

## Vegetarian Diet vs. A Traditional Diet in Regards to Blood Pressure and Body Mass Index

Jon Abrahamson, Stacy Teigen, Kale Proksch

University of Wisconsin-Eau Claire, Eau Claire, WI

### ABSTRACT

**Abstract.** Abrahamson, J., Teigen, S., Proksch, K. Vegetarian Diet vs. A Traditional Diet in Regards to Blood Pressure and Body Mass Index. *J. Undergrad. Kin. Res.* 2005;1(1):48-54. With so many individuals concerned about their health, especially their weight, it is difficult to find a diet that is beneficial to their overall health. We examined the possible effects of a vegetarian diet (in this study a vegetarian is defined as an individual who has not consumed meat in the past two months) in regards to blood pressure and body mass index (BMI) as compared to a traditional diet which contains meat. There were ten vegetarian volunteers and twenty non-vegetarian volunteers between the ages of 19-26 who participated in our study. The mean age for both vegetarian and non-vegetarian participants was 22 years old. We measured each individual's height, weight, and blood pressure. The mean height for vegetarian subjects ( $n = 66.2$  inches), non-vegetarians ( $n = 69.3$  inches.) The average weight for the vegetarians ( $n = 143$  lbs.), non-vegetarians ( $n = 173$  lbs.) The measurements were all taken during midmorning to early afternoon. The participants were asked to follow these guidelines before the measurements: do not consume alcohol 24 hours prior to testing, no food consumption, exercise, or tobacco use two hours prior to testing. This study resulted in the findings that eating a vegetarian diet could result in a lower BMI. This study did not show any significant difference in systolic blood pressure ( $p = 0.525$ ) or diastolic blood pressure ( $p = 0.633$ ) between people who consume a vegetarian diet as compared to those who consume a typical diet. Consuming a vegetarian diet can help in lowering a person's BMI but will not significantly lower a person's blood pressure.

**Keywords:** Body mass index (BMI), blood pressure, vegetarian, traditional diet, diet, hypertensive, normotensive, overweight, obesity

### Introduction

On any given day 25% of men and 45% of women are on some kind of diet (8). According to Vegetarian Society, in a 2002 survey of college students in the United States, 11 percent of women and 4 percent of men claimed to be vegetarians.(12) Blood pressure and Body Mass Index (BMI) are two frequently used methods to measure a person's overall health. "Blood pressure is the force exerted by the blood against the walls of the blood vessels; it is usually measured millimeters of mercury (mmHg) (6)." Blood pressure is measured in the following way:

Systolic		Diastolic	Category:
Less than 130	and	Less than 85	Normal blood pressure
130-139	or	85-89	High-normal blood pressure
140-159	or	90-99	Stage 1 (mild) hypertension
160-179	or	100-109	Stage 2 (moderate) hypertension
180-209	or	110-119	Stage 3 (severe) hypertension
210 or higher	or	120 or higher	Stage 4 (very severe) hypertension

BMI is calculated by taking the persons weight in Kg divided by their height in meters squared. The range for a healthy BMI is between 18.5 and 24.9, overweight is between 25 and 29.9, and obesity is anything over 30. An article found in *The International Journal of Obesity* stated that vegetarians mean BMI is lower than a person who consumes a traditional diet (1). This test is one of the most commonly used methods of testing body composition because it is the cheapest and most convenient. When a person gets their BMI results they will be able to determine if they are at an increased risk for cardiovascular disease, osteoarthritis, diabetes, premature death, some cancers, and high blood pressure (3). Approximately 1 in 5 Americans have high blood pressure and about 1/3<sup>rd</sup> of these people don't even know it because there are little or no symptoms (3). A study in the *Nutritional Reviews* journal found that when meat was replaced with vegetables in hypertensive and normotensive subjects, a reduction of blood pressure occurred (2). It was an 18 month study in which the group that lost 2.4kg of weight had a significant reduction in blood pressure. Their systolic blood pressure dropped 5.8mmHg and their diastolic blood pressure had a net reduction of 3.2mmHg. During the follow up study seven years later, hypertension affected 18.9% of the weight loss group and 40.5% of the control group (2). If high blood pressure is left untreated it can lead to stroke, heart attack, heart failure, and/or kidney failure. As stated in the *Journal of Postgraduate Medicine*, it is known as the "silent killer" and the only way to detect it is to get it checked.

The purpose of this study was to determine if there is a relationship between blood pressure, body mass index and dietary status. It was hypothesized that people who consume a vegetarian diet will have lower BMI. It was also hypothesized that people who consume a vegetarian diet will have lower blood pressure values than people who eat a typical diet.

## Methods

### Subjects

The subjects for our study were a convenience sample of volunteers, 19 to 26 year olds (Table 2). To recruit our subjects, we sent an email to the student body requesting any volunteers to participate to come to an open lab for testing. There were 10 vegetarian and 20 non-vegetarian participants. This study was approved by the University of Wisconsin Eau Claire. Anonymity and confidentiality will be assured for every participant. The subjects were informed that the purpose of this study is to see if a vegetarian diet promotes lower BMI and blood pressure than the typical diet.

## **Instrumentation**

### Blood Pressure Measurements

Requested of subjects was for them to not eat a meal or exercise a few hours before they got their blood pressure tested. Subjects were tested at midmorning to early afternoon. Once subjects arrived at the lab, where the testing was held, the subjects had to sit down and rest for a period of five minutes to make sure their blood pressure was not elevated due to walking or stair-climbing to get to the lab. The subject then had their blood pressure tested once.

### Body Mass Index

Some of the subjects self reported their height while the other subjects removed their shoes and stood against the wall to get their height measured with a measuring stick. The subjects were instructed to tilt their chin up and take a breath in while getting measured. The height was measured to the nearest quarter inch. . The height was then converted to centimeters so the body mass could be determined. The shoes were kept off when weight was measured. The subjects were also asked to remove any objects in their pockets or large clothing such as a coat. Weight was measured to the nearest half pound and then converted to kilograms. Once both measurements, height and weight, were recorded, the body mass was calculated by dividing kilograms by centimeters squared.

## **Data Collection Procedures**

To start our data collecting process, we sent out an e-mail to the entire student body requesting volunteers for our study. The e-mail contained some guidelines that every student should follow prior to participating in the tests. The guidelines will include going to bed at their normal time, not to consume alcohol 24 hours prior to testing, do not eat anything 2 hours prior to testing and to not use any tobacco products immediately before participating. The data collecting procedures took place between October 25<sup>th</sup> and November 18<sup>th</sup> in the exercise physiology lab of McPhee between 10 am and 11 am. It will take about 10 minutes for each student to complete the tests. Once they get to the lab the subjects were asked a few demographic questions. Then the subjects had their blood pressure, height, and weight recorded. After testing the participants, the data collection is complete and the data is ready for analysis.

## **Data Analysis**

In our study we compared the relationship between a vegetarian diet and a non-vegetarian diet by using an independent-samples t test. The data compared was the Body Mass Index (BMI) and Blood Pressure to determine which diet has a healthier lifestyle.

## **Independent and Dependent Variables**

### Independent Variable

The independent variable of this research project is the vegetarian diet.

### Dependent variable

The dependent variables for this research project are blood pressure and body mass index.

## Results

Demographics	Vegetarian	Non-vegetarian
Age (yr)	22	22
Height (inches)	66.2	69.3
Weight (lbs)	143	178

Table 2. Subject characteristics (Mean values).

This study resulted in the acceptance of our BMI hypothesis. Our blood pressure hypothesis was rejected. There were significant differences ( $p < 0.05$ ) between vegetarian BMI (22.1) and non-vegetarians BMI (25.9),  $t (-2.8)$ ,  $p = 0.008$ . There were no significant differences ( $p > 0.05$ ) between vegetarian systolic blood pressure (118.4) and non-vegetarians systolic blood pressure (120.7),  $t (-.644)$ ,  $p = .525$ . There were no significant differences ( $p > 0.05$ ) between vegetarian diastolic blood pressure (76.6) and non-vegetarians blood pressure (74.7),  $t (.483)$ ,  $p = (.633)$ . Figure 3 illustrates the mean difference in blood pressure and body mass index (BMI) values among vegetarians and non-vegetarian.

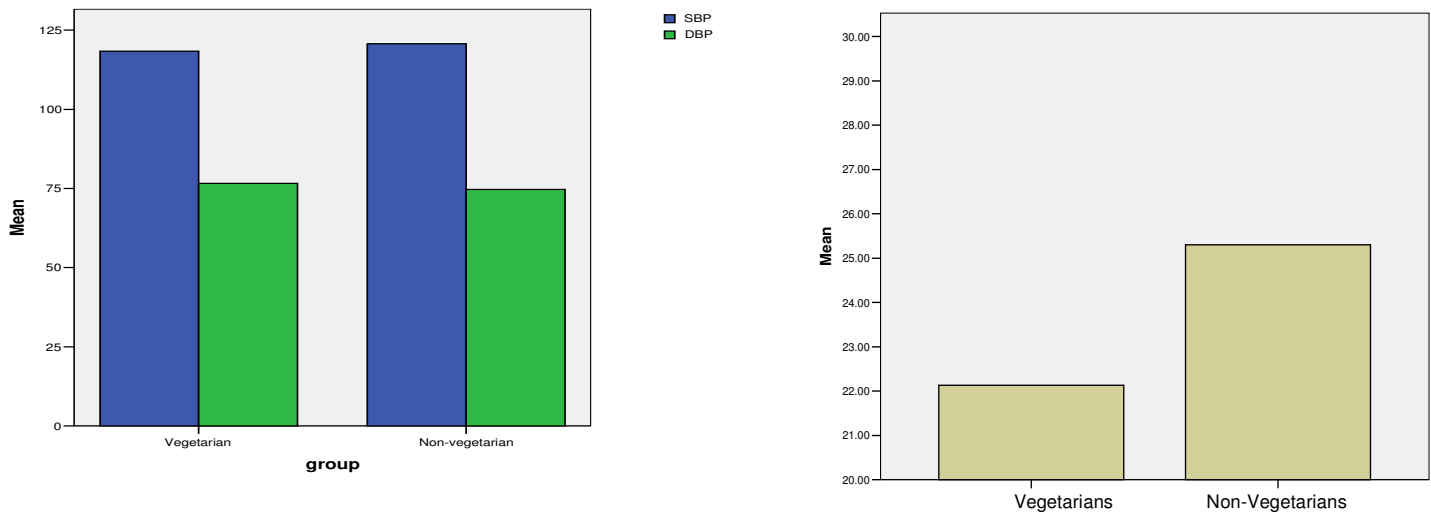


Figure 3 – Mean Blood Pressure BMI values for Vegetarians (1) and Non-Vegetarians (2) groups.

## Discussion

The results observed from our study show that vegetarians ranging in age from 19 to 26 years exhibit about the same blood pressure readings as non-vegetarians. When comparing our study to other similar studies we found that our statistics were not the typical results reported. In one article it is reported that individuals who follow a self-selected vegetarian diet tend to have lower blood pressure levels than non-vegetarians (2). We found that vegetarians had a mean blood pressure of 118/76 and our non-vegetarians had a mean reading of 120/74. In Melby's study, which had a mean age of 52, the mean blood pressure for both vegetarians and non-vegetarians were lower by 2-5

points for systolic pressure and 9-10 for diastolic compared to the vegetarians in our study (5).

Although we found that our blood pressure results were not comparable to other studies; we did find comparable results to previous studies on the relationship between a vegetarian diet and BMI. As stated by Berkow, “vegetarians are leaner and have a lower body weight than non-vegetarians” (2). Melby’s study reported the vegetarians mean weight (Kg) to be 65.2kg while the non-vegetarians were 71.7kg (5). Vegetarian children were also found to be leaner, and when comparing growth, and taller than meat-eaters (7).

### **Limitations**

Our main limitation was having too small of a study group of vegetarians. This limitation might have skewed our results due to the fact that we only had ten vegetarian volunteers. We did not find a substantial number of participants to report any significant findings in regards to blood pressure. Other research contradicts our results in regards to our blood pressure hypothesis, making this limitation significant. In separate studies done by Melby and Berkow, people that lived a vegetarian lifestyle had a lower blood pressure (5, 2). The participants were between the ages of 19-26 years old which limit the results only to individuals in their twenties. Body mass index is not the most accurate reading for body composition because it does not take muscle mass into consideration. Very muscular individuals might have had a BMI reading of overweight or obese, which would raise the mean BMI of that group. The vegetarians only had one male participant, while the non-vegetarians had 13, which could have raised their average on the account that men having more muscle mass than women.

### **Interpretation of Findings**

Our study has resulted in statistics that show people who consume a vegetarian have a lower BMI than individuals who consume a diet that contains meat. This may be because protein, which is abundant in many sources of meat, helps facilitate muscle growth much more than grains, vegetables, and fruits. Typical vegetarian diets that contain green leafy vegetables, fruits, and grains are very low in calories and fat which might also explain the lower BMI results.

Our study has also shown that there is no significant difference in blood pressure results between vegetarians and non-vegetarians. This shows that neither diet promotes either a high blood pressure or a low blood pressure because the average for both groups was close to 120/80 mm/Hg which is optimal. The blood pressure statistics for this study can be reliable, but only for the same generalized sample population.

### **Applications for Findings**

The findings of this study could be applied in nutrition programs where the person’s goal is to lower their BMI. They could either convert completely to a vegetarian diet or just replace some of their meat consumption with a non-meat alternative.

The vegetarian diet has shown to be an effective means to losing weight. With 25% of men and 45% of women on some type of diet, it is important to know which diets are successful and safe. (8)

### **Recommendations**

A vegetarian diet is a suitable way to lower your BMI. With our age group of subjects in their twenties, blood pressure showed no substantial difference against a non vegetarian diet. An explanation for this is that a high BMI is a risk factor for high blood pressure, so high blood pressure sets in later in life than BMI. There is a greater than 90% chance of developing hypertension between the ages of 55-65. (10) A follow up study on the same subjects would be able to show if that is the case for this study.

### **Suggestions**

Recording the amount of protein, carbohydrates, and fat intake of subjects would be beneficial. This would show if vegetarians are getting their recommended daily value of all food groups. This would also show what amounts of food groups are associated with vegetarians BMI lower. Knowing how much physical activity each individual gets would tell how much exercise could vary the results. If a large group of vegetarians are used, they could be divided up into different categories, such as ova-vegan and vegan. Lastly, it would be beneficial to get an even number of males and females, so a gender comparison could be done.

### **Conclusion**

In conclusion, people who consume a vegetarian diet tend to have a lower BMI than people who consume a diet that contains meat. The main recommendation that can be concluded from this study is that people whose main fitness goal is to lower their BMI would benefit from eating a vegetarian diet. Even if the fitness goal is not to lower their BMI, a person can protect themselves from an increased risk of cancer, coronary heart disease, strokes, along with other diseases if they do not consume high saturated fats such as meat, eggs, and dairy (11). People who have higher BMI's are more susceptible to developing hypertension later in life. With this said, eating a vegetarian diet can help lower an individual's BMI which would also reduce the risk of developing hypertension. This study would be interesting to any one who would like to diet safely and successfully. With contradicting view points on whether a vegetarian diet would be safe for children to eat, Romano conclude that sticking to nutritious food would result in a safe diet with enough nutrients for proper growth (11). The recommendations are applicable only to individuals in their twenties. Further studies have to be done on all age groups to prove the recommendations will stay the same for everyone.

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### **Address for correspondence**

Teigen, Stacy 609 Valley Park Ct. #8 Eau Claire, WI 54701, University of Wisconsin Eau Claire WI, USA 54702 (715) 836-2637 email: [teigensj@uwec.edu](mailto:teigensj@uwec.edu)

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