Type of Article **Phytopharmacology Research Journal (PRJ) Open Access**

Received: 1 May 2024 | Revised: 7 June 2024 | Accepted: 20 July 2024 | Published online :28 July 2024 | ISSN : 2959-9687

The screening of *Cichorium intybus* with a physiological approach

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Funding information
Not applicable

Abstract

The therapeutic application of medicinal plants is crucial for maintaining both individual and community health. These plants' therapeutic relevance is derived from a number of chemical substances that have specific physiological effects on humans. Among these plant bioactive components, alkaloids, tannins, flavonoids, and phenolic compounds are the most significant. Medicinal plants have been utilized nearly as long as humans have existed. It has been estimated by researchers that 6% and 15%, respectively, of medicinal herb plants have undergone screening and phytochemical examinations. A vital step before the isolation and bulk extraction is phytochemical evaluations. It is imperative to use plants for medicinal purposes in research in order to get outcomes worthy of excellence. It is vital to extract a plant bioactive chemicals and determine their quality and quantity in order to study it for applications in medicine. This study concerned the examination of *Cichorium intybus* for phytochemicals. The research presented here establishes a solid scientific foundation for the significant use of plants that are being studied in the physiological approach discussion. The existence of phenol, flavonoids, saponin, tannin, alkaloids, protein, glycosides, and carbohydrates have been identified by the phytochemical screening. For the purpose of trying to discover fresh medicinal products, this approach will instruct the researcher to separate novel therapeutic molecules from different Cichorium intybus components.

KEYWORDS

Cichorium intybus, Medicinal Plant, Phytochemical constituents, Qualitative screening, bioactive constituents

1.0 INTRODUCTION

Medicinal plants are extremely crucial to human health, the therapeutic potential of these plants is attributed to the presence of certain chemical substances that have a specific physiological influence on the human body [1]. Herbal medicines have a variety of pharmacological active components, which can have therapeutic effects [2]. Due to their natural origin and fewer side effects, traditional herbal medicines have been widely used for thousands of years [3]. Researchers in infectious diseases are highly interested in biologically active compounds from herbal sources [4]. The most prominent plant bioactive constituents are active ingredients like tannins,

flavonoids, and phenolic chemicals [5]. Novel pharmaceuticals and healthcare products are heavily influenced by medicinal plants [6]. Plant extracts are increasingly being used as natural antibacterial and antioxidant agents [6]. Human physiology is significantly influenced by Phytoconstituents [7]. Phytochemicals in the body interact with proteins and nutrients to protect the body from ailments and stress conditions [8]. Natural substances have been used for medicinal purposes for a considerable amount of time [9]. The use of barks, leaves, flowers, roots, fruit, and seeds can lead to the production of medicines [10]. The use of plants that have bioactive components in humans is one of the most fundamental and conservative therapeutic medicinal techniques [11]. Despite the fact that more than 6,000 medications have been made from various plant sources [12].

Chicory has received attention for its high concentration of significant phytochemicals, which can be observed throughout the plant but are primarily found in the roots and leaves, which have the potential to be used as nutritional supplements [13]. All parts of this plant are crucial since they contain compounds that may be very useful in addition to the aforementioned phytochemicals. [14]. The leaves of the *Cichorium intybus* L. have many traditional uses with a lot of medicinal benefits [15]. Chicory leaf is a unique source of dietary fiber [16] that has favourable properties as a fiber ingredient for poultry nutrition [17]. Chicory is a plant that is resilient and can endure extreme temperatures during both the vegetative and reproductive growth stages. [18]. *Cichorium intybus* roots are employed as coffee alternatives and flavouring agent [19]. The plant derivative contains vitamins including ascorbic acid, thiamine, retinol, riboflavin, niacin, carotenoids and insulin like scoring, escalation, esculin, lactation, and lactucopicrin, according to phytochemical research [20].

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2.0 MATERIALS AND METHODS

2.1Plant Extracts

The *Cichorium intybus* plant species were collected from the District Swat. The roots, leaves, and fruit were rinsed and dried for 15 days in the shade at room temperature (18 °C). Using scissors, the fresh roots, leaves, and fruit were cut into smaller pieces and pulverized with a crusher after drying.

2.2 Solvent Extraction Process

The extraction method involved the use of an ethanol solvent 50 gm of leaves was soaked in 420 ml of ethanol, 35 gm of roots in 250 ml of ethanol, and 50 gm of fruit in 250 ml of ethanol for 15 days at room temperature. The extracts were filtered after a period of 15 days. After that, the filtrate was given the incubation period (20 days) at room temperature to obtain concentrated moiety.

2.3 Reagents

Benedict Reagent, Wagner Reagent, Millions Reagents, Mayer's Reagent, Selwinoff's Reagent, Molish Reagents, and Hager's Reagents

2.4. Analysis for phytochemical

2.4.1 Analysis for Steroids and Phytosterols

Using a sulphuric acid test, phytosterols were detected in which one millilitre of plant extract, one millilitre of chloroform, and a few drops of strong sulphuric acid were added. The formation of a brown ring is indicative of the presence of steroids, while the formation of a blue-green tint is indicative of phytosterols.

2.4.2 Analysis for Cardiac Glycosides

Cardiac glycosides were detected with reagents that combined approximately 5 ml of each extract with 2 ml of glacial acetic acid and a drop of ferric chloride solution. Then, 1ml of concentrated Sulphuric acid was added. The brown ring at the contact indicates Cardenolide's deoxysugar property.

2.4.3 Analysis for Saponins Glycosides

The foam test was used to determine the presence of saponins glycosides by shaking an equal volume of extract sample and water vigorously. The presence of Saponins Glycosides was observed in the persistent foam observed.

2.4.4 Analysis for Alkaloid

The Hager's Test was utilized to test for alkaloid, which involved adding 3 mL of Hager's reagent to 1 mL of sample extract (saturated aqueous solution of picric acid). The production of yellow precipitate showed the presence of alkaloids.

2.4.5 Analysis for Tannin

To identify Tannin, mix 5 mL of sample extract in 20 mL of chloroform and add a few drops of 0.1% ferric chloride ($FeCl_3$) solution. The development of a brownish colour after filtering was a sign of the presence of tannins.

2.4.6 Analysis for Saponins

The identification of Saponins was achieved by boiling 5 ml of each extract sample in 20 ml of chloroform in a water bath and filtration. To create a stable and sustained foam, 10 mL of the filtrate was mixed with 5 mL of distilled water and vigorously shaken after filtering. The foam was mixed with three drops of olive oil and stirred vigorously before attempting to form an emulsion.

2.4.7 Analysis for Flavonoids

A portion of the filtrate from each plant extract and chloroform was treated with 5 ml of ammonia solution before being treated with concentrated H_2SO_4. Flavonoids were indicated in each extract by a golden coloration.

2.4.8 Analysis for Terpenoids

Add 5 mL of the sample extract to 2 mL of chloroform and 3 mL of concentrated Sulphuric acid with care. The formation of a layer of reddish brown foam confirmed Terpenoids.

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3 RESULTS AND DISCUSSION

One by one, the fruit, leaves, and roots of the plant *Cichorium intybus* were qualitatively examined for the phytochemical active ingredients. Alkaloid compounds, saponins, tannins, flavonoids, terpenoids, glycosides, and phenols all contributed to distinct results at various points of the screening procedure. Accordingly, terms denoted by the symbols (+) and (-) indicate whether the relevant phytochemicals are present or absent (Table 1). Steroids and phytosteroids are molecules with a range of biological purposes. The plant's root and leaves screened positive for both steroids and phytosteroids, even though the fruit failed to demonstrate these compounds. Cardiac glycosides are among the substances that are recognized to have potential effects on cardiovascular health. Positive test results suggest that cardiac glycosides may have been detected in the fruit and leaves but not in the root. The leaves tested positive for saponin glycosides, while the fruit and root showed no indications of their existence. Consistent with the findings of the examination for saponin glycosides, the leaves tested positive for saponins, while the fruit and root showed no traces of these

chemicals. Nitrogen-containing compounds are called alkaloids, and they have a variety of physiological effects. While the root and leaves tested positive for alkaloids, all tests on the fruit produced no evidence of alkaloids. It is commonly known that tannins have an astringent effect. Tests on the plant's fruit, root, and leaves all revealed high tannin levels. We identify substances exhibiting antioxidant properties as flavonoids. The fruit and root did not exhibit any signs of flavonoids, but the leaves tested positive for them. Terpenoids are a diverse group of substances. Terpenoids analyses of the plant's leaves, fruit, and root revealed nothing unfavorable. The analysis reveals which plant parts and how much of each phytochemical are present. The study's findings suggest to a varied makeup, with some compounds present in some plant parts but absent from others. The differences in phytochemical profiles may have an effect on the potential biological activities and uses of specific plant parts. The detail about the photochemical screening is presented in the inset of Table-1.

Table 1. Phytochemicals screening of fruit, Roots and Leaves extracts of *Cichorium intybus*

S.No	phytochemicals	Test	Fruit	Root	Leaves
1	Analysis for steroids and Phytosteroids	Sulphuric Acids	-	+	+
2	Analysis for Cardiac Glycosides	Acetic acids	+	-	+
3	Analysis for Saponin glycosides	Foam	-	-	+
4	Analysis for Saponins	Foam	-	-	+
5	Analysis for Alkaloids	Hagers	-	+	+
		Wagners	-	+	+
		Harborne	-	+	+
6	Analysis for Tannin	Ferric chlorides	+	+	+
7	Analysis for Flavonoids	Sulphuric acids	-	-	+
8	Analysis for Terpenoids	Chloroform	+	+	+

4 CONCLUSION

Throughout the world, *Cichorium intybus* is grown and utilized for an assortment of reasons. It is frequently used to maintain overall wellbeing or for its preventive and therapeutic properties. It is an incredibly versatile plant that has high levels of proteins, carbohydrates, minerals, and phytobioactive substances that are good for both humans and animals. The findings of this investigation reveal that the *Cichorium intybus* plant offers pharmaceutical qualities. *Cichorium intybus* plant extracts have been shown to have antioxidant, antidiabetic, and antibacterial, properties. Comparing the phytochemical results of several *Cichorium intybus* portions revealed that they almost all contained the same sort of phytochemical since the results were nearly identical. As a result, we extrapolated that *Cichorium intybus* fruit, leaves, and roots all possessed comparable phytochemical constituents.

ACKNOWLEDGMENTS

The authors acknowledge Malakand Institute of Medical Sciences Dargai Malakand, KPK, Pakistan for providing the facilities for the conduct of the study.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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