

A COMPARISON OF VEGETARIAN AND NON-VEGETARIAN BLOOD PRESSURE, HEART RATE, AND BODY COMPOSITION

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Abstract

Valiquette LW, Jeffrey ZA, Olson E, Lyremann DJ. A comparison of vegetarians and non-vegetarians blood pressure, heart rate, and body composition. *J. Undergrad. Kin. Res.* 2006; 1(2): 37-43. This study analyzed the effect of a lacto-ovo vegetarian diet compared to a non-vegetarian diet, in regards to blood pressure, resting heart rate, and body composition. The control group (non-vegetarians) consisted of 12 (5 female 7 male) healthy subjects (N=12) age 30-52 years (mean of 39.83 ± 8.19 yrs). While the test group (lacto-ovo vegetarians) consisted of 4 (2 female 2 male) healthy subjects (N=4) age 49-56 years (mean 52.25 ± 2.99 yrs). After collecting subject height and weight, blood pressure, resting heart rate, and body composition were all taken. It was determined that the lacto-ovo vegetarians had no significant difference in resting heart rate, systolic and diastolic blood pressure than the control group. In contrast to past studies the body composition of lacto-ovo vegetarians was not leaner as the control group.

Key Word: Bioelectrical Impedance, Blood Pressure, Body Mass Index, Heart Rate, Hypertension

INTRODUCTION

Hypertension is a disorder characterized by chronic high blood pressure. Approximately 50 million individuals in the United States and one billion people worldwide have hypertension (1). Hypertension can lead to stroke, blood vessel damage, heart attack, heart failure, and kidney failure (2). Blood pressure and bio-electrical impedance are two tests used to determine the health level of individuals. Blood pressure is the force that blood exerts on arterial walls (3). Blood pressure is usually measured with a sphygmomanometer. Normal blood pressure is 120/80. Bio-electrical impedance is quick and non-invasive procedure that measures a person's fat free mass, (FFM) or also referred to as lean body mass (LBM). Bio-electrical impedance measures body composition by calculating the body's resistance to electrical flow (4). Body composition composed of >25% for men and >32% for women is typically indicates an increased risk of morbidity (5). A heart rate of 60-100 beats per minute (BPM) is the normal range for adults (2). "Epidemiological data suggests that plant-based dietary patterns are associated with a significantly lower prevalence of hypertension (6)."

Past studies have found a correlation between diets high in fruits and vegetables and lower rates of hypertension compared to general populations. A study in the *Journal of Nutritional Medicine* found diets abundant in fruits and vegetables help to lower the significance of hypertension (7). This eight week study found a 12 mmHg drop in systolic and diastolic blood pressures in the study group with no change in the control

group (7). A 2003 study found that vegetable-based diets are associated by lower instances of hypertension and cardiovascular disease (6).

The purpose of this study is to compare the blood pressure, resting heart rate, and body composition of lacto-ovo vegetarians to non-vegetarians. The hypothesis of this research study is that the lacto-ovo vegetarians will have lower blood pressure, leaner bodies, and a lower resting heart rate compared to their omnivore peers.

METHODS

Subjects

The subjects in this study are divided into two groups; the control group is made up of 30-60 year old adult non-smoking, low to average levels of training with a non-vegetarian diet. The test group is made up of 30-60 year old adult non-smoking; low to average levels of training that are lacto-ovo vegetarians. All subjects were disqualified from participation if they were on any kind of blood pressure medication, and have given informed consent. This study was approved by the University of Wisconsin Eau Claire.

Table 1. Descriptive Statistics of Control Group Subjects (mean \pm SD)

	N	Minimum	Maximum	Mean	SD
Age	12	30	52	39.83	8.19
Height	12	156	188	175	10.27
Weight	12	53.18	113.18	78.82	19.89

Table 2. Descriptive Statistics of Test Group Subjects (mean \pm SD)

	N	Minimum	Maximum	Mean	SD
Age	4	56	49	52.25	2.99
Height	4	163.50	188.50	174.25	10.60
Weight	4	62.27	102.27	73.41	19.33

Instrumentation

Blood pressure

Requested subjects will refrain from eating and any kind of strenuous activity for one hour prior to having blood pressure taken. Subjects were measured throughout the day. Blood pressure was measured with a sphygmomanometer. When subjects arrived at physiology lab, they were asked to sit for 10 minutes prior to testing to ensure their blood pressure wasn't elevated due to external stresses. Blood pressure was then taken 2 times for accuracy with a one minute interval between each test. The left arm of subjects was used for blood pressure reading.

Heart Rate

Subjects' heart rate was measured directly after blood pressure tests were administered. Heart rate was determined by a 30 second count multiplied by two. The heart rate was counted using the distal pulse.

Body Composition

Bioelectrical impedance (BIA) was utilized to measure the subjects' body composition. Two BIA instruments were used in measuring body composition, a handheld model (Body Logic model HBF-306BL body fat analyzer) and a standing model (Tanita Body

TBF-522 Composition Analyzer/ Scale). Subjects' weight and height were measured with minimal clothes and no shoes or socks.

Procedures

Contacted subjects were asked to follow these guidelines: no food or drink an hour prior, refrain from caffeinated drinks the day of test, wear/bring minimal clothing (ex. T-shirt, running shorts, swim suit), refrain from alcohol consumption 24 hours prior to test, urinate before test, and no strenuous exercising the day of testing. Subjects were asked to complete a questionnaire. A 30 minutes time slot was asked of each subject.

Statistical analysis

This study compared a lacto-ovo vegetarian to a non-vegetarian diet using independent sample t-test. We compared diastolic, systolic, body composition, and heart rate data to determine if a lacto-ovo vegetarian diet is healthier than a non-vegetarian diet. The sample size was determined by the number of subjects we could find to participate in the study.

Dependent variable

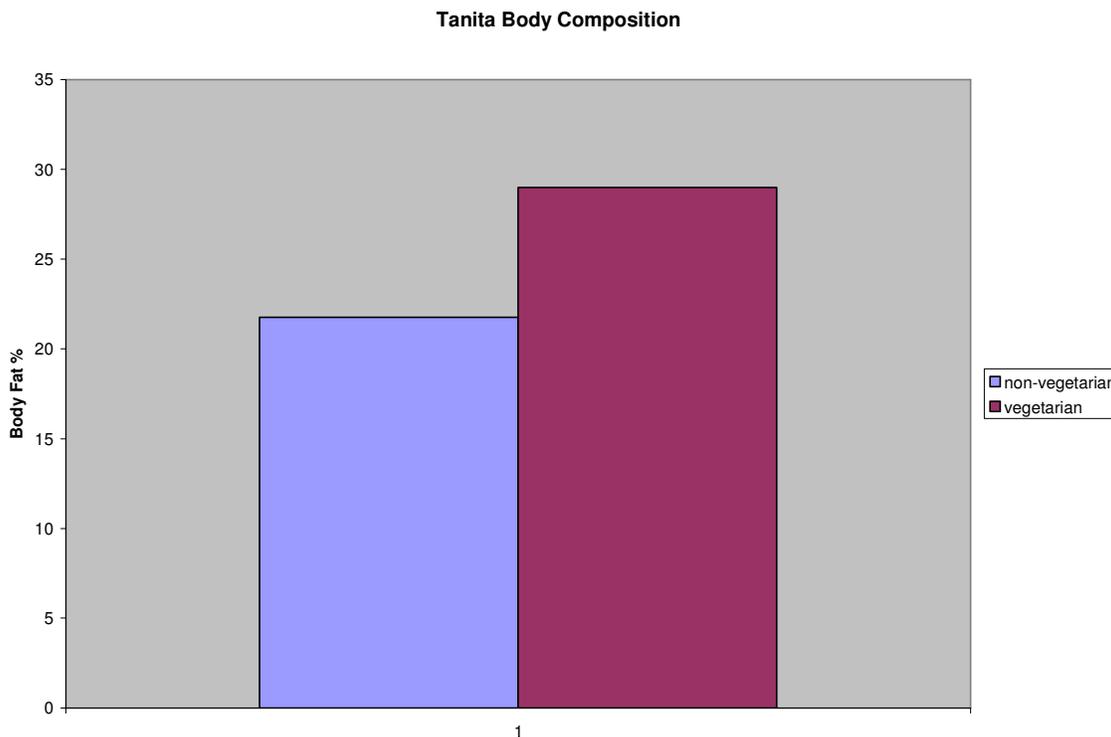
The dependent variables are blood pressure, body composition, and heart rate.

Independent Variable

The independent variable is a lacto-ovo vegetarian vs. non-vegetarian diet.

RESULTS

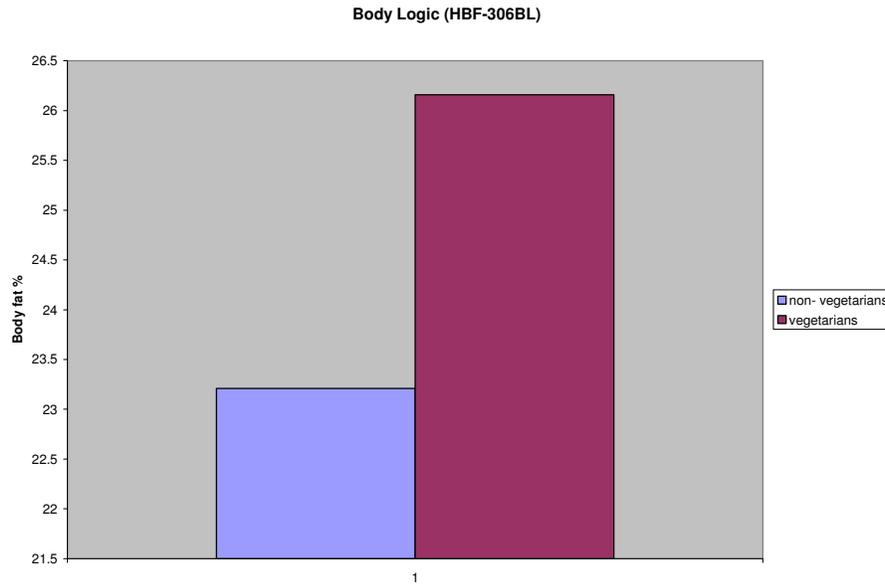
FIGURE 1. Body Composition comparison using the Tanita TBF-522 Body Composition Analyzer: Vegetarian vs. Non-Vegetarian



No Significant differences:

The was no significant difference in body composition between the lacto-ovovegetarian group (M=29.0) and the non-vegetarian group (M=21.7), $t(14) = -1.33, p > 0.05$

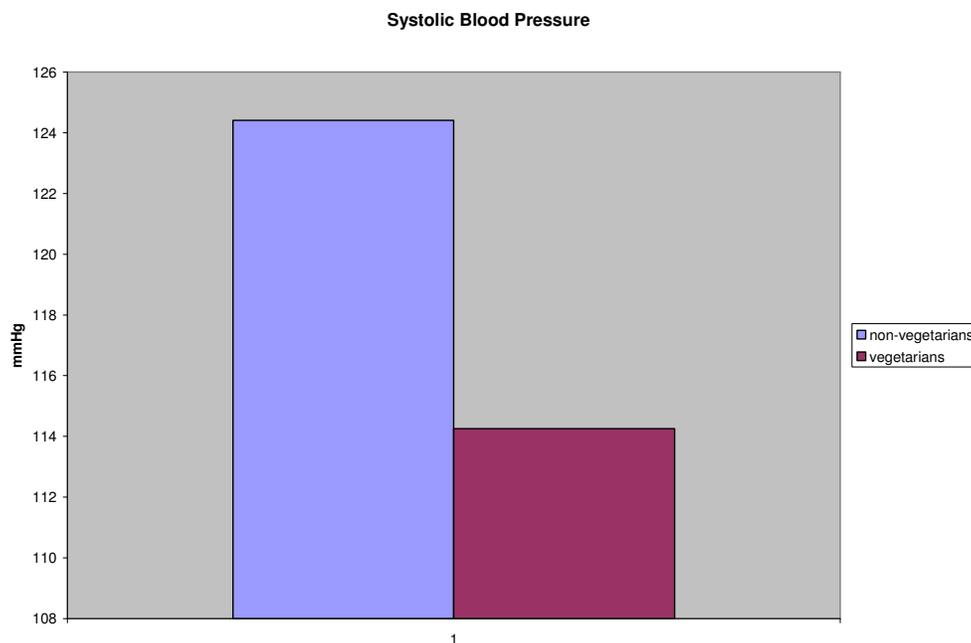
**FIGURE 2. Body Composition comparison using the Body Logic (HBF-306BL)
Body Composition Analyzer: Vegetarian vs. Non-Vegetarian**



No Significant differences:

The was no significant difference in body composition between the lacto-ovovegetarian group (M= 26.1) and the non-vegetarian group (M= 23.2), $t(14) = .851, p > 0.05$

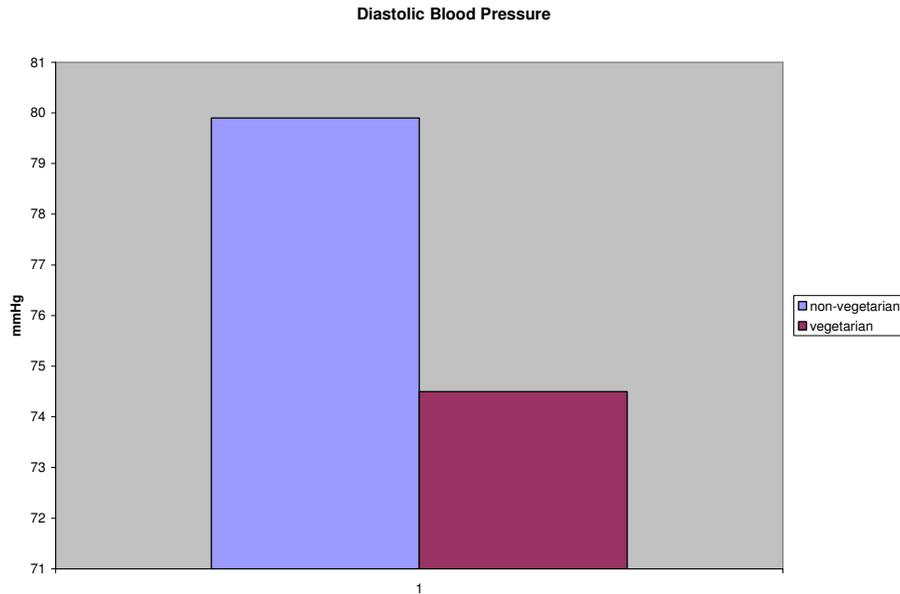
FIGURE 3. Systolic blood pressure: Vegetarian vs. Non-Vegetarian



No Significant differences:

The was no significant difference in systolic blood pressure between the lacto-ovovegetarian group (M= 114) and the non-vegetarian group (M= 124), $t(14) = 1.797$, $p > 0.05$

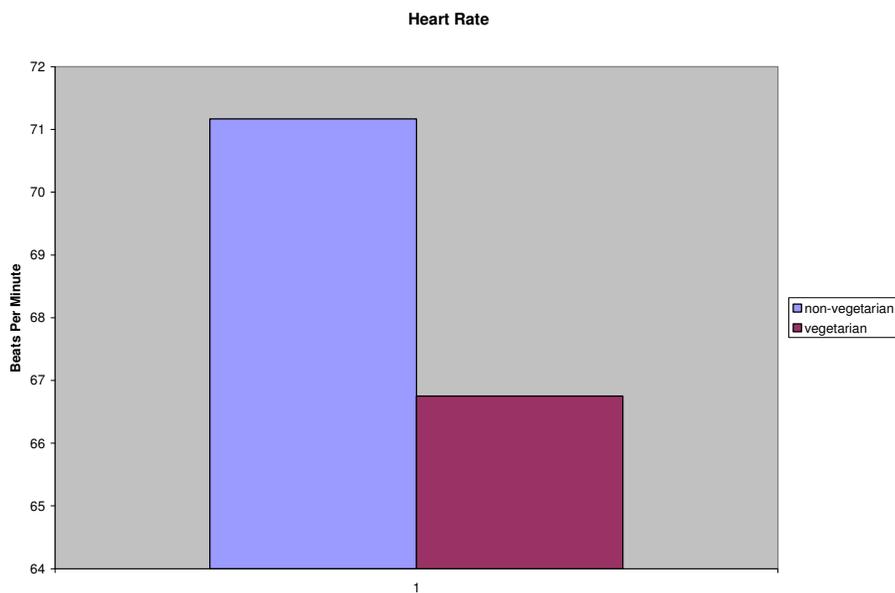
FIGURE 4. Diastolic blood pressure: Vegetarian vs. Non-vegetarian



No Significant differences:

The was no significant difference in diastolic blood pressure between the lacto-ovovegetarian group (M= 74.5) and the non-vegetarian group (M= 79.9), $t(14) = 1.062$, $p > 0.05$

FIGURE 5. Heart rate: Vegetarian vs. Non-vegetarian



No Significant differences:

The was no significant difference in heart rate between the lacto-ovovegetarian group (M= 66.7) and the non-vegetarian group (M= 71.1), $t(14) = .523, p > 0.05$

DISCUSSION

The main objective of our study was to determine if a vegetarian diet led to lower blood pressure, a healthier body composition, and a lower heart rate. This study found no significant difference in systolic and diastolic blood pressure between the vegetarians and non-vegetarians. The blood pressure readings contradict past studies that have found that plant-based diets are associated with a significantly lower prevalence of hypertension (6). Our findings of similar blood pressure in the subjects with higher body weight contradicts past studies that found lower body weight is associated with lower blood pressure (8, 9). Our study focused on different body compositions instead of overall body weight. Individuals can weigh the same in kilograms, but have body compositions that are very dissimilar. Other past studies have found that vegetarians are leaner and have lower body weights than non-vegetarians (10). However, we found just the opposite. The vegetarians in our study averaged 2.9 % to 7.3% higher body fat than the non-vegetarians in the study; the 2.9% average body fat difference was using the Bio Logic handheld BIA instrument. The 7.3% average body fat difference was using the Tanita Body composition analyzer which has been found to be an accurate alternative to underwater weighing (11).

Assumption and Limitations

One limitation of the study was that we hoped to find more subjects. We came into the study thinking the BIA instruments were calibrated and would have similar results. Future research could be focused on the accuracy of two BIA methods. Other limitations were relying on the subjects actually being vegetarians and not attaining subjects of similar activity levels.

Interpretation of Findings

Our findings showed that vegetarians did not demonstrate a significant difference in body composition, heart rate, systolic blood pressure, and diastolic blood pressure compared to non-vegetarians. Possible explanations for the similar findings can include a more physically active non-vegetarian group, genetic predisposition for high or low blood pressure among subjects, or anxiety to having blood pressure, heart rate and weight measured. The small numbers of subjects in each group could lead to inaccurate means test means.

CONCLUSIONS

The purpose of our study was to determine if adults can improve their heart rate, systolic and diastolic blood pressure, and body composition by choice of diet. Looking at our findings a vegetarian diet does not produce significant differences in blood pressure, body composition or resting heart rate. The findings could be used to by those wanting to promote red meat as a healthy source of protein although numerous studies have found red meat to not be healthiest protein resource. There are a number of different versions of a vegetarian diet; some may be healthier than others. The lacto-ovovegetarian diet may have contributed to the similar research data among the two groups; dairy products

contain cholesterol, saturated fats, and some products are high in sodium. Cholesterol, saturated fats and excessive amounts of sodium have been identified as factors of high blood pressure and Cardiovascular disease. Further research needs to be conducted with larger number of subjects to prevent possible skewing of data. Further research could be conducted looking each sex individually, a smaller age range, different types of vegetarian diets, or the effects of a vegetarian diet on Cardiovascular Disease.

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