

USE OF MUSA AAB IN KIDNEY STONE TREATMENT AND OTHER DISEASES

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Email: prasobhgr@yahoo.com**ABSTRACT**

Bananas are cultivated in more than 120 countries throughout the tropics and subtropics, according to the Food and Agriculture Organization of the United Nations (FAO) current statistics. In terms of total production the banana ranks after oranges, grapes, and apples, but when plantain production becomes the world's number one fruit crop. While commercial production of bananas is oriented to the fresh export trade destined mainly for temperate-zone markets, plantains and even unripe bananas—consumed boiled, fried, roasted, or even brewed—are a major staple food throughout the world. The fruits are picked when they are unripe and starch-rich, but when they ripen the starch turns into simple sugars (sucrose, glucose and fructose). Plantain juice is used as an antidote for snake bite. Studies in rats demonstrate effectiveness for stone lysis. The roots can arrest hemoptysis and possess strongly astringent and anthelmintic properties. *Musa paradisiaca* is available in tincture or capsule. No toxicities and contraindication are reported in human yet.

Keywords: Kidney stones, UV studies.

INTRODUCTION

Musa species are grouped according to "ploidy" the number of chromosome sets they contain, and the relative proportion of *Musa acuminata* (A) and *Musa balbisiana* (B) in their genome. Most familiar, seedless, cultivated varieties (cultivars) of banana are triploid hybrids say, Robusta (AAA), Nendran (AAB), ABB). Diploids say, AA, Ney Poovan (AB), BB) and tetraploids (AAAA, AAAB, AABB, ABBB) are much rarer; the latter essentially being experimental hybrids.

Medicinal and Therapeutic Value¹

The easy digestibility and nutritional content make ripe banana an excellent food, particularly suitable for young children and elderly people. In the green stage (and after liquefying) it is used in Brazil to treat dehydration in infants, as the tannins in the fruit tend to protect the lining of the intestinal tract against further loss of liquids. In general, the banana is appropriate for consumption when a low-fat, low-sodium, and/or cholesterol-free diet is required, making it particularly recommendable for people with cardiovascular and kidney problems, arthritis, gout, or gastrointestinal ulcers.

Health benefits²

Along with other fruits and vegetables, consumption of bananas is associated with a reduced risk of colorectal cancer and in women, breast and renal cell carcinoma. Individuals with a latex allergy may experience a reaction to bananas.

Bananas contain considerable amounts of vitamin B₆, vitamin C, and potassium. The latter makes them of particular interest to athletes who use them to quickly replenish their electrolytes.

In India, juice is extracted from the corm and used as a home remedy for jaundice, sometimes with the addition of honey, and for kidney stones.

Kidney stones³ are a painful disorder of the urinary tract. Stones occur 4 times more often in men than in women. The pain of having a stone has been compared to that of childbirth. The stones grow slowly over several months or years and are made of hard deposits of various minerals, including calcium, uric acid, and oxalate.

A kidney stone is a hard mass developed from crystals that separate from the urine within the urinary tract. Normally, urine contains chemicals that prevent or inhibit the crystals from forming. These inhibitors do not seem to work for everyone, however, so some people form stones. If the crystals remain tiny enough, they will travel through the urinary tract and pass out of the body in the urine without being noticed.

Urolithiasis is the medical term used to describe stones occurring in the urinary tract. Other frequently used terms are urinary tract stone disease and nephrolithiasis.

Kidney stones may contain various combinations of chemicals. The most common type of stone contains calcium in combination with either oxalate or phosphate. These chemicals are part of a person's normal diet and make up important parts of the body, such as bones and muscles⁴.

A less common type of stone is caused by infection in the urinary tract. This type of stone is called a struvite or infection stone. Another type of stone, uric acid stones, are a bit less common, and cystine stones are rare.

Kidney stones typically leave the body by passage in the urine stream, and many stones are formed and passed without causing symptoms. If stones grow to sufficient size before passage on the order of at least 2-3 millimeters they can cause obstruction of the ureter. The resulting obstruction causes dilation or stretching of the upper ureter and renal pelvis as well as muscle spasm of the ureter, trying to move the stone. This leads to pain, most commonly felt in the flank, lower abdomen and groin. Renal colic can be associated with nausea and vomiting. There can be blood in the urine, visible with the naked eye or under the microscope.

Pathogenesis of Stones

Urinary stones or kidney stone formed when the normal balance of water, salt, minerals and other things found in the urine changes. On the one hand kidney must play an important role in water conservation, but at the same time, minerals with low solubility need to be excreted.

Stone formation and Inhibitors

The kidney filters waste products from the blood and adds them to the urine that the kidneys produce. When waste materials in the urine do not dissolve completely, crystals & kidney stone are likely to form.

Kidney stone form when there is a high level of calcium (hypercalciuria), oxalate (hyperoxaluria) and uric acid (hyperuricosuria) in the urine; a lack of citrate in the urine or insufficient water in the kidneys to dissolve waste products. The kidneys must maintain an adequate amount of water in the body to remove waste products. If dehydration occurs, high level of substances that do not dissolve completely (eg. Calcium, oxalate, uric acid) may form crystal that slowly build up into kidney stones. Urine normally contain chemicals, Citrate, Magnesium, Pyrophosphate, Glycosaminoglycans. These prevent the formation of crystals & low

level of these inhibitors can contribute to the formation of kidney stones. Often citrate is thought to be most important because citrate, or citric acid, is an ordinary component of our diet, present in high amounts in citrus fruits. Citrate binds with calcium in the urine, thereby reducing the amount of calcium available to form calcium oxalate stone⁶.

It also prevents tiny calcium oxalate crystals from growing and massing together into larger stones. Finally, it makes the urine less acidic, which inhibits the developments of both calcium oxalate and uric acid stone.

Magnesium

Magnesium is also one of the crystal inhibitors which are present in urine. It acts by increasing calcium solubility (especially in the urine) and reducing calcium absorption, magnesium can help to prevent kidney stones especially those composed of calcium oxalate. It is thought that calcium oxalate stones are most likely to form in people who are magnesium deficient, so it may just correct that deficiency.

Pyrophosphate

Inorganic pyrophosphate is a potent inhibitor which appears to affect calcium phosphate more than calcium oxalate crystals. Other urine inhibitors in urine that appear are glycoproteins, which strongly inhibit the growth of calcium oxalate crystals. As a consequence of the presence of these inhibitors, crystal growth in urine is very slow.⁷

UV Studies

The UV studies are carried out by using the juice extract. The study is carried out by taking different concentrations of juice. The absorbance at the wavelength region 250-400 nm is taken⁸. From the studies it is clear that the *Musa AAB* juice contains magnesium and potassium nitrate. From the UV studies it was concluded that λ_{max} 302.8 nm.



In Vitro Studies

Kidney stones of 10 patients were collected from Punarjani Superspeciality Hospital, Thiruvananthapuram from Dr. Sathesh Kumar. V, Chief Urologist. The *invitro* studies were conducted on these stones. Initially the size and weight of the stones were measured and noted. Then they were subjected for *invitro* analysis. To an iodine flask 50 ml of juice extract was added. To this the stone under the study was placed. Stir the solution using a magnetic stirrer. The weight and size of the stones were measured after two weeks and determined⁹.

RESULTS AND DISCUSSION

It was found that the *Musa* stem juice has good antirolithiatic (kidney stone dissolving) property. Potassium nitrate and magnesium nitrate are the major constituents present in *Musa AAB* stem juice and was confirmed by chemical test and UV spectroscopy.

From the two weeks *invitro* studies it was found that the size of kidney stone reduced to a greater extent¹⁰.

In general, *Musa AAB* plant extract was successful to reduce kidney stone in *invitro* condition. The benefit of this was nontoxic and cheaply available (the plant is commonly available in India, especially in Kerala).

In present investigation there was a significant decrease in the size of kidney stone under *invitro* condition¹¹. This is due to the presence of inorganic constituents like magnesium, potassium and nitrate. Magnesium nitrate and potassium nitrate are the major active constituents present in the *Musa AAB* stem juice and was confirmed by the *invitro* studies. Literature has proved the explosive and solubilizing property of potassium nitrate.

The result from these experiments demonstrates the potential of concentrated *Musa AAB* stem juice extract as a good natural remedy against kidney stone¹².

CONCLUSION

The objective of investigation was to evaluate urolithiatic property of *Musa* stem juice. For this purpose carried out chemical test, UV analysis and one month *invitro* studies. From the chemical test it was identified the presence of the constituents potassium nitrate, magnesium nitrate, alkaloids and tannins¹³. From the UV analysis it was confirmed the presence of potassium nitrate and magnesium nitrate. By the three month *invitro* analysis it was proven that the *Musa* stem juice is effective to dissolve kidney stone. *Musa* species is one of the widely distributed plants through India (Kerala)¹⁴. The stems of these plants are used as food but it has a higher degree of medicinal value. The present investigation shows that the *Musa AAB* stem juice has antirolithiatic property. The experiment is carried out in *invitro* condition. The chemical and analytical studies show that the organic constituent present in the stem juice which is responsible for the activity. The plant products and derivatives of their lead compounds as such may not replace the ESWL and surgical removal procedures but may surely help in decreasing the recurrence rate of renal calculi.

The *Musa AAB* stem juice may be useful to overcome the major drawback of surgical procedures which is recurrence of stones. *In vivo* studies can further confirm and revalidate the use of these agents in real time clinical settings.

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