

Relationship of Coffee Consumption and Energy Expenditure

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Abstract

Abstract. Relationship of Coffee Consumption and Energy Expenditure. DeJarlais, B. Scherz, R., Snyder, R., Wanka, L. *J. Undergrad. Kin. Res.* 2005;1(1):55-59. Does coffee consumption show a relationship between the amount a person consumes and the amount of energy they expend? The purpose of this study is to determine the relationship between coffee consumption and energy expenditure in both men and women coffee (N=39) and non coffee consumers (N=17) ranging from the ages of 18-56 years in Eau Claire, Wisconsin. Energy expenditure was calculated using the demographics of each subject (Weight, number of cups consumed a day, frequency, intensity, and duration of activity) through an interviewed questionnaire. There was a significant difference ($p < .05$) in energy expenditure between the coffee consumption group ($m=3240$ kcals per week) and the non-coffee consumption group ($m=1431$ kcals per week), $t(54) = 4.025$, $p = <.001$. There was not a significant relationship between energy expenditure and coffee consumption ($r = .053$, $p = .748$). This data shows a large difference between the energy expenditures between the two groups. We concluded that coffee consumption has a negative effect on energy expenditure and some health aspects, but understanding why so many benefits exist is compelling.

Key Words: Physical Activity, Exercise, Caffeine, Health

Introduction

In 2004 alone, 167 million United States coffee drinkers consumed nearly 6.3 billion gallons of coffee, admitting to drinking over three cups per day (1). Due to the high amounts of coffee being consumed, our research revealed that the effects of coffee consumption on physical activity and energy expenditure have been examined for many years. Consequently, coffee consumption is prevalent, with four out of five Americans drinking coffee, and nearly half indulging in coffee daily (2). According to the *British Journal of Nutrition* (3), a study stated that there was significant relationship between the change in coffee intake and the change in physical activity. 14.5% of those who consumed less coffee, declared that they had been more active than usual, compared to the 10% who increased coffee consumption, and reported less physical activity (2).

Jeff Kluger with *Time* magazine quoted after referencing a study by Meir Stampfer, “It’s hard to find much wrong with a drug that can battle fatigue and improve creativity and could even prevent Parkinson’s disease and diabetes (1,4). It’s also hard to find much right with a drug that elevates blood pressure, aggravates stress, causes insomnia and leads to addiction. When both drugs are the same thing, it’s hard to know what to think.”

Caffeine is a unique chemical in that it has positive effects on some functions of the body, while simultaneously having adverse effects of others. According to a study from *Annals of Internal Medicine* (5), researchers at Harvard concluded that drinking six cups or more per day can reduce the risk of diabetes in men by 54% and in women by 30% (6). Michael Leitzmann from *The Journal of the American Medical Association* (6,7) states that people who drink coffee on a regular basis have an 80% lower risk of developing Parkinson's disease. He also states that drinking at least 2 cups per day can lead to a 25% lower risk of colon cancer, an 80% drop in the risk of liver cirrhosis, and nearly 50% drop for the risk of gallstones (4,6,7). Some negative effects of coffee include increases in the risk of heart attacks, blood pressure, and a decrease in bone density and birth weight (4,8).

The purpose of this study is to determine the relationship between coffee consumption and energy expenditure in adults between the ages of 18 and 56 in both males and females. It is hypothesized that there is a relationship between coffee consumption and energy expenditure in adults.

Methods

Study Population

The subjects in this study were both men and women coffee (N= 39) and non coffee consumers (N=17) ranging from the ages of 18-56 years. The participants in this study were chosen through personal interaction to ensure validity and honesty. The subjects were carefully selected on the basis of physical activity. The procedure and consent forms were approved by the University Human Subjects Internal Review Board. All subjects signed an informed consent form before data collection began.

Instrumentation

Our study will be conducted through a questionnaire. The questionnaire and coffee data sheet will consist of various questions pertaining to the amount of physical activity converted to energy expenditure and the amount of coffee a person consumes daily.

Data Collection Procedures

The data was collected using a coffee consumption and physical activity questionnaire used to determine the amount of activity each coffee drinker participates in. The questionnaire procedure took approximately 30 minutes, while data collection lasted for approximately one month. The subjects were asked to complete the questionnaire to the best of their ability or knowledge. They were asked to express their daily physical, athletic, recreational, or occupational activities per week that require energy expenditure in terms of daily duration and intensity of their activities. The amount of coffee consumed was defined in cups where 1 cup = 8 ounces and intensity was measured in miles per hour. An example intensity rate would be walking at 3.5 mph.

Data Analysis

The investigation of the study compared the amount of coffee each subject consumed to the amount of energy they expend. An independent T-test was used to define the group's differences between low, moderate, and highly active people who consume coffee.

Results

After collecting data from our subjects, the results from our coffee consumption and physical activity questionnaire prove that there is a negative relationship between coffee consumption and energy expenditure. A Pearson's Correlation Coefficient statistic (Pearson's r) is defined as having a correlation between -1 and 1. There was a significant difference ($p < .05$) in energy expenditure between the coffee consumption group ($m=3240$ kcals per week) and the non-coffee consumption group ($m=1431$ kcals per week), $t(54) = 4.025$, $p = <.001$. There was not a significant relationship between energy expenditure and coffee consumption ($r = .053$, $p = .748$).

Figure 1, on the following page, shows the difference in mean kcal expenditure per week between the coffee consuming group and the non-coffee consuming group. Figure 1, which was compiled from the statistics from Table 1, also shows the mean standard deviation of the two groups.

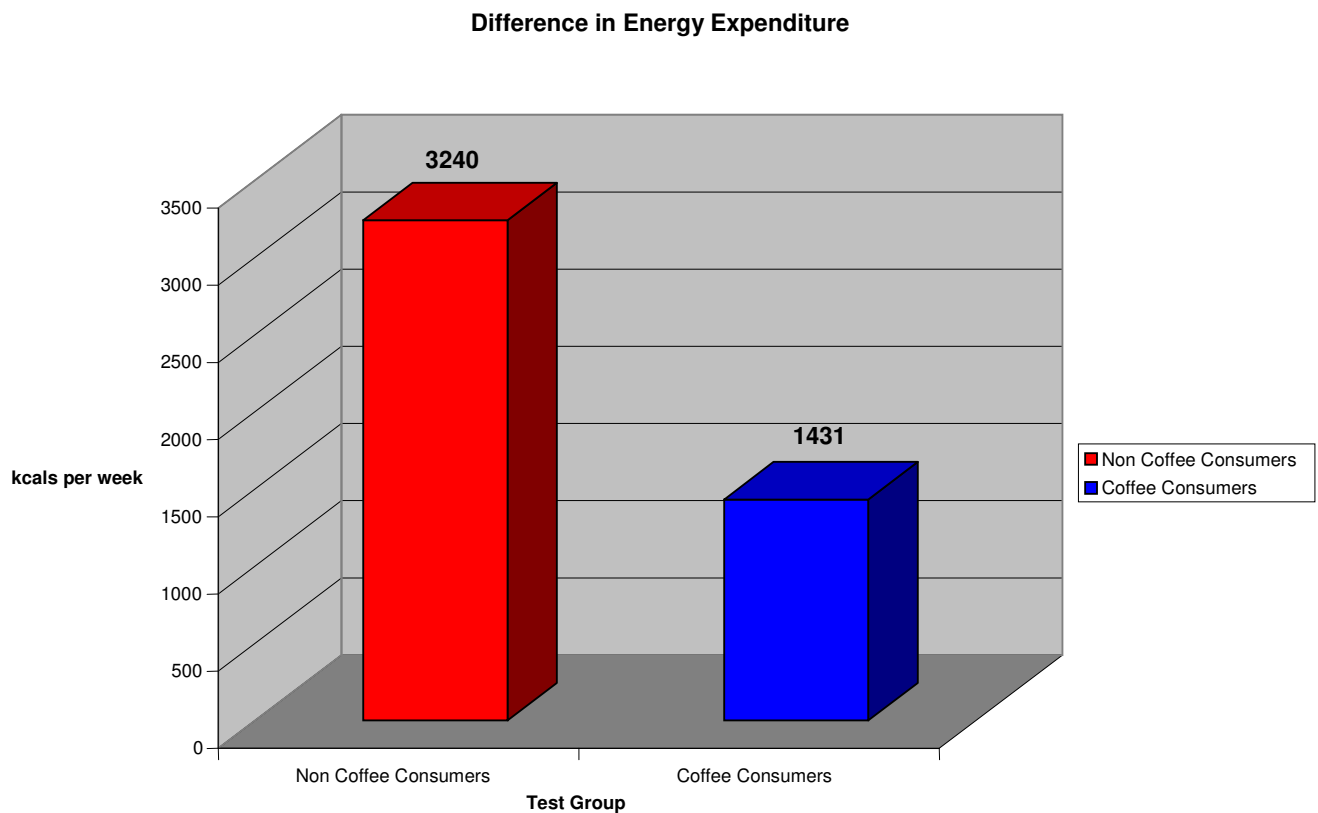


Figure 1. Difference in Energy Expenditure.

Discussion

According to the *British Journal of Nutrition* (3), there was a significant negative association between change in coffee intake and change in physical activity level during a study that was performed. Among the coffee abstainers, 14.5 percent reported that they had been more active than usual during the trial compared with none among those with increased coffee intake. In contrast, 10 percent of those with increased coffee intake had been less active, compared with 2.9 percent among abstainers. The strongest relationship was between those subjects who drank the most coffee which resulted in less energy expended each day. Therefore we consider that the opposite (less coffee consumed leads to more energy expended) will be true. Our study concurred with the findings of this study, meaning that increased coffee consumption translated into decreased energy expenditure.

Acute caffeine administration increases both systolic and diastolic blood pressures by 10-15 mm Hg, meaning an increase in the workload for the heart (9,4). Many people think that drinking caffeinated coffee is associated with an increase in energy expenditure, although some studies show a negative relation. According to the Titlow et al. study, when separate groups of non coffee and coffee consumers (given 2 cups of brewed coffee-200 mg caffeine) were compared, the study concluded that the caffeine drinkers results failed to affect their metabolism during submaximal exercise (10). In accordance with this study, our findings considered an increase in cardiac output due to coffee intake to be an assumed increase in blood pressure,

Assumptions and Limitations

Our assumption relating to this study is that each subject filled out the data sheet questionnaire honestly and accurately to the best of their knowledge. Our limitation of this study is that each subject used self-reported data rather than actual measured data.

Conclusion:

Overall, we hypothesized that there is a relationship between coffee consumption and physical activity in adults. Although it wasn't statistically significant, our findings show that daily coffee consumption has a negative relationship with energy expenditure. This could be because high coffee consumers have a general lack of interest in having a healthy lifestyle (3). Consumers and non-consumers of coffee can benefit from this study. The general public would be interested in these findings due to the lower risk of Type II diabetes, Parkinson's disease, colon cancer, liver cirrhosis, and gallstones. Negative effects including increased risk of heart attacks, blood pressure, bone density, and lower birth weight are also beneficial for the general public's knowledge. When considering future research, we conclude that coffee consumption has a negative effect on energy expenditure and some health aspects, but understanding why so many benefits exist is compelling. An area for future research would be examining the effects of long-term coffee consumption on health and energy expenditure.

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