

A Pilot Study on Sodhana of Puga (*Areca catechu* Linn.)

Research Article

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Abstract

The "Ayurveda" science of life was one of the most valuable gifts our predecessors gave us. It is the traditional healing system of India and has been passed down through countless generations without losing any of its unique lusters. Due to its efficiency, it is helping to improve human health in many degenerative and incurable chronic diseases. In Ayurveda classics, there is a description of many drugs, in which *Puga* (*Areca catechu* L.) is one. In the *karma paribhasha* chapter, Sharangadhara cited *Puga* as an example of the *vikasi guna* (fast-spreading property), due to this it was considered to be *Visha samana* (equal to poison). After reviewing the various *Ayurveda lexicons*, it was found that the *vikasi guna*, *ojonashaka* (immunity destroying) property was only visible in *apakva-adrapuga* (unmatured areca nut). According to *Nighantu Bhavaprakasha* *Puga* should be boiled in "Choughar" to do *Sodhana* (processing). The pharmacognostic characteristics, physicochemical, and preliminary phytochemical analyses of *Asuddha* (raw) and *Suddha* (processed) *Puga* (areca nut) were performed in the current study. The *rasa* of *suddha Puga* was found to be mild *Madhura* (sweet) and *Kasaya* (astringent) *rasa*, and it has a higher alcoholic extraction value than *Asuddha Puga* (raw areca nut). The phytochemical evaluation shows the difference between *Suddha* (processed) and *Asuddha* (raw) *Puga* (areca nut).

Keywords: *Puga*, *Areca catechu* Linn. *Sodhana*, Pharmacognosy, Phytochemical analysis.

Introduction

The "Ayurveda" science of life, was one of the most valuable gifts our predecessors gave us. Is the traditional healing system of India and has been passed down through countless generations without losing any of its unique lusters. Due to its efficiency, it is helping to improve human health in many degenerative and incurable chronic diseases.

In Ayurveda classics, there is a description of many drugs, in which *Puga* (*Areca catechu* L.) is one. It is mentioned in *Vedas* and ancient Ayurveda literature viz... *Brihatrayi*, *Laghutrayi* by the name *Kramuka* (1). *Ghornta*, *Pugi*, *Guvaka*, *Kramuka*, *Pugiphalam*, *Udvegam* are synonyms of *Puga*. *Puga* having *kasaya* (astringent) and *katu rasa* (pungent), *guru* (heavy) and *ruksha guna* (dry property), *katu vipaka* (pungent biotransformation) and *sita virya* (cold potency) properties and also *Kaphapittasamana* (pacify *kapha* and *pitta* morbidities) properties, with *dipana*

(appetizer), *pacana* (digestant), *asyavairasya nasanam* (which improve taste in mouth), *sara* (laxative) and *Bedana* (chloeretic) actions (2). According to *Dhanwantari Nighantu* (3) and *Madhanapla Nighantu* (4), *Ardra Puga* (unmatured areca nut) has *Guru* (heavy), *Abhisyanthi* (obstruct channels), *Agninasaka* (reduce digestive fire) and *Drstinasaka* (harm to eyesight) in nature.

In the *karma paribhasha* chapter, Sharangadhara (5) cited *A. catechu* as an example of the *vikasi guna* (fast-spreading property), after reviewing the various *Ayurveda lexicons*, it was found that the *vikasi guna*, *ojonashaka* (immunity destroying) property was only visible in *apakva- adrapuga* (unmatured and wet arecanut) (6). The *A. catechu* which undergoes *Sodhana* (Purification) and *Svinna* (boiled) at the same time is considered to have *Snigdha guna* (slimy) and *Tridosahara karma* properties (pacify *vata*, *pitta* and *kapha* morbidities) (7).

According to K.C. Chuneekar's commentary on *Nighantu Bhavaprakash*, *Puga* should be boiled in "Choughar" (Decoction of *Jambupatra* and *Twak* (*Syzigium cumini* L. leaves and bark), *Manjista* (*Rubia cordifolia* L.), *Khadira sara* (*Acacia gum*), *Raktachadana* (*Pterocarpus santalinus* L.) *Guda* (Jaggery), and *Eranda taila* (Castrol oil) for *sodhana* (8). Therefore, the current study aims to perform *Puga Sodhana* (Purification) and compare the

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pharmacognostic and phytochemical characteristics of *Suddha* (processed) and *Asuddha* (raw) *Puga* (areca nut).

Aims and objectives

- To do *Sodhana* of *Puga*
- To compare the pharmacognostic studies of *Suddha* and *Asuddha Puga*
- To compare the phytochemical analysis of *Suddha* and *Asuddha Puga*

Material and Methods

Collection of plant material

The drug *Puga* (Seeds) picked for the study was acquired from the Chennai drug market (Shobhakanth & Co). Later examined for genuinity of drugs by identifying them with the original drugs available in the department and discussing with experts at the Department of Post Graduate Studies in *Dravyaguna*, T.T. D's S.V.Ayurvedic College, Tirupati. After that, they were washed with water dried in the shade for one week, and chopped into pieces.

Figure 1: *Puga* (slices of seeds *A. catechu*)

Figure 2: *Puga* (Seeds of *A. catechu*)



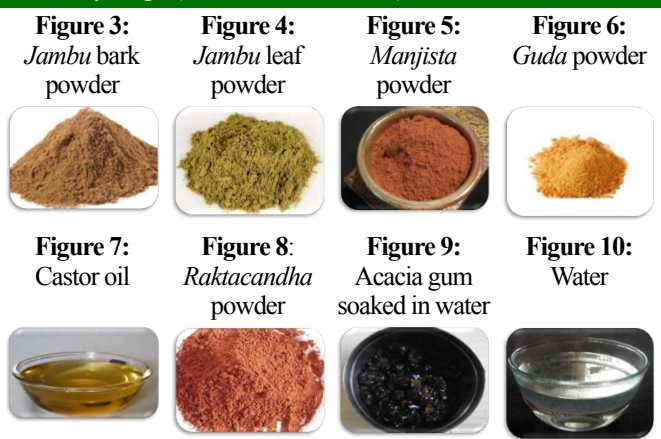
Shodhana of Puga

The *Puga Sodhana* (processing) was done by boiling in "*Choughar*" at the Department of Post Graduate Studies in *Rasashastra*, T.T. D's S.V. Ayurvedic College, Tirupati. The quantity of ingredients and time required for boiling was not mentioned in K.C. Chunekar's commentary on *Nighantu Bhavaprakash*. After discussing with experts of *Rasashastra*, the quantity of ingredients and process of *Sodhana* is planned according to the suggestion given by the experts. The Ingredients of *Choughar* are mentioned in Table 1.

Table No 1: Ingredients of Choughar for Sodhana of Puga (Figures: 3 to 10)

Ingredients	Quantity
<i>Jambu</i> bark powder (<i>Syzigium cumini</i> L. bark)	1 Kg
<i>Jambu</i> leaf powder (<i>Syzigium cumini</i> L. leaf)	1 Kg
<i>Manjista</i> Powder (<i>Rubia cordifolia</i> L.)	0.5 Kg
<i>Raktachadana</i> (<i>Pterocarpus santalinus</i> L.)	100 gms
<i>Guda</i> (Jaggery)	180 gms
<i>Eranda tailam</i> (Castrol oil)	60 ml
Water	20 Liters
<i>Khadira sara</i> (Acacia gum)	6 gms

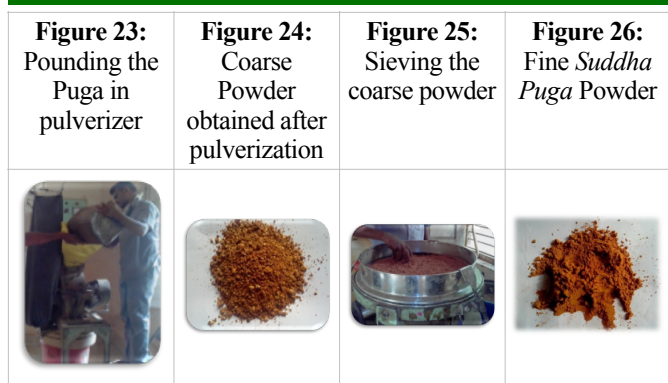
Note: Acacia gum should be soaked in 500 ml of water for 1 night on the previous day.



Procedure

Decoction was prepared by taking *Jambu* bark powder (1kg), *Jambu* leaf powder (1kg) and *Manjista* powder (0.5kg), *Raktacandhan* powder (100gms) to these 20 liters of water is added and heated on *Mandaagni* (low flame) for 3 hours till it reduces to 5 liters and filtered it using cloth. Pieces of *Puga* (12 kgs) are added to the decoction prepared and boiled on *Mandaagni* (low flame). During boiling *Guda* (180 gms), Castor oil (60 ml), and Acacia gum (6 gms) are added and heated for 3 hours till the decoction gets thread-like consistency as suggested by experts of *Rasashastra*, later *Puga* pieces are separated and dried for 1 day in a drier. After final preparation, the 13 kgs of *Suddha Puga* was obtained, and subjected for pulverizing and sieving. Finally, 12.5 kgs of *Suddha Puga curna* was obtained. The weight gain may be to the ingredients of decoction. This was preserved in air-tight containers to avoid infestations (Figures: 11 to 26).





Pharmacognostical study

The Pharmacognostical study of trial drug *Puga* (*Areca catechu* Linn.) was done at the Andhra Pradesh state level Drug Testing Laboratory, Hyderabad as per the standard format for the identification parameters like macroscopic, microscopic, and standard physicochemical parameters mentioned in the Ayurveda Pharmacopoeia of India.

Phytochemical study

Puga (*Areca catechu* L.) seed was analyzed using various standard phytochemical tests as per API at the College of Pharmacy, Sree Vidhyanikethan, Tirupati.

Observations and Results

Macroscopic and Organoleptic parameters: Macroscopic and organoleptic parameters are the easiest and simplest methods of identification. Organoleptic parameters (9) like, shape, size, odour, colour, and taste were studied and results were shown in Tables 2 and 3.

Table 2: Macroscopic and Organoleptic properties of *Puga*

Character	Seed
Shape	Conical to Round
Size	1-2 cm (Chopped pieces)
Colour	Externally pale reddish-brown marked with a network of paler lines
Odour	Characteristic
Taste	Astringent
Texture	Hard

Table 3: Organoleptic properties of *Asuddha* and *Suddha Puga*

Character	Raw-Unpurified Powder	Purified Powder
Colour	Pale reddish-brown	Light reddish-brown
Odour	Characteristic	Characteristic
Taste	Astringent,	Astringent, sweet
Texture	Fine powder with slightly coarse particles	Fine powder

Physicochemical analysis

The powdered sample was subjected to the determination of physicochemical parameters like foreign matter, moisture content, total ash, alcohol-soluble extractive (10), and water-soluble extractive (11). The results are shown in Table 4.

Table No 4: Physicochemical parameters of *Asuddha* and *Suddha Puga*

S. No.	Parameters	Method/SOP	Results		Units of measurement
			Raw-Powder	Processed Powder	
1	Foreign matter	API	Nil	Nil	%
2	Moisture content	API	8.23	7.99	%
3	Total ash	API	2.35	1.78	%
4	Alcohol-soluble extractive	API	26.25	29.0	%
5	Water-soluble extractive	API	17.6	16.8	%

Microscopic characters of the raw *A. catechu*

The transverse section of the areca nut showed a seed coat made up of several rows of tangentially elongated cells with inner walls that are more or less thickened, whitish endosperm tissue cells with thick porous walls that contain oil globules and aleuronic grains, and brown perisperm tissue with thick-walled cells and delicate tracheae.

Powdered raw areca nut was reddish brown to light brown, under the microscope it showed fragments of endosperm tissue with porous walls, irregularly thickened and small stone cells of the seed coat, a few aleurone grains, and oil globules, and a few delicate tracheae, present, starch absent (Figure 27, 28).

Microscopic characters of the *Suddha Puga* Powder

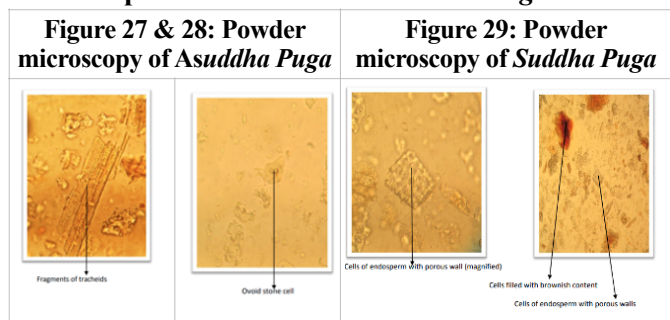


Table No 5: Preliminary phytochemical analysis of the *Asuddha* and *Suddha Puga*

S.No	Phyto-constituents	Results	
		Raw-Unpurified Powder	Purified Powder
1	Alkaloids	+	+
2	Carbohydrates and glycosides	+	+
3	Phytosterols	+	+
4	Fixed oil and fats	-	-
5	Saponins	-	-
6	Phenolic compounds and Tannins	+	-
7	Protein and Amino Acid	-	+
8	Gum and Mucilage	-	-
9	Test for flavonoids	+	+

(+) indicate present (-) indicate absent

Preliminary phytochemical analysis of the *Asuddha* and *Suddha Puga*

Puga (*A. catechu*) both raw (unprocessed) and processed analyzed using various standard phytochemical tests. The phytoconstituents present in the *Asuddha* and *Suddha Puga* are listed in Table 5. It is observed that phenolic compounds and tannins are not present in *Suddha puga*.

Discussion

The desire to prevent illness and maintain health dates back as far as life itself. Every single indigenous remedy has its roots in folklore or traditional practices, either directly or indirectly. In Ayurveda, the technique that transforms any drug into a useful, harmless substance is termed *Sodhana* (processing/purification). The concept of *Sodhana* (processing/purification) includes not only the elimination of physical impurities and chemical impurities but also the reduction of side effects and enhancement of the potency and therapeutic efficiency of the purified drugs (12).

The seed of the plant *Areca catechu* L., also known as betel nut, is chewed and wrapped in betel leaves (paan) or with tobacco (betel quid), the contents of which varied among people and nations. 10% of the global population is estimated to be addicted to it, making it one of the most often consumed addictive substances worldwide, after nicotine, ethanol, and caffeine (13). Areca nut has a variety of physiological impacts on humans; it has been associated with type II diabetes and central obesity (14). According to the International Agency for Research on Cancer (IARC) evaluation, areca nut is carcinogenic to humans and has been connected to malignancies of the uterus, liver, pharynx, oesophagus, and oral cavity (15). In the *karma paribhasha* chapter, *Sharangadhara* cited *Puga* as an example of the *vikasi guna* (fast-spreading property). The dravya having *vikasi* property causes *shaitihilya* in *sandhibandha* and *oja vishlesha* of *dhatus* (*sandhibandha vishlesha* is not only for bone joints but for the bonds even between the very minute structural-functional units of different *dhatus*), due to this it was considered to be *Visha samana* (equal to poison).

Puga Sodhana (processing of areca nut) is done by boiling in "*Choughar*", as stated in K.C. Chuneekar's commentary on *Bhavaprakash Nighantu*. The quantity of ingredients and time required for boiling was not mentioned in K.C. Chuneekar's commentary on *Nighantu Bhavaprakash*. After discussing with experts of *Rasashastra*, the quantity of ingredients and process of *Sodhana* is planned according to the suggestion given by the experts. The drugs mentioned in *Choughar*, which is used for *puga sodhana*, are of the *Kasaya rasa* (astringent) and *Sita virya* (cold potency), which will potentiate the *A. catechu*. It was seen that the colour changed to a reddish brown after *Sodhana* (processing). Additionally, the *rasa* of *Suddha Puga* (processed areca nut) was found to be mild *Madhura* (sweet) and *Kasaya* (astringent), this may be due to jaggery added in decoction.

The pharmacognostic analysis of *Asuddha* (raw) and *Suddha* (processed) *Puga* (areca nut) showed

that the seed coat contains oil globules, aleuronic grains, delicate tracheae, and small stone cells. When compared to *Asuddha Puga* (raw), *Suddha Puga* (processed) has a higher alcoholic extraction value. The *suddha Puga* alcoholic extractive value was higher; this corresponds to the higher content of phytoconstituents (Table No 4), which corresponds to higher biological activity in human beings. According to De Miranda et al. (1996), boiled and baked areca nut was reported to be more potent than raw nut in anti-bacterial effect. The tannic acid (hydrolysable tannins), may be the cause of the areca nut antibacterial effects (16).

Based on the phytochemical analysis, *Suddha Puga* and *Ashodita Puga* include alkaloids, carbohydrates, glycosides, phytosterols, and flavonoids. *Ashodita Puga* contains tannins and phenolic chemicals. While *Suddha Puga* contains saponins, proteins, and amino acids (Table No 5). Phytochemicals are responsible for the therapeutic effect of the drug, as there change in the phytochemicals of *Puga* after *Sodhana*, which may alter the action of *Suddha Puga*.

Conclusion

The pharmacognostic characteristics, physicochemical, and preliminary phytochemical analyses of *Asuddha* and *Suddha Puga* were performed in the current study. The *rasa* of *Suddha Puga* was found to be mild *Madhura* and *Kasaya rasa*, this may be due to jaggery added in decoction. and it has a higher alcoholic extraction value than *Asuddha Puga*. The *Suddha Puga* alcoholic extractive value was higher; this corresponds to the higher content of phytoconstituents. The presence of a higher content of phytoconstituents suggests more biological activity in human beings. The phytochemical evaluation shows a difference between *Asuddha* and *Suddha Puga*, as there change in the phytochemicals of *Puga* after *Sodhana*, which may alter the action of *Suddha Puga*.

It may be concluded that the traditional method of purification (*Sodhana*) has the potential to alter the phytochemical, pharmacological, and toxicological profile of plant drugs, which is beneficial for improving the safety and efficacy of the drugs. *Sodhana* is also known as *Samskara* in Sanskrit, that is, transformation (*Samskaro hi Gunantaradhanamuchyate*) of the inherent attributes of a substance which leads to the addition of new properties or qualitative. This was a pilot study conducted in a short period with constrained funding. Further research is needed to explore its other connected elements in terms of modern science.

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