



Dual Effects of Low and High Dose Caffeine

Siew H. GAN *, Norzihana RAMLI & Norman MUKIAR

*Department of Pharmacology, School of Medical Sciences, Universiti Sains Malaysia,
16150 Kubang Kerian, Kelantan, Malaysia.*

SUMMARY. Using a Digiscan Actimeter, many previous studies have shown that low dose caffeine (6.25-25 mg/kg) stimulates locomotion while caffeine in high doses (100 mg/kg) depresses locomotion. This locomotor stimulatory effects induced by caffeine in rodents have been attributed to antagonism of adenosine A1 and A2A receptors while its depressant effects are mediated by the blockade of the A1 receptors. The objective of this study is to further confirm caffeine's dual effects using Porsolt's Forced Swim Tests (FST). This study is also the first to report on mice's active behaviours such as climbing and swimming that can further elucidate caffeine's mode of antidepressive action. Male Swiss albino mice (n = 18) weighing 22-29 g were divided into 3 groups. Each group received either 100 mg/kg of caffeine (Group 1), sodium benzoate vehicle as control (Group 2) or 10 mg/kg of caffeine (Group 3) intraperitoneally. After 30 min of administration, the mice were subjected to a FST and the immobility time was measured. The mice's active behaviours were also scored by an independent observer who is blinded to the treatment group. Animals receiving high dose caffeine (Group 1) illustrated a significantly longer immobility time (reduced by 82%), while the groups receiving low dose caffeine showed shorter immobility time (increased by 19%) when compared to the control group. Group 1 also went into an immobility stage faster (p = 0.036: ANOVA). Animals in Group 3 also showed significantly higher frequencies of swimming and climbing behaviours when compared to the other two groups. Overall, these data support the hypothesis that high dose caffeine promotes a state of "prolonged helplessness". Caffeine shows a dual effect and when it is administered in low dosages, it may be a potential drug to be used and developed as an antidepressant agent. High dose caffeine gives the opposite effect.

KEY WORDS: Caffeine, Dual effects, Forced swim test.

* Author to whom correspondence should be addressed. *E-mail:* usmPCRprob@yahoo.com