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(RESEARCH ARTICLE)

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Phytochemical screening of *Capparis zeylanica*

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Abstract

One important member of the Capparidaceae family is *Capparis zeylanica* Linn.plant in the Ayurvedic system of medicine, where it is used as a "Rasayan" drug. This plant has been reported to possess a range of pharmacological activities, including antioxidant, antipyretic, analgesic, anti-inflammatory, antimicrobial, and immunostimulant properties. In traditional Ayurvedic medicine in India, *Capparis zeylanica* L is valued for its rejuvenating effects. Numerous bioactive substances, including fatty acids, flavonoids, tannins, alkaloids, vanillic acid, ferulic acid, and p-coumaric acid, have been found in the plant according to phytochemical investigation. The plant's phytochemical profile was recently further expanded by the isolation of a novel substance, E-octadec-7-en-5-ynoic acid, from the root portion.The present study aims to summarize the current knowledge on the phytoconstituents and pharmacological activities of *Capparis zeylanica* Linn., highlighting its potential as a valuable medicinal plant

Keywords: *Capparis zeylanica* linn; Rasayana; Phytochemical screening

1. Introduction

Capparis zeylanica (CZ) Linn, a prostrate shrub, is widely distributed across various regions including the plains between the Indus and Jhelum, inner valleys of the Himalayas, Chamba, Nepal, Sind, Andhra Pradesh,

Rajasthan, Maharashtra, and Konkan regions of India. It is also found in Afghanistan, North Africa, and Australia . All parts of the plant are used to treat a variety of illnesses, demonstrating its well-known medicinal qualities. Particularly bitter are the root and bark, which have several uses as an analgesic, anthelmintic, tonic, expectorant, and emmenagogue. Rheumatism, paralysis, toothaches, and enlarged spleen are among the ailments they are used to cure. The root bark decoction is used as an anthelmintic and anti-inflammatory in Unani medicine, and it is given to treat liver and spleen problems. In many local cultures, plants have played a vital role in daily life by providing food and healing. People from all walks of life use medicinal plants extensively, either directly as traditional treatments or indirectly in the manufacturing of contemporary medications. Various plants have been traditionally used for nutritional and medicinal purposes, with wild and cultivated species providing a rich source of nutraceuticals for many communities. These practices are often linked to seasonal changes and local rituals, reflecting the deep-rooted connection between nature and traditional knowledge systems, such as the principles of Siddha and the Traditional.

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1.1. Knowledge Digital Library (TKDL)

Figure 1 *Capparis zeylanica*

1.2. Chemical constituent

Chemical components of *Capparis zeylanica* Linn. are diverse. When leaf extracts are subjected to preliminary phytochemical screening, alkaloids, flavonoids, saponins, glycosides, terpenoids, tannins, proteins, and carbohydrates are found. A novel fatty acid, E-Octadec-7-en-5-ynoic acid, was extracted from the chloroform extract and identified using 1D and 2D-NMR spectroscopy. The roots also contain alkaloids, phytosterols, acids, and mucilage. The petroleum ether extract of leaves has also been used to separate carotene. B amyrin, n-triacontane, fixed oil, and thioglucoside glucocapparin in seeds and leaves are among the other substances found. Other fatty acids that have been found include linoleic acid, sterculic acid, malvalic acid, and resinolic acid. Several elements, such as C, O, Mg, Al, Si, Cl, K, Ca, Fe, Cu, and Zn, are present, according to elemental analysis using EDX .

2. Method and material

2.1. Maceration process

The aforementioned extraction studies do not explain this methodology, but it was tried during our testing process to identify the most effective extraction method. In order to achieve the proper phytoconstituent, this approach entails selecting a closed vessel and adding the solvents (menstruum). Three grammes of powdered *Capparis zeylanica* fruit were combined with hexane, dichloromethane, acetone, ethanol, and water. The previously mentioned procedure was run for 15, 25, and 50 hours in order to optimise the extraction conditions. It was also rattled from time to time.Even though this conventional approach has been in use for a long time, there are a number of drawbacks, such as the following: This method requires little extraction and a large amount of liquid for dilution. After the material has been filtered, a costly evaporation step is needed, which damages the thermo-liable components. The mass of the compounds extracted using the maceration process (in milligrammes)

2.2. Soxhlet method

Fresh *Capparis zeylanica* leaves were collected from India. The leaves underwent a thorough washing process, first with normal water and then with distilled water, to remove impurities. After cleaning, the leaves were dried under sunshade to eliminate moisture completely. Once dry, the leaves were powdered using a mechanical grinder and then stored for future use . Using a 50:50 ethanol-water mixture, 500g of dried and coarsely ground *Capparis zeylanica* leaves and seeds were extracted using the Soxhlet method. After being concentrated by vacuum distillation and allowed to dry outdoors, the extracts produced a 26.5% extract for seeds and a 24.4% extract for leaves. The dried extracts were further fractionated with petroleum ether, chloroform, and methanol, resulting in yields of 11.57%, 9.69%, and 12.47% for leaves, and 12.10%, 10.11%, and 14.10% for seeds, respectively. The hydro-alcoholic extracts and all fractions were preserved in a refrigerator.

2.3. Preliminary phytochemical study

Identify the presence of various natural products in the plant. The plant material was extracted using different solvents, including petroleum ether, chloroform, ethyl acetate, and methanol. These extracts were then subjected to characteristic phytochemical tests to detect the presence of compounds such as sugars, starch, polyphenols, saponins, mucilage, steroids, alkaloids, and flavonoids.

2.4. Chemical test

2.4.1. Alkaloids

The extract was filtered after being treated with diluted hydrochloric acid.

The filtrate underwent testing using:

- The presence of alkaloids is indicated by a cream colour when using Mayer's reagent, according to the test. Dragendorff's Test: The presence of alkaloids is indicated by a reddish-brown precipitate when Dragendorff's reagent is used.
- Hager's Test: The presence of alkaloids is indicated by a yellow precipitate when using.

2.4.2. -Sugar Reduction and Carbohydrates

Molisch's Test:

- Sulphuric acid and Molisch's reagent were used for treatment.
- Carbohydrates are indicated by a violet ring.
- A and B, Fehling's reagents, were used to treat the test.
- The presence of reducing sugars is indicated by a reddish-brown precipitate.

2.4.3. Liebermann-Burchard's Test for Steroids

Acetic anhydride, glacial acetic acid, and concentrated sulphuric acid were used as treatments. Steroids are indicated by a bluish-green hue.

2.4.4. Proteins

The Biuret Test was conducted using a solution of sodium hydroxide and copper sulphate.

Proteins are indicated by a violet hue.

- Millon's Test: - Millon's reagent was applied. Proteins are shown by the colour pink.
- Tannins; 10% lead acetate solution was used to treat them.

The presence of tannins is indicated by white precipitate.

- -Phenolic Substances

Test for Ferric Chloride:

- Neutral ferric chloride solution was used as a treatment.
- Phenolic compounds are indicated by their violet colour.

-Flavonoids test

Shinoda's Test for Flavonoids

The extract was boiled after being dissolved in alcohol and treated with strong HCl and magnesium turnings. The presence of flavonoids is indicated by a pink appearance.

- Mucilage and Gums: The extract was filtered after being treated with pure alcohol. The swelling characteristics of the filtrate were investigated.
- Glycosides: Concentrated sulphuric acid, ferric chloride solution, and glacial acetic acid were used to treat the extract. Glycosides are present when a ring forms at the intersection of the two liquids.
- Saponins (Foam Test): Distilled water was added to the extract, and it was thoroughly shaken.

The presence of saponins is shown by the formation of foam in the upper portion of the test tube.

Triterpenoids: Tin and thionyl chloride were used to preheat the material. Triterpenoids are indicated by the colour pink.

2.5. Development of Thin Layer Chromatographic [TLC]

Aluminium sheets coated with silica gel G 60 F254 PRE were used to perform the TLC profile of methyl alcohol extract. Toluene: etheyl acetate [1:1] was the solvent system used to create the plate. The plate was allowed to air dry after growth before being examined under UV light (both short and long wavelengths). Following dipping in vanillin-sulfuric acid reagent, the plate was heated to 105°C until the spot's RF values were recorded at UV254 and UV366 nm. Following deriwatization with the reagent,

3. Result

The methanol extract of Cyperus rotundus showed the presence of alkaloids, tannins, carbohydrates and phytosterols. While, proved the absence of saponins, steroids and flavonoids.These phytochemical compounds are known for their biological and curative effects. While plants produce them for selfprotection, research has shown that they also offer protective benefits against human diseases. Notably, alkaloids, phenolics, and tannins contribute to the antioxidant activities of plants and are effective in treating various diseases, including cancer, cardiac conditions, and infectious diseases.

4. Conclusion

This study compiles existing knowledge on Cyperus rotundus, focusing on recent research. The rhizome and its extracts have been extensively used in traditional medicine and Ayurveda for various therapeutic purposes. As a prominent Ayurvedic medicine, Cyperus rotundus has been documented to possess multifaceted therapeutic properties. Scientific validation is necessary to authenticate its traditional claims. Given its importance in traditional Indian medicine, further research is warranted to explore its therapeutic potential using modern techniques and parameters. By doing so, we can unlock the full benefits of this herb for humanity.

Compliance with ethical standards

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