

UNIVERSITI TEKNOLOGI MARA

**EFFECT OF ACUTE CAFFEINE
ADMINISTRATION ON INDUCING ANXIETY-
LIKE BEHAVIOUR IN BALB/c MICE**

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ABSTRACT

Caffeine is consumed by many people around the world. A central nervous system (CNS) stimulant with a very low potential of abuse, caffeine-containing coffee is consumed for its alertness properties. Anxiety, an effect that is usually observed with CNS stimulation, has also been associated with caffeine-consumption. However, the concentration at which caffeine caused anxiety-like symptoms varies greatly between individual (Smith, 2002). Genetic factor (Yang, Palmer, & Wit, 2010) and lifestyle (Youngstedt, O'Connor, Crabbe, & Dishman, 1998) for example, have great influence on how an individual reacts to caffeine. In the present study, the effect of acute administration of caffeine in BALB/c mice was observed. Two concentrations of caffeine, 1 mg/kg and 3 mg/kg were used in this study. The mice were randomly divided into four groups: the control group, the restraint group, caffeine 1 mg/kg group and caffeine 3 mg/kg group. The control and restraint groups received normal saline solution. All the treatments were given intraperitoneally, 30 minutes before the behavioral test on Elevated Plus Maze (EPM). The results from this study show that at the two concentrations used, caffeine did not cause anxiogenic effect in the mice. The result could also suggest that at low concentration, caffeine acts more as an anxiolytic

CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

Anxiety is a state when an individual is experiencing feelings of nervousness, worry or unease about events that are still uncertain of happening. When put under stressful situations, being anxious is a part of normal physiologic and psychological response. For normal individual, once the stressor is removed, the anxious will subside and disappear. However, for people who are suffering from anxiety disorder, they will become anxious even under normal circumstances. These people have trouble to control their thoughts that responsible in uncontrollable feeling of anxiety. Physiologically, anxiety disorder is caused by the imbalance of neurotransmitter in part of the brain that control mood and feeling (McEwen & Olié, 2005). In anxiety, there is imbalance of dopamine, serotonin and norepinephrine. This imbalance may be caused by trauma to the brain that results in neuronal damage or intake of substances that can affect the level, function and release of the neurotransmitter in the central nervous system (CNS).

A very common compound with known anxiogenic is caffeine. It is a CNS stimulant (George, 2000) with a very low potential of abuse. Despite it is considered safe for daily consumption in the form of coffee or tea, excessive intake of caffeine still causes negative side effects such as anxiety and gastrointestinal discomfort. These negative effects of caffeine however, differ between species, individual and amount of caffeine consumed. Some people easily get antsy only after a cup of coffee while some others can take higher content of caffeine without experiencing anxiety. Thus, there is no solid answer to what concentration of caffeine that can truly trigger anxiety in people. The mechanism of action of caffeine that may cause anxiety is believed to be strongly related to the antagonism of the adenosine receptors. In general, adenosine receptors play an important role in inhibitory mechanism of the CNS (Fisone, Borgkvist, & Usiello, 2004). When adenosine, the endogenous ligand of the adenosine receptor binds to it, released of excitatory neurotransmitter in the CNS such as dopamine and norepinephrine is reduced (Fredholm *et al.*, 2000). This reduction of