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Assessment of Passiflora foetida Linn's Initial Phytochemical Screening

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Abstract:

In order to determine which bioactive chemicals in Passiflora foetida Linn. (Passion fruit) are responsible for its medicinal effects, this research will assess the efficacy of a preliminary phytochemical screening. We used established methodologies to perform phytochemical analysis on several extracts of Passiflora foetida fruit. Our goal was to discover the presence of secondary metabolites such as alkaloids, flavonoids, saponins, tannins, and terpenoids. Flavonoids, alkaloids, saponins, tannins, and phenolic compounds were among the many bioactive chemicals found in Passiflora foetida extracts. These compounds have antioxidant, anti-inflammatory, and antibacterial properties, according to the data. The phytochemicals found in Passiflora foetida indicate that it may be a good source of natural medicines. Additional research into the medicinal and pharmacological uses of Passiflora foetida may be built upon the results of this first phytochemical screening.

Keywords: Passiflora foetida, Phytochemical screening, Bioactive compounds, secondary metabolites.

Introduction

Passiflora foetida Linn., also referred to as wild passion fruit, is a species within the Passifloraceae family, mostly found in tropical and subtropical areas. This plant has been historically used throughout cultures for its therapeutic characteristics, including its capacity to address diseases such as inflammation, discomfort, fever, and wounds. The bioactive chemicals of Passiflora foetida, including alkaloids, flavonoids, saponins, and tannins, are thought to enhance its medicinal properties.

Phytochemical screening is a crucial method for finding the chemical compounds in plants that may possess therapeutic potential. Phytochemical study may provide significant insights into a plant's pharmacological potential by carefully assessing the presence of secondary metabolites, including flavonoids, terpenoids, alkaloids, tannins, and saponins. These chemicals are recognized for their diverse biological actions, including antioxidant, anti-inflammatory, antibacterial, and antidiabetic properties.

This work seeks to conduct an initial phytochemical analysis of Passiflora foetida Linn. to identify and define its principal bioactive constituents. This knowledge is essential for the further investigation of the plant's medicinal potential and its use in the formulation of natural therapies. Understanding the phytochemical profile of Passiflora foetida provides a basis for future investigations into its pharmacological

activities and prospective uses in contemporary medicine.

Materials and Methods

Acquisition and verification of botanical specimens

The leaves of Passiflora foetida Linn. (Poaceae) were taken from the nearby region of Rewa.

Dehydration and dimensional reduction

The chosen plant's sections were desiccated by sun exposure for about one week, followed by drying in an oven at 30°C-35°C for eight hours. The desiccated plant components were mechanically ground to a coarse powder that went through a filter with a mesh size of 40. The powdered substance was then dried in an oven at 30°C-35°C for one hour and kept in an airtight container for future analysis.

Substances

Chloral hydrate, Fehling's solutions A and B, picric acid, and sodium hydroxide were acquired from Merck Specialities Pvt. Ltd., Mumbai; acetonitrile, nitric acid, α-naphthol, chloroform, petroleum ether (40-60°C), toluene, ethanol, methanol, ethyl acetate, hydrochloric acid, sulfuric acid, and nitric acid were obtained from RFCL Ltd., New Delhi; lead acetate, perchloric acid, potassium bismuth iodide, potassium mercuric iodide, potassium iodide, sodium bicarbonate, sodium carbonate, and glacial acetic acid were sourced from Qualigens Fine Chemicals, Mumbai; antimony trichloride, ferric chloride, trichloroacetic acid, and sodium nitroprusside were procured from Hi Media Laboratories Pvt. Ltd., Mumbai; Millon's reagent and ninhydrin reagent were purchased from CDH Pvt. Ltd., New Delhi; anisaldehyde was acquired from Loba Chemie, Mumbai. All additional chemicals and reagents used were of analytical grade.

Extraction of Plant material

Plant material sourced from Passiflora foetida Linn was shade-dried and coarsely pulverized. Each chosen plant part was subjected to sequential extraction of 1000 mg of powdered material using solvents: petroleum ether (40-60°C), chloroform, ethyl acetate, ethanol, and filtered water by soxhlation (Anonymous, 2008).

The extracts were concentrated using a rotary vacuum evaporator, dried in desiccators, and kept in airtight containers in a refrigerator until used.

Initial phytochemical analysis

The extracts derived from the sequential soxhlet extraction of powdered plant leaves, utilizing petroleum ether (40-60°C), chloroform, ethyl acetate, ethanol, and water, were analyzed through qualitative phytochemical tests to identify the presence of glycosides, alkaloids, sterols, carbohydrates, phenolic compounds, tannins, flavonoids, saponins, proteins, and amino acids (Farnsworth NR, 1966; Kokate CK, 1994; Harborne JB, 1998).

Test for alkaloids

Approximately500 mg of each of the dried extract was agitated with about 5 ml of dilute hydrochloric acid and then filtered. The obtained filtrate was tested with the following reagents:

1. **Mayer's reagent:** Few drops of potassium mercuric iodide solution (Mayer's reagent) were added to each filtrate separately and the formation of white or cream coloured precipitate was observed.
2. **Dragendorff's reagent:** 1-2 drops of a solution of potassium bismuth iodide (Dragendorff's reagent) were added to each filtrate separately and the formation of orange-yellow precipitate was observed.
3. **Hager's reagent:** 1-2 drops of a saturated aqueous picric acid solution was

added to the filterate, yellow precipitates were observed.

4. **Wagner's reagent:** Few drops of a solution of iodine in potassium iodide (Wagner's reagent) were added to each filtrate separately and the formation of the reddish-brown precipitate was observed.

Test for flavonoids

1. **Ammonia test:** A few milligrams of the extract was dissolved in water and filtered. Filter paper strip was dipped in the filtrate and ammoniated. Yellow colouration of the filter paper strip indicates the presence of flavonoids.
2. **Shinoda test:** A few milligrams of the extract was dissolved in water and filtered. To the filtrate, a piece of metallic magnesium/zinc was added followed by the addition of 2 drops of concentrated hydrochloric acid. The appearance of reddish brown colour indicates the presence of flavonoids in all the extracts.

Test for glycosides

1. **Keller-Killiani test:** 1 ml of glacial acetic acid containingtraces of ferric chloride and 1 ml of concentrated sulphuric acid was added to extracts carefully. The appearance ofred colour indicates the presence of glycosides.
2. **Sodium nitroprusside test:** The extracts were made alkaline with few drops of 10% sodium hydroxide and then freshly prepared sodium nitroprusside solution was added. Blue colour indicates the presence of glycosides in the extracts.
3. **Borntrager's test:** Appearance of pink colour, when 1 ml of benzene and 0.5 ml of dilute ammonia solution were added to extracts indicates the positive test for glycosides.

Test for sterols

1. **Liebermann-Burchard test:** A few milligrams of the extract were dissolved in chloroform and 2 ml of acetic anhydride was added, followed by 2 drops of concentrated sulphuric acid along the sides of the test tube. The appearance of blue to green colour indicates the presence of sterols in the extract.
2. **Salkowski test:** Sulphuric acid (2 ml) was added to a few milligrams of residue taken in 2 ml of chloroform. The appearance of a yellow ring at the junction which turns red after 1 min. indicates the presence of sterols in the extract.

Test for phenolic compounds and tannins

A few milligrams of the extract were mixed with 5 ml of distilled water, filtered and to the filtrate following tests were performed.

1. **Ferric chloride test:** Formation of blue-green colour on addition of ferric chloride solution (1% w/v) was taken as a positive test for phenolic compounds.
2. **Lead acetate test:** Addition of few drops of lead acetate solution (10% w/v) to the aqueous extract gives a yellow/white precipitate, suggesting the existence of phenolic compounds/tannins.

Test for saponins

1. **Foam test:** To the few milligrams of the extract, a few drops of water were added and shaken well. Formation of foam indicates the presence of saponins.
2. **Sodium bicarbonate test:** To the few milligrams of extract, few drops of sodium bicarbonate were added and shaken well. Formation of honey comb like frothing indicates a positive test for saponins.

Test for proteins and free amino acids

Too few milligrams of residue, 5 ml of distilled water was added and filtered. Filtrate was then subjected to the following tests:

1. **Millon's test:** To 2 ml of the filtrate, 5-6 drops of Millon's reagent (solution of

mercurynitrate and nitrous acid) were added. The appearance of red precipitate indicates the presence of proteins and free amino acids.

2. **Ninhydrin test:** To the filtrate, lead acetate solution was added to precipitate tannins and filtered. The filtrate was spotted on a paper chromatogram, sprayed with ninhydrin reagent and dried at 110°C for 5 minutes. Violet spots (free amino acids) confirmed the presence of proteins/free amino acids.

Test for carbohydrates

1. **Molisch's test:** A few milligrams of the extract were dissolved in water and filtered. To the filtrate, few drops of α-naphthol (20% in ethyl alcohol) were added. Then about 1 ml of concentrated sulphuric acid was added along the side of the tube, reddish violet ring at the junction of two layers was seen, indicates the presence of carbohydrates.
2. **Fehling's test:** 1 ml of the filtrate was boiled on a water bath with 1 ml each of Fehlingsolution A and B. Appearance of a green suspension and red precipitate indicates the presence of carbohydrates.

Results and discussion

Percentage Yield

The sequential extraction of powdered roots and seeds from chosen plants was conducted using petroleum ether (40-60°C), chloroform, ethyl acetate, ethanol, and water, according to the approach outlined in the materials and methods section.

Table 1: Successive extracts yield values of the leaves of Passiflora foetida L.

S. No.	Solvent used	Percentage Yield(w/w)
		Passiflora foetida leaves
1	Petroleumether(40-60°C)	0.62±0.82
2	Chloroform	3.15±0.78
3	Ethylacetate	1.13±0.97
4	Ethanol	9.84±0.61
5	Aqueous	12.50±0.45

Values are mean±S.E.M.;n=3

Preliminary phytochemical screening

Preliminary phytochemical screening reveals the presence of phytoconstituents in the extracts. The sequential extracts of Passiflora foetida L. underwent preliminary phytochemical screening as outlined in the materials and methods section.

Table 2: Phytochemical screening of different extracts of Passiflora foetida L leaves.

S. No.	Chemical Test	Petroleum ether extract	Chloroform extract	Ethyl acetate extract	Ethanol extract	Aqueous extract
1	**Alkaloids** Dragondorff'stest Hager's test Mayer'test Wagner'stest	-ve -ve -ve -ve	+ve -ve +ve +ve	-ve -ve -ve -ve	-ve -ve -ve -ve	-ve -ve -ve -ve
2	**Carbohydrates** Benedict's test Fehling test Molisch'stest	-ve -ve -ve	-ve -ve -ve	-ve -ve -ve	-ve -ve -ve	+ve +ve +ve
3	**Glycosides** Killer Killani test Sodiumnitroprusside Test	-ve -ve	-ve -ve	-ve -ve	+ve +ve	+ve +ve
4	**AnthraquinoneGlycosides** Borntrager'stest ModifiedBorntrager'stest	 -ve -ve	 -ve -ve	 -ve -ve	 +ve +ve	 +ve +ve
5	**Steroids** Hesse's test LiebermanBurchard's test Salkowskitest	+ve +ve +ve	+ve +ve +ve	-ve -ve -ve	-ve -ve -ve	-ve -ve -ve
6	**Flavonoids** Ammoniatest Shinoda test	-ve -ve	-ve -ve	+ve +ve	+ve +ve	+ve +ve
7	**Saponins** Foamtest	-ve	-ve	-ve	-ve	+ve
8	**Freeaminoacids** Millon's test Ninhydrintest	-ve -ve	-ve -ve	-ve -ve	-ve +ve	-ve +ve
9	**Phenolics&Tannins** Ferricchloride LeadAcetate	-ve -ve	-ve -ve	-ve -ve	-ve +ve	+ve +ve
10	**Starch** Iodinetest	-ve	-ve	-ve	-ve	+ve

+ve-Present, -ve- Absent

The first phytochemical analysis of the sequential extracts of chosen plant species, namely. Petroleum ether (40-60°C), chloroform, ethyl acetate, ethanol, and aqueous extract revealed the presence of carbohydrates, glycosides, alkaloids, sterols, phenolics, tannins, saponins, flavonoids, and amino acids. The phytochemical analysis of the research verifies the existence of plant phenolics, flavonoids, and other secondary metabolites, which are increasingly significant due to their beneficial effects on human health (Pullaiah T and Chandrasekhar NK, 2003). Flavonoids and other plant phenolics serve as treatments for stress-related disorders and as topical applications for wounds, cuts, and rheumatism (Havsteen B, 1983).

Summary:

The first phytochemical analysis of *Passiflora foetida* L. The extracts

demonstrated the presence of several bioactive chemicals in the different solvents used for extraction. The petroleum ether, chloroform, ethyl acetate, ethanol, and aqueous extracts exhibited unique phytoconstituent profiles.

The ethanol and ethyl acetate extracts exhibited the most extensive array of bioactive chemicals, including glycosides, flavonoids, and phenolics. The aqueous extract revealed the presence of carbohydrates, glycosides, and saponins, but the petroleum ether and chloroform extracts exhibited less phytoconstituents, suggesting their preferential solubility for certain chemicals.

Alkaloids, an important category of bioactive chemicals, were not detected in any of the extracts, suggesting that *Passiflora foetida* may not serve as a substantial source of these compounds. The presence of flavonoids and phenolics, especially in the ethyl acetate and ethanol extracts, indicates their potential contribution to the plant's medicinal capabilities, including antioxidant and anti-inflammatory actions. Saponins, recognized for their antibacterial and anti-inflammatory properties, were detected in the aqueous extract, corroborating the plant's therapeutic potential for addressing many diseases. The results indicate that *Passiflora foetida* L. represents a possible source of natural bioactive chemicals, namely flavonoids, glycosides, and phenolics, which may enhance its medicinal efficacy. Additional research is advised to investigate these compounds more thoroughly and assess their pharmacological properties for possible therapeutic uses.

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