

Effects of caffeine on long term memory



**ASSIGN
BUSTER**

1. Introduction

One of the most significant chemical contents of coffee is bioactive compounds namely phytochemicals with almost 10 percent when caffeine represents only 1 percent of coffee in general. Phytochemicals are reported with their neuroprotective activities. In particular, some of the phytochemicals such as chlorogenic acid, caffeic acid, kahweol and cafestol were found in vivo experiments to have significant positive impact on working or short term memory with their neuronprotective and antioxidative interactions (Janga, et al., 2013, p. 114).

In the early research conducted in this field, Herz, (1999, p. 878) demonstrated that 5 mg/kg dose of caffeine improves the arousal characteristic of mood without influencing the pleasantness feelings. The function of arousal mood was closely linked to learning memory performance and cognitive performance in this study which reflected that caffeine may have a positive impact on memory and cognitive functions of human brain.

A number research have scanned the advantages of caffeine consumption for individuals who are in different conditions that require them physical and/or mental wellness. The concept of “ being well” referred to various physical performance tasks and mood dimensions. Such as the work of Mednicka, Caic, Kanadya, & Drummond (2008, p. 79) suggests that caffeine improves verbal memory, alertness and mood, attention and vigilance, motor speed, reaction time and the speed of information processing for sleep deprived persons.

The research conducted by Smillie & Gökçen (2010, p. 496) proved that caffeine improves the subjective experience of alertness and concentration which can be applied in cognitive achievement and learning oriented situations. Nevertheless in this study, the role of caffeine on some key functions of cognition such as working memory remained unclear. Because caffeine found to alter neuronal processing however has no influence on cognitive performance and related tests of working memory. Their study explained these inconsistencies in terms of the role of individual differences in response to the effects of caffeine.

The action of caffeine within the brain is exerted through a non-selective antagonists on adenosine receptors. Because of these adenosine receptors exhibit a general decreasing influence on neural activity and stimulant role of receptor antagonist has effect on disinhibitory mechanisms.

Koppelstaetter, et al. (2008, p. 492) put forth that the effects of low doses of caffeine created substantial enhancements in activity of brain regions that mediate concentration, mood and sleep. In this sense, they claimed that the effects of caffeine is not limited to excitatory neuro-stimulation but also it reduces the blood flow in cerebra. Together these effects have shown that caffeine at doses of 200 mg. can reduce the resting demand in individuals by as much as 30 percent.

Although there are many non-experimental studies conducted in this field, most of the concrete results have been gathered from rat experiments. Cechella, et al. (2014, p. 98) demonstrated in their experimental study that exposure of caffeine reduces the spatial and long term, exercise developed memory in middle aged rats. Since exercising is accepted as a proven factor

<https://assignbuster.com/effects-of-caffeine-on-long-term-memory/>

for rats (swimming) and humans to protect against cognitive progressive deficits and brain health related with aging. Therefore in some studies caffeine consumption failed to create enhanced performance in hippocampal region of brain which is associated with emotional processes, learning and memory and suppressed the positive influences of physical activities on the long term memory.

This research is based on the results of previous research aims to test the effects of caffeine consumption on the long term memory of individuals. The main conjecture of the study considers the stimulant effects of caffeine on the long term cognitive performance of human memory.

Discussions

The questionnaire consists of demographic questions and six questions (Appendix) that were directed in order to identify the caffeine consumption in the day tests were conducted. To determine the effects of caffeine consumption on individuals' long term memories, test subjects were grouped into three groups in which each group was consisted 8 individuals. The first group was given a cup of coffee with 150-200 mg. caffeine, the second group was given a cup of coffee without caffeine and to the last group was not given any drinks. Finally, 15 minutes after they finished their drinks, individuals in each group were asked to memorize the given word list which includes 21 meaningful but disconnected words. The purpose of the tests were to determine the average number of words remembered by each group after two minutes those memory cards retrieved from these individuals. The

research conditions were randomly selected and researchers did not make any adjustments to align the physical environment.

Although the test subject consists of a narrow sample size, the results of data showed a significant and meaningful difference between three groups about the average number of words remembered from the word list. Profile plots for estimated marginal means of memory word test for caffeine group was 12, 13, without caffeine group was 11, 75 and group without any drink (none) was 7, 63 among 21 words in the list. Therefore, these results were required to be tested to measure the confidence degree of the data. In order to test the validity of these results in One-Way ANOVA F test (variance analysis) was applied in 95 percent confidence interval degree. The results of F tests exhibited that the interaction influence between caffeine consumption and long term memory were occurred at a significant and considerable degree as $p = 0,041 < 0,05$. On the other hand, these variables were adjusted into a later corrected validity model designed for dependent variable (IV= caffeine consumption) however the F test results remained at $p = 0,041$ degree which strengthened the consistency of the tests. Therefore marginal means for each group and between groups were confirmed.

The group which is given coffee without caffeine was observed placebo effect when the standard deviation, mean and variance analyses evaluated. There is a sharp difference in terms of marginal means of groups between without caffeine and None group (11, 75 and 7, 65). When the variances of each group compared, with caffeine and None groups show a similar degree of variance (12, 411 and 11, 411) however the variance of without caffeine group is differentiated at 16, 214. The high range created in the variance of <https://assignbuster.com/effects-of-caffeine-on-long-term-memory/>

without caffeine group shows us the placebo effects on the without caffeine group's memory test results.

The correlation analyses were adopted to test results in order to measure the relationship between demographic variables (gender differences) and caffeine consumption. According to the results of correlation tests Pearson correlation was found at 0, 119 positive point. However, this correlation rate is not accepted by SPSS as a significant correlative degree. This means that gender differences do not make a considerable influence on the degree of caffeine's effects on memory.

Thus, the experiment conducted in this research showed that caffeine is an effective chemical agent that creates a significant enhancement influence on the long term memories of individuals. The results of this study includes the limitations of working on a narrow test group. Nevertheless, the same research method can be applied to a more controlled and wider test subjects in the further studies may create more credible conclusions.

References

Cechella, J. L., Leite, M. R., Rocha, J. T., Dobrachinski, F., Gai, B. M., Soares, F. A., et al. (2014). Caffeine suppresses exercise-enhanced long-term and location memory in middle-aged rats: Involvement of hippocampal Akt and CREB signaling. *Chemico-Biological Interactions*, 223 , pp. 95-101.

Herz, R. S. (1999). Shorter Communication: Caffeine effects on mood and memory. *Behaviour Research and Therapy*, 37 , pp. 869-879.

Janga, Y. J., Kima, J., Shima, J., Kim, C.-Y., Jangd, J.-H., Lee, K. W., et al. (2013). Decaffeinated coffee prevents scopolamine-induced memory impairment in rats. *Behavioural Brain Research*, 245 , pp. 113– 119.

Koppelstaetter, F., Poeppel, T., Siedentopf, C., Ischebeck, A., Verius, M., Haala, I., et al. (2008). Does caffeine modulate verbal working memory processes? An fMRI study. *NeuroImage*, 39 , pp. 492–499.

Mednicka, S. C., Caic, D. J., Kanadya, J., & Drummond, S. P. (2008). Comparing the benefits of caffeine, naps and placebo on verbal, motor and perceptual memory. *Behavioural Brain Research*, 193 , pp. 79–86.

Smillie, L. D., & Gökçen, E. (2010). Caffeine enhances working memory for extraverts. *Biological Psychology*, 85 , pp. 496–498.

Appendix: Survey Questionnaire

Demographic Questions:

Age:

Gender: Male / Female

Questions related with caffeine consumption

1. Amount of the coffee consumed today (cups):
2. If consumed, the type of coffee: Espresso / Filter / Cappucino / Nescafe with milk/ Turkish coffee
3. Amount of cola consumed today (tin box):
4. Amount of tea consumed today (glass):

5. Did you consumed chocolate today? Yes/ No

6. If yes, how much? (pieces or packs)