

PROPOSAL OF EMPLOY OF EXTRACT OF DESMODIUM ADSCENDENS AS ANTI-HISTAMINIC DRUG: TRIALS OF EFFICACY BY REFLECTANCE SPECTROPHOTOMETRY

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Abstract

Introduction: Aim of our study is to propose the ancient plant *Desmodium adscendens*, that is hitherto known for combating, when orally administered, a plethora of other ailments and diseases and considered even an anti-histaminic, for external use. An inhibition of histamine depot by inhibiting the enzymatic activity of histidine decarboxylase can be suspected, since biological principles contained in D.A. belong to the same pharmacological class of natural derivatives that elicit the same effects (nicotinic acid, cyanides and quercetine) and of synthetic alkylamines (e.g contained in bubble baths). *Desmodium adscendens* is a perennial plant, growing wild in Africa, especially in Camerun and Ivory Coast as well as in South and Central America and the continent of Asia. Aborigines were accustomed to employ the entire plant for rites of initiation and other shamanistic ceremonies. Notwithstanding, it has been used for thousands of years by peoples native to those areas where it grows for a variety of health issues. This plant has been studied in France, Italy, India and Canada and appreciable are the results with regard to bronchial dilation, relaxation of smooth muscles, antihistamine effects, when orally administered, albeit there is a neat evidence of an extreme paucity of references about its ability to act as a completely natural anti-histaminic herb for external use.

Material and Methods: To conduct our study we have recruited 24 volunteers out from 4 categories of employees generally suffering from Type I Contact Dermatitis. They were prayed to spread the hydroglyceric extract of *Desmodium adscendens* every morning at 10.00 a.m. and every afternoon at 03.00 p.m onto the skin of forearms and cheeks, where an artificial rash was evoked by the use of a mix made up with allergenic herbs. As far as the evaluation of the degree of severity of skin inflammation is concerned we have used the Reflectance Spectrophotometry, to measure the erythematous manifestation twice a day for one week: at 09.00 a.m. (to check the gravity of erythema induced in each single case) and at 04.30 p.m., to check the real efficacy of the D.A. hydroglyceric extract. We have to keep seriously on account that Reflectance Spectrophotometry can't evaluate histamine concentration and its characteristic effects and that the 40-50% of cases of erythematous manifestations are not rigorously ascribable to the phenomenon of the histamine release.

Results and Conclusions: Results are amazingly encouraging, since it has been observed that the mean value of the blanching effect of the electuary on erythema is of 48.8%.

Key words: *Desmodium*; anti-histaminic; Spectrophotometry; Erythema; Skin rash

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Introduction

Desmodium adscendens var. *ceruleum* (Lindl) (synonymous: *Desmodium strangulatum* Thwaites od *Desmodium Twaitesii* Baker) is a perennial plant, growing wild in Asia, especially in India, Java, Malaysia, Sarawaki and Philippines, Indian Ocean (Madagascar, Mauritius and Seyscelles) [1-7]. Africa (Angola, Cameroun, Ivory Coast, Swaziland). In ancient times aborigines were accustomed to employ the entire plant for rites of initiation and other shamanistic ceremonies. It has been used for thousands

of years by peoples native to those areas where it grows for a variety of health issues: asthma, bronchitis, jaundice, hepatitis, muscle cramps and backache. This plant has been studied in France, Italy, India and Canada and appreciable are the results with regard to bronchial dilation, relaxation of smooth muscles, anti-histamine effects, when orally administered, albeit there is a neat evidence of an extreme paucity of references about its ability to act as a completely natural antihistaminic herb for external use [4-7].

Effectively, only Rastogi & Pandey [8] referred that different concentrations of a hot water extract of *Desmodium adscendens* showed that the extract's inhibition of histamine-induced reactions is largely competitive and that its effect of reducing histamine content is dose-dependent, and that this entire process takes 10-30 s.

Besides, Mitsuma & De Hengs [9] assert that the same extract causes a dose-dependent increase of the amount of beta-endorphines in the pituitary gland, competitively with the same histamine and that this complementary contingency occurs in 20min.

Phytochemical investigations on hydroglyceric extract of *Desmodium adscendens* has led to the isolation of several alkaloids and triterpenoid saponins although there is evidence of a valuable percentage of indole-3-alkyl amines and alpha and beta phenylethylamines that play an agonistic role of paramount importance in the physiological pathway of histaminic induced reactions on safe or scarified skin [8,9].

A pharmacological theory flourished at the half of the XX century, about indole-alkylamines that may be useful in the control of histamine-release, especially as mimetics and/or direct inhibitors with regards to receptors for histamine. MacIntosh was the first in 1949 [10] to disclose that histamine can be liberated by certain organic bases (aromatic amines) and successively Feldberg et al. [11] and Erspamer [12] in 1954 deepened this argument, discovering that these amines could be useful to reduce the phenomenon of the histamine release.

Aim of our study is to propose the external use of a plant as an anti-histaminic drug: the *Desmodium adscendens*, that is known and employed for combating, when orally administered, manifold ailments and diseases and already considered an anti-histaminic drug when taken orally.

In this study we focus our attention on the time necessary to observe the blanching effect of the hydroglyceric extract of *Desmodium adscendens* on the skin rash, that has previously been artificially evoked by the aids of an herbal electuary and on the blanching degree of the same extract.

In future we will provide to study how long the effect of blanching on the skin rash can last.

Material and Methods

To conduct our study we have recruited 24 volunteers out from 4 categories of employees generally suffering from Type I Contact Dermatitis:

- 6 (six) seasonal sunflower pickers (in their specific case the peculiar noxa was represented by the sesquiterpenic lactones contained in the flowers);

- 6 (six) hairdressers (in their specific case the peculiar noxa was represented by the Brandowky bases for hair dyes);

- 6 (six) tawers (in their case the peculiar noxa was represented by the Potassium dichromate contained in leather dyes);

- 6 (six) workers at quick frozen fish processes in food industry (in their specific case the peculiar noxa was represented by the hemocyanines contained especially in lobsters and crabs).

We have aprioristically excluded from the experiments:

Pregnant women.

Women or men which generally use cosmetic products that are referred to induce dermatitis or eczemas.

Individuals that declared a certain personal hypersensitivity to chocolate.

Individuals that denounced their participation to another clinical trial during present trial.

Subjects taking antibiotic, anti-viral, anti-fungal drugs or corticosteroids within 3 days of inclusion. The trials were conducted in accordance with the good clinical practices (GCP) after having dispatched the plans of study to the competence of the Department of Work, Health and Social Politics in Rome, since trials deal with herbal therapy, only an informed consent was required from each volunteer prior to participate to the experiment.

An electuary was made up with roots of *Pastinaca sativa* (CAS 90082-39-6 EINECS/ELINCS 290-129-0), fruits and leaves of *Ficus Carica* (CAS 90028-74-3 EINECS/ELINCS 289-868-1) and leaves and roots of *Angelica Archangelica* (CAS 84775-41-7 EINECS/ELINCS 283-871-1) and diluted in a solution of water and glycerine.

This electuary, once applied to safe skin, is capable to induce a quasi-sudden (9-23 min) rash, itching/swelling (especially of the face/throat/armpit areas), and for, all the 24 volunteers are gently requested to spread this electuary onto their forearms and cheeks once a day for 7 days, every morning 8.00 a.m.

Afterwards they are required to spread the hydroglyceric extract of *Desmodium* every morning at 10.00 a.m. and every afternoon 03.00 p.m., that is respectively two and seven hours after the application of the herbal electuary.

As far as the evaluation of the degree of severity of skin inflammation is concerned we have decided to use the Reflectance Spectrophotometry [13] albeit Skin rash status and Erythema must be regarded as a mere descriptive observation with regards to the severity of skin inflammation, so we measured the erythematous manifestation twice a day for one week, at 09.00 a.m. (to check the gravity of erythema induced in each single case) and at 04.30 p.m., to check the real efficacy of the *Desmodium adscendens* hydroglyceric extract.

We have to punctuate that Reflectance Spectrophotometry can't evaluate at all the histamine concentration and its characteristic effects and that the 40-50% of cases of erythematous manifestations are not rigorously ascribable to the phenomenon of the histamine release.

For this, we have decided to administer the herbal electuary that induces skin rashes onto skins of subjects already compromised by conclamated contact dermatitis, exorcizing by this way the statistical gap provided by the fact that 40-50% of cases of erythematous may arise from other aetiologies.

Besides we have decided to evaluate the blanching effect of the extract of *Desmodium adscendens* even by the use of a magnifying glass, albeit we can assure that results are really encouraging (without debating these values in this seat).

Redness is calculated by subtracting the absorbance due to hemoglobin from the absorbance of the green filter, using Color Meter II (Cortex Technology, Hadsund, Denmark). Three independent measurements were made at an interval of 30 s, on the basis of which the average value was determined. Instrumental assessments were performed in the same room conditions (temperature 20-22°C, humidity 20-40%) after 15 min acclimatization by the same physician.

Reflectance spectrophotometry [14] provides a useful adjunct to the current subjective method for the evaluation of irritation. This method provides an objective measure of erythema (one of the hallmarks of cutaneous irritation) and provides a continuous grading scale for this parameter. This is in contrast to the current subjective evaluations by a trained observer. Using a continuous scale provides several advantages, the most obvious of which is the ease of statistical analysis of the data.

The difficulty of discriminating between grades is removed and the influence of background skin colour is reduced. Spectrophotometric readings were taken between the wavelengths of 510 and 650 nm.

The absorbance maximum for hemoglobin is in the green region of the spectrum. Thus, the relative absorbance for the green and red regions is related to the degree of erythema [7]. The values used for the correlation were calculated as follows:

$$\text{Adjusted absorbance} = (Gt - Rt) - (Gc - Rc)$$

Where G is the absorbance in the green region (570-580 nm), R is the absorbance in the red region (645-650 nm), t is the treated site, and c is the control site. The data were analyzed using Spearman's rank correlation procedure.

Results and Discussion

Table I refers the mean values of E-indices (Erythema

indices) recorded each of every 7 morning of trial and the mean values of E-indices recorded each of every 7 afternoon.

Normal values of E-indices (that is the value recorded by Reflectance Spectrophotometry spectra measured on safe skin) depend strictly on the phenotype and especially as far as the presence of haemoglobin and melanin (that are the major responsible of the spectrophotometric spectra) are concerned, we have to stress to keep in account the range of E-indices that goes from Finnish subject (5.8) to Russian (8.41), from Chinese (13.90) to Iranian (21.65), from Kazakhs (13.90) to Nepalese (46.09) and finally to African subject (49.06).

For Caucasians the mean value generally accepted is 8.41 [15]. We desire to emphasize that volunteer 404 was mulatto, for this, E-indexes resulted higher than the standard ones.

The mean value of the results recorded as blanching effect onto erythema afforded by the hydroglyceric extract of D.A. is 48.8%.

Volunteer	Mean of Initial E-index (measurement at 09.30 a.m.)	Mean Final E-index (measurement at 04.40 p.m.)
101	17.7	12.1
102	16.1	9.9
103	15.4	8.5
104	18.2	9.7
105	15.6	8.2
106	16.9	7.4
201	18.1	9.1
202	17.4	6.6
203	18.8	7.4
204	14.9	5.7
205	15.8	9.1
206	16.2	8.8
301	19.1	7.9
302	15.7	9.6
303	18.7	8.3
304	15.7	7.7
305	16.4	9.8
306	17.5	6.1
401	18.6	8.4
402	19.2	7.8
403	18.3	8.9
404	27.9	19.6
405	18.5	9.0
406	16.9	8.5

Table I. Changes of E-indices's values during the day.

Conclusion

It is noteworthy to stress that a perennial, redundant and infesting vine, native to tropical and equatorial areas, could elegantly replace, in certain cases, some synthetic drugs for topical use, apt to interfere with the phenomenon of histamine release, generally chemical remedies that act inhibiting the enzymatic functionality of histidine decarboxylase, catalyzing the transformation of histidine into histamine (atypical antihistaminics), inhibiting the action of histamine by blocking its attachment to histamine receptors (H1-H4 histamine receptors) or acting as mastzellen stabilizers.

The anti-erythematous effect of the herb is guaranteed almost for 7 hours.

We must apologize that, even if results appear satisfactory, the real congeries of causes that evoke erythematous manifestations in human skin is not precisely predictable, for, we attempted to resolve this dilemma, by inducing skin inflammations to volunteers which are already compromised from dermatological diseases.

In future we will provide to make additional measures of E-indices after 7 hours the final measurement at 4.30 p.m., to validate the chance that *Desmodium adscendens* could be long-lasting effective.

Effectively all the volunteers assure they did not need to scrape the inflamed area during the night.

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