

# Phytochemical and Biological Evidences of *Passiflora Incarnata* Linn: A review

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## Abstract

*Passiflora incarnata* from Passifloraceae family is an important medicinal plant of tropical and subtropical India. Its medicinal usage has been reported in the traditional systems of medicine such as Ayurveda, Siddha and Unani. *P. incarnata* has been described as a passion flower and has been used extensively for treatment of some diseases like anxiety, insomnia, convulsion, sexual dysfunction, cough and cancer. A wide range of chemical compounds has been isolated, mainly alkaloids, flavonoids, phenols and carbohydrates. It has been described as passion flower and used extensively for treatment of several diseases like anxiety, insomnia, convulsion, sexual dysfunction, cough and cancer. **Keywords:** *Passiflora Incarnata*, chemical compounds, plants, bioactivities..

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## 1. Introduction

Plants have been an important source in cancer drug discovery. The medicinal values of plants lie in their phytochemicals, which makes specific physiological actions on the human body. Phytochemicals are compounds found in plants that are utilized as food and medicine top reserve against illness and to ensure human health.

The genus *Passiflora* consists of 500 species that are mostly found in warm and tropical regions. *Passiflora* comes from Latin word "Passio" that was first time discovered by Spanish discoverers in 1529 and was described as a symbol for "Passion of Christ" [1,2]. This plant was used widely in traditional medicine in West India, Mexico, The Netherland, South America, Italia and Argentina. One of species of this genus named as *Passiflora incarnata* is more popular than its other species. *Passiflora* contains several compounds including alkaloids, phenols, glycosyl flavonoids and cyanogenic compounds [2]. In some experiments, it has potential effects for treatment of some diseases like anxiety, opiates withdrawal, insomnia, attention-deficit hyperactivity disorder and cancer [3-9].

An herbaceous perennial vine with distinctive three-lobed leaves and attractive flowers that may reach 6 1/2 feet or more in length. Passion flower is primarily found along the edges of woods and fields, but is becoming more noticeable in many of Virginia's agronomic crops, especially where conservation tillage is practiced. The beneficial effects of passionflower on memory function have also been confirmed [10]. The use of *P. incarnata* in people with chronic insomnia may produce a therapeutic effect in the management of sleep disorders, memory loss, and degenerative brain diseases. *Passiflora* may be helpful in the treatment of insomnia, through its sedative action, as a result of which the person experiencing difficulty sleeping will be more likely to get to sleep [11]. *Passiflora* demonstrates positive effects in episodes of anxiety, restlessness, sleeplessness, and in depressive states [12]. The objective of this systematic review was to evaluate phyto-pharmacological potentials of *P. incarnata* is an attempt to provide a direction for further research.

## 2. Phytochemicals

### 2.1 Flavonoids

Flavonoids are chemical phenylbenzopyrones, which, usually conjugated with sugars, are present in all vascular plants [13]. Flavonoids are reported to be the major phyto-constituents of *P. incarnata*. It contains mainly C-glycosylflavones based on apigenin and luteolin. Concerning the qualitative composition, the previous studies [14-16] that reported isovitexin, vitexin, isoorientin, orientin and saponarin as main components are refuted by recent well-documented and reliable investigations [17-18]. The authors found schaftoside, isoschaftoside, isovitexin-2"-O- $\beta$ -glucoside and isoorientin-2"-O- $\beta$ -glucoside [18], furthermore vicenin-2 and lucenin-2 beside notable amounts of isovitexin and isoorientin [19] as major compounds. Saponarin, vitexin and orientin occurred in very small concentrations [19, 20]. The presence of some of these flavonoids was confirmed in other studies. 6- $\beta$ -D-glucopyranosyl-8- $\beta$ -D-ribofuranosyl apigenin and swertisin also investigated [20]. The greatest accumulation of flavonoids has been reported to be in leaves and the highest concentration of isovitexin was found to be between the preflowering and flowering stages. A newly reported benzoflavone moiety chrysin has also been estimated within *P. incarnata* extract. During various quantitative studies, it was observed that the ethanol free liquid extract of *P. incarnata* contains higher contents of flavonoids as compared to the commercial preparations.

### 2.2 Alkaloids

*P. incarnata* contains simple indole alkaloids based on  $\beta$ -carboline ring system namely harman, harmol, harmine, harmalol and harmaline. Content of harman and harmine, determined by direct spectrofluorimetric methods on TLC plates, and has been reported to be 10–20  $\mu$ g/100 ml in the medicinal fluid extract of *P. incarnata* [21]. Recently, all types of  $\beta$ -carboline alkaloids have been analyzed quantitatively by HPLC with selective fluorometric detection [22]. The vegetative parts of greenhouse grown *P. incarnata* contain 0.012 and 0.007% of harman and harmine, respectively, while the content of these alkaloids in the plant grown in fields has been reported as 0.005% and nil, respectively [23-25].

### 2.3 Miscellaneous Phyto-constituents

Various other constituents which have been reported from *P. incarnata* include  $\gamma$ -benzo-pyrone derivative maltol [26], carbohydrates such as raffinose, sucrose, D-glucose and D-fructose [27]; essential oil containing hexanol (1.4%), benzyl alcohol (4.1%), linalool (3.2%), 2-phenylethyl alcohol (1.2%), 2-hydroxy benzoic acid methyl ester (1.3%), carvone (8.1%), trans-anethol (2.6%), eugenol (1.8%), isoeugenol (1.6%),  $\beta$ -ionone (2.6%),  $\alpha$ -bergamotol (1.7%) and phytol (1.9%). Various

constituents responsible for typical odor of *P. incarnata* such as limonene, cumene,  $\alpha$ -pinene, prezizaene, zizaene, and zizanene[28]; twenty one amino acids [29], and a cyanogenic glycoside gynocardin [30].

## 3. Biological activities

### 3.1 Anticancer

The phytochemical composition of passion fruit juice was hypothesized to have valuable anti-cancer activity. Chrysin, a passion flower extract, may be beneficial because of its potential to attenuate surgical suppression of natural killer (NK) cell activity, thereby minimizing metastatic spread of cancer [31].

### 3.2 Hypertension

Despite improved pharmacotherapies and mechanical treatments, cardiovascular disease remains a principal cause of morbidity and mortality worldwide, with every chance that this burden will increase [32]. *P. incarnata* which is an allied species of *Passiflora nepalensis* has already been reported to possess antihypertensive effects. The antihypertensive effect of *P. incarnata* is contributed due to presence of water soluble substance isolated as a mercury salt (C<sub>10</sub>H<sub>22</sub>O<sub>8</sub>NHgCl<sub>2</sub>) and flavonoids. *P. nepalensis* is used in folklore medicine for treating hypertension.

### 3.3 Antitussive

The methanolic extract of leaves of *P. incarnata* (100 and 200 mg/kg, p.o.) exhibited significant antitussive activity on sulfur dioxide-induced cough in mice, the cough inhibition being comparable to that of codeine phosphate [33]. These results corroborate the folklore claims on the effectiveness of the plant in managing 'tough' cough conditions. Moreover, *P. incarnata*, that has not been reported anywhere to possess addiction-liabilities, could present advantages over available cough-suppressants (opiates, antihistaminics) which, though acting fast, have several adverse effects including CNS depression, dryness of mouth, blurred vision, severe gastrointestinal effects, and burning micturition [34]. Further studies are, therefore, necessary to evaluate better the potential of *P. incarnata* as an effective cough suppressant.

### 3.4 Anticonvulsant

The current therapeutic treatment of epilepsy with modern antiepileptic drugs (AEDs) is associated with side-effects, dose-related and chronic toxicity, and teratogenic effects, and approximately 30% of the patients continue to have seizures with current AEDs therapy. Natural products from folk remedies have contributed significantly in the discovery of modern drugs and can be an alternative source for the discovery of AEDs with novel structures and better safety and efficacy profiles. Evidence for anticonvulsant activity of *P. incarnata* in the clonic seizure of

pentylentetrazole model has been tested in mice. As the protective effects of *P. incarnata* in clonic seizure, it suggests that it could be useful for treatment of absence seizure. Furthermore, the important role of benzodiazepine receptor in the effects of *P. incarnata* should be considered [35].

### 3.5 Alcohol Withdrawal

A BZF moiety has been reported recently to be responsible for the multifarious CNS effects of *P. incarnata*. In the light of the established usefulness of the BZF moiety in counteracting the withdrawal effects of substances like cannabinoids and nicotine by the authors, the bioactive BZF moiety has been tested in mice treated with an addictive dose of ethyl alcohol, in order to evaluate its effectiveness in countering alcohol dependence. The chronic administration of *P. incarnata* with alcohol had better preventive effects than the single acute treatment with *P. incarnata* in alcohol-dependent mice. These results suggested that the treatment of *P. incarnata* extract could be used as safe and alternative drug for alcohol withdrawal [36].

### 3.6 Antiasthmatic

The methanol extract of the leaves of *P. incarnata* was evaluated for its antiasthmatic effects against acetylcholine chloride-induced bronchospasm in guinea pigs. This may be due to defective alpha-adrenoceptor function reported after excessive or continuous administration of an alpha-receptor agonist. [37].

### 3.7 Aphrodisiac Activity

The aphrodisiac properties of the methanol extract of leaves of *P. incarnata* Linn. had been evaluated in mice by observing the mounting behaviour. So this study suggested that the *P. incarnata* may cause sexual desire in human beings as well [38].

## 4. Conclusion

The therapeutic efficacy of *P. incarnata* extensively used in Indian system of medicine has been established through modern testing and evaluation (pre-clinical and clinical trials) in different disease conditions. These studies place this indigenous drug as a novel candidate for bioprospection and drug development for the treatment of such diseases as anxiety, insomnia, convulsion, sexual dysfunction, cough, cancer and postmenopausal syndrome.

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