

Metabolomic characterization and pharmacological effects of Cichorium intybus stem methanolic extract

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Introduction

Herbs of all kinds have long been utilized in traditional medicine as a means of treating a wide range of diseases. Modern times have given great thought to the use of plant-derived treatments as an alternative to or as a substitute for other synthetic chemicals. Although *Cichorium intybus* is often used in traditional medicine to treat ailments, there hasn't been enough study to back up its effectiveness or pinpoint the phytochemicals that give it its pharmacological benefits.

Objectives

The objective of the current study is to perform physicochemical analysis and metabolomics profiling of the *Cichorium intybus* stem methanolic extract using GCMS, FTIR and HPLC. This investigation is also intended to assess the plant's in vitro anti-inflammatory and antioxidant properties.

Methodology

The methanolic extract of the plant seed was prepared by maceration. According to USP, 2016 specifications, a physicochemical analysis of the sample was conducted. The qualitative and quantitative assessment of the primary and secondary metabolites was performed according to established procedures. For metabolomics profiling, various analytical techniques, including FTIR, atomic absorption spectroscopy (AAS), UV/Vis spectroscopy, HPLC, and GCMS were used. The protein denaturation method was employed to examine the in vitro anti-inflammatory efficacy, and diclofenac was used as a standard. DPPH, FRAP, phosphomlybednum, and the hydrogen peroxide scavenging tests were employed to evaluate the anti-oxidant impact. For antioxidant activity, vitamin C was used as a standard.

Results

The study's findings showed that the physicochemical characteristics were within the USP's 2016 suggested range. The estimation of primary metabolites revealed that the quantities of carbohydrates were larger than those of fat and protein. Estimating secondary metabolites revealed that polyphenols are present in lower concentrations than flavonoids. Various minerals, including Fe, Zn, Ca, K, and Na, were detected by atomic absorption spectroscopy. FTIR analysis exhibited the presence of various functional groups like OH, C-C, C=O, etc. Quercetin was detected in significant amounts by HPLC analysis, although ferulic acid was only found in trace amounts. The GCMS analysis of the plant showed the presence of important volatile compounds, i.e., hexadecanoic acid, lupeol, 9, 12-octadecadienoic acid, gamma sitosterol, stigmasterol, etc. The results of the investigation showed that stem methanolic extract greatly decreased inflammation, having effects similar to those of diclofenac. The plant has also shown significant anti-oxidant effects when compared to a reference drug..

Conclusion

This study has shown that *Cichorium intybus* includes numerous vital minerals and phytochemicals that are necessary to not only preserve physiological function but may also be very effective in the treatment of illnesses. *Cichorium intybus* displayed anti-oxidant and anti-inflammatory properties. Future research is desired to determine the phytochemicals' mode of action and to confirm their efficacy and safety before they can be employed in clinical settings.

Keywords: *Cichorium intybus*; Traditional medicine; Phytochemicals; HPLC

References

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Table 1. Physicochemical analysis of the *Cichorium intybus* stem

Sr. No	Parameter	Quantity (%)
1	Total ash	8.5
2	Acid insoluble ash	1.9
3	Water soluble ash	3.2
4	Moisture content	5.6

