

## *Polyalthia longifolia* Promises to be a Potential Nutraceutical

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### Abstract

Use of herbs for treatment of various diseases is well defined in all indigenous folk medicine worldwide. This practice led to the formation of a well-accepted link among diet, nutrition and health and therefore evolved the concept of nutraceuticals in modern medicine. Nutraceuticals hold promises in clinical settings as they have the ability to decrease the risk of side effects that are associated with pharmaceuticals along with reduced cost and toxicity. *Polyalthia longifolia* Benth. and Hook (Annonaceae) is a large genus of shrubs and tree distributed in tropics and subtropics regions of India, Pakistan and Sri Lanka. Studies have demonstrated antimicrobial activity, cytotoxic function, antiulcer activity, hypoglycemic activity and hypotensive effects of extracts from various parts of *P. longifolia*. Till date, more than 20 active principles have been isolated and characterized from the *P. longifolia* in aqueous, methanolic, and ethanolic and chloroform extracts. The therapeutic efficacy of *P. longifolia* extensively used in folk system of medicine, however, testing and evaluation (preclinical and clinical trials) in a modern scientific way is the need of hour.

**Keywords:** *Polyalthia longifolia*; Nutraceutical; Anticancer; Anti-inflammatory

### Introduction

Natural products always receive utmost attention due to their wide utility in traditional medicinal system worldwide whether it is Indian, Egyptian, Chinese, or Greek. A number of herbal preparations either in wholesome or in their components have been shown to translate protection both *in vivo* and *in vitro*. Scientifically proven beneficial effects of diet containing fruits, vegetables and certain beverages such as green tea, wine etc. have reincarnated nutraceuticals. *Polyalthia longifolia* Benth. and Hook (Annonaceae) is a large genus of shrubs and tree which is distributed in tropics and subtropics regions of India, Pakistan and Sri Lanka [1,2]. It has been shown to possess variety of medicinal properties in indigenous systems of medicine. Almost all parts of the plants are used in the traditional system of medicine for the treatment of various ailments in human beings. Till date, more than 20 active principles have been isolated and characterized from the *P. longifolia* in aqueous, methanolic, and ethanolic and chloroform extracts [2-5].

The anticancer potential of *P. longifolia* has also been tested in various cell lines and the mechanism of apoptosis induction like increased DNA ladder formation, cytochrome c release, and activation of caspase-9, caspase-3 and cleavage of poly ADP ribose polymerase (PARP) has been reported [6]. Additionally, plant extract inhibit the interactions between nuclear factors and target DNA elements, mimicking sequences recognized by the NF- $\kappa$ B [7]. In another study, Manjula et al. have demonstrated *in vitro* and *in vivo* antitumor activity of ethanolic extract of *P. longifolia* stem bark [8]. Ramachandra et al. have recently demonstrated a protein (Fraction 2 peptide) isolated from *P. longifolia* is cytotoxic and an effective inducer of apoptosis in A549 and HeLa cancer cells, therefore offers an important strategy in the development of cancer therapeutics [9].

Extracts in different solvents from various parts of *P. longifolia* (e.g. leaves, root bark, stem bark, green berries, flowers etc.) demonstrated anti-bacterial and anti-mycotic properties [10-12]. Misra et al. have demonstrated presence of a non-toxic and orally safe anti-parasitic principle 16 $\alpha$ -Hydroxycyclohexa-3,13(14)Z-dien-15,16-olide (Compound 1) in *P. longifolia* [4]. Alcoholic extracts of the plant has also been shown to exhibit antiulcer activity in animal models

[13,14]. Recently study by Gbedema et al. have demonstrated that the stem bark extract of *P. longifolia* (Sonn) Thw. var. pendula together with three compounds (three clerodane diterpenes [16-hydroxycyclohexa-3,13-dien-16,15-olide, 16-oxocyclohexa-3,13E-dien-15-oic acid and 3,16-dihydroxycyclohexa-4(18),13(14)Z-dien-15,16-olide, isolated therein had displayed potent antiplasmodial activity that strongly supports its use in phytomedicines for treating malaria [15]. *P. longifolia* has the potential to be explored as a cardioprotective medicinal plant. Sashidhara et al. have identified diterpene 1 as an active principle in the *P. longifolia*, which have lipid lowering action through HMG-CoA inhibition [5]. In addition, a defatted extract of *P. longifolia* root bark was showed a significant ability to reduce blood pressure [16]. Mittal et al. have demonstrated a significant decrease in the mRNA expression of iNOS in PMA-stimulated blood mononuclear cells (isolated from postmenopausal women with CAD) in presence of ethanolic extract of *P. longifolia* and therefore suggested to have anti-inflammatory and cardio-protective effects [17]. Bark extract of *P. longifolia* has high content of phytosteroids, which may mimic estrogen structurally and therefore may modulate the estrogen receptor expression. Though, there is no specific evidence but bark extract may act as SERM (selective estrogen receptor modulators) to effect on the downstream signaling cascades driven through estrogen receptor was demonstrated in the study by Mittal et al. [17]. A clerodane diterpenoid from Formosan *P. longifolia* var *pendula* has been shown to significantly inhibit the generation of superoxide anion and the release of elastase in activated human neutrophils in a concentration dependent manner. These results demonstrate an anti-inflammatory and anti-oxidative activity of the plant extract [3]. In another study, the ethanolic and aqueous extracts of *P. longifolia* were found to reduce Carrageenan induced edema and inflammation [18]. Hepatoprotective potential of plant has also been demonstrated in an animal study [19,20].

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Usage of plants as medicines is an old practice, which is evident both in folk and scholarly traditions worldwide. Studies cited here and others provide ample justifications for the requisite scientific validation and evaluation of *P. longifolia*. Though there is a long way to go, this medicinal plant holds the promise to reach for its therapeutic potential against various diseases from laboratory to the clinics in near future and therefore, need to be explored so that it can be claimed as potential nutraceutical.

## Conflict of Interest

The author has no conflict of interest to declare.

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