PEPPERMINT TEA VS. PLACEBO FOR THE IMPROVEMENT OF MEMORY AND FOCUS IN COLLEGE STUDENTS

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Abstract

Peppermint tea has many claims surrounding its homeopathic properties including boosting the immune system, preventing motion sickness, improving memory and focus and more. All of these claims have been made despite the lack of scientific evidence depicting these properties. To test whether the tea can improve memory and focus, we enlisted professors from various majors at the University of Findlay to volunteer some of their class time. We then randomly distributed tea or water to the student volunteers within each class. We conducted a digit span memory test (DSMT) at the beginning and end of class to measure memory and asked each student to quantitatively record their focus on a scale of 1-10 through a pre and post survey. As of now, because of our alpha value of 0.05, our results are not statistically significant based on a p-value of 0.45 from a 1-tailed t-test Though our data shows that the tea group had a 0.06 average decrease in their DSMT scores when compared to the 0.20 decrease in the average DSMT scores within the water group. Overall focus per a 1-10 scale also indicated a 0.54 decrease in the water group and a 0.52 average increase within the tea group.

Introduction

In the United States, tea can be found in over 80% of all households and in any given day more than 159 million Americans consume tea. With all the different types of tea available, many different claims are made to influence consumers to buy specific brands. Examples of these claims include increased focus, memory, relaxation, and many others. Despite all these claims there is very little scientific literature with supporting evidence for these statements. There is currently a lack of regulation when it comes to medicinal herbal products in the U.S. and for this reason it is imperative to test these claims. Past literature has indicated that there may be a link to peppermint and increased cognitive function such as memory and focus. This literature did not test the effectiveness of peppermint tea on memory and focus, rather, it looked at other mediums like gum, and odorants. With the large variety of different herbal teas available to consumers, many different studies need to be conducted to reveal the true properties of these natural remedies.

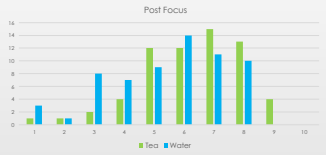
Purpose

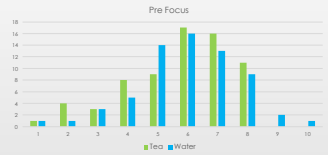
- To determine the effect of peppermint tea on the memory and focus of college students when compared to placebo
- To test the overall claim that peppermint tea improves memory and focus
- To test whether peppermint tea can improve overall performance in the classroom

Methods

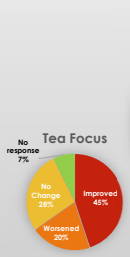
Our first step for our project was to reach out to professors from various departments (mostly pharmacy) to see who would be interested in volunteering their class time. We sent out a formalized email explaining the purpose of our study, what we planned to do with their class time, and what we needed them to do prior to our testing date in their class. We asked professors from pharmacy, history, algebra, and physics classes, first to use a random number generator, which we supplied in the email, to randomly assign a number to each student in their class. Then we asked them to forward us their roster so we could distribute the presurvey prior to our date in class. We used these randomized numbers as the answer to the first question on the pre and post surveys. This served as the survey identifier. We also used these numbers for labeling the cups. This allowed us to use the random number generator to assign students to either tea or water based on the random numbers generated for each group without knowing the students names. Our presurvey consisted of 5 questions, one to type their random number, two to identify/differentiate their class and professor, a scale of 1-10 to rate their general (pre) focus in that class, and finally confirmation for known allergies to herbal supplements. The students who completed the presurvey then received a filled cup containing either tea or placebo with their matching randomized number and were instructed to leave the lids on and sip on their drink throughout class. At this time, we also handed out our Digit Span Memory Test (DSMT) sheet with the post-survey and began testing. We ran three sequences of numbers 0-9 increasing from 7 to 9 numbers with each number in the sequence appearing on the screen for 0.75 seconds. Students were instructed to wait until the sequence ended, then record as many numbers they could recall in the correct order. Class then continued as usual and we presented three new sequences in the last 2 minutes of class followed by students completing the post-survey which started with the same three identifiers followed by a 1-10 scale, whether or not they finished the drink and space to share any other thoughts or changes they experienced.

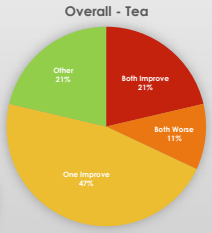
Results





	Tea	Water
Pre-Focus Average	5.75	5.98
Post-Focus Average	6.28	5.44
Pre-DSMT Average	5.34	5.46
Post-DSMT Average	5.28	5.26
Mean	5.28	5.25
P-value	0.456995	





We based our results from 134 students on both qualitative measures obtained with a Likert scale of 1-10 for perceived focus and quantitative measures for the changes of DSMT scores before and after class. The scale on the pre and post survey generally indicated an average increase of 0.53 points in focus from the tea group and an average decrease of 0.54 points in focus in the placebo/water group. The tables above show graphically how the focus scores shifted at the beginning and end of class comparing the 2 groups. In terms of the DSMT results, both groups showed a decrease in performance, however the tea group showed an average decrease of -0.06, while the water group had an average decrease of -0.20. DSMT scores were determined by the correct number being placed in the correct location within the sequences of 7, 8, and 9 numbers before and after class. Shown the table are the mean DSMT scores as well as our P-value(CI 95%, alpha = 0.05) with power of 0.8 and the average focus and DSMT scores before and after class which resulted in the calculated changes mentioned previously. We conducted a two-sample t-test assuming equal variances based on the data sets at the end of class to calculate a p-value of 0.456995. We did succeed in meeting our power however our results were not statistically significant. The pie chart then depicts whether students who drank the tea improved in both focus and memory, one area, remained the same or worsened by the end of the class period.

Conclusions

Peppermint tea may provide slight improvement to memory and focus, however based on our results, there was no statistically significant change in these characteristics. Many students from the tea group commented that they felt more focused, awake and alert during class which in a couple cases lead them to being more distracted. Some mentioned that the tea relieved a headache or calmed them, sometimes to the point of drowsiness (especially in our afternoon classes). In comparison, those in the water group mostly noted no change or that it made them more tired and less focused. The placebo group did have 3 students which commented that the water helped them through class. This, along with the results shown in the pie chart, indicate there may be some clinical significance to our study despite the lack of statistical significance. There were some sources of bias identified after the study completion such as selection bias because mostly pharmacy students were selected as participants, and observation bias because participants were aware they were being tested for memory and focus. Although the study was blinded and randomized, it was apparent after the first class based on survey feedback that people receiving our control (hot water) were aware of this. In future studies an active control with another type of tea should be used, or something should be added to the control group to make it flavored or scented. This could have introduced some confirmation bias amongst participants, because they knew they received the control and therefore knew they shouldn't have improved memory and focus. This was a large weakness of our study however, we knew going into the study that this may happen. Our main hope was to ascertain if tea had any effect compared to an absolute placebo such as water because we were worried other placebos may introduce confounding variables. As for external and internal validity, this study can be extrapolated to a large population of people, however, most participants were Caucasian, and pharmacy students. We don't believe the results would be different given a change in major, or ethnicity, but this should be noted. Internal validity was average considering we had good randomization. However, the blinding was not considered successful given that the control group in some cases, commented that they had hot water. Further studies need conducted to see if other types of herbal teas can help with memory and focus. These studies could also serve to test other tea claims such as those claiming to help with sleep, and anxiety.

References

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