Barrier Function Properties of Jojoba Derivatives Post-Shaving

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Abstract

Jojoba (*Simmondsia chinensis*) oil has historically been shown to have beneficial skin effects. Barrier function and skin irritation are significant considerations in creating products used during or immediately after shaving the face, legs, and armpits; thus prompting our research to explore the benefits of jojoba derivatives. Multiple small, IRB approved, randomized, double blind, vehicle-controlled studies (14 to 15 subjects each) were carried out under controlled environmental conditions in order to evaluate the effectiveness of jojoba derivatives on restoring barrier function and decreasing irritation. The jojoba-derived ingredients were incorporated into a lotion, wipe, or shaving cream system, and applied post-dry shave (i.e. lotion and wipe) or during the shaving process (i.e. shaving cream). Barrier function measured by transepidermal water loss (TEWL) and irritation by erythema measurements, were conducted before and after shaving/treatment. The jojoba-derived ingredients restored barrier function and decreased erythema at all measured time points.

Wipe: Improved Barrier Function

Objective: Determine the effect of hydrolyzed jojoba esters on barrier function when added to a baby wipe solution.

Test Articles: Floraesters K-100 Jojoba,[1] Floraesters K-20W Jojoba,[2] and bisabolol.[3]

Design: Nonwoven wipes (45g/m^2 spunlace) were soaked in 2.5g of test solution for 24 hours. The forearms of 14 healthy subjects were dry shaved to create skin irritation. Measurements were made at baseline (pre-shave, no treatment), post-shave (pre-test article treatment), and 4, 24, 48, and 72 hours post initial test article application. Test article applications were made following post-shave, 4, 24, and 48 hour measurements.

End Point: Increased barrier function as measured by the Tewameter TM 300[4] (Figure 1).

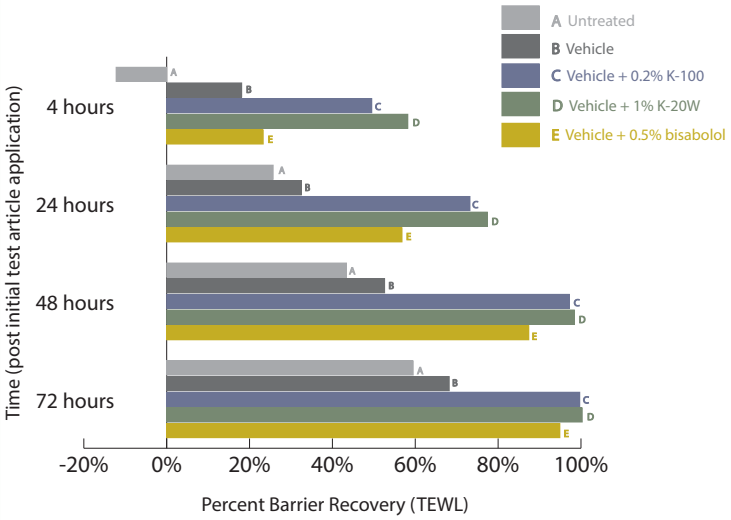

Figure 1: The addition of 1% Floraesters K-20W Jojoba or 0.2% Floraesters K-100 Jojoba produced statistically significant increases ($p<0.01$) in barrier recovery over the vehicle and untreated skin at all time points. The Floraesters K-20W Jojoba product also performed statistically significantly ($p<0.05$) better than 0.5% bisabolol at the 4 and 24 hour time points.

Wipe: Anti-Irritation

Objective: Determine the anti-irritation potential of hydrolyzed jojoba esters when added to a baby wipe solution.

Test Articles: Floraesters K-100 Jojoba, Floraesters K-20W Jojoba, and bisabolol.

Design: Nonwoven wipes (45g/m^2 spunlace) were soaked in 2.5g of test solution for 24 hours. The forearms of 14 healthy subjects were dry shaved to create skin irritation. Measurements were made at baseline (pre-shave, no treatment), post-shave (pre-test article treatment), and 4, 24, 48, and 72 hours post initial test article application. Test article applications were made following post-shave, 4, 24, and 48 hour measurements.

End Point: Reduced erythema (redness) as measured by the Mexameter MX 18[5] (Figure 2).

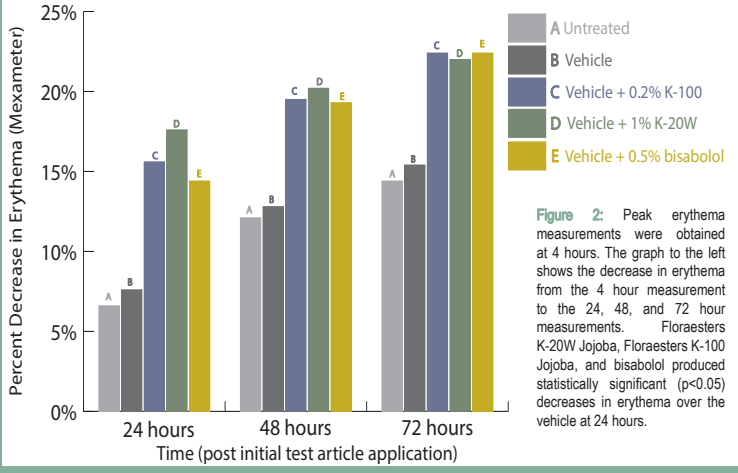

Figure 2: Peak erythema measurements were obtained at 4 hours. The graph to the left shows the decrease in erythema from the 4 hour measurement to the 24, 48, and 72 hour measurements. Floraesters K-20W Jojoba, Floraesters K-100 Jojoba, and bisabolol produced statistically significant ($p<0.05$) decreases in erythema over the vehicle at 24 hours.

Lotion: Improved Barrier Function

Objective: Determine the effect of jojoba esters on barrier function when added to a lotion (oil in water emulsion).

Test Articles: Floraesters 20,[6] Floraesters 30,[7] Floraesters 60,[8] and bisabolol.

Design: The forearms of 15 healthy subjects were dry shaved to create skin irritation. Measurements were made at baseline (pre-shave, no treatment), post-shave (pre-test article treatment), and 4, 24, 48, and 72 hours post initial test article application. Test article applications were made after the following measurement time points: post-shave, 4, 24, and 48 hour.

End Point: Increased barrier function as measured by the Tewameter TM 300 (Figure 3).

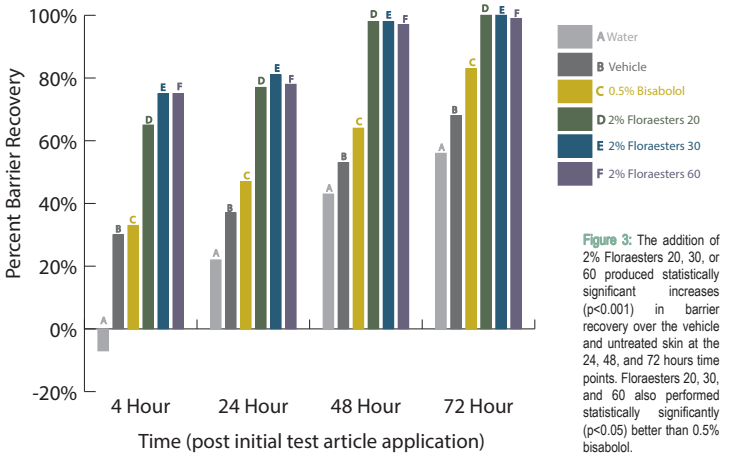

Figure 3: The addition of 2% Floraesters 20, 30, or 60 produced statistically significant increases ($p<0.001$) in barrier recovery over the vehicle and untreated skin at the 24, 48, and 72 hours time points. Floraesters 20, 30, and 60 also performed statistically significantly ($p<0.05$) better than 0.5% bisabolol.

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Lotion: Anti-Irritation

Objective: Determine the anti-irritation potential of jojoba esters on barrier function when added to a lotion (oil in water emulsion).
Test Articles: Floraesters 20, Floraesters 30, Floraesters 60, and bisabolol.
Design: The forearms of 15 healthy subjects were dry shaved to create skin irritation. Measurements were made at baseline (pre-shave, no treatment), post-shave (pre-test article treatment), and 4, 24, 48, and 72 hours post initial test article application. Test article applications were made after the following measurement time points: post-shave, 4, 24, and 48 hour.
End Point: Reduced erythema (redness) as measured by the Mexameter MX 18 (Figure 4).

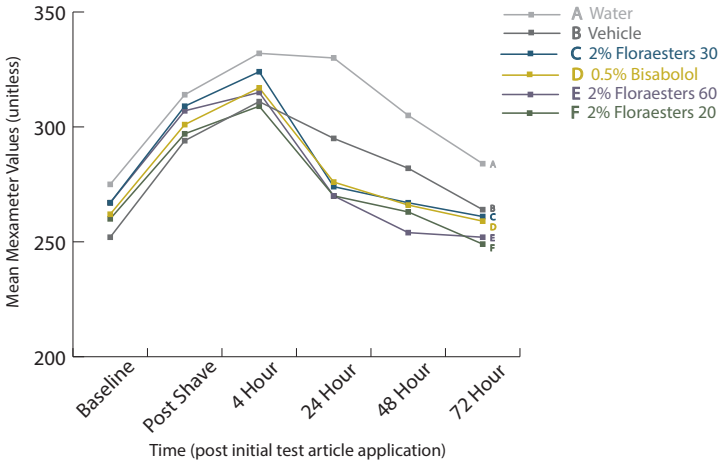

Figure 4: The addition of 2% jojoba esters produced statistically significant decreases ($p<0.01$) in erythema over the vehicle and untreated skin at all time points. The products containing jojoba esters also performed statistically equivalent to 0.5% bisabolol.

Shaving Cream: Decreased Barrier Dysfunction

Objective: Determine the effect of hydrolyzed jojoba esters and jojoba esters on barrier dysfunction when added to a shaving cream.
Test Articles: Floraesters 30 and Floraesters K-100 Jojoba.
Design: Measurements were made at baseline (pre-shave,no treatment), 15 minutes post-shave, and 60 minutes post-shave on the forearms of 15 healthy female subjects. Test article applications were made following baseline measurements, but prior to shaving.
End Point: Decreased barrier dysfunction as measured by the Tewameter TM 300 (Figure 5).

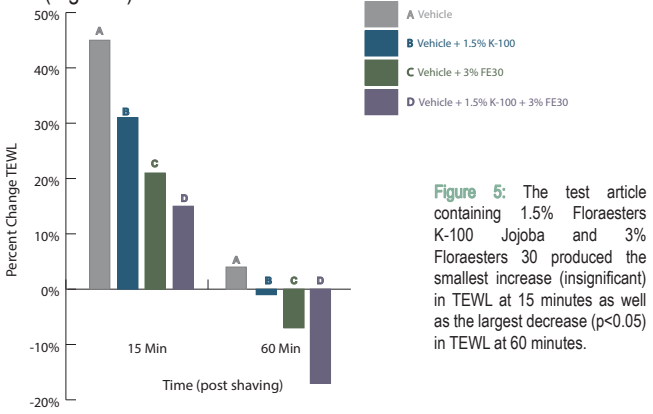

Figure 5: The test article containing 1.5% Floraesters K-100 Jojoba and 3% Floraesters 30 produced the smallest increase (insignificant) in TEWL at 15 minutes as well as the largest decrease ($p<0.05$) in TEWL at 60 minutes.

Shaving Cream: Skin Hydration

Objective: Determine the skin hydration potential of hydrolyzed jojoba esters and jojoba esters when added to a shaving cream.
Test Articles: Floraesters 30 and Floraesters K-100 Jojoba.
Design: Measurements were made at baseline (pre-shave, no treatment), 15 minutes post-shave, and 60 minutes post-shave on the forearms of 15 healthy female subjects. Test article applications were made following baseline measurements, but prior to shaving.
End Point: Increased skin hydration as measured by the Corneometer CM 825[9] (Figure 6).

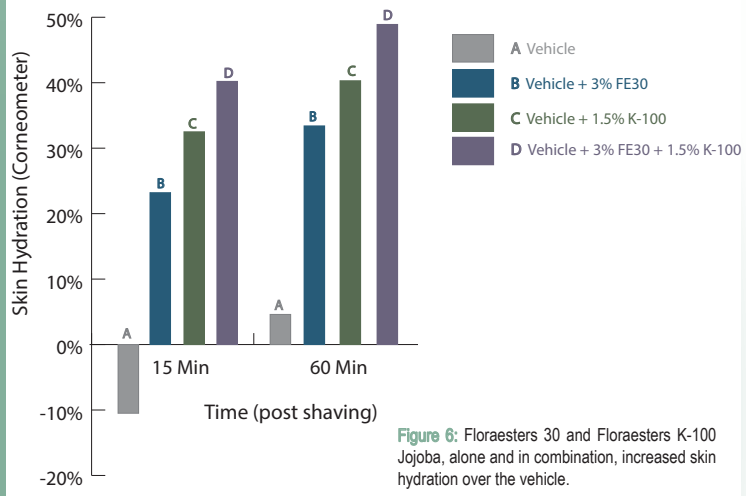

Figure 6: Floraesters 30 and Floraesters K-100 Jojoba, alone and in combination, increased skin hydration over the vehicle.

Conclusions

The data indicate that jojoba-derived ingredients can have a profound effect on the skin's barrier function. These jojoba derivatives **improved barrier function**, **increased skin hydration**, and **decreased barrier dysfunction** caused by shaving. It was not surprising that these jojoba derivatives also **reduced erythema** since Habashy *et. al.* were able to show in 2005 that jojoba seed oil was anti-inflammatory in a number of standard models for inflammation.[10]

References / Footnotes

1. Floraesters K-100 Jojoba [INCI: Hydrolyzed Jojoba Esters (and) Jojoba Esters (and) Water (Aqua)] was supplied by Floratech.
2. Floraesters K-20W Jojoba [INCI: Hydrolyzed Jojoba Esters (and) Water (Aqua)] was supplied by Floratech.
3. Alpha-Bisabolol Natural was supplied by BASF Corporation.
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. Floraesters 20 (INCI: Jojoba Esters) was supplied by Floratech.
7. Floraesters 30 (INCI: Jojoba Esters) was supplied by Floratech.
8. Floraesters 60 (INCI: Jojoba Esters) was supplied by Floratech.
9. Corneometer is a product of Courage + Khazaka Electronic GmbH, (Koln, Germany).
10. Habashy RR, Abdel-Naim AB, Khalifa AE, and Al-Azizi MM. Anti-inflammatory effects of jojoba liquid wax in experimental models. Pharmacological Research. 2005; 51: 95-105.

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