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Formulation of an *Inula Viscosa L.* Plant Extract Emulgel: Phytochemical Study and Evaluation of Anti-Inflammatory and Antioxidant Activity

Madaoui Batoule^{1*}, Houari Walid², Belhadji Linda¹, Boutoumi Hocine², Hadj Sadok Abdelkader¹, Ayachi Nabila^{1,3}

¹ Research Laboratory in Functional Analysis of Chemical Processes Department of Process Engineering Faculty of Technology University of Blida 1, Algeria

²Chemical Engineering Laboratory Department of Process Engineering Faculty of Technology University of Blida 1, Algeria

³Pharmacy Department Faculty of Medicine University of Blida 1, Algeria.

*Corresponding author's email: madaouibatoule99@gmail.com

ABSTRACT

The proper formulation of plant extract consisting of secondary metabolites with pharmacological activities contributes to the improvement of their therapeutic activities. The methanol extract of *Inula viscosa L.* obtained with a yield of 18.15% per soxhlet, which is rich in secondary metabolites such as polyphenols, flavonoids and tannins. The evaluation of the anti-inflammatory activity of the extract argued an interesting anti - inflammatory effect presented by a reduction rate of edema of 27% compared to that of the reference product the diclofenac which is 77%. In addition, the evaluation of the antioxidant activity by the DPPH method of the polar extract gave us; a very interesting percentage of inhibition was recorded of the order of 85.71%, with an IC₅₀ equal to 211.79µg/ml. which shows the polyphenol richness and captivity of the radicals of the *Inula viscosa L.* Finally, the emulgel prepared from the *Inula viscosa L.* extract complies with the standards required by stability tests and rheological profiles.

Keywords: *Inula viscosa L.*, polyphenols, anti-inflammatory activity, emulgel.

1. Introduction :

Medicinal plants have always played a major role in health [1]. Medicinal plants, thanks to the natural substances they contain, constitute the first reservoir of new medicinal molecules [2]. Among these plants we were interested in the plant *Inula viscosa L.* which belongs to the family Asteraceae, originating mainly on the borders of the Mediterranean and widespread in Algeria. Many researches in the field of pharmacology have been carried out on this plant in order to demonstrate its possible anti-inflammatory, anti-ulcerogenic, antioxidant, antitumoral properties, etc. [3] In this context, the objective of this study is the therapeutic valorisation of the leaves of the plant *Inula viscosa L.*, using their polyphenolic extracts, in the formulation of an emulgel, possessing local anti-inflammatory and anti-radical activity, evaluated by the induced oedema test performed on laboratory animals and the antioxidant activity performed by the DPPH method.

2. Experimental

The experimental work of our study is based on the extraction of phenolic compounds by soxhlet from finely grated leaf powder and then tinted to select the best yielding granulomateria. A phytochemical screening was carried out on the polyphenolic extract to identify the active secondary metabolites of the powder of the plant studied. The evaluation of the anti-inflammatory power of the aquatic plant extract was done, by the method of carragenin-induced edema at the plantary level of the Albinos mouse legs reference method [4], while the evaluation for the antioxidant activity of the polyphenolic extracts was performed by the DPPH method compared to a reference anti-oxidant vitamin C. A pharmaceutical formulation was proposed based on an emulgel, where trials were made by emulsifying the polyphenolic



extracts and then its dispersion in a hydrogel, these formulations were subsequently characterized on the rheological and physico-chemical level in order to detect the optimal formulations.

3. Results and Discussion:

The results showed that the 400 µm medium-diameter powder was the optimal diameter with the highest extraction yield of 22%, compared to the other populations with 500 µm and 250 µm diameter yielding 17% and 15.8%. The Phytochemical Screening has highlighted the marked presence of polyphenols, flavonoids, quinones, gallic tannins and saponins, in the methanol extract of *Inulaviscosa* L. On the other hand, we noted the remarkable absence of coumarins, terpenoids, anthocyanins, alkaloids and steroids in the plant's methanol extract. The quantification of the total polyphenol content of the methanol extract using spectral photometric dosages has shown that *Inula viscosa* L. is rich in polyphenols with a content of 46.55 mg EAG/g E, in flavonoids with a contents of 3.242 mg EQ /g E and with a low content of condensed tannins of 1.595 mg E.C./g E. The results of the anti-inflammatory activity of the extract claimed an interesting anti-inflammatory effect presented by an edema reduction rate of 27% compared to that of the reference product the diclofenac which is 77%. For the evaluation of antioxidant activity, a very interesting percentage of DPPH inhibition was recorded of the order of 85.71%, with an IC50 equal to 211.79µg/ml. The formulation of a 0.5% extract Emulgel showed required quality characteristics with stable rheological profiles.

Table 1: Results of anti-inflammatory test in vivo of the aquatic extract of *I.viscosa*

| Lots | Percentage of edema (%) | Inhibition percentage (%) |
|-----------|-------------------------|---------------------------|
| Reference | 10,07 | 77,27 |
| I.Visco.E | 32,07 | 27,03 |
| Witness | 44,32 | / |

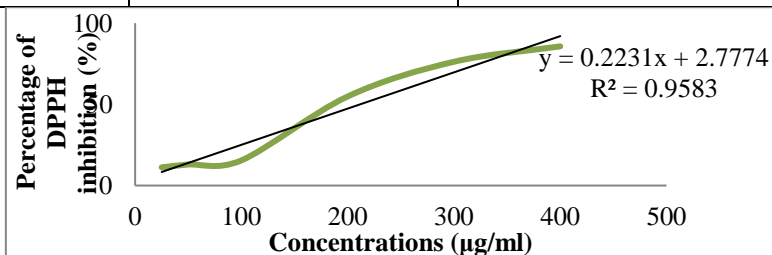


Figure 1: Free radical inhibition percentage based on concentrations of *Inula viscosa* L.

4. Conclusions

The extraction by volatile solvent using a soxhlet of *Inula viscosa* L. leaves provided a yield of 18.15%. The phytochemical screening confirmed the richness of active metabolites such as polyphenols, flavonoids, quinones, saponins and coumarins and the absence of anthocyanins, tannins and alkaloids. The anti-inflammatory test in vivo of leaf extract proved an interesting activity. The formulation of the *Inula viscosa* L. extract-based emulgate meets the required physico-chemical characteristics.

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