



UNIVERSIDAD DE GUAYAQUIL

DEPARTMENT OF CHEMICAL SCIENCES

Ciudadela Universitaria "Dr. Salvador Allende"

Telephone: 2293680, E-mail: fcquimic@ug.edu.ec

Guayaquil, Ecuador

FINAL REPORT

TITLE:

Establishment of the potential anti-inflammatory effect of the product known as **Noni**, originating from NutraMedix Laboratories, LLC, Florida

OBJECTIVE:

To study the possible anti-inflammatory effect of Noni measured by edemas, induced by carragenine in the feet of laboratory mice.

BACKGROUND:

The method of inducing edemas by applying carragenine to the feet of mice is a classic model for the study of products with anti-inflammatory activity. The by-products of the metabolism of araquidonic acid via cecloxygenesis and the production of reactive species of oxygen are also involved. It is reported that there are four principle phases to this edema: an initial phase in which histamine and serotonin is released; a second phase measured by kinins; a third phase (about 5 hours) in which prostaglandins are liberated; and a fourth phase related to the local infiltration of neutrophils and their activation. This model has recently been recommended as very useful for the evaluation of anti-oxidant products with anti-inflammatory properties and free radicals of oxygen inhibitors.

As discussed in numerous international works, the pharmacological study of the above-mentioned effect is indispensable, and guarantees (within the margin of error associated with the technique) that the potential for producing anti-inflammatory effects in humans will be learned.

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The basis of this work is the pharmacological effect as an anti-inflammatory, as described in international literature (1, 2).

TECHNICAL, SCIENTIFIC AND SOCIOECONOMIC BENEFITS:

The demonstration of this product as an anti-inflammatory is important due to its potential as a new, plant-based medication, with its associated low toxicity. This was demonstrated by us in a previous work, allowing us to enter the product as a new medication in the appropriate Register.

VARIABLES TO MEASURE:

1. Weight of the feet
2. Percentage of Inflammation
3. Percentage of inhibition

PROCEDURES TO FOLLOW:

TEST MATERIALS:

Noni: The procedure followed was that described by CYTED (1996) and the Gerhard Voegel (1997).

CHANGES IN THE STUDY PLAN:

Changes did not take place in protocol proposed to the Unity of Quality Guarantee, whose number is referred to on page 1.

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DATA FROM THE SAMPLE:

Organization soliciting services: NutraMedix Laboratories, LLC.

Person in charge of the Organization's application: Ing. Jose Icaza

Date of application: 7/15/05

Organization that carried out the work: University of Guayaquil, Department of Chemical Sciences.

Address: Ciudadela Universitaria "Dr. Salvador Allende"

Person in charge in the Executor Organization: Dr. Diadelis Ramirez Figueredo

Storage: The product was stored at room temperature with controlled access.

Form of presentation of the product: amber glass drop bottle containing 30 milliliters

Storage: The product was maintained at room temperature before and during the experiment, and as indicated was protected from light and kept in a locked cabinet.

INFORMATION WITH RESPECT TO THE HANDLING:

No special handling instructions were needed.

COMPOSITION OF THE PRODUCT:

Noni extract *Morinda citrifolia*

Mineral water

Ethanol (20 – 25 %)

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EXPERIMENTAL PROCEDURE:

INTRODUCTION:

This experiment was carried out with the intention of determining the possible anti-inflammatory effect of NONI, using dermal application and employing the method of edema induced by carragenine as the inflammatory agent.

DOSAGE USED IN THE TEST:

In this study the product was administered to the animal skin, covering the animal foot with 20ul of Noni, which was then allowed to dry, after which the animal was placed in a cage.

PRINCIPAL TEST:

METHODS AND TECHNIQUES:

Study Material: Noni

Animal Model: A single rodent species (mouse) was utilized, with a minimum of 5 animals of a single sex in each group. In this case, male mice with an average weight within $\pm 20\%$ (3), belonging to the Swiss line and coming from the Chemistry Department of the University of Guayaquil, were appropriate and were utilized in the experiment.

The animals were maintained in quarantine conditions and were acclimated according to established procedures (4, 5), said period having a duration of five days minimum.

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Access to the water and the food was "ad libitum." (6, 7)

The animals were randomly distributed from within the different groups. (8)

Food was denied 4 hours before exposure to the test material.

The experiment lasted 6 days (5 of acclimation and 1 of test).

DEVELOPMENT OF THE METHOD:

The following four groups were constructed for the test:

TEST GROUPS	
1	Flebogenous agent Carragenine 1%
2	Flebogenous agent Carragenine 1% + Ibuprofen (600mg/kg) orally
3	Carragenine 1% + Noni (20uL covering the entire animal foot)
3	Carragenine 1% + Celecoxib 200mg/kg

The mice were denied food for four hours then weighed, after which began the experiment.

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The irritant solution of 1% carragenine was dissolved in physiological saline and 0.1 ml was administered on the right sole. The saline alone was administered to the other foot as a negative control.

The Noni solution was administered dermally one hour before the application of the carragenine.

Five hours after the application of carragenine, the animals are euthanized in a saturated ether atmosphere, and their feet are cut at the knee and weighed.

RESULTS CALCULATIONS:

Outcomes are rated by calculating the weight of each mouse's feet, both the treated and untreated.

Percentage of inflammation: $\% \text{ Inflammation} = \frac{T \times 100}{ST} - 100$

Where T is the average of the weights of the treated feet (right) and ST is the average of the weights of the untreated feet.

Percentage of inhibition: $\% \text{ Inhibition of inflammation} = 100 - (\text{mean values of the treatment group} / \text{mean values of the control group}) \times 100$

DESCRIPTION OF THE DOSAGE, METHOD OF ADMINISTRATION AND DURATION OF THE TEST:

The test was achieved by following the method established by CYTED and using the dosage indicated for each mouse.

The Noni was administered dermally and the control medications Celecoxib and Ibuprofen were applied orally one hour before the application of the carragenine.

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ANALYTICAL RESULTS:

The results of the average value of the weights of the treated feet, the standard deviations, the percentage of inflammation and the percentage of inhibition are found in Table #1:

Table 1: Anti-inflammatory Effect of Noni in the Edema Induced by Carragenine.

Groups	Feet Weight (g) (Mean ± st. dev.)	% of inflammation	% of inhibition
Carragenine 1%	0.3 ±0.6^a	96.1	---
Carragenine + Ibuprofen	0.2 ±0.3^b	42%	100%
Carragenine +Noni	0.23±0.8^b	64%	88.2%
Carragenine +Celecoxib	0.22±0.6^b	54%	78.5%

As is demonstrated in Table # 1, Noni showed an anti-inflammatory effect similar to COX-2 anti-inflammatories Celecoxib and Ibuprofen. It is important to note that Noni demonstrated this anti-inflammatory effect when applied dermally (local effect) to inflammation caused by the potent inflammatory carragenine, which after 5 hours frees a series of mediators which are involved in the inflammatory response.

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Other natural anti-inflammatories such as Vimang, from the bark of the mango tree (9), and Ficocianin pigment joined with a protein found in blue algae, have shown a similar or lesser percentage of inhibition toward this inflammation, which speaks favorably to the product being tested in this study. In addition, Indomethycine, a pharmaceutical used to diminish inflammation produced by carragenine, produced an inhibition rate of 50 percent. These results offer guidelines for the investigation into the mechanism of action of this product as an anti-inflammatory and antioxidant.

CONCLUSIONS:

1. **Noni** demonstrated to have an anti-inflammatory effect similar to conventional anti-inflammatories.
2. Ibuprofen and Celecoxib also demonstrated the effect for which they are sold.

GENERAL CONCLUSIONS:

Noni demonstrated to have anti-inflammatory effect similar to ibuprofen and celecoxib and may be used to address inflammation from inflammatory agents such as carragenin, as observed in animal testing and as appears in specialized literature.

PERSONNEL RESPONSIBLE FOR THE STUDY

Responsible Professional:
Dr. Diadelis Ramirez Figueredo

Signature: 

Date: 07/18/05

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