

ORAL ADMINISTRATION OF BORAGO OIL IN ATOPIC DERMATITIS

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Synopsis

Borago, evening primrose, and blackcurrant oils are all well known for their richness in gamma-linolenic acid (G.L.A.), but borago oil is characterized by the highest G.L.A. content of all, up to 25%. Normally, dietary linoleic acid is converted to G.L.A. by the enzyme delta-6-desaturase and the following biological pathway leads to synthesis of eicosanoids and prostaglandins.

A defect in the function of delta-6-desaturase has been observed in atopic dermatitis and G.L.A. has been reported of value in the treatment of this disease.

A borago oil oral supplementation in a group of 24 atopic dermatitis patients improved their clinical conditions after 4-8 weeks, with significant reduction in inflammation, dryness, scaliness and itch and without side effects.

Riassunto

L'olio di semi di borragine, quello di enagra e quello di ribes nero sono noti per il loro alto contenuto in acido gamma-linolenico (A.G.L.), ma tra tutti il più ricco è l'olio di borragine che ne contiene fino al 25%.

Nel soggetto sano, l'acido linolenico assunto con la dieta è convertito dall'enzima delta-6-desaturasi in A.G.L., che rappresenta un passaggio chiave nella sequenza metabolica che porta alla sintesi finale di eicosanoidi e prostaglandine.

Numerose osservazioni sperimentali suggeriscono che una carenza di delta-6-desaturasi e di acidi grassi essenziali svolga un ruolo patogenico nella dermatite atopica e che l'A.G.L. possa essere utile nel trattamento di tale malattia.

Uno studio controllato condotto in 24 pazienti affetti da dermatite atopica ha permesso di dimostrare che una dieta arricchita di A.G.L. per somministrazione giornaliera di 2 g di olio di borragine è in grado di migliorare in 4-8 settimane le condizioni cliniche dei pazienti, con effetti particolarmente evidenti sul prurito nonché su congestione, xerosi e desquamazione della cute.

Non sono stati osservati effetti collaterali indesiderati.

Normally, dietary linoleic acid is converted by the enzyme delta-6-desaturase to gamma-linolenic acid (G.L.A.), a key intermediate essential fatty acid in the biological pathway leading to synthesis of eicosanoids and prostaglandins PGE1 and PGE2.

This desaturation may be inhibited by several clinical conditions such as diabetes, alcoholism, stress etc. with a reduction of G.L.A. formation and risk of pathological consequences (1). The G.L.A. bio-deficiency may be avoided by the dietary intake of G.L.A. from a natural origin. Common dietary fats and oils from vegetable or animal origin are known for not containing this particular essential fatty acid, but several research teams working in Northern America and Europe have selected new seeds containing a good percentage of oils with a high G.L.A. content.

Today, borago, evening primrose, and blackcurrant oils are well known for their richness in G.L.A., but borago oil extracted from mature seeds of *Borago Officinalis*, is characterized by the highest G.L.A. content of all, up to 18-26% of total fatty acid composition (2) (Table I).

Borago Officinalis, a plant native to West Asia, is distributed in the Mediterranean basin. It has recently been grown commercially in France (with success) and its oil is in widespread use.

Wright and Burton (3), have observed that in patients with atopic dermatitis (A.D.) the plasma levels of G.L.A., dihomogammalinolenic acid (DGLA) and arachidonic acid were lower than in healthy control subjects, whereas the level of cis-linoleic acid was higher. The same difference in the plasma levels of essential fatty acid N=6 with a more consistent variation was described by Strannegard et al. (4) in children affected by A.D.. The AA. also observed a positive correlation between plasmatic high concentration of linoleic acid and serum IgE increase in newborns with a familial anamnestic risk to develop AD.

Moreover, several comparative studies in humans and animals (5,6) demonstrated that a diet deficiency in EFA is followed by several pathological modifications mainly located on the skin.

Cutaneous alterations due to lack of EFA

- Thinned hair or alopecia
- Wrinkled and finely scaling skin
- Eczematic dermatitis similar to AD
- Fragility of superficial vessels
- Slow cicatrization of injuries
- Susceptibility to cutaneous infections
- High trans-cutaneous water loss
- Itching

Table I.

FATTY ACID COMPOSITION FOR MAJOR G.L.A.-RICH OILS

Fatty acid	Borago	Ev.Primrose	Blackcurrant
Palmitic Acid	9-12	5-6	6-7
Stearic Acid	3-4	1-2	1-2
Oleic Acid	15-19	8-12	9-10
Linoleic Acid	34-39	70-79	45-50
Alfa linolenic Acid	0,1-2	0,1-0,4	12-15
Gamma linolenic Acid	18-26	8-12	12-17
Stearidonic Acid	0,1	-	2-4

All these observations suggest a pathogenic role for metabolic alterations in EFA and delta-6-desaturase enzyme in AD and GLA has been reported of value in the treatment of that disease (7). Good therapeutic results have been reported following oral treatment with evening primrose oil or blackcurrant oil in patients with AD (8,9).

To analyse the effects of borago oil, (the oil with the highest concentration of GLA) in AD, a borago oil oral supplementation was adopted in a group of 24 patients with AD in comparison with placebo.

24 young adults (13 males and 11 females), aged 12-27 years with atopic dermatitis (AD) were studied (Table II). The diagnosis was based on a typical dermatological picture and, in addition, the patients also had a family history of atopy or suffered from atopic respiratory symptoms.

The patients were randomly divided into two groups, 14 patients receiving borago oil and 10 patients receiving placebo, in a double-blind trial. The borago oil was provided in capsules each containing 500 mg of oil (EFAGEL) and 35 mg of lipids, 26% /70 of linoleic acid and 17,6% /70 of GLA. The placebo capsule contained 500 mg of liquid paraffin. Four capsules

were taken twice a day for 8 weeks. The patients were instructed to keep diet unchanged during the study period. Only in case of severe skin symptoms a mild topical corticosteroid cream or oral antihistamine was adopted, whereas an emollient cream was at the patient's disposal in unlimited quantities.

The extent and severity of the AD was assessed at the beginning of the trials and every 4 weeks thereafter, always by the same dermatologist. The overall severity of the AD was estimated on a linear scale from 0, no symptoms, to 100, worst possible. In addition, the percentage of the body surface involved was recorded, and the degree of inflammation, dryness and itch graded on a scale of 0, none; 1, mild; 2, moderate, and 3, severe. The overall response to the treatment was estimated on the following scale: -1, worse; 0, no change; 1, improved; 2, much improved; 3, cured.

No patient dropped out of trial and no side-effects due to borago oil were observed.

During the 8-week period, only one patient in the borago oil group consumed about 20 g. of topical not alogenate steroid, whereas in the placebo group the same topical steroid was used by three patients and in 2-3 times larger quantity.

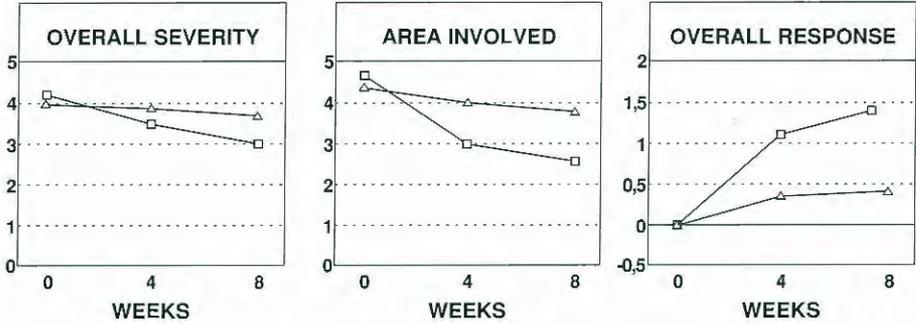
In the borago oil group (Table III), a statistically

Table II.

BASAL FEATURES OF THE TWO GROUPS OF TREATMENT

Basal features		Borago oil	Control	P
Sex	MALE	8	5	n.s.
	FEMALE	6	5	n.s.
Age (years)	MEAN	17.7±5.1	16.1±6.8	n.s.
	RANGE	13-26	12-27	n.s.
Weight (Kg)	MEAN	56.4±15.1	51.3±13.6	n.s.

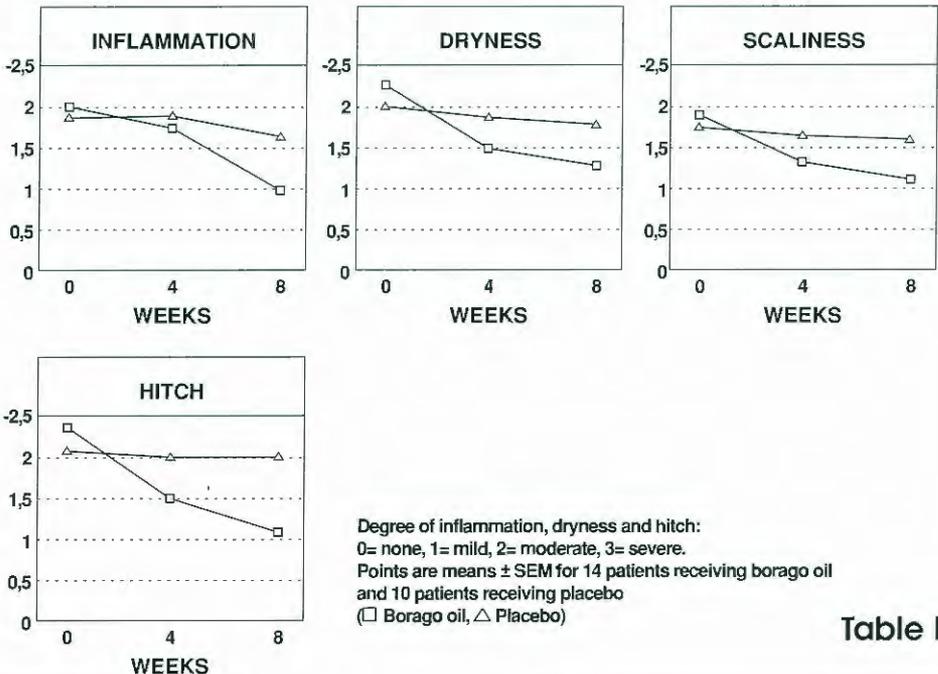
Effects of treatment with oral borago oil or placebo on the clinical status of atopic dermatitis



Overall severity of atopic dermatitis and extent of cutaneous area involved on a linear scale from 0 to 10. Estimation on overall response to treatment: -1 = worse, 0 = no change, 1 = improved, 2 = much improved, 3 = cured. Points are means \pm SEM for 14 patients receiving borago oil and 10 patients receiving placebo (□ Borago oil, △ Placebo)

Table III.

Effects of treatment with oral borago oil or placebo on the different symptoms of atopic dermatitis



Degree of inflammation, dryness and hitch: 0= none, 1= mild, 2= moderate, 3= severe. Points are means \pm SEM for 14 patients receiving borago oil and 10 patients receiving placebo (□ Borago oil, △ Placebo)

Table IV

significant improvement was observed at the end of treatment in the overall severity and in overall response ($p < 0.01$).

A significant reduction in surface of the area involved was also observed in the same group.

Patients in the placebo group showed a small insignificant improvement. At the end of treatment the borage group also presented a significant reduction of all clinical parameters and

in 5 patients, these results were maintained in an open longterm treatment without side effects. The same symptoms were not influenced by the placebo (Table IV).

In conclusion, in this study only the patients receiving borage oil showed significant improvement in their AD with respect to all the clinical parameters assessed.

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