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PASSIFLORA INCARNATA: PHARMACOLOGICAL PROFILE AND THERAPEUTIC POTENTIAL

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ABSTRACT

Passionflower, also known as Passiflora incarnata, is a medicinal plant that is used to treat sleep issues and mental stress. Important Features Plant Type: Perennial vine that grows quickly and is indigenous to tropical climates. Traditional Use: Treating neuralgia, anxiety, and uneasiness; Active Ingredients: Glycosides, indole alkaloids (harmin, harmin), and flavonoids (vitexin, isovitexin, and orientin). Uses of Medicines for Sleep and Anxiety Disorders: Good for improving sleep and lowering anxiety - Addiction Treatment: Has the potential to treat alcohol and nicotine addiction. Advantages of neuropharmacology: Positive impacts on depression, anxiety, and sleep issues Comparison of Registered Medicinal Products and Food Supplements: Research has revealed that many food supplements are not subject to quality control, with some failing to adhere to identity and content requirements. Recommendation: To guarantee product safety and effectiveness, transparent and enhanced quality control is advised.

KEYWORDS: *Passiflora Incarnata*, Gc -Ms, Anti-Inflammatory Activity, Anticonvulsant etc.

INTRODUCTION

Maypop, apricot vine, passion vine, and granadilla are alternative names for passion flowers. It has a powerful, woody stem and is capable of reaching a height of 30 feet (10 meters). Passion flowers, often known as passion vines (Passiflora), are the largest blooming plants in the Passifloraceae family, with a genus of over 400 species. Most of them are vines, while

some species are herbaceous and others are shrubs. Though they are significantly less common in Asia, Australia, and tropical Africa, species of this genus are found throughout the world's mild temperate and tropical climates. Passiflora species are naturalized outside of their normal ranges. For instance, Spain is now home to wild Blue Passion Flower (P. caerulea).[4]

There are 500 species in the genus Passiflora, most of which are found in warm, tropical climates. Passiflora is derived from the Latin term "Passio," which was originally identified by Spanish explorers in 1529 and was interpreted as a representation of the "Passion of Christ."[1]

The Latin word "Passio" is the source of the name Passiflora, since Spanish "conquistadors" in 1529 referred to its flowers as symbols for the "passion of Christ." The vast majority of these species are vines, and although some are found in North America, Southeast Asia, and Australia, the majority are found in Central or South America.[2]

In several pharmacopoeias, *Passiflora incarnata* appears as the official species. C-glycosyl flavones, containing vitexin, isovitexin, schaftoside, isoschaftoside, and isovitexin-2-O-glucoside phenols, glycosyl flavonoids, and cyanogenic substances, can be identified in *Passiflora incarnata*.[3]

One of the most well-researched species in the Passiflora genus with medicinal qualities is Passiflora incarnata. The plant's fruits, flowers, and aerial portions are all utilized medicinally. They are said to have anxiolytic, antispasmodic, and anthelmintic properties.

In addition, passionflower is used to treat morphine dependence, burns, headaches, diarrhea, painful menstruation, haemorrhoids, neurotic disorders, insomnia, and convulsions or neuralgia. Alkaloids, phenolic chemicals, flavonoids, and cyanogenic glycosides can all be identified as Passiflora incarnata. Flavonoids (apigenin, luteolin, quercetin, and kaempferol) and flavonoid glycosides (vitexin, isovitexin, orientin, and isoorientin) are the main phytochemicals found in passionflower.[18]

Chromatographic approaches for qualitative and quantitative examination of herbal medical products based on their active or marker component(s) are essential for standardization, hence ensuring their safety and therapeutic efficacy, as well as for detecting fraud.

The passionflower, or Passiflora incarnata L., is a perennial plant with edible fruit in the shape of an egg that can reach a height of 10 meters. The fruit is low in calories (41–53 kcal/100 g) and high in calcium, phosphorus, iron, and vitamins A, C, B1, and B2. The species, which is indigenous to South America, Australia, and South East Asia, is now grown as a raw material for pharmaceuticals.[18]

The family Passifloraceae includes the passion flower (Passiflora incarnata). Maypop, purple passion flower, true passion flower, wild apricot, and wild passion vine are some of the names that have been applied to it. With 16 genera and 650 species, it is the largest member of the Passifloraceae family.[8]

Some of these species have really been used for a long time as herbal tea. *P. incarnata L.* is a perennial plant that grows quickly. One of the hardiest kinds of passion flower, it features enormous, ornate blossoms with conspicuous styles and stamens. The wildflower is widespread throughout the southern United States. The Passiflora edulis, Passiflora leschenaultia, Passiflora mollissima, and Passiflora subpeltata are the widely accessible wild species limonene, cumene, α-pinene, prezizaene, zizaene, and zizanene are the components that give P. incarnata its characteristic smell.[9]

P. incarnata may have a therapeutic effect on the treatment of memory loss, degenerative brain diseases, and sleep disturbances in those who suffer from chronic insomnia. Given its sedative properties, passiflora may be useful in treating insomnia, increasing the likelihood that the individual who is having trouble falling asleep will do so.[10] Passiflora has beneficial effects on depressive moods, anxiety episodes, restlessness, and insomnia.[11]

Assessing the effectiveness of *Passiflora incarnata* formulations in the management of neuropsychiatric diseases was the aim of this systematic study. The comprehensive review encompassed randomized controlled trials (RCTs) that examined the connection between Passiflora incarnata use and various nervous system illnesses.[15]

Classification

Botanical Source: *Passiflora Incarnata L.*

Family : *Passifloraceae*

Genus : *Passiflora L.*

Species : *Passiflora Incarnata L* [1]

Phytochemistry

A wide range of phytochemicals are present in Passiflora, however the primary constituents include various forms of flavonoid glycosides. Nevertheless, concentrations vary among species.[13]

Group	Name	References
Flavonoids	Isovitexin, vitexin,isoorientin	Glotzbach and Rimpler, Schilcher
	Schaftoside, isoschaftoside, isovitexin-2″ -O-glucopyranoside and isoorientin-2-Oglucopyranoside	Qimin et.al
	Isovitexin, isoorientin, schaftoside, isoschaftoside, swertisin	Rehwald et.al
	Isoscoparin 2″ -O-glucoside	Rahman et al.
	Apigenin, chrysin, kaempferol, luteolin	Zanoli et al.
Alkaloids	Harman, harmol, harmine, harmalol, harmaline	Poethke et al.
Y-Bezopyrone derivative	Maltol	Aoyagi et al.

Phytochemical Constituents

The flavonoids, which include vitexin, isovitexin, orientin, isoorientin, apigenin, kaempferol, and quercetin, make up the majority of the Passion flower's substance (0.25%). According to the beta-carboline ring system, the indole alkaloids (0.1%) contain harman, harmin, harmalin, harmol, and harmalol. Benzopyrones, cyanogenic glycosides like gyanocardin, sugars, amino acids, glycosides, and pyrone derivatives like maltol and ethyl maltol are among the other isolated plant compounds that have been found. Tri-substituted benzoflavone moiety (BZF) and chrysin are two significant ingredients that have been identified.[20]

Phyto – Pharmacology

Cannabinoids reversal

The recently identified benzoflavone (BZF) component of P. incarnata (Linn) has been assessed in the context of earlier studies on the plant's potential to treat cannabis addiction. There is no effective treatment for the severe withdrawal symptoms of various cannabis products, such as marihuana, marijuana, bhang, hashish, ganja, etc., whose use has reached alarming levels worldwide, particularly among the younger generation, in the modern or allopathic system of therapeutics. When given alongside cannabinoids, the BZF of P. incarnata has been shown to inhibit the development of tolerance and dependence in mice. The manifestation of withdrawal symptoms in cannabis dependence was greatly inhibited even by an immediate injection of BZF. Thus, these investigations indicated that BZF might be helpful in the reversal of cannabinoids.[1]

Benzoflavone

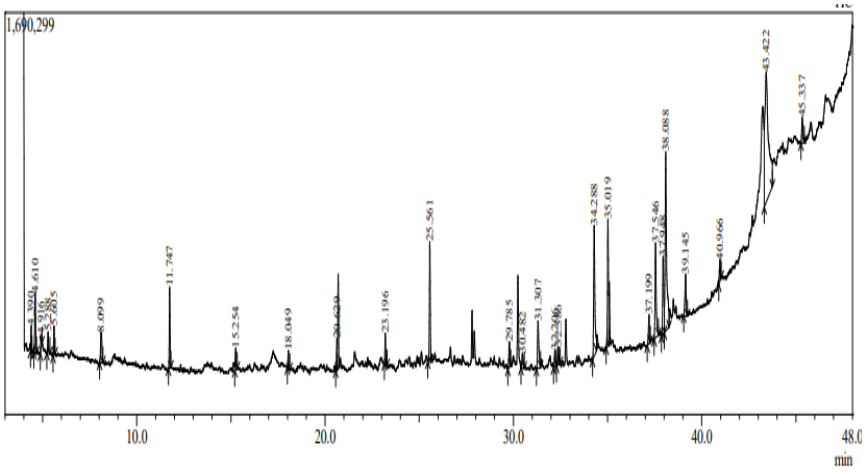
The aryl hydrocarbon receptor is strongly agonistic to naphthoflavone, often referred to as 5, 6-benzoflavone. It also induces detoxifying enzymes such as uridine 5'-diphospho glucuronosyl transferases (UGTs) and cytochromes P450 (CYPs) (Chlouchi et al., 2007). -An agent that may be used to avoid chemotherapy is naphthoflavone.[19]

Nicotine reversal

The BZF moiety extracted from P. incarnata was also found to be highly successful in preventing laboratory animals from becoming addicted to the addictive chemical nicotine, according to several pharmacological research on the BZF moiety. The bioactive BZF moiety that was separated from the aerial parts of Passiflora incarnata has been used in investigations on tobacco addiction in light of several reports indicating the plant's benefits. Accordingly, these early investigations indicated that the BZF would be useful in treating nicotine addiction.[1]

GC-MS hydroethanolic extract analysis of *Passiflora Incarnata* leaves

GC-MS analysis of PI leaf extract was carried out. According to the test extract's initial phytochemical analysis, the following phytoconstituents were present: Passiflora Incarnata leaf ethanol extract's predominant phytocompounds.[19]



Peak Report TIC

Peak#	R.Time	I.Time	F.Time	Area	Area%	Name
1	4.390	4.355	4.440	256236	0.85	1-Propene, 3,3-diethoxy-
2	4.610	4.530	4.680	817765	2.71	Ethane, 1,1-diethoxy-
3	4.916	4.875	4.970	179440	0.60	Glyceraldehyde
4	5.288	5.220	5.390	295619	0.98	2-Pentanone, 4-hydroxy-4-methyl-
5	5.605	5.550	5.665	334232	1.11	Propane, 1,1-diethoxy-2-methyl-
6	8.099	8.020	8.200	647938	2.15	Butane, 1,1-diethoxy-3-methyl-
7	11.747	11.685	11.815	969707	3.22	Propane, 1,1,3-triethoxy-
8	15.254	15.205	15.335	309656	1.03	Dodecane
9	18.049	17.990	18.130	231649	0.77	Nonane, 3-methyl-5-propyl-
10	20.629	20.570	20.650	391083	1.30	Glutaric acid, butyl ethyl ester
11	23.196	23.145	23.285	370502	1.23	Heptadecane
12	25.561	25.445	25.620	1619964	5.38	Hexadecane
13	29.785	29.700	29.860	426359	1.41	6-Hydroxy-4,4,7a-trimethyl-5,6,7,7a-tetrahydr
14	30.482	30.405	30.575	283891	0.94	Eicosyl nonyl ether
15	31.307	31.225	31.440	985061	3.27	Neophytadiene
16	32.206	32.135	32.290	254539	0.84	1,2-Benzenedicarboxylic acid, bis(2-methylprc
17	32.386	32.290	32.480	295621	0.98	3,7,11,15-Tetramethyl-2-hexadecen-1-ol
18	34.288	34.200	34.415	2561602	8.50	n-Hexadecanoic acid

Analgesic Activity

The test extracts were given intraperitoneally to the mice one hour prior to the intraperitoneal administration of 10 milliliters per kilogram of 0.6% (v/v) acetic acid. The control group received intraperitoneal (0.9%) NaCl. For the standard group of mice, 150 mg/kg of acetylsalicylic acid was given. We counted the writings that happened five to fifteen minutes after the acetic acid was administered.[14]

Motor activity for CNS Effects

Test extracts (100–400 mg/kg) and saline (control) were injected into mice, and a photoactometer was used to measure their motor activity. After treatments, the motility was measured for 120 minutes and 30 minutes before to injections.[14]

Anti – Inflammatory activity

The reduction of edema in rats was used to assess the anti-inflammatory effect. To create edema, 0.1 ml of carrageenan suspension was injected into each rat's right hind paw beneath

the subplantar area. Rats received the test extracts (100–400 mg/kg, i.p.) one hour before to the injection of carrageenan. In the control group, acetylsalicylic acid (ASA; 150 mg/kg) was employed as a standard anti-inflammatory drug, and 10 ml/kg of 0.9% NaCl solution was administered intraperitoneally. Edema was determined by measuring the increase in the linear paw circumference.[14]

Antimicrobial activity

According to author Ingle, several of the chemical constituents of passion flowers (passicol) have antibacterial properties of their own. Different levels of antibacterial activity were shown by the ethanol leaf extracts against P. putida, V. cholerae, and S. flexneri and S. pyogenes, respectively. Strong to moderate action against V. cholerae was demonstrated by the acetone extracts, which were followed by P. putida, S. flexneri, and S. pyogenes.[19]

The fruit extracts made from ethanol shown a modest level of action against the bacterial diseases V. cholerae, P. putida, S. pyogenes, and S. flexneri. The leaf extracts showed superior antibacterial activity over the fruits among the two components examined (Ingle and Hivrale 2010). The previous investigations used various techniques to concentrate on the antibacterial qualities of Passiflora species. According to a 2010 study by Ingle et al., Passiflora shows antibacterial properties against Pseudomonas tetrandra, Escherichia coli, Bacillus subtilis, and Pseudomonas aeruginosa.

Antioxidant activity

According to the author (Ingle et al., 2010), the antioxidant activity Extracts from P. palmeri stems and P. nitida leaves were found to have antibacterial activity and a high antioxidant power, which is correlated with high catechin and o diphenol concentrations. Although P. foetida leaf extracts exhibit strong antibacterial action, they are poor in o-diphenol and catechin and have a limited antioxidant capacity.

According to the author Ingle et al. (2010), P. tenuifila leaves exhibit moderate levels of antioxidant activity while having very high levels of flavones and total phenols. This is likely because o-diphenols and gallocatechins contribute less to the phenol content.

P. edulis leaf and stem extracts were tested for antioxidant activity using the 1, 1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging assay (Ingale et al., 1958). The oxidizable groups of synthetic or natural antioxidants can be titrated with ease and precision using

DPPH (Ingle et al., 2010). To make the stock solution, P. edulis leaf and stem crude extracts were combined with 95% methanol (10 mg/100 mL).[19]

When applied to planar lipid bilayers containing cholesterol, the Passiflora hemolysin significantly improved conductivity; however, it had no effect on cholesterol-free bilayers. Hemolytic activity was recovered in the n-butanol fraction after the crude hemolysin was successively extracted using n-hexane, chloroform, ethyl acetate, and n-butanol, leading to a 10-fold purification (Hivrale et al., 2010).

Anticonvulsant

Approximately 30% of people still experience seizures after using modern antiepileptic medications for epilepsy. These medications are linked to teratogenic consequences, dose-related and chronic toxicity, and adverse effects. Traditional medicines' natural ingredients have played a vital role in the development of contemporary medications and may serve as a substitute source for the development of new compounds with improved safety and effectiveness characteristics. Tests on mice using the pentylenetetrazole model of clonic seizures have demonstrated *P. incarnata's* anticonvulsant activity. Given that *P. incarnata* has protective benefits against clonic seizures, it may be helpful in treating absence seizures. The significance of the benzodiazepine receptor in P. incarnata's effects should also be taken into account.[18]

Aphrodisiac

In determining the mode of action of P. incarnata, which is mentioned in ancient ayurvedic medical writings as a promising remedy for male impotence, post-menopausal decline in female libido, irregular menstruation, morphinism, alcoholism, and tobacco addiction, the isolation of a tri-substituted BZF moiety as the primary bioactive phyto-constituent has been an encouraging breakthrough.[18]

LD 50

After eight groups of ten mice were administered either water (control) or the following doses (mg/kg) of CPV extract intraperitoneally (i.p.): 3000, 3250, 3500, 3750, 4000, 6000, and 8000 mg/kg, the mice were monitored for a week to determine the mortality index. Similarly, six sets of ten mice were given either water (control) or the following oral doses (mg/kg) of CPV extract: 640, 1250, 2500, 5000, and 8000. The mice were similarly monitored for a

week to determine the mortality index. A linear regression technique (Graphpad Prism® – GraphPad Software, Inc.) was used to determine the LD 50 by i.p.

DISCUSSION

Herbal medicines are being used more and more frequently. Over $1.5 billion is spent on herbal remedies each year in the US, and this amount is growing at a rate of 25% annually.3. One-seventh of respondents say they have used herbal treatments in the previous 12 months. The content, quality, and safety of natural treatments, however, vary greatly due to a lack of standardization and licensing procedures. After using therapeutic quantities of a herbal cure for stress from Passiflora incarnata for two days, our patient had bradycardia, ventricular arrhythmia, including bigeminy and ventricular tachycardia, weakness, protracted vomiting, and severe nausea. The apparent temporal correlation between the symptoms and the use of the herbal product, the lack of gastrointestinal or cardiovascular comorbidities, the lack of any other explanation for the sickness, and the improvement that occurs when the treatment is stopped all corroborate the causality of the association.

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