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Phytochemical Screening and inflammatory Activity Evaluation of Hydroalcoholic extract of *Glycyrrhiza glabra* root.

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INTRODUCTION & AIM

In a context where chronic inflammatory diseases are on the rise, the search for effective and sustainable treatments has become essential. Natural anti-inflammatories derived from plant sources are gaining popularity due to their beneficial effects and often superior safety profile compared to synthetic drugs. Unlike the latter, which can lead to unwanted side effects and long-term complications, natural compounds offer a holistic approach to the treatment of inflammation, Incorporating phytochemicals into health regimens allows inflammatory mechanisms to be targeted while minimizing the risks associated with conventional treatments.

The root of *Glycyrrhiza glabra*, commonly known as licorice, belongs to the Fabaceae family and has been used as a medicine and flavoring agent for over 400 years. This plant continues to play an important role in the pharmaceutical and food industries. Licorice extracts are widely used in functional foods and dietary supplements.

Phytochemicals detected in the hydroalcoholic extract of *Glycyrrhiza glabra*, such as flavonoids and saponins, have shown significant anti-inflammatory properties, thus offering a promising alternative to synthetic treatments.

This study aims to explore in depth the phytochemical profile of the hydroalcoholic extract of the root of *Glycyrrhiza glabra* while evaluating its anti-inflammatory activity, thereby contributing to the valorization of this plant in the health field and expanding the therapeutic options available for the treatment of inflammatory diseases.

METHOD

1,* Preparation of the hydroalcoholic extract of the roots of *Glycyrrhiza glabra L.

Licorice extract was prepared by macerating 15 g crushed root in 100 mL hydroethanolic solution (70/30, V/V) for one week at room temperature. The extract was then filtered through Whatman No. 1 filter paper to remove plant residues and obtain a clear liquid. The filtered extract was dried in an oven at 45°C for 3 days, to remove excess solvent.

The extract obtained was then stored in opaque glass pillboxes, hermetically sealed, protected from light and humidity, and at low temperature.

2. Phytochemical Screening

The qualitative phytochemical screening was conducted using the methods described by Hammoudi et al **[1].**

3, In vitro anti-inflammatory activity

The *in vitro* anti-inflammatory activity of the hydroalcoholic extract of the roots of *G. glabra* was studied using the egg albumin protein denaturation assay according to Fetni et al. (2020) with some modifications **[2].** For each concentration of hydroalcoholic extract (2 mL) or standard (diclofenac), 2.8 mL of phosphate-buffered saline (PBS), pH= 6.5 was added, mixed with 0.2 mL of egg albumin (fresh). Samples were incubated in a 37°C oven for 15 minutes, then immersed in a 70°C water bath for 5 minutes. After cooling the tubes, the absorbance (level of protein precipitation) was measured at 660 nm in a spectrophotometer and the percentage inhibition of protein denaturation was calculated using the following formula :

$$\% \text{ d'inhibition} = 100 \times [Abs_{sample} / Abs_{control} - 1]$$

The result is the average of three replicates.

This method evaluates the potential of the extract to inhibit the denaturation of proteins, hence indicating its anti-inflammatory properties.

RESULTS & DISCUSSION

The hydroalcoholic extract of the roots of Glycyrrhiza glabra L. produced a brown-colored powder with a yield of 16% relative to the initial dry mass of the plant

1, Phytochemical analysis of the hydroalcoholic extract *G. glabra*

The results of the phytochemical tests performed to identify the different families of secondary metabolites are presented in **Table 1**. Phytochemical analyses of the hydroalcoholic extract of the roots of Glycyrrhiza glabra L. revealed a remarkable diversity of secondary metabolites, indicating the presence of different bioactive compounds. A significant presence of flavonoids, heterosides, saponins, alkaloids and polyphenols were observed, along with a moderate presence of tannin.

Table 1. Phytochemical test results

Flavonoids	Alkaloids	Tannins	Saponosides	Polyphenols	Heterosides
+++	+++	++	+++	+++	+++

+++ Strongly positive, ++ moderately positive.

***2, In vitro* Anti-inflammatory activity**

The *in vitro* anti-inflammatory activity of the hydroalcoholic extract of *G. glabra* roots and sodium diclofenac was analyzed using the protein denaturation method, as shown in **Table 2**. The results presented show a concentration-dependent inhibition of protein (albumin) denaturation by the samples. Sodium diclofenac was used as a reference drug at the same concentration. The results indicate that the hydroalcoholic extract of *G. glabra* roots has a very good inhibitory effect, reaching a percentage of 81% at a concentration of 10 g/L, compared to diclofenac, which showed an inhibition percentage of 61.3%.

Table 2. Percentages of inhibition of protein denaturation of the hydroalcoholic extract of *G. glabra* roots and sodium diclofenac at different concentrations.

	% Inhibition	
Concentrations (g/L)	Sodium diclofenac (%)	Hydroalcoholic extract of G. glabra (%)
1	9,1±0,2	12,6±0,3
2,5	16,7±0,6	20,3±0,5
5	38,5±1,1	60,8±0,9
10	61,3±0,3	81,1±0,2

Samples and positive control were performed in triplicate (n=3). SD = standard deviation.

CONCLUSION

This study represents the first exploration of the phytochemical composition and anti-inflammatory activity of the hydroalcoholic extract of *Glycyrrhiza glabra* L. roots. The extract revealed the presence of various phytochemical compounds, including flavonoids, heterosides, saponins, alkaloids, polyphenols and tannins. It is particularly interesting to note that root extract showed greater anti-inflammatory power than diclofenac sodium, a commonly used synthetic anti-inflammatory drug. This is probably due to the diversity of secondary metabolites it contains, making it a promising candidate for future development as an alternative therapeutic agent, particularly in the creation of new anti-inflammatory drugs.

FUTURE WORK / REFERENCES

1. Hammoudi, A.; Zatla, A.T.; Dib, M.E.A. A Phytochemical and Antioxidant Study of the Hexanoic Extract of Rhaponticum acaule. *Chemistry Proceedings*, **2023**, *14*(1), 81.
2. Fetni, S.; Bertella, N. *In vitro* study of anti-inflammatory properties of methanolic extract fruits from Rosa canina L. (Rosaceae). **2020.**