Pharmacognostic and Phytochemical investigation of leaves of Pandanus odoratissimus Linn.f.

Abstract: Pandanus odoratissimus Linn.f. (Syn: Pandanus fascicularis Lamk) belongs to the family Pandanacea, is a palm like small tree or shrub, which usually grow in old world tropics and few warm temperate regions. Mostly all parts are medicinally used. In the present study, histological, physical, powdered characteristics and preliminary phytochemical investigations were carried out on the leaves of Pandanus odoratissimus Linn.f.

Keywords: Pandanus odoratissimus, Pandanacea, Pharmacognostic, Phytochemical.

INTRODUCTION

Pandanus odoratissimus Linn.f. (Pandanacea), is a palm like small tree or shrub with fragrant flowers found along the coast of India and in Andaman Islands. It is common on the sea shore forming a belt of dense, impenetrable vegetation above the high water mark. Leaves are glaucous-green, 6-8 ft. long, ensiform, caudate acuminate, coriaceous, with spines on the margins and on the midrib. It is commonly known as Umbrella tree or Screw pine tree in English, Ketaki in Sanskrit, Keura, Kewda, Ketki, Gagandhul in Hindi, Kyadage-gida in Kannada. Leaves, anthers, oil as well as roots are medicinally useful. The leaves are said to be valuable in leprosy, small pox, syphilis, scabies, heat of body, pain, leucoderma, diseases of heart and the brain, and as an aphrodisiac, tonic. Chemical component analysis of the root parts of Pandanus odoratissimus led to the isolation of two phenolic compounds, four lignan type compounds plus a new benzofuran derivative. Among them, pinoresinol and 3, 4-bis (4-hydroxy-3-methoxy benzyl) tetrahydrofuran showed strong antioxidative activities. However, no scientific reports are available on pharmacognostic and phytochemical studies on the leaves.

Therefore the present investigation reports the pharmacognostic and phytochemical properties of leaves of Pandanus odoratissimus Linn.f.

MATERIALS AND METHODS

The leaves of Pandanus odoratissimus L.f were collected from the local areas of Hubli, Karnataka, and authenticated by Dr. B.D. Huddar, Head, Department of Botany, Kadasiddheshwar Arts College and H.S. Kotambari Science institute, Hubli. A voucher specimen (no.05PG353, Sneha Chilakwad) has been deposited in the PG Pharmacognosy laboratory of the college for future reference.

Organoletic, macroscopic and microscopic characters were studied as described in quality control methods. Proximate values such as extractive values, moisture content and ash values were studied.

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were carried with powdered crude drug of the leaves of *Pandanus odoratissimus* Linn.f. 6-11. Shade dried & powdered leaves were subjected to exhaustive soxhlet extraction with alcohol and also extracted successively with Pet ether, Chloroform, Ethyl acetate, n-Butanol and Methanol. Qualitative chemical tests of all these extracts were carried out using different solvents 12-15.

RESULTS AND DISCUSSION

Organoleptic and macroscopic characteristics:
Leaves of *Pandanus odoratissimus* L.f are glaucous green in color ensiform in shape with have a characteristic odor. They are about 8-6 ft in length and 2 inches in width. Botanical evaluation of the leaves revealed that they are sessile; phyllotaxy – spiral and tristichous; apex – cuspidate; margin with straight spines; Lamina is linear, simple and coriaceous with parallel, palmate and convergent venation with distinct midrib; leaf base – sheathing.

Microscopic characteristics:
TS of leaf showed the presence of single layered upper and lower thin walled epidermal cells, with a moderately thick cuticle, and cells are more or less rectangular. Covering type, unicellular, thick walled, lignified Trichomes, pointed at one end and has a base like that of a hockey stick are emerge from the epidermal layers. Stomata are also seen in the epidermal layer. Mesophyll forms the bulk and is differentiated into thin walled, large, polyhedral, colorless parenchyma with intercellular spaces and 3 to 4 layered, tightly arranged spongy parenchyma (Chlorenchyma). Numerous bundles of acicular raphides and calcium oxalate crystals as prisms were seen in the parenchymatous cells of mesophyll. Collateral vascular bundles were seen at regular intervals and have protoxylem followed by metaxylem towards upper epidermis and phloem followed by bundle sheath extension (sclerenchyma) towards lower epidermis. The whole vascular bundle is covered by border parenchyma. The TS of the leaf when treated with safranine vascular bundles have stained with pink color and when treated with sudan red lignified cell wall produced red color

Powder microscopy:
Coarsely powdered shade dried leaf of *Pandanus odoratissimus* L.f. is light green in color with characteristic odor and acrid taste. It primarily consists of Scalariform and annular xylem vessels; Covering type, unicellular, thick walled trichomes which are lignified, pointed at one end and has a base like that of a hockey stick; paracytic stomata with straight walled epidermal cells surrounding it. Calcium oxalate crystals as prism and acicular raphids scattered in Parenchyma.

Leaf Surface Data:
Stomatal number and Stomatal index of Leaf of *Pandanus odoratissimus* L.f. were carried out. The value of stomatal index of upper epidermis is 23 and the value of stomatal index of lower epidermis is 56.

Proximate values:
Results of Extractive values, Moisture content and Ash values of shade dried *Pandanus odoratissimus* L f. leaves are tabulated in Table No: 2

Preliminary Phytochemical Investigations:
Percentage yield and physical characteristics of various extracts of *Pandanus odoratissimus* L f. leaves are tabulated in Table No: 3. Preliminary phytochemical analysis for Alkaloids, Steroids, Carbohydrates, Phenolic compounds, Glycosides, Proteins and Aminoacids are tabulated in Table No: 4

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**Figure No: 1. Photograph of T.S of *Pandanus odoratissimus* L. f leaf.**

![Image of T.S of Pandanus odoratissimus L.f. leaf]

**Table No: 1. Evaluation of TS of *Pandanus odoratissimus* L.f. leaf**

| Sl No. | Parts                        | Sl No   | Parts                                      |
|-------|------------------------------|---------|--------------------------------------------|
| 1     | Upper epidermis              | 7       | Border Paranchyma                          |
| 2     | Stomata                      | 8       | Phloem                                     |
| 3     | Paranchyma                   | 9       | Bundle sheath extension (Sclerenchyma)     |
| 4     | Spongy Paranchyma or Chlorenchyma | 10     | Lower epidermis                            |
| 5     | Protoxylem                   | 11      | Ca-oxalate crystals, Acicular Raphides     |
| 6     | Metaxylem                    | 12      | Trichome                                   |
Table No: 2. a. Extractive values, b. Moisture content and c. Ash values of *Pandanus odoratissimus* L f. leaves

| Sl. No. | Parameter                           | Determined Value % w/w |
|---------|-------------------------------------|------------------------|
| a       | Extractive values                   |                        |
| 1       | Alcohol soluble extractive value    | 10.00                  |
| 2       | Water soluble extractive value      | 21.00                  |
| b       | Moisture content                    | 07.80                  |
| c       | Ash Values                           |                        |
| 1       | Total ash                           | 8.7166                 |
| 2       | Acid insoluble ash                  | 8.3050                 |
| 3       | Water soluble ash                   | 3.6950                 |
| 4       | Sulphated ash                       | 8.0000                 |

Table No: 3. Percentage yield and physical characteristics of various extracts of *Pandanus odoratissimus* L f. leaves

| Extract                           | % Dry wt in gms. | Colour            | Odour               | Consistency |
|-----------------------------------|------------------|-------------------|---------------------|-------------|
| Alcoholic                         | 11.48            | Blackish green    | Characteristic      | Sticky      |
| Successive extraction             |                  |                   |                     |             |
| Petroleum Ether (40-60C)          | 2.08             | Dark brown        | Characteristic      | Waxy        |
| Chloroform                        | 2.66             | Dark Green        | Characteristic      | Powder      |
| Ethyl acetate                     | 1.91.            | Brownish yellow   | Characteristic      | Sticky      |
| n-Butanol                         | 2.11             | Brown             | Characteristic      | Sticky      |
| Methanol                          | 8.24             | Reddish Brown     | Characteristic      | Sticky      |
Table No: 4. Qualitative chemical analysis of various extracts of *Pandanus odoratissimus* L f. leaves.

| Nature          | Total Alc | Total Aq | Successive Extraction |
|-----------------|-----------|----------|-----------------------|
|                 |           |          | P.E | E.A | n-But | Met. |
| Alkaloids       | +         | --       | --  | +   | --    | --   |
| Steroids        | +         | --       | +   | +   | --    | --   |
| Carbohydrates   | +         | +        | --  | --  | +     | +    |
| Phenolic        | +         | --       | --  | --  | +     | +    |
| Pr & Amino acid | +         | +        | --  | --  | --    | +    |
| Glycoside       | +         | +        | --  | --  | +     | +    |

**KEYWORDS:**
- Alc = Alcoholic
- Aq = Aqueous
- P.E = Petroleum Ether
- CH = Chloroform
- E.A = Ethyl acetate
- N-But = n-Butanol
- Met = Methanol
- + = Present;
- -- = Absent

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