

Study of the Anti-Inflammatory Activity of Flavonic Extract of *Globularia alypum* L.

K. BOUTEMAK^{a,*}, B. SAFTA^b, N. AYACHI^c

^aLaboratoire d'Analyse Fonctionnelle des Procédés Chimiques, Université Blida 1, rt. de Soumaa, Blida, 09000, Algérie

^bDépartement de Chimie, Faculté des Sciences, Université Blida 1, rt. de Soumaa, Blida, 09000, Algérie

^cDépartement de Pharmacie, Faculté de Médecine, Université Blida 1, rt. de Soumaa, Blida, 09000, Algérie

Globularia alypum L. of the family Globulariaceae is widely used in traditional medicine for its anti-inflammatory activity. The aim of this study is to evaluate the anti-inflammatory activity of flavonic extract (butanol fraction) of *globularia alypum* against carrageenan induced paw-oedema in mice. The results have shown that the dose of 0.3 g/ml of butanol fraction present the most significant activity (33.01%) compared with reference product aspirine (39.76%) at dose of 2 mg/ml.

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1. Introduction

Medicinal plants have been identified and used throughout human history. Thus, the medicinal plants' usage has gradually abandoned the empirical method and become based on explicatory facts [1]. According to data from the World Health Organization (WHO), more than 80% of the population of developing countries still relies on medicine originating from natural plants as their main source of healthcare [2]. *Globularia alypum* L. is an aromatic and medicinal plant belonging to the Globulariaceae family, found throughout the Mediterranean area and largely used and considered for its therapeutic virtues [3]. In Algeria, this specie known under the name "Tasselgha" is widely used in folk medicine for these many properties: anti-inflammatory drug, anti-ulcer, antidiabetic, antioxidant, cardiovascular, renal diseases and various cancer lesions of the stomach, colon, rectum and oesophagus [4]. It is distributed in the Saharan Atlas, Hoggar in altitude, in the forests of Algeria [5].

Inflammation is the body response to infection, tissue injury or invasion by microorganisms. It is considered a protective measure taken by the organism to remove the cause and promote the regeneration of the tissue that was injured [6]. The aim of the present study is evaluate the flavonic extract (butanol fraction) of *Globularia alypum* for anti-inflammatory activity.

2. Materials and methods

2.1. Plant material

The aerial part of *Globularia alypum* L. was collected in March 2013 from Hammam melouane a mountainous area, located approximately at 40 km in the south

of Algiers (North Algeria). Plant material was identified and authenticated by the botanic laboratory of El Hamma (Algiers, Algeria) according to the Algerian flora and voucher specimen.

2.2. Animals

Fifty four adults albino mice of either sex weighing 19–21 g were housed in stainless steel cages at a temperature of 22 ± 2 °C with a 12 h:12 h dark:light cycle and relative humidity of 50%. They were fed with standard diet and water ad libitum.

2.3. Extraction and isolation

100g of dried aerial part in shade at room temperature was powdered. The total hydroalcoholic extract was obtained by maceration with 50% ethanol. This procedure was repeated three times. After filtration, the residue was discarded and the solvent was evaporated to obtain the crude hydroalcoholic extract. A general procedure for extracting of flavonoid-rich fraction was based on liquid-liquid extraction of total extract with *n*-butanol.

2.4. Anti-inflammatory activity paw

Flavonic extract (butanolic fraction) from *globularia alypum* was tested for anti-inflammatory activity against carrageenan induced paw-oedema in mouse (Levy test) [7]. Carrageenan induced paw oedema is the standard experimental model of acute inflammation. It is the phlogistic agent of choice for testing anti-inflammatory drugs. Acetylsalicylic acid was taken as a reference standard anti-inflammatory drug. Albino mice of either sex were divided into five groups of six animals. The dosage of the drugs administered to the different groups was as follows:

- Group I: witness control (normal saline 0.5 ml),
- Group II: Butanolic extract (0.1 g/ml),

*corresponding author; e-mail: kboutemak@yahoo.fr

- Group III: Butanolic extract (0.2 g/ml),
- Group IV: Butanolic extract (0.3 g/ml),
- Group V: positive control (acetylsalicylic acid, 2 mg/ml).

The animals were pre-treated with normal saline (witness control), acetylsalicylic acid (reference standard used as positive control) and with *Globularia alypum* extracts, 30 min prior to the induction of the oedema. Thereafter, 0.025 ml of 0.1% W/V carrageenan solution was injected under the subplantar aponeurosis of the left hind paw of each mice and the right paw was served as the control. The paw volume was measured using plethysmometer. The activity of tissue measurement paw oedema (MPO) was assessed 4 h after injection of carrageenan. The percentage of inhibition in drugs treated mice versus control was calculated using the following formula:

$$\text{inhibition paw oedema} = [(C - T)/C] \times 100\%.$$

C — increase in paw-volume of control group; T — increase after administration of extracts.

3. Results and discussions

Butanolic fraction of *Globularia alypum* was tested for anti-inflammatory activity against carrageenan induced paw oedema in mice. The percentage reduction in the paw volume in the group of animals treated with butanolic fraction at 0.1g/ml exhibits a lower effect (8.55%) compared to the effect caused by acetylsalicylic acid (reference) (39.76%) and for the 0.2 g/ml was 27.15% at 4 h. The anti-inflammatory activity of butanolic fraction is more significant marking a percentage of reduction of 33.01% for 0.3 g/ml.

TABLE

Inhibition paw oedema after 240 min [%]

	normal saline	positive control	group		
			II	III	IV
inhibition paw oedema [%]	—	39.76%	8.55%	27.15%	33.01%

4. Conclusion

The evaluation of anti-inflammatory activity of flavonic extract of *Globularia alypum* has shown that for 0.3 g/ml, the percentage inhibition of paw oedema was 33.01% in comparing with acetylsalicylic 2 mg/ml where the percentage paw volume reduction is 39.76%. Therefore, the extract has a significant effect on inflammation and reduced the swelling, having anti-inflammatory activity against the carrageenan induce paw oedema in mice.

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