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## ANTI-SPASMODIC EFFECTS OF TRADITIONAL MEDICINAL PLANT ON EXPERIMENTAL RABBIT MODEL

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### ABSTRACT

Present study has been under taken with main objective of evaluating the aqueous extract of flowers of *Muntingia calabura* for antispasmodic activity using rabbit as an experimental animal model. In conclusion, the findings suggest that *Muntingia calabura* has antispasmodic activities which are mediated possibly through blockade of calcium channels as well as release of calcium from intracellular stores.

**Key Words:** *Muntingia calabura*, antispasmodic activity

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### INTRODUCTION

In medicine a spasm is a sudden, involuntary contraction of a muscle, a group of muscles, or a hollow organ such as a heart, or a similarly sudden contraction of an orifice. It most commonly refers to a muscle cramp which is often accompanied by a sudden burst of pain, but is usually harmless and ceases after a few minutes. There is a variety of other causes of involuntary muscle contractions, which may be more serious, depending on the cause. The word "spasm" may also refer to a temporary burst of energy, activity, emotion, Eustress, stress, or anxiety unrelated to, or as a consequence of, involuntary muscle activity. A variety of types of involuntary muscle activity may be, or referred to as a "spasm [1, 2]. Examples include muscle contractions due to abnormal nerve stimulation abnormal activity of the muscle itself. A series of spasms or permanent spasms

are called spasmism. A spasm may lead to muscle strains or tears of tendons and ligaments, if the force of the spasm exceeds the tensile strength of the underlying connective tissues, such as with a particularly forceful spasm, or in the case of weakened connective tissues. True hypertonic spasm is caused by malfunctioning feedback nerves, is much more serious, and is permanent unless treated. In this case, the hypertonic muscle tone is excessive and the muscles are unable to relax. A subtype of spasms is colic. This is an episodic pain due to spasms of smooth muscle in a particular organ (e.g. the bile duct). A characteristic of colic is the sensation of having to move about, and the pain may induce nausea or vomiting if severe. Amongst causes of spasms are insufficient hydration, muscle overload, and absence of electrolytes. Spasmodic muscle contraction may be due to a large number of medical conditions, including the dystonias. Hypertonic muscle spasms is the state of chronic, excessive muscle tone, or tension in a resting muscle – the amount of contraction that remains when a muscle is not actively working. Initial symptoms of spasmodic torticollis are usually mild. The head may turn or tilt

in jerky movements, or sustain a prolonged position involuntarily. Over time, the involuntary spasm of the neck muscles will increase in frequency and strength until it reaches a plateau. Symptoms can also worsen while the patient is walking or during periods of increased stress. Other symptoms include muscle hypertrophy, neck pain, dysarthria and tremor. Studies have shown that over 75% of patients report neck pain and 33% to 40% experience tremor of the head [3, 4].

## MATERIALS AND METHODS

### Antispasmodic activity

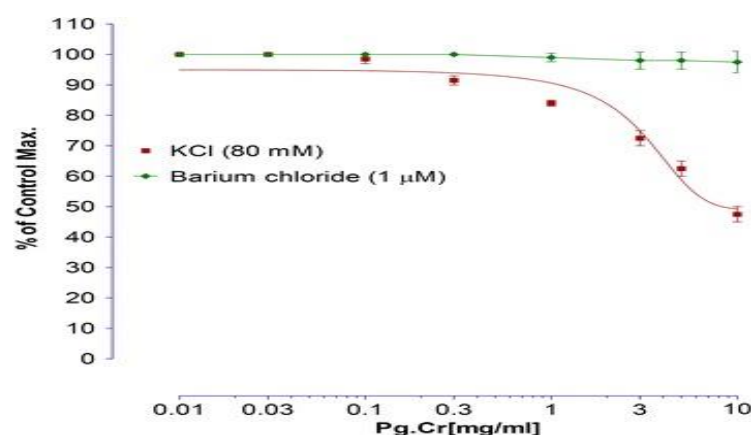
The spasmolytic activity and possible mode of action of the plant materials were studied by using isolated rabbit jejunum as described previously [32]. Rabbits were starved for 24 hrs prior to experiment and they were stunned by blow on the head and then pithed. The abdomens of pithed animals were opened and jejunum portion of about 2.0cm were removed. Each preparation was cleared off the mesentery so that it could freely give spontaneous contractions. Each segment of about 2 cm lengths was suspended in a 10 ml [33] tissue bath containing Tyrode's solution maintained at 37°C and aerated. The tissues were allowed to equilibrate for at least 30 min at preload of 1 g. Tension changes in the tissue were recorded on kymograph. The smooth muscles relaxant action of test materials was observed by administration of test drugs in a cumulative fashion directly without the use of an agonist. To assess whether the spasmolytic activity of the test substance was through calcium channel blockade (CCB), high K<sup>+</sup> (80 mM), as KCl [38] was used to depolarize the preparations [34]. The K<sup>+</sup> (80 mM) was added to the tissue bath, which produced a sustained contraction. The test materials were then added in a cumulative fashion to obtain concentration-dependent inhibitory responses. To confirm the Ca<sup>++</sup> antagonist property of the test substance, the tissue was allowed to stabilize in normal Tyrode's solution, which was then replaced with Ca<sup>++</sup>-free Tyrode's solution containing EDTA (0.1 mM) for 30 minutes in order to remove Ca<sup>++</sup> from the tissues. This solution was further replaced with K<sup>+</sup>-rich and Ca<sup>++</sup>-free Tyrode's solution. Following an incubation period of 30 min, control concentration-response curves

(CRCs) of Ca<sup>++</sup> were obtained. When the control Ca<sup>++</sup>CRCs were found super-imposable (usually after two cycles), the tissue was pre-treated with the crude extract for 60 min. The CRCs of Ca<sup>++</sup> were reconstructed in the presence of different concentrations of the extract [5].

## RESULTS AND DISCUSSION

### Effects on rabbit jejunum

Acute toxicity study of crude methanolic extract of *Muntingia calaburawas* carried out. In isolated rabbit jejunum preparation, the flower extract of *Muntingia calabura* (Mc.Cr), inhibited the spontaneous contractions in a concentration-dependent manner with EC<sub>50</sub> value of 0.30 mg/ml similar to that of verapamil graph-1. When tested against high K<sup>+</sup> (80 mM)-induced contractions, Mc.Cr caused relaxation with EC<sub>50</sub> value of 80 ug/ml as shown in graph. Mc.Cr caused relaxation of K<sup>+</sup> (80 mM)-induced contractions at lower concentration compared to that of spontaneous contractions. Similar pattern was seen with verapamil, which produced relaxation of K<sup>+</sup> (80 mM)-induced contractions with EC<sub>50</sub> value of 60 µg/ml at lower concentration than that of spontaneous contractions in rabbit jejunum. Pre-treatment of the tissues with Mc.Cr (30 - 100 ug/ml) showed rightward shift in the Ca<sup>++</sup> concentration response curves similar to that of verapamil.



**Graph-1** Effects of crude methanolic extract of *Muntingia calabura* on high concentration (80 mM) KCl-induced contractions on rabbits' jejunal preparations

## CONCLUSION

The present study on preliminary phytochemical and physicochemical evaluation of *Muntingia calabura* flower could be used as the diagnostic tool for the standardization of medicinal plant. The aqueous extract of *Muntingia calabura* produced positive results for alkaloids, glycosides, carbohydrates, Saponins, phenols. In conclusion, the findings suggest that *Muntingia calabura* has antispasmodic activities which are mediated possibly through blockade of calcium channels as well as release of calcium from intracellular stores. This research may explain the medicinal use of *Muntingia calabura* in abdominal colic and diarrhoea.

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