrictions. Other extraneous variables may have predisposed the athletes to injury such as previous medical history, sports specific demands, or adequate recovery time following work outs. Because of potential interference from these variables, the results must not be generalized.

## Implications for Future Research

Future research comparing athletic injury rates by diet should aim to accommodate more participants. A larger sample size would increase the likelihood that generalizations could be made from the data. Additionally, future research to aim to eliminate the survey component. A secondary data analysis using information provided in the athlete's medical history can increase the sample size and eliminate the potentially unsuccessful recruitment process to find participants. Using existing data can also eliminate any potential linguistic bias by removing the need for participants to recall their athletic injury history information. Instead, this information would be provided to the researcher from the electronic medical records (EMR) database, which

is already accessible to the healthcare provider via the Health Insurance Portability and Accountability Act (HIPAA).

## Conclusion

Although the survey yielded an exceptional amount of data, there are not enough tangible results from this study to determine if diet affects athletic injury rates. The results of this study are not comparable to the current literature which states there should be a relationship between vegetarian diets and an increased risk of athletic. Future research must be conducted to gather if nutrient deficiencies on the metabolic level translates to injuries at the musculoskeletal level.

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## Appendix A

**Dietary Habits and Athletic Injuries Survey**

1. What is your gender?
   a. Male
   b. Female

2. What is your ethnicity?
   a. African American/Black
   b. Hispanic/Latino
   c. Asian
   d. Caucasian
   e. Indian
   f. Other

3. What is your age?
   a. 17
   b. 18
   c. 19
   d. 20
   e. 21
   f. 22
   g. Other _____

4. What is your current sport?
   a. Lacrosse (M/W)
   b. Basketball (M/W)
   c. Golf (M/W)
   d. Soccer (M/W)
   e. Field Hockey
   f. Volleyball
   g. XC/Track & Field (M/W)
   h. Tennis (M/W)
   i. Swimming (M/W)
   j. Equestrian

5. What do you eat? In Other words, what foods are in your diet?
   a. Meat, eggs, fish, anything that tastes good to me (omnivore)
   b. Not meat or fish, but I do eat milk and eggs (ovo-lacto-vegetarian)
   c. No meat, but I do eat fish, milk, and eggs (pescetarian)
   d. I eat no animal products whatsoever (vegan)
   e. Other _____

6. When did you start eating this diet?
   a. Born and raised with it

b. Since I was young (5 years old)
c. When I became a tween/teenager (13 years old)
d. As an adult (18 years old)

7. Have you been injured since you started eating this diet?
    a. Yes
    b. No

8. Where have you been injured in the last 12 months?
    a. Head (Concussion)
    b. Face
    c. Skull
    d. Neck
    e. Shoulder
    f. Elbow
    g. Wrist
    h. Hand
    i. Chest
    j. Abdomen
    k. Back
    l. Hip
    m. Upper Leg
    n. Knee
    o. Lower Leg
    p. Ankle
    q. Foot

9. Please specify what injuries you had:
    _____
    _____
    _____
    _____

10. How long were you restricted from activity for each of your injuries:
    _____
    _____
    _____
    _____