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Evaluation of *In Vitro* Anti Urolithiatic Activity of *Musa acuminata* (Banana Flower)

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ABSTRACT

The present study explores that evaluation of in-vitro antiurolithiatic activity of *Musaacuminata* (banana flower). It was observed that the calcium oxalate crystals dissolution was observed in the ethanolic extract of *Musaacuminata*. It was found that ethanolic extract of *Musaacuminata* has more efficient to dissolve calcium oxalate. In this study Neeri was used as standard drug.

KEYWORDS

Ethanolic extract, *In-vitro* antiurolithiatic activity, *Musa acuminata* (banana flower), Neeri, Urolithiasis

INTRODUCTION

The formation of stone in the urinary system i.e. in the kidney, ureter, and urinary bladder or in the urethra is called urolithiasis. 'Urolithiasis' = ouron (urine) and lithos (stone) (T. Vijaya et al., 2013). The symptoms of kidney stone are related to their location whether it is in the kidney, ureter or urinary bladder. Initially, stone formation does not cause any symptom. Later, signs and symptoms of the stone disease consist of renal colic (intense cramping pain), flank pain (pain in the back side), hematuria, obstructive uropathy (urinary tract disease), blockage of urine flow, and hydronephrosis (dilation of the kidney). These conditions may result in nausea and vomiting with associated suffering from the stone event (Tilahun Alelign et al., 2018). Generally, calcification for the formation of bone and teeth takes place in controlled biological situations. Uncontrolled pathological crystallization occurs when solvent becomes supersaturated leading to the formation of precipitates in the body called as kidney stones (Konigsberger E et al., 2001).

In most of the cases the commonly occurring stones are calcium oxalate or magnesium ammonium phosphate type. In the traditional systems of medicine, most of the remedies were taken from plants and they were proved to be useful though the rationale behind their use is not well established through systematic pharmacological and clinical studies except for some composite herbal drugs and plants. Pharmacotherapy can reduce the recurrence rate. In India, in the Ayurvedic system of medicine, 'Pashanabheda' group plants, claimed to be useful in the treatment of urinary stones. 'Pashanabheda' is the Sanskrit term used for a group of plants with diuretic and antiurolithiatic activities (Pashana = stone; Bheda = break). Hence, in the present review an attempt has been made to enumerate the studies carried out on these plants. This could serve as a source of information on the present trends in research on plants accredited with antiurolithiatic activity.

In recent years, a number of proprietary compositae herbal drugs have also been introduced for dissolving kidney calculi of which mention may be made Cystone and Calcuri. These drugs are common use in India. Kaphaj (phosphetic) stones were dissolving in all the three drugs. Among them kulatha had marked (87 %) dissolving activity and stones become friable. There are many herbal preparations described in Ayurvedic a text in which kulatha is the main ingredient. It has been described as Ashmarighana (Destroyer of stone) by Charak, Sushruta and Other authorities. Sushruta mentions its efficacy in vatajashmari with the characteristics of oxalate stone. Clinical investigations have been shown that out of fifteen cases urinary calculi, nine patients passed their stones within 8-10 days of treatment with *Dolichos biflorus* (Rahul DeoYadav et al., 2017). Intake of oxalate – rich foods should be limited. Some items are oxalate rich in food such as spinach, rhubarb, beets, nuts, chocolate, tea, wheat bran, and strawberries which have been shown influence for raising oxalate levels and significant increase in urinary oxalate excretion (Massey LK et al., 1993).

Banana is one of the main crops in the world that has significance to humans for its nutrition and mineral contents. It must have been one of the first known tropical crops since there are records of it being in cultivation 4000 years ago (Khairul Anwar Mohamad Said et al., 2006). Banana is the common name for herbaceous plants of the genus *Musa* and for the fruit they produce. It is one of the oldest cultivated plants. All parts of the banana plant have medicinal applications (K.P. Sampath Kumar et al.). *Musa* is in the family Musaceae. Almost all modern edible seedless (parthenocarp) bananas come from two wild species – *Musa acuminata* and *Musa albisiana*. The banana flower is also known as a banana blossom or a banana heart and it is a drop-shaped purple flower that hangs at the end of a cluster of bananas. It has a deep crimson color and consists of tightly packed leaves or bracts that wrap around rows of thin stemmed male flowers.

The pseudo stem and rhizome of banana has recently been identified as potential nutraceutical, antioxidant rich food beverage. Banana flower and pseudo stem are fibre rich potent antioxidant materials with low glycemic index value. Therefore, they may serve as a beneficial health food supplement for diabetic individuals (Ajay Anand et al., 2015). Roots of *Musa paradisiacal* are antihelminthic, flowers are astringent and fruits are mild laxative. It is also useful in celiac disease, constipation and peptic ulcer. It has been found that bananas have curative properties both scientifically and traditionally. The flower has been used to treat bronchitis, constipation and peptic ulcer (Bibechana Timsina et al., 2014). Banana blossom has tremendous nutritional value similar to banana fruits. They are excellent source of vitamins, certain minerals, good source of fibre and protein. Besides banana blossoms are also excellent source of certain phytochemicals which acts as antioxidants. Health benefits of banana blossom include – Helpful in diabetes, in ulcers, in infection treatment, Lowers menstrual bleeding, increase the milk production in lactating mothers, Good for gastrointestinal health (Shilpisingh et al., 2017).

MATERIALS AND METHODS

Plant Materials

The flowers of *Musa acuminata* were collected from Ajaram (Village), West Godavari (Dist) of Andhra Pradesh in the month of March 2019. The flowers were washed with tap water and dried under shade.

Preparation of Plant Extract

The flowers of *M. acuminata* were dried under shade and crushed in pulveriser and powdered. These powdered plant material was extracted with ethanol in a soxlet apparatus for 72 hours. After complete the extraction, the extracts were cooled at room temperature and filtered and evaporated to dryness using rotary evaporator.

Chemicals Used

Neeri, Sodium oxalate, Tris buffer, calcium chloride, Potassium permanganate (KMnO_4), Sulphuric acid (H_2SO_4).

Investigation of *In Vitro* Antiuro lithiatic Activity Test by Titrimetry

The experimental kidney stones of calcium oxalate (CaOx) were prepared in the laboratory by taking equimolar solution of calcium chloride dehydrate in distilled water and sodium oxalate in 10 ml of 2N H_2SO_4 . Both were allowed to react in sufficient quantity of distilled water in a beaker, the resulting precipitate was calcium oxalate. The precipitate was freed from traces of sulphuric acid by ammonia solution, washed with distilled water and dried at 60°C . The dissolution percentage of calcium oxalate was evaluated by taking exactly 1 mg of calcium oxalate and 10 mg of the extract, packed it together in semi permeable membrane of egg as shown in the model designed given below. This was allowed to suspend in a conical flask containing 100 ml of 0.1M Tris buffer. First group served as blank containing only 1 mg of calcium oxalate. The second group served as positive control containing 1 mg of calcium oxalate and along with the 10mg standard drug, i.e. Neeri. The 3rd group along with 1 mg of calcium oxalate contain Ethanolic extract. The conical flasks of all groups were

kept in an incubator preheated to 37°C for 2 hours. Remove the contents of semi permeable membranes from each group into separate test tubes, add 2 ml of 1N sulphuric acid to each test tube and titrated with 0.9494N KMnO_4 till a light pink colour end point obtained. The amount of remaining undissolved calcium oxalate is subtracted from the total quantity used in the experiment in the beginning to know the total quantity of dissolved calcium oxalate by various solvent extracts (Unnate Atodriya et al 2013).

RESULTS AND DISCUSSION

In the present study, Titrimetry method was used to assess the antiuro lithiatic activity of Ethanolic extract of *M. acuminata*. The dissolution percentage, i.e. 90% of CaOx dissolution was observed in Ethanolic extract (Table 1). From this study, it was observed that Ethanolic extract of *M. acuminata* showed antiuro lithiatic activity. This study has given primary evidence for *M. acuminata* the plant which possess lithotriptic property. This *in vitro* study has given lead data and shown that Ethanolic extract of banana flower is quite promising for further studies in this regard (Figure 1a-1c).

Table 1: Shows % Dissolution of Calcium Oxalate (CaOx) By *Musa acuminata* Extracts.

% of Dissolution of Calcium Oxalate		
S.No.	Groups	Banana Flower
1	Blank	0
2	Positive Control	81
3	EthanolicExtract	90



Figure 1: *In Vitro* Experimental Model Setup To Evaluate Antiuro lithiatic Activity.



Figure 1(a): Decalcification of egg shell in 10% Acetic acid overnight

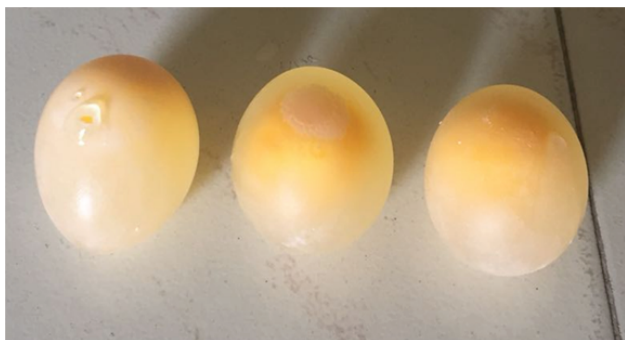


Figure 1(b): Decalcified Eggs

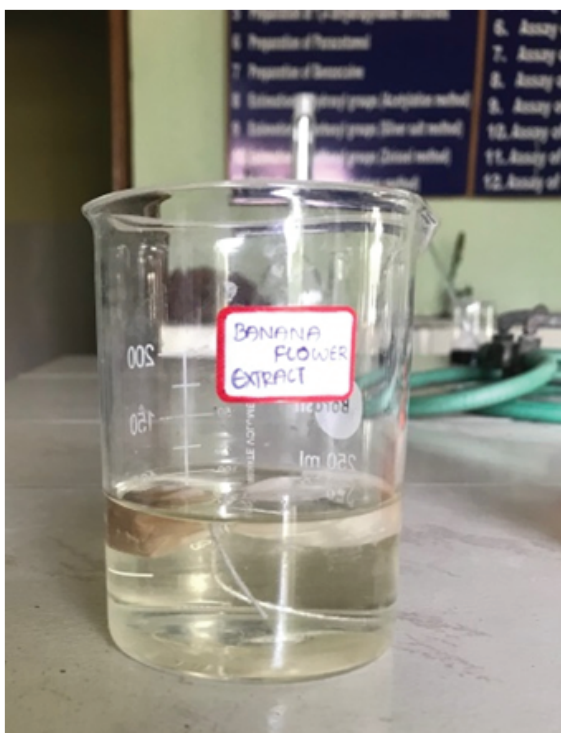


Figure 1(C): Egg Membrane Along with the Contents Suspended into the 0.1 M Tris Buffer: suspended into the 0.1 m tris buffer

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CONCLUSION

In the present work, the dissolution of calcium oxalate crystals by Ethanolic extract of *M. acuminata* was studied by using the standard drug, Neeri. The work was performed by using *in vitro* antiurolithiatic model for calculating percentage dissolution of kidney stone. This study has given primary evidence for *M. acuminata* the plant which possess antiurolithiatic property.

