

# A PHARMACOLOGICAL STUDY OF THE ANTI-INFLAMMATORY ACTION OF VEGETAL PRODUCTS OBTAINED FROM THE AERIAL PARTS AND SEEDS OF NIGELLA SATIVA AND DAMASCENA

Claudia Crina Toma<sup>1</sup>, Cristina Mogosanu<sup>2</sup>, Daniela Hanganu<sup>2</sup>

## REZUMAT

*Nigella sativa* și *Nigella damascena* sunt două specii din familia Ranunculaceae, originare din Siria și țările Africii de Nord: Maroc, Tunisia, Egipt. Speciile sunt întâlnite în flora spontană sub denumirea de chimen negru. În privința compoziției chimice, există câteva grupe principale de compuși, după cum urmează: componente active - timochinona, nigelona, uleiurile fixe, componente cu rol nutritiv - proteine, carbohidrați, lipide, alte componente - acizi grași, aminoacizi, vitamine, oligoelemente, alcaloizi. Cationii prezenți în *Nigellae* semen sunt: K<sup>+</sup>, Ca<sup>2+</sup>, Fe<sup>2+</sup>, Fe<sup>3+</sup>, Mn<sup>2+</sup>, Se<sup>2+</sup>, Zn<sup>2+</sup>. Studiul de față propune o evaluare farmacologică, atât calitativă cât și cantitativă, în privința efectului antiinflamator al câtorva tincturi obținute din părțile aeriene și semințele speciilor *Nigella sativa* și *Nigella damascena*.

**Cuvinte cheie:** *Nigella sativa*, *Nigella damascena*, Ranunculaceae, tinctură, acțiune antiinflamatoare, fenilbutazona

## ABSTRACT

*Nigella sativa* and *Nigella damascena* belong to Ranunculaceae family, originals from Syria and North Africa countries: Morocco, Tunisia, and Egypt.<sup>1-3</sup> These plants are in the spontaneous flora under the popular name Fennel flower or black cummin. Considering the chemical composition, there are several groups of compounds: active compounds - timokinona, nigellona, constant oils, compounds with nutritive role - proteins, carbohydrate, fat, other compounds - fat acid, amino-acids, vitamins, minor elements, alkaloids. The cations present in *Nigellae* semen are: K<sup>+</sup>, Ca<sup>2+</sup>, Fe<sup>2+</sup>, Fe<sup>3+</sup>, Mn<sup>2+</sup>, Se<sup>2+</sup>, Zn<sup>2+</sup>.<sup>3-5</sup> This study proposes a pharmacological evaluation from qualitative and quantitative point of view regarding the anti-inflammatory action found in some tinctures obtained by aerial parts and seeds of *Nigella sativa* and *Nigella damascena*.<sup>6,7</sup>

**Key Words:** *Nigella sativa*, *Nigella damascena*, Ranunculaceae family, tincture, anti-inflammatory action, phenylbutazone

## INTRODUCTION

The paper presents a study on the pharmacological action of tinctures obtained from the seeds and the aerial parts of *Nigellae* L. species (Ranunculaceae).<sup>1-3</sup>

Because data from the reference materials does not point out the toxicity of either the seeds, or the alcoholic extracts of the tinctures of *Nigella* species, we have considered the possibility of pharmacological studies of these species without researching the acute, sub-acute and chronic toxicology on the vegetal material.<sup>2,4,7</sup>

## MATERIAL AND METHOD

From the aerial parts and the seeds of the two species of *Nigella*, *Nigella damascena* and *Nigella sativa* tinctures of 1:10 in 70 deg. ethyl alcohol (according to FRX) have been prepared, which have been given in 500 mg/kg doses.<sup>8</sup>

Six groups of eight white male Wistar-Bratislava rats have been considered for the study. The animals have been kept in suitable conditions - they had access to water, but not food, for 24 hours before the experiment. These were the groups:

- Group I - Witness group treated with distilled water;
- Group II - Control group treated with phenylbutazone 50 mg/kg body;
- Group III - Group treated with 1:10 tincture obtained from the aerial parts of *Nigella damascena* - 500 mg/kg body NDH;
- Group IV - Group treated with 1:10 tincture obtained from the seeds of *Nigella damascena* - 500 mg/

<sup>1</sup> Victor Babes University of Medicine and Pharmacy, Timisoara, <sup>2</sup> Iuliu Hatieganu University of Medicine and Pharmacy, Cluj- Napoca

Correspondence to:  
Claudia Crina Toma, 1 Piata Mica, Arad, Tel. +40-744-792968  
Email: claudiatoma2004@yahoo.com

Received for publication: 18 Apr. 2006. Revised: 23 Mar. 2007.

kg body NDS;

- Group V – Group treated with 1:10 tincture obtained from the aerial parts of *Nigella sativa* 500 mg/kg body NSH;

- Group VI – the group treated with 1:10 tincture, obtained from the seeds of *Nigella sativa* 500 mg/kg NSS.

The substances and the vegetal products used have been orally given by forced feeding, an hour before inducing the acute inflammatory state with kaolin 10%. Each animal has had his hind, left leg's initial volume pletismometric measured, then the acute inflammatory state has been induced by intraplantar injection of 0.1 ml of 10% kaolin suspension.

At 2 hours, 4 hours and 24 hours after inducing the inflammatory state, the hind left leg's volume was measured again.

The medium value of the inflammatory edema ( $X \pm s.e.$ ), the standard error (s.e.) and the inhibiting percentage of the inflammatory edema observed at the witness group have been calculated, for each group, with the aid of this formula:<sup>9-11</sup>

$$\% \text{ Inhibition of the edema} = (1 - X_{\text{substance}} / X_{\text{witness}} - \text{distilled water}) \times 100$$

## RESULTS

The obtained results are presented in Tables 1 and 2.

**Table 1.** The inflammatory edema values for material and substances used in this study.

Group Nb.	Substance	Doses mg/kg	Edema at 2 h $x \pm s.e.$	Edema at 4 h $x \pm s.e.$	Edema at 24 h $x \pm s.e.$
1	Distilled water	-	0.63 ± 0.05	1.20 ± 0.08	1.31 ± 0.11
2	Phenylbutazone	50	0.39 ± 0.02	0.60 ± 0.03	1.14 ± 0.10
3	NDH tincture	500	0.70 ± 0.07	1.05 ± 0.07	1.46 ± 0.11
4	NDS tincture	500	0.67 ± 0.04	1.13 ± 0.09	1.07 ± 0.19
5	NSH tincture	500	0.62 ± 0.06	1.04 ± 0.09	1.01 ± 0.12
6	NSS tincture	500	0.70 ± 0.07	1.05 ± 0.10	1.23 ± 0.11

**Table 2.** Percentages of the inhibiting of the inflammatory edema induced by kaolin 10%.

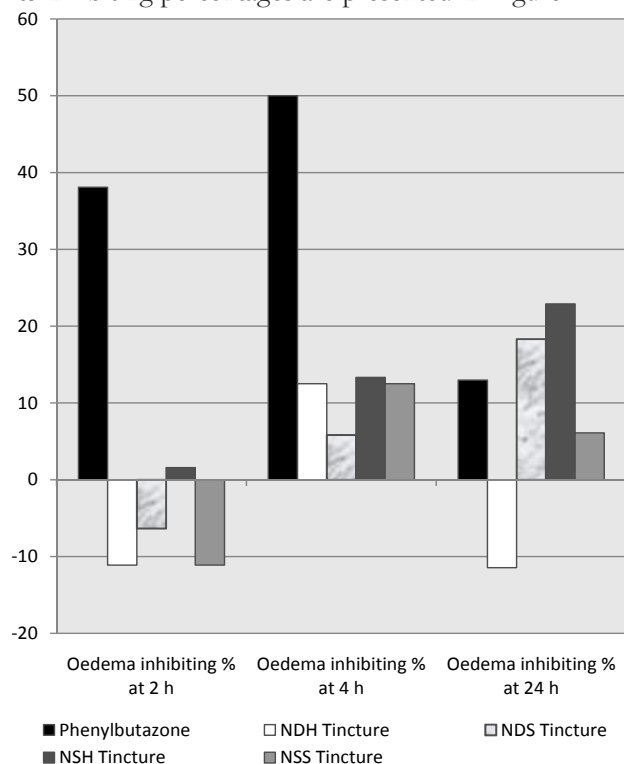
Group Nb.	Substance	Doses mg/kg	Edema inhibiting % at 2 h	Edema inhibiting % at 4 h	Edema inhibiting % at 24 h
1	Distilled water	-	-	-	-
2	Phenylbutazone	50	38.09	50	12.97
3	NDH tincture	500	-11.11	12.5	-11.45
4	NDS tincture	500	-6.34	5.83	18.32
5	NSH tincture	500	1.58	13.33	22.9
6	NSS tincture	500	-11.11	12.5	6.10

## DISCUSSIONS

The witness group presents a  $0.63 \pm 0.05$  ml inflammatory edema at 2h,  $1.2 \pm 0.08$  at 4 h and  $1.31 \pm 0.11$  at 24 h.

The control group treated with an acknowledged anti-inflammatory product presents inferior value  $0.39 \pm 0.02$  at 2 h,  $0.6 \pm 0.03$  at 4 h,  $1.14 \pm 0.1$  at 24 hours.

For the four products considered for the study, the comparative plotting of the inflammatory edemas and its inhibiting percentages are presented in Figure 1.



**Figure 1.** The comparative plotting of the percentage of the edema's inhibiting process by the tinctures versus phenylbutazone, every 2h, 4h and 24h.

Compared to the witness group, the group treated with 50-mg/kg body phenylbutazone has reduced the inflammatory edema with 38.09% at 2 h, 50% at 4 h and 12.97 % at 24 h. The best effect has been observed 4 hours after inducing the acute inflammatory effect.

For the four products considered in the study, the values of the inflammatory edema at different time periods do not show significant variations from the witness group. Thus, for the tincture obtained from NDH 500 mg/kg the edema is greater than the one of the witness group at 2 h, at 24 h and at 4 h, a 12.5% diminution at 4h being observed.

For the group treated with tincture obtained from NDS 500 mg/kg, the inflammatory edema has exceeded the value of the witness group at 2 h, at 4 h and 24 h,

being considered a modest diminution compared to 5.83%, and 18.32% of the witness group.

For the group treated with NSH 500 mg/kg, the inflammatory edema has inferior values compared to the witness group for all the 3 moments when the measurements have been made. Thus, at 2 h the edema inhibiting percentage is of only 1.58%, evolving towards 13.33% at 4 h and 22.9% at 24 h.

For the last product considered for the study, the tincture obtained from NSS 500 mg/kg, there has been an increase of the inflammatory edema compared to the witness group at 2 h, at 4 and 24 hours the inhibiting percentage of the edema is 12.5%, and 6.10%.

## **CONCLUSIONS**

50 mg/kg of phenylbutazone confirms the anti-inflammatory action in the chosen experiment.

For the 4 products considered for the study, two from *Nigella damascena* species and two from *Nigella sativa* species, administered in similar doses, has a diminishing of the inflammatory edema was noted, 4 hours after inducing it with 10% kaolin. The inhibiting percentages of the edema are similar for NDH, NSH, NSS.

Two products, the NDS and NSH tinctures administrated in 500 mg/kg doses have presented high percentages in inhibiting the inflammatory edema at 24

h, higher even than the percentages obtained 4 hours after inducing the inflammatory state.

The two species as 1:10 500 mg/kg tinctures, have modest anti-inflammatory effects, the results recommending the use of tinctures in acute inflammatory states only associated with other anti-inflammatory products so that, their anti-inflammatory action can be increased.

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