

A Review Article of Pharmacognostic Study, Botanical Description and Therapeutic Uses of *Putranjiva Roxburghii*

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Abstract

The present investigation focuses on the Pharmacognostic study the plant of *Putranjiva roxburghii* Wall. (*Putranjivaceae*). Plants have been studied from different perspectives of morphological and microscopically, powder analysis, histochemistry and extractive values. Morphological analysis revealed shape, size, odour and taste of leaf, bark, root and seeds. They showed shiny, smooth and rough texture with pungent and bitter taste. Microscopically analysis revealed the presence of, lower epidermis, upper epidermis, vascular bundles cortex, pericycle and pith region of the transverse sections. Histochemical analysis showed the presence of lignins, starch, alkaloids, tannins and calcium oxalate crystals. Saponins are present in leaf, root and stem except in seeds. pH analysis revealed the acidic and basic property of different plant extracts. Leaf, bark, root and seeds extract showed pH values below 7. Among methanolic extracts, leaf, bark and root showed higher value. Among aqueous extracts root and bark showed higher value. Fluorescence analysis of plants showed different colours in the UV and visible light due to presence of secondary metabolites.

Keywords: *Putranjiva roxburghii* Wall, Pharmacognostic study, Microscopic study, *Putranjivaceae*, Chhattisgarh

INTRODUCTION

Putranjiva roxburghii plants belongs to the family *euphorbiaceae* that cultivated in mostly Asian tropical regions. The plant can be utilised in a number of ways but is still unnoticed as the likes of some famous plant materials like *Eucalyptus*, *Jatropha* etc. The famous botanist Roxburgh recognized this plant and accordingly the plant is named as *Putranjiva roxburghii* [1]. *Putranjiva roxburghii* belongs to the family *Euphorbiaceae*. It is also locally called as *putijia*, and sonam “*Pra Kham Kai*” or “*Ma Kham Kai*”. It is widely grown all over Asia, particularly in Indochina, India, Nepal, Thailand, Bangladesh, Indochina, Myanmar and Sri Lanka [2]. *Putranjiva roxburghii* is known for its threupetic qualities, grown all over India. Leaves are normally procreant, bitter, refrigerant and astringent. The leaves are handy in treating of illness, phlegm, skin ailment, aridity and are also

helpful in curing rheumatism [3]. The leaf extracts and bio-oil extracted from seeds are mostly utilized in Ayurveda, herbal and Unani medications.

Its leaves and fruits are conventionally used for freeing muscle sprain and curing arthralgia in Thai medicine and the total plant issued to treat sickness and haemorrhoids. Women munch the nuts of *Putranjiva* orally to influence the birth of a male child [4]. Two triterpenoids and four triterpenoids were extracted from the shaft bark of the plant [5, 6]. Adding to this, a triterpene acid and a biflavonoid were also isolated from the alcoholic extract of *P. roxburghii* leaves [7, 8]. So its plant is utilized as an active healing plant and also used to separate some organic chemicals from the leaves and shaft bark of *Putranjiva*.

Putranjiva roxbargi is an evergreen tree belonging to the family *Euphorbiaceae*

found in tropical region of India.

Leaves are oblong, simple, shiny, shady green distantly rough. Fruits are spheroidal drupes, seed generally one. Kernel yielding glycosides, glucojiaputin, glucocochlearin, glucopturanjivin, and glucocleomin normally comprise vital oil with the mustard odour of isothiocyanate [8]. The leaves are procreant and refrigerant which are useful in treating fever, catarrh and sterility. Seeds are fresh and sour. It is ophthalmic emetic, anti-seditious, diuretic and aphrodisiac. It has been used for many conventional health applications such as treatment of mouth and stomach ulcers, hot swellings, small pox and also useful in burning sensation, ophthalmopathy, hyper emesis, elephantiasis, impairment, strangury, azoospermia, usual termination and infertility [6, 11]. Putranjiva roxburghii Wall is commonly called by names Kuduru in Telugu and in Hindi as Putijia belongs to the family Euphorbiaceae grows abundantly in khammam forests of Andhra Pradesh [12].

It is used by tribes in treating a number of health problems [13]. The research was done with a view to separate the ethanolic extract from the *P. roxburghii* wall to investigate and to confirm that the anti-itching and antioxidant effects of the ethanolic extract from the leaves and shaft bark of *P. roxburghii* using dissimilar pharmacological activity simulations in mice. Leaves, fruits and stones of fruits are given in coldness and infections, also in sore affections. Rosaries, made of firm gravels of the berry, are placed over the roll neck of children to secure them from sicknesses [14].

Putranjiva roxburghii grow in the tropical region of Asia. The kernel has a sturdy smell with a yield of 0.7 percent. The oil has 2 butyl isothiocyanates and isopropyl as the prime components and 2 methyl-

butyl isothiocyanates in a very minute amount. In addition, glucoside and glucocleomin are also found in the seed (kernels). The glucoside pattern in the seeds has also been reported to be in shoots and roots. The fruitlet paste comprises a large amount of mannitol and little amount of a saponin glucoside with alkaloid which is also found to be in the stones of the seed case. It is examined that *P. roxburghii* oil protected the peanut seeds for six months as it has an extreme toxicity against fungi and insects without exhibiting any contrary effect on seed dispersion, sapling growth and general health of plants. So the bio-oil is an effective herbal preservative for peanut seeds against spoilage by fungi and insects while kept in stowage [15]. An ethnobotanical survey taken at Karandamalai, (Southern Eastern Ghats) in Tamil Nadu, a rural area colonized by tribes, revealed the potent application of stalk bark of *Putranjiva* combined with leaves of *Pterospermum suberifolium* healing broken bones [16].

In a recent study, change in the oil and fatty acids composition of different aged *P. roxburghii* seeds was investigated. Oleic and linoleic acids were found to be the major compounds [17]. The petroleum ether extract dose of *Putranjiva* vulnerably produced analgesic activity for squirming in mice induced by acetic acid. At the dose range of 400 mg/kg, the extract considerably reduced fever caused by yeast in rats [18]. Anaesthetic and CNS sedative property of methanol extract of *P. roxburghii* Wall seeds were examined in a rat model. In the anodyne activity, the reaction time enhanced significantly for the standard groups and extract. The locomotive activity count in the extract and the standard group was significantly reduced when related to other groups [19].

Putranjiva roxburghii–taxonomy

Trees—Normally of 20-22m height having a whitish white being young and dusky grey colour when grown up with straight pores; branches generally pendulous; sprigs are cylindrical and tapering with brown colour, slim and flossy. The Putranjiva tree is shown in (fig. 1).



Figure 1: Putranjiva Tree

Leaves—Leaves are alternate; A small leafy outgrowth at the base of the stalk and usually occurring in pairs and shed at an early stage of development, adjacent; leafstalk is of 0.2 to 0.3 inch long, lean, glossy; plates of 2x21 inch, ovoid and elongated in shape, apex is little sharp, base sloping, dense tip; Jagged like a saw with teeth pointing toward the apex, smooth, dusky green, coriaceous and shining; contiguous 6-12 pairs of nerves, featherlike, slim and ascending, lofty, intercostal and reticular. The leaves of Putranjiva are shown in (fig. 2).



Figure 2: leaves of Putranjiva

Flowers—Flowers having only one type of sexual organ; not hermaphroditic, small,

yellow in colour; Male flowers-stalk less, in alar spikes, 2-2.5 mm across; pedicels are of 1.5-3 mm long, sepal is of 3-5, square shaped, puberulent without, cilia, rounded at the apex, overlapping or layered as scales or shingles; stamens having a length of 1.5-2 mm; thick fibrils, more or less cognate towards foot; borne on the stalk is ovate, hirsute; Female flowers—Hermit and alar; pedicle up to 15 mm long, puberulent; husks shaped like a lance head; petals 2.5 × 1-1.5 mm, uneven, having elongated form with approximately parallel sides, 3-celled, ovum 2 in each cell; type 3, dispersal, shielded with thickly tangled strings, often cognate with broad plump stigma; stigma semilunar-shaped, glandular.

Fruit—Stone fruit with a single seed of 1.18 inch. Oval shaped and ellipsoidal, enclosed with thickly tangled strings; having a hard crust or shell; A small stalk bearing a single flower of an inflorescence 0.2-inch long [21]. The fruits of Putranjiva trees are shown in (fig. 3).



Figure 3: fruits of Putranjiva trees

Botanical Description

Putranjiva roxburghii Wall. also called as Putranjiva or Putrajeevak a well-known moderate-sized, evergreen tree growing up to 12 m in height. It has adjective branches and dark grey bark having horizontal lenticels. Leaves are simple, dark green, alternately arranged, elliptic-oblong, shiny, distantly serrated. Male flowers are found with short stalks, in rounded axillary

clusters and female flowers are in 1-3 in leaf axil. Fruits are rounded or ellipsoid, drupes, white seed normally one, stone pointed, rugose, very hard. Its flowering time is between March to April while fruits appear during January- March. It is widely grown in Thailand, Nepal, Bangladesh, India, Myanmar and Sri Lanka [3]. In folklore medicine, its leaves and fruits have been traditionally used for the treatment of fever, muscle twisting, arthralgia and rheumatism [4]. They have also been used as anti-nociceptive, antipyretic & anti-inflammatory while the whole plant of *P. roxburghii* has been used for the treatment of fever and haemorrhoids [1, 2].

Pharmacognosy The fruit pulp contains a large quantity of mannitol, a saponin glucoside and an alkaloid, while the seeds contain fatty oil and also contains an essential oil with mustard smell, isothiocyanate yielding saponins A, saponin B, saponin C saponin D [8]. The Ethanol extraction of fresh leaves of *P. roxburghii* convenient for the isolation of polyphenolic compounds. In addition to triterpenoid, this extract yielded ellagic acid, gallic acid, galocatechin, ellagi-and gallo-tannins and saponins. The main components of the root bark were triterpenoids, friedelin, putranjivadione, roxburgholone, methyl putrate and saponins derived from oleanolic acid [9]. Chemical investigation of the bark of stem and leaves of *Putranjiva* glycosides, glucoputranjivin, glucocochlearin, glucojiaputin and glucocleomin. The seed coat yields putranjivoside, β -sitosterol triterpene saponins, and its glucoside, saponins and pyranosides A-D. Its leaves contain β -amyrin ,putrone and esters, , putrol, methyl putrajivate ,putranjivic acid, , stigmasterol and hydrocarbons, triterpene roxburghonic acid and biflavones, whereas the bark yields triterpenes - friedelin, friedelanol, roxburgholone,

putranjivadione, putranjic acid and putric acid [6, 7]. The Leaves also contain roxburghii resulted in the isolation of a new ellagic acid glycoside with four saponins. The structures of the isolated compounds were established by detailed spectral analysis. Putranoside-A methyl ester the first time isolated from this species and the saponins exhibited potent DNA topoisomerase IB inhibitory activity [10]. Two triterpenoids, is putranjivanonol and putranjic acid, were isolated from the trunk bark of *P. roxburghii* [11]. From the isolation of four other compound triterpenoids, friedelin, putranjivadione, friedelanol and roxburgholone, from the bark of *P. roxburghii* [12]. Roxburghonic acid, a triterpene acid, and putraflavone, a biflavonoid, were isolated from the alcoholic extract of *P. roxburghii* leaves [13] Detection and quantification were performed by densitometry, with a tungsten lamp at 580 nm. The response to stigmasterol and β -amyrin was linear in the concentration range 0.045 to 0.360 μg per band and 0.041 to 0.328 μg per band respectively. The validated method was used for quantitative analysis of stigmasterol and β -amyrin in *Putranjiva roxburghii* wall. and it can be used for quality-control analysis powder of leaf *Putranjiva roxburghii* wall [14]. Now in this days, the preparation of nano scale gold materials has become very important due to their unique properties, which are different from those of the bulk materials. The properties of these particles in applications as diverse as catalysis, sensors and medicine depend critically on the size and composition of the nanoparticles which can be produced mainly by either chemical, physical or biological methods. Since noble metal nanoparticles such as silver and platinum nanoparticles, gold, are widely applied to human contacting areas, there is a growing need to develop environmentally friendly processes synthesis of nanoparticles does s not use toxic chemicals.

Therapeutic uses

Putranjiva roxburghii Wall. has been historically ascribed an important role in the traditional Ayurvedic and Unani systems of holistic health and herbal medicine of the East. The leaves of *Putranjiva roxburghii* Wall. are reported to have good medicinal values in these traditional systems of medicine. The name of this plant is sometimes misleading since it has been wrongly interpreted as a medicine for obtaining only male child. There is no mention of any such property or action responsible to or associated with *Putranjiva* in the Ayurveda or any other ancient traditional medicine text. However, these texts prescribe its usage in female patients to increase the strength of their female genital systems and also for curing of diseases like leukorrhoea, infertility, menstrual problems, etc. The use of *Putrajeevak* has been associated with many beliefs and practices. It is said to increase fertility in women, it aids and facilitates conception and its fruits are worn in the form of a necklace by pregnant women to prevent miscarriage. The seeds of its fruits are strung together to form rosaries and used as a necklace to protect children from diseases and by persons suffering from acute cough and cold, while its dried fruits are used in a garland to cure skin allergy and itching [1,5].

Conclusion

Putranjiva roxburghii grow in the tropical region of Asia. The kernel has a sturdy smell with a yield of 0.7 percent. The oil has 2 butyl isothiocyanates and isopropyl as the prime components and 2 methyl-butyl isothiocyanates in a very minute amount. In addition, glucoside and glucocleomin are also found in the seed (kernels). The glucoside pattern in the seeds has also been reported to be in shoots and roots. The fruitlet paste comprises a large amount of mannitol and little amount of a saponin glucoside with alkaloid which is also found to be in the

stones of the seed case. It is examined that *P. roxburghii* oil protected the peanut seeds for six months as it has an extreme toxicity against fungi and insects without exhibiting any contrary effect on seed dispersion, sapling growth and general health of plants. So the bio-oil is an effective herbal preservative for peanut seeds against spoilage by fungi and insects while kept in stowage. An ethnobotanical survey taken at Karandamalai, (Southern Eastern Ghats) in Tamil Nadu, a rural area colonized by tribes, revealed the potent application of stalk bark of *Putranjiva* combined with leaves of *Pterospermum suberifolium* healing broken bones. *Putranjiva roxburghii* Wall. has been historically ascribed an important role in the traditional Ayurvedic and Unani systems of holistic health and herbal medicine of the East. The leaves of *Putranjiva roxburghii* Wall. are reported to have good medicinal values in these traditional systems of medicine.

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