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EAL Assignment Part 5

**"What is the relationship between coffee consumption and glucose tolerance and insulin sensitivity in individuals with and without type 2 diabetes?"**

**Study Participants with type 2 diabetes:**

A good within-subject or crossover study design that was a double-blind and placebo-controlled by Lane et al (2006) disproved the common belief that habitual coffee drinking leads to the development of tolerance to the effects of caffeine on blood glucose. Research showed the p-value was P=0.02 and that the mean glucose value after the administration of caffeine rose 28% higher than those in the control group. The mean insulin value after the administration of caffeine rose 19% in contrast to those who received the placebo. The study showed that blood glucose was affected when coffee is consumed, and the effects of caffeine can persist for 10 hours or more after drinking coffee or other caffeinated beverages.

In a random-order cross-over study, Krebs et al (2012) looked at 18 habitual coffee drinkers (classified as consuming 237mg of caffeine per day) with type 2 diabetes mellitus who were randomly assigned to three different test treatments, either one double shot black espresso coffee, one double shot black decaffeinated coffee or the same volume of hot water to examine the effects of caffeine on glucose tolerance and insulin sensitivity. Study participants consumed one of the three test beverages following a fasting blood draw and then participated in a 75g oral glucose tolerance test one hour after the test beverage was consumed. Results indicated that area under the curve glucose was marginally different between beverages (P=.06)

being greater following caffeinated coffee than water, mean difference 104mmol/L/180min (95% CI 0.1-198.1, P=.031), or decaffeinated coffee, mean difference 92.1mmol/L/180min (95% CI -1.9-186.1, P=.055). People who consumed black espresso coffee had a marginally greater release of glucose compared with decaffeinated coffee and water and did not appear to change insulin sensitivity.

**Study Participants without type 2 diabetes:**

In a fairly good large scale prospective cohort study Salazar-Martinez et al (2004) found that there was an inverse association between coffee intake and type 2 diabetes after an adjustment for age and body mass index. The study suggests that long-term caffeine consumption when in the form of coffee is associated with a statistically significant lower risk for the development of type 2 diabetes. The coffee consumption categories ranged from 0, less than 1, 1 to 3, 4 to 5 and 6 cups or more of coffee. For men, the statistical significance was 1.00, 0.98, 0.93, 0.71, and 0.46 with P = 0.007. For women the values were as follows; 1.00, 1.16, 0.99, 0.70, 0.71 with P = <0.001. Total caffeine ingestion from coffee and other beverage sources of caffeine are associated with a significantly lower risk for diabetes in both men and women.

In a randomized control trial, Brennan et al (2011) looked at 45 healthy overweight individuals, over an 8-week trial, who were regular coffee consumers who were randomly assigned to three control groups of either caffeinated coffee, decaffeinated coffee, or no coffee to measure glucose tolerance, insulin sensitivity, and insulin secretion. No significant differences were found between treatment groups for glucose tolerance, insulin sensitivity, and insulin secretion. However

consumption of caffeinated coffee increased adiponectin (difference in change from baseline 1.4μg/mL; 95% CI: 0.2, 2.7) and interleukin-6 (difference: -20%; 95% CI: 8, 138) as compared with no coffee which suggests improvements in adipocyte and liver function which may help with metabolic effects on long-term coffee consumption.

**Conclusion:**

Coffee consumption amongst participants with or without type 2 diabetes resulted in mixed findings for glucose tolerance and insulin sensitivity. Two of four studies resulted in no change with insulin sensitivity and glucose tolerance with the consumption of coffee. However, one study did find that caffeine ingestion showed elevated levels blood glucose and affected the effects can last for up to ten hours. The fourth study showed that consumption of coffee had a greater release of glucose but did not appear to change insulin sensitivity. Due to inconclusive results the grade for these studies is Grade II: Fair.