

## EVALAUTION OF ANTISPASMODIC EFFECT OF AQUEOUS EXTRACT OF *MANGIFERA INDICA* LEAVES

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### ABSTRACT

The emphasis on the uses of medicinal plants had hitherto been placed on the treatment rather than prevention of diseases. A spasm is a sudden involuntary contraction of a muscle, a group of muscles, or a hollow organ such as the heart and intestine. The plant *Mangifera indica* is a dicotyledon plant belongs to the family Anacardiaceae. The main active constituents are mangiferin, mangiferone, rutin, myricitin. It have various pharmacological effect. It is used as anti-oxidant, immunomodulatory, anti- inflammatory, antidiabetic, anti-cancer, anti-helminthic and anti-bacterial agent. The present study highlights the pharmacological evaluation of in-vitro anti-spasmodic activity of *Mangifera indica* leaves by using aqueous extract which is prepared by soxhlet extraction technique. The evaluation of anti-spasmodic activity

is carried out in aqueous extract of leaves of *Mangifera indica* by using rotating drum method using chicken ileum. Anti-spasmodic drugs are agents that suppress muscle spasm. These are used for smooth muscle relaxation. Thus in this study the aqueous extract of *M.indica* shows effect same as that of the atropine. It is found from the dose response curve of the aqueous extract and atropine.

**KEYWORDS:** *Mangifera indica*, Anacardiaceae, antispasmodic effect, chicken ileum, acetylcholine, atropine.

### 1. INTRODUCTION

Medicinal plants, also called medicinal herbs, have been discovered and used in traditional medicine practices since prehistoric times. About 80% of the world's inhabitants relying mainly on traditional medicines for their primary health care.<sup>[1]</sup> For centuries, herbs have been used in traditional medicine to treat many gastrointestinal disorders.<sup>[2]</sup> Antispasmodics

are muscular relaxants that are used to relieve cramps or spasms of the stomach, intestines and bladder. They are commonly used for the treatment of different gastrointestinal disorders, including diarrhoea and irritable bowel syndrome, which affect millions of people.<sup>[3]</sup> Many people nowadays turn to the use of natural product medicine for treatment of intestinal disorders. Natural products have served as a source of medicines for centuries, and about half of the pharmaceuticals in use today are derived from natural products.<sup>[4]</sup>

*Mangifera indica* L., also known as mango, belonging to the family of Anacardiaceae has been an important herb in the Ayurveda and indigenous medical systems for over 4000 years.<sup>[5]</sup> It is a juicy fruit grown in many parts of the world, particularly in tropical countries.<sup>[6]</sup> The important constituents present in the plant that contribute to its nutritional value and pharmacological effects include, flavanols, vitamins, organic acids, carbohydrates, amino acids, phenolic acids, triterpenes, phytosterol and certain volatile compounds.<sup>[7,8,9]</sup> *Mangifera indica* L. is used medicinally to treat ailments such as asthma, cough, diarrhoea, dysentery, leucorrhoea, jaundice, pains, and malaria.<sup>[10]</sup> Various parts of the plant such as bark, leaves, seeds and fruits have been reported to possess antibacterial, anti-fungal, anthelmintic, anti-parasitic, anticancer, anti HIV, anti-bone resorption, antipyretic, antidiarrheal, hypolipidemic, antimicrobial, hepatoprotective, gastro protective analgesic, anti-inflammatory, anti-diabetic, antioxidant and immunomodulatory properties.<sup>[6,11]</sup>

The aim of this investigation was to study the anti-spasmodic effect of the aqueous extract of *M. indica* leaves using rotating drum method.

## 2. MATERIALS AND METHODS

### 2.1 Collection and authentication of plant material

The plants *Mangifera indica* were collected from Kasaragod district in the month of September. The plant material was taxonomically identified by the botanist. The leaf were dried under shade for about 15 days and then powdered with a mechanical grinder and stored in an air tight container.

### 2.2 Extraction

Extraction of dried powder of the leaf of *M. indica* was carried out by using soxhlet extractor. Extraction is done using water. Around 20 g of dried powder was weighed, moistened with water in the soxhlet extractor and was then extracted with water. The extract was filtered and solvent distilled off and finally the dried extract was obtained.<sup>[12]</sup>

### 2.3 Antispasmodic study

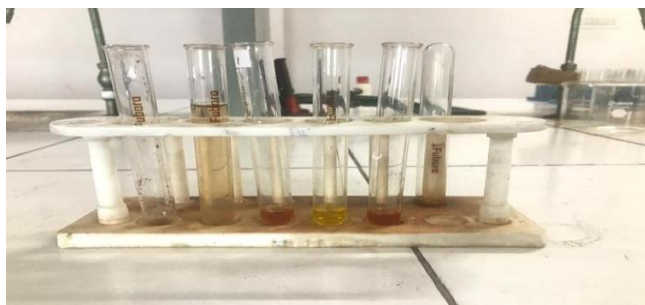
The fresh chicken ileum was collected from local slaughter house in Tyrode solution and cleaned off the mesentery. The segment of 2cm long was mounted in a 20ml tissue organ bath and maintained at 37°C. The tissue was allowed to equilibrate for 30 min, during which, the bathing solution was changed at every 10 min. Contact time of 60 sec, and base line of 30sec time cycle were opted for proper recording. Dose response curve of acetyl choline was recorded on the kymograph first. Then cumulative concentration-effect curves were recorded on kymograph for Acetyl choline (100µg/ml) in absence and presence of aqueous extract of *Mangifera indica* (100 µg/ml) on Kymograph by using Sherrington's Recording Drum. The same procedure was carried for concentration-effect curve of Ach in presence of Atropine sulphate as a standard drug. The percentage inhibition of extract and standard drug was calculated and graph was plotted by taking log dose verses height of response curve.<sup>[13,14]</sup>

## 3. RESULT

### 3.1 Extraction

The dried leaves of *Mangifera indica* was powdered and subjected to extraction using soxhlet apparatus. The extraction is carried out by using aqueous solvent (water). After extraction the percentage yield of aqueous extract was calculated with reference to air dried drug used in the study. The percentage yield of the extract was 12.5% W/W.

### 3.2 Phytochemical Screening



**Fig 1: Phytochemical screening of aqueous extract of *Mangifera indica* leaves.**

Phytochemical screening of the showed the presence of saponin, alkaloids, phenols, tannins, flavonoids, steroids, glycosides and diterpenes.

**Table 1: Phytochemical constituents of various extracts of *M. indica*.**

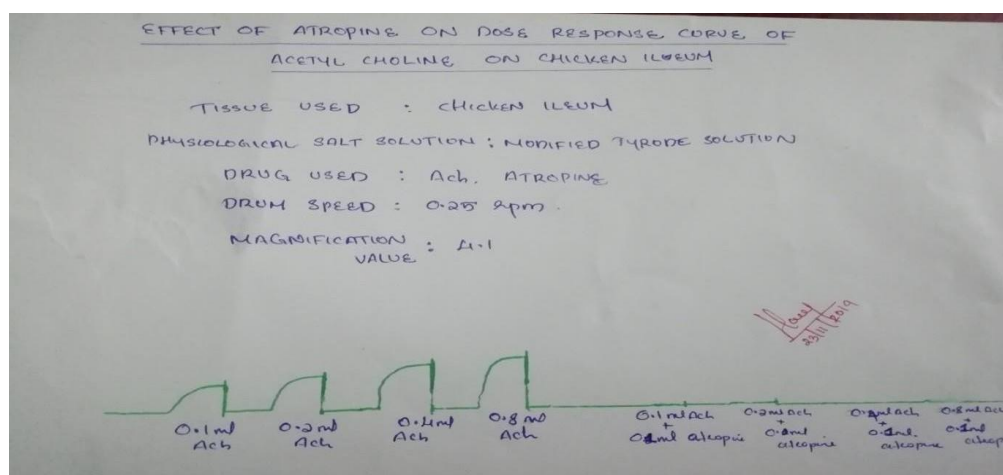
	Aqueous	Hexane	EtOAc	MeOH
Saponin	+	–	+	+
Alkaloids	+	–	+	+
Phenols	+	–	+	+
Tannins	+	–	+	+
Flavonoids	+	–	+	+
Steroids	+	–	–	+
Starch	–	–	–	–
Glycosides	+	+	–	–
Diterpenes	+	+	+	–
Anthocyanins	–	–	–	–
Amino acids	–	–	–	–
Coumarins	–	–	–	–

### 3.3 Pharmacological Screening

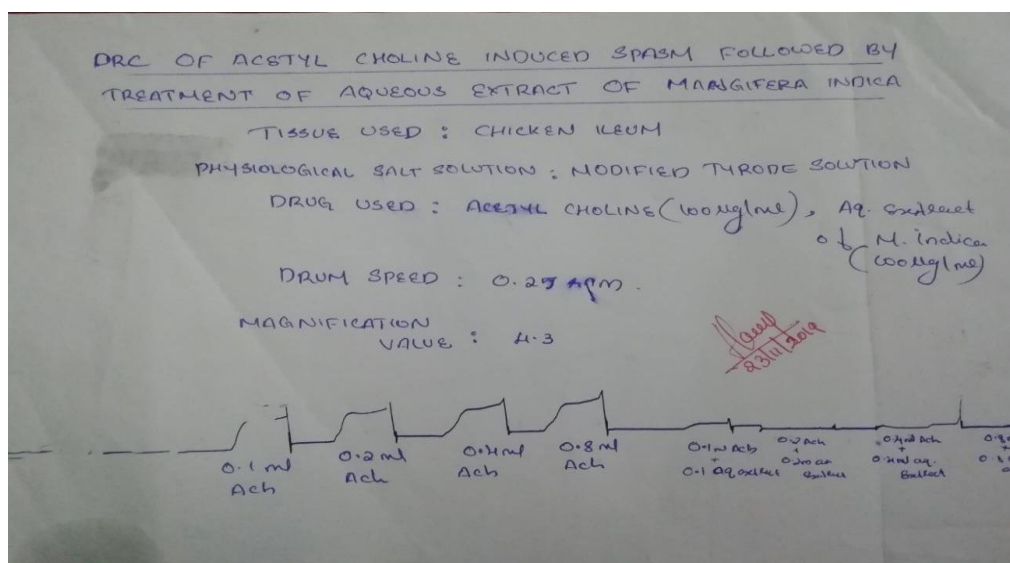
#### 3.3.1 Antispasmodic study

**Table 2: DRC of Ach, Atropine and aqueous extract of *M. indica* on chicken ileum.**

Sl.no.	Drug	Dose (ml)	Height of response
1	Acetyl choline	0.1	0.7 cm
2		0.2	1 cm
3		0.4	1.3 cm
4		0.8	1.5 cm
5	Atropine + Acetyl choline	0.1+0.1	0.00 cm
6		0.2+0.1	0.00 cm
7		0.4+0.1	0.00 cm
8		0.8+0.1	0.00 cm
9	Aqueous extract + Acetyl choline	0.1+0.1	0.01 cm
10		0.1+0.2	0.00 cm
11		0.1+0.4	0.00 cm
12		0.1+0.8	0.00 cm

**Fig 2: Response curve of Ach and atropine.**

Effect of Ach on chicken ileum reflected an increase in spasmodic activity (response) with an increase in the dose. DRC of Ach in presence of atropine was taken as shown in figure 2.



**Fig 3: Response curve of Ach+ aqueous extract of *M. indica*.**

Ach induced spasm followed by the treatment of aqueous extract of *M. indica* showed prominent antispasmodic activity as shown in the figure 3.

Results were compared with standard drug atropine, an anti-spasmodic drug. But there is no dose dependent increase in antispasmodic activity is seen in the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> treatment of the extract.

#### 4. DISCUSSION

The dried leaves of *M. indica* was powdered and subjected to extraction using soxhlet apparatus. The phytochemical screening of the aqueous extract of *M. indica* leaves shows the presence of saponin, alkaloids, phenols, tannins, flavonoids, steroids, glycosides and diterpenes.

Antispasmodic activity of *M. indica* leaves is carried out by rotating drum method by using chicken ileum. For this study we have used aqueous extract of *M. indica* leaves. Dose response curve of acetyl choline was recorded on the kymograph first. Then cumulative concentration-effect curves were recorded on kymograph for Acetyl choline (100 µg/ml) in absence and presence of aqueous extract of *Mangifera indica* (200 µg/ml) on Kymograph by using Sherrington's Recording Drum. The same procedure was carried for concentration-effect curve of Ach in A presence of Atropine sulphate as a standard drug. The percentage

inhibition of extract and standard drug was calculated and graph was plotted by taking log dose verses height of response curve.

Antispasmodic study on aqueous extract of *M. indica* leaves, indicate that in the presence of the extracts chicken ileum shows decrease in Ach induced spasm. The extracts are given in increasing doses and effects were noted. But there is no dose dependent increase in antispasmodic activity is seen in the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> treatment with aqueous extract. The effects were compared with the standard drug atropine, an anti-spasmodic drug. Aqueous extract of *M. indica* possess comparatively higher spasmolytic activity by blocking cholinergic receptors.

Anti-spasmodic activity is mainly due to the presence of the chemical constituent of mangiferin.

Steroids and the flavonoid in the extract may be responsible for the antispasmodic effect. They directly or indirectly modulate the contraction of smooth muscle by suppressing agonist induced increased calcium level or by down regulating or uncoupling receptor mechanism. They act on the muscarinic (M<sub>3</sub>) and histaminic (H<sub>1</sub>) receptors present in the chicken ileum.

Thus from the study performed in the aqueous extract of *M. indica*, significant anti-spasmodic effects were shown by the extract in 200 µg/ml.

## 5. CONCLUSION

One of the important pharmacological actions shown by our extract is antispasmodic effect. The study was carried out in chicken ileum for aqueous extract and it was concluded that the aqueous extract of *M. indica* leaves has comparatively greater anti-spasmodic effect nearer to the standard. Presence of mangiferin, steroids and flavonoid contribute to the effect. Most of the antispasmodic drug available in the market shows side effects like mydriasis, tachycardia, hypersensitivity etc. Our drug being an herbal could be suitable alternative and could be a newer member of the class of antispasmodic drug.

Thus in the present study of evaluation of anti-spasmodic effect of *M. indica* leaves, significant results were obtained. Our results guide us for the further detailed investigation and development of new drugs from our plant. The future work will be focused on the pharmacological studies on isolated constituents from *M. indica* extract.

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