

Effect of caffeine on alcohol consumption in wistar rats

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Introduction: The transient increase in alcohol consumption following a period of alcohol deprivation is known as alcohol deprivation effect (ADE). ADE models relapse and it is useful for screening the effectiveness of anti-relapse drugs¹. Alcohol and caffeine are two widely used psychoactive substances and they are commonly co-ingested². The study of the effect of caffeine on alcohol consumption following a period of deprivation has received little or no attention. Hence, the main aim of this study was to investigate the effect of caffeine on alcohol consumption with or without a period of alcohol deprivation.

Method: Male wistar rats were housed in individual cages and exposed to 10% alcohol (v/v) and water in an unlimited access two bottle free choice procedure over several weeks until a stable baseline for alcohol consumption was established². Rats were then deprived of alcohol for 3 days and 15 minutes before re-exposure to alcohol; rats were injected with saline, 2.5, 5, or 10 mg/kg caffeine intraperitoneally. Both alcohol and water consumption were measured 24 hours after each injection. Rats with stable low baseline alcohol consumption without deprivation also received intraperitoneal injection of 2.5, 5 or 10 mg/kg caffeine and alcohol and water consumption were measured as described before.

Results: There was no significant difference in alcohol consumption post-deprivation following injection with 4 ml/kg saline, 2.5 mg/kg or 5 mg/kg caffeine compared to baseline consumption. However, 10 mg/kg caffeine injection significantly ($p < 0.05$) reduced alcohol consumption post-deprivation compared to baseline consumption. Also, 10 mg/kg caffeine injected rats showed a significant ($p < 0.01$) reduction in alcohol consumption post-deprivation compared to saline, 2.5 mg/kg or 5 mg/kg caffeine injected rats (Figure 1). Additionally, in rats with very low baseline alcohol consumption which did not undergo alcohol deprivation, 5 mg/kg caffeine injection caused a significant ($p < 0.05$) increase in alcohol consumption compared to baseline while 10 mg/kg caffeine injection significantly ($p < 0.05$) reduced alcohol consumption compared to 5mg/kg caffeine injection (Figure 2).

Conclusion: The result shows that caffeine has a bi-modal dose-effect on alcohol consumption with or without a period of deprivation. The result also indicates that adenosine pathways may be involved in alcohol seeking behaviours and may hold promise as a potential target for treatment of alcohol relapse.

References:

1. Koros E *et al.* (1999). *Alcohol & Alcoholism* 34: 540-550.
2. Rezvani AH *et al.* (2013). *Alcohol Clin Exp Res* 37: 1609-1617.

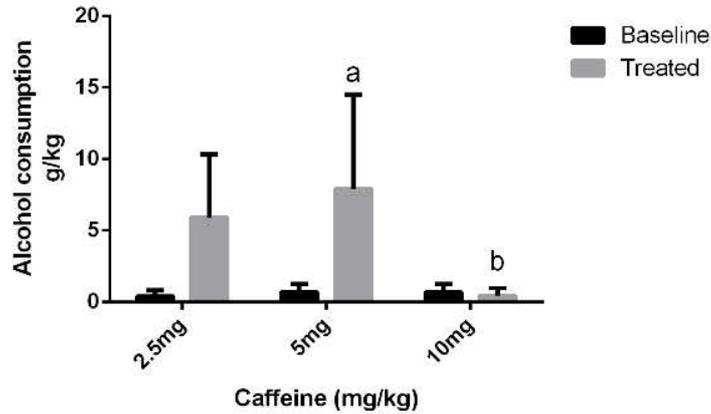


Figure 2. Effect of intraperitoneal injection of caffeine on alcohol consumption without alcohol deprivation. Statistical analysis was performed using two way ANOVA followed by turkey post-hoc test. Values are mean \pm SEM (n=5). ^a $p < 0.05$ versus baseline alcohol consumption of 5 mg/kg caffeine treated rats, ^b $p < 0.05$ versus 5 mg/kg caffeine treated rats.

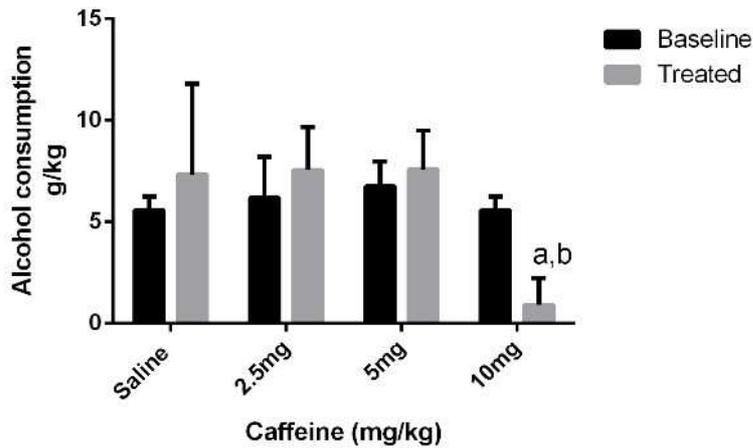


Figure 1. Effect of intraperitoneal injection of caffeine on alcohol consumption following a period of 3 days alcohol deprivation. Statistical analysis was performed using two way ANOVA followed by turkey post-hoc test. Values are mean \pm SEM (n=5). ^a $p < 0.01$ versus saline, 2.5 and 5 mg/kg caffeine injections, ^b $p < 0.05$ versus baseline consumption of 10 mg/kg treated rats.