Skin Barrier Protection with Jojoba Esters

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Abstract

There is an increasing appeal for functional and naturally derived ingredients that not only function to increase skin hydration, but also function in skin barrier protection and recovery. Previous studies were done to demonstrate the skin hydration potential of jojoba esters, but until recently, the effect of barrier function was unknown. The objective of this research was to explore the potential of jojoba esters to impact barrier function through small, vehicle-controlled, double-blind, in vivo clinical studies. The effect of jojoba esters on skin barrier function was evaluated in four separate studies:

1) Test sites were treated with one application of various simple lotion formulations prior to sodium lauryl sulfate (SLS) exposure and the percent reduction in SLS-induced transepidermal water loss (TEWL) was determined. The lotion formulations containing jojoba esters produced similar reductions in TEWL as the lotion containing petrolatum, up to 90% and 87%, respectively (p<0.001, relative to untreated skin).

2) In a dose-response study, the procedure from the first study was repeated at concentrations ranging from 0.2-2% jojoba esters. For this study, the results showed a sigmoid curve where 1% jojoba esters were statistically as effective as 2% jojoba esters with regard to reductions in TEWL (p<0.05, relative to untreated skin).

3) Transepidermal water loss (TEWL) and instrumental erythema evaluations were made pre and post dry shaving of the volar forearm skin. Test sites were measured and repeat applications with simple lotion formulations were made over four days. Jojoba esters were compared to bisabolol (standard cosmetic anti-irritant ingredient). After 24 hours, the lotion formulations containing jojoba esters produced up to 81% barrier recovery, compared to bisabolol at 47% (p<0.05) and the vehicle at 37% (p<0.001). Jojoba esters reduced erythema similar to bisabolol (up to 15% and 13%, respectively) and better than the vehicle (5%, p<0.01).

4) Test sites were treated with three applications of test articles post-SLS exposure and the percent barrier recovery was determined using TEWL. The lotion formulations containing jojoba esters produced similar percent barrier recoveries as the lotion containing petrolatum, up to 78% and 79%, respectively (p<0.01, relative to the vehicle).

Jojoba esters are a functional and naturally derived ingredient(s) that can provide skin barrier protection and can increase the speed of barrier recovery.

Clinical Design

Four small, randomized, vehicle-controlled, clinical studies were conducted under controlled environmental conditions (20±2°C and <50% RH) at Floratech in Chandler, Arizona, to ascertain the ability of various melting point jojoba esters to decrease transepidermal water loss (TEWL) and skin erythema. These jojoba esters included melting points of 45°C (low melting point Floraesters 20 (JE LMP)), 50°C (medium melting point Floraesters 30 (JE MMP)), and 60°C (high melting point Floraesters 60 (JE HMP)).

The studies were approved by an independent IRB and the subjects signed an informed consent form before enrolling into the studies. Each study had a 1-2 day wash out period in which subjects did not use any creams, lotions, or gels on the test sites. TEWL measurements were carried out in duplicate using a Tewameter TM300. Erythema was measured in triplicate using a Mexometer MX 18. The lotions used were simple oil in water emulsions.
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Anti-Irritation

The objective of this study was to determine if JE LMP, JE MMP, and JE HMP, incorporated into a oil/water emulsion, can improve barrier recovery when skin is post-treated following SLS exposure. TEWL was measured on the forearms of twelve healthy male and female participants. The forearms were then exposed to a 0.3% solution (w/w) of SLS for approximately 18 hours under occlusion using 19mm Hill Top Chambers, followed by chamber removal and three hourly treatments with the test articles. TEWL measurements were then repeated one hour after the last treatment. (Figure 3)

![Graph showing percent barrier recovery over time for different treatments.](image)

**Figure 3:** The addition of 2% jojoba esters produced statistically significant increases (p<0.001) in barrier recovery over the vehicle and untreated skin at the 24, 48, and 72 hours time points. JE MMP and JE HMP also performed statistically significantly (p<0.05) better than 0.5% bisabolol.

Skin Barrier Recovery

The objective of this study was to determine if JE LMP, JE MMP, and JE HMP, incorporated into a oil/water emulsion, can improve barrier recovery when skin is post-treated following SLS exposure. TEWL was measured on the forearms of twelve healthy male and female participants. The forearms were then exposed to a 0.3% solution (w/w) of SLS for approximately 18 hours under occlusion using 19mm Hill Top Chambers, followed by chamber removal and three hourly treatments with the test articles. TEWL measurements were then repeated one hour after the last treatment. (Figure 5)

![Graph showing percent barrier recovery over time for different treatments.](image)

**Figure 5:** The inclusion of 2% jojoba esters statistically significantly (p<0.05) increased percent barrier recovery over the vehicle, and performed statistically equivalently to 5% petrolatum.

Conclusions

The data indicate that naturally-derived jojoba esters can have a profound effect on the skin’s barrier function. Three distinctive jojoba esters improved barrier function as well as increased barrier recovery from SLS damage with efficacy similar to petrolatum. It was not surprising that jojoba esters also inhibited inflammatory action; Habashy et. al. were able to show in 2005 that jojoba seed oil was anti-inflammatory in a number of standard models for inflammation.⁷

References / Footnotes

3. LMP = Floraesters 20, MMP = Floraesters 30, and HMP = Floraesters 60.
4. Tewameter is a product of Courage + Khazaka Electronic GmbH, (Koln, Germany).
5. Mexameter is a product of Courage + Khazaka Electronic GmbH, (Koln, Germany).
6. Hill Top Chamber is a registered trademark of Hill Top Research, Inc. (Cincinnati, OH).

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