

THE CICATRIZING ACTION OF A NEW TOPICAL PRODUCT BASED ON *RIBES NIGRUM* ESSENTIAL OIL

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Abstract

The cicatrizing action of a new topical gel based on *Ribes nigrum* essential oil isolated from buds was studied on induced experimental wounds (burns) in rats.

The action of the new topical product was determined compared with Cicatrizin[®], considered the reference product, with an untreated group and with a gel base treated group.

The new topical gel favoured the healing of the induced burn wounds and the effect was similar to Cicatrizin[®]. For the control group (untreated) the healing appeared after 15-16 days.

Rezumat

A fost studiată acțiunea cicatrizantă a unui nou gel cu ulei volatil izolat din muguri de *Ribes nigrum*, cu aplicare topică, asupra rănilor produse experimental la șobolan.

Determinarea acțiunii cicatrizante s-a făcut comparativ cu Cicatrizinul[®] luat ca produs de referință, cu un lot de animale netratate și cu un lot tratat cu baza de gel.

Gelul de uz topic cu ulei volatil de *Ribes nigrum* a favorizat vindecarea rănilor după 12 zile de tratament, rezultate comparabile cu cele obținute pentru Cicatrizin[®]. La animalele martor, netratate, vindecarea rănilor s-a produs după 15-16 zile.

Keywords: cicatrizing action, essential oil, buds, gel, *Ribes nigrum*

Introduction

Ribes nigrum L. (blackcurrant) is known as an important component in food industry, cosmetics and medicine.

There are many studies about the anti-inflammatory and antimicrobial activity of extracts obtained from *Ribes nigrum*. A hydroalcoholic extract of *Ribes nigrum* leaves revealed significant anti-inflammatory activity, comparable to indomethacin and niflumic acid, but without ulcerogenic activity [4, 12]. A 400-fold dilution of a *Ribes nigrum* extract exhibited a strong inhibitory effect on the plaque formation induced by both herpes simplex virus type 1 and 2, and varicella-zoster virus [15].

There are many studies describing the chemical composition of essential oils from blackcurrant buds [6, 9, 14].

The buds are used in medicine for their antiseptic and diuretic activities [7]. The antimicrobial activity of some gemmoderivatives that contain extracts of *Ribes nigrum* buds and young shoots of *Rosa canina* was demonstrated [11].

The essential oils obtained from Romanian varieties of *Ribes nigrum* buds exhibited good antimicrobial activity against both Gram-negative and *S. aureus* strains and inhibited the expression of microbial adhesins, demonstrating its anti-pathogenic potential [13].

The main volatile compounds identified in *Ribes nigrum* essential oil are: sabinene, α - and β -pinene, δ -3-carene, limonene, ocimene, α -terpinolene, β -caryophyllene, α -humulene, terpinen-4-ol [13]. In the recent years, it was demonstrated that some components of the previously mentioned compounds developed antimicrobial activity: α - and β -pinene, p-cymene, γ -terpinene, bornyl acetate [2], limonene [1] and 3-carene [3].

Some of these terpenoids were tested for their ability to protect α -linolenic acid from free radical induced peroxidation. α -pinene, δ -3-carene, limonene induced a significant reduction of ethane and ethene production [5].

In this paper we studied the cicatrizing action of a new topical gel based on *Ribes nigrum* essential oil.

Materials and methods

The buds of Ronix variety of *Ribes nigrum* were collected in February 2008 from an experimental area belonging to the Fruit Research Institute Maracineni Pitesti. The buds were dried, separated from branches and manually crumbled. They were hydro-distilled in a Clevenger-type

apparatus for 4 h [16]. The essential oil was dried over anhydrous Na_2SO_4 , stored in a dark glass bottle, and kept at 4°C.

The essential oil was incorporated in a water-soluble gel base which contained Carbopol 940, triethanolamine, propylene glycol and purified water. The essential oil concentration in gel was 5%. Cicatrizin[®] was used as a reference substance.

The experiments were performed on white male Wistar rats weighing 210 ± 10 g.

All the animals used in the study were kept in standard laboratory conditions and all the experiments were performed according to the European Communities Council Directive 1986 (86/609/EEC) and Ordinance No. 37 of the Romanian Government dated February 2nd, 2002. The rats received water *ad libitum* and were not fed for 12 hours before the experiment. They were kept in mobile cages and were fed on standard food, twice a day.

They were depilated on the dorsal zone. The assays were performed after producing wounds by burning with a metallic 1 cm in diameter disk device, which was heated with a sodium chloride solution (5%) at 105°C. The hot disk was applied on the dorsal zone on the other anesthetized animals for 10 seconds. The treatment consisted in one layer daily application, in a thin film, for 12 days as follows:

- one control group was untreated (group 1);
- one group was treated with the gel base (group 2);
- one group was treated with the gel based on *Ribes nigrum* essential oil, isolated from buds, in 5% concentration (group 3);
- one group was treated with Cicatrizin[®] (group 4).

The clinical state of the animals had been assessed daily. The wounds evolution was monitored once in two days, by measuring the treated area, compared to the untreated group and with Cicatrizin[®]. The statistical evaluation of the results was performed by Student's *t*-test. The differences were considered to be statistically significant for $p < 0.05$.

Results and discussion

The animals' treatment with the new topical product, containing a 5% concentration of *Ribes nigrum* essential oil, induced a decrease of wounds area with 13.73% after 10 days. On the control group (untreated) the wounds healed after 15-16 days (table I and figure 1).

Table I

The evolution of the induced wounds to rats after the treatment with a new topical gel based on *Ribes nigrum* essential oil.

Tested products	Results	1 st day	2 nd day	4 th day	6 th day	8 th day	10 th day	12 th day	14 th day
Control (without treatment)	Wound Areas (mm ³) $\bar{X} \pm DS$	112.4 ± 12.8	112.8 ± 14.6	96.4 ± 10.2	88.32 ± 9.8	74.14 ± 9.2	60.2 ± 7.4	49.2 ± 6.7	34.7 ± 4.4
	Healing %	-	0	14.23	21.42	34.04	46.44	56.2 2	69.1 2
New Gel	Wound Areas (mm ³) $\bar{X} \pm DS$	110.2 $\pm 12^{**}$	108.4 $\pm 12.6^{**}$	88.6 $\pm 10.2^*$	76.4 $\pm 8.7^{**}$	58.8 $\pm 6.3^*$	28.8 $\pm 12.8^{**}$	0	0
	Healing %	-	1.63	19.60	30.67	46.64	73.73	100	
Gel Base	Wound Areas (mm ³) $\bar{X} \pm DS$	106.4 $\pm 11.6^*$	106.8 $\pm 12.4^{**}$	87.5 $\pm 10.7^*$	76.54 $\pm 8.9^*$	68.30 $\pm 10.2^*$	50.44 $\pm 6.22^*$	42.2 $\pm 5.6^*$	20.8 ± 3.9 2
	Healing %	-	0	17.76	28.06	35.80	52.59	60.3 3	80.3 7
Cicatrizin®	Wound Areas (mm ³) $\bar{X} \pm DS$	113.3 $\pm 12.6^{**}$	108.2 $\pm 1.8^{**}$	92.5 $\pm 10.6^{**}$	70.8 $\pm 9.2^*$	30.6 $\pm 4.5^{**}$	6.3 $\pm 2.1^{**}$	0	0
	Healing %	-	4.50	18.35	37.51	72.99	94.43	100	-

$\bar{X} \pm DS$ = average $\pm$ standard deviation

** $p < 0.05$

* $p < 0.01$

These results confirm the previous study concerning the cicatrizing action of some new gemmotherapy products with *Ribes nigrum* alcoholic extracts [11].

Our results suggest that the cicatrizing action of the new gel with essential oil of *Ribes nigrum* buds may be related to antimicrobial and antioxidant activities of the essential oil components.

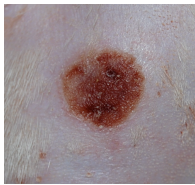
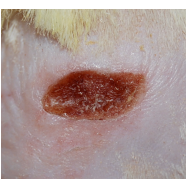
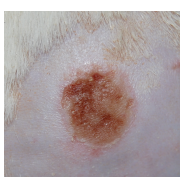
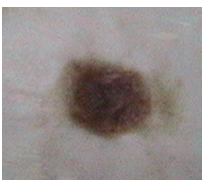
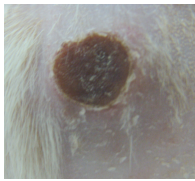
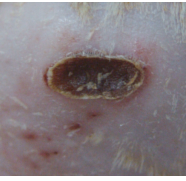
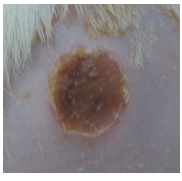
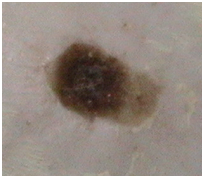
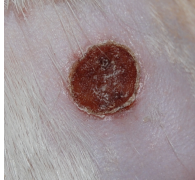
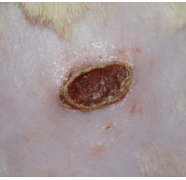
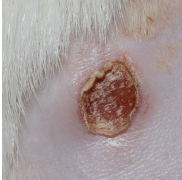
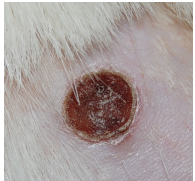
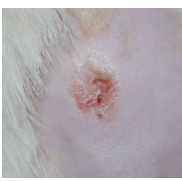
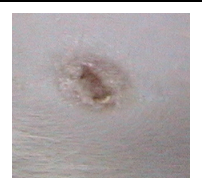
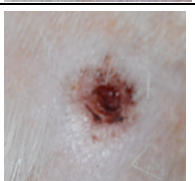
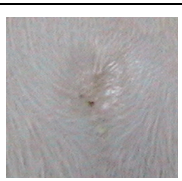
Day of treatment	Control	New Gel	Gel Base	Cicatrizin®
2 nd day				
4 th day				
6 th day				
8 th day				
10 th day				
12 th day				

Figure 1

The healing dynamic of the induced wounds to rats after the treatment with a new topical gel based on *Ribes nigrum* essential oil.

Conclusions

The new topic product having a 5% concentration of essential oil isolated from *Ribes nigrum* L. buds favoured the healing of the induced burn wounds and the effect was similar to the one induced by Cicatrizin® in rats.

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