Introduction

The skin barrier provides protection from the damaging effects of the environment, not only to the skin, but also to the internal organs. When the barrier is damaged, either from ultraviolet radiation, chemicals, or physical insult, water immediately escapes. A compromised barrier can lead to skin irritation and skin pathologies such as atopic dermatitis and skin inflammation. Naturally occurring lipids such as ceramides have been shown to be necessary for normal barrier function and have beneficial effects when added exogenously to the skin. Other lipids, such as hydrolyzed jojoba esters, have also been shown to benefit the skin.1

Floratech has created the hydrolyzed jojoba esters by hydrolyzing the wax found in the native jojoba seed oil. The resultant esters are used in various cosmetic and personal care formulations. The following studies were designed to determine if hydrolyzed jojoba esters incorporated into hydro-alcoholic and non-alcoholic, nonwoven wipes could increase skin hydration, and reduce TEWL and erythema.

In order to explore additional benefits of hydrolyzed jojoba esters, three small, vehicle-controlled, clinical studies were conducted using nonwoven wipes to deliver the hydrolyzed jojoba esters to the skin. In the first study, the objective was to dry-shave the forearms of normal subjects. 1% HJE20® (25% hydrolyzed jojoba esters in water) or 0.2% HJE80** (80% hydrolyzed jojoba esters + 10% jojoba esters in water) was incorporated into baby wipes and compared with a vehicle wipe as well as a wipe containing 0.5% bisabolol. Multiple wipe applications were made over 4 hours with erythema and transepidermal water loss (TEWL) measurements taken after each wipe application. The baby wipes which contained HJE20®, or HJE80® increased barrier recovery (as measured by TEWL) better than bisabolol and were as effective as bisabolol in reducing skin erythema. In a second study, 1% of HJE20® or 0.2% HJE80** was incorporated into hydro-alcoholic wipe solutions. After one application of the wipes to the designated skin test sites, the wipes containing HJE20® or HJE80® produced statistically greater skin hydration (as measured by capacitance) than the vehicle wipe, with peak hydration increases of 34% and 36%, respectively. In the third study, 0.2% HJE20® or 0.1% HJE80** was incorporated into non-alcoholic, nonwoven wipes. These wipes were compared to a vehicle wipe as well as to currently marketed antibacterial wipes. After one application of the wipes to the skin test sites, the wipes containing HJE20® or HJE80® produced statistically greater skin hydration than all other wipes, with peak hydration increases of 47% and 43%, respectively. These studies indicate that hydrolyzed jojoba esters can be delivered to the skin from various formats of nonwoven wipes and produce significant benefits to the skin barrier.

Clinical Design

Three small, randomized, vehicle controlled, clinical studies were conducted under controlled environmental conditions (72±2°C and <50% RH) at Floratech in Chandler, Arizona, to ascertain the ability of nonwoven wipes incorporated with various hydrolyzed jojoba esters to increase skin hydration, decrease transepidermal water loss (TEWL), and decrease skin erythema. The studies were approved by an independent IRB and the subjects signed informed consent forms before enrolling into the studies. Each study had a three 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®TM 300. Erythema was measured in triplicate using a Mexameter® MX 18. Skin hydration was measured in triplicate using a Corneometer® CM 825E. The non-alcoholic wipes were made by soaking 45g/m² of non-alcohol tacky nonwoven fabric with HJE20® or HJE80® micro-dispersed in water. The hydro-alcoholic wipes were made by soaking 45g/m² of non-woven fabric with 5% alcohol of an aqueous solution of HJE20® or HJE80®.

Study #1 - Barrier Function and Anti-Irritation: Baby Wipes

The objective of the first study was to determine if HJE20® and HJE80**, incorporated into a baby wipe, can increase barrier recovery from “dry shaving” and reduce erythema. The forearms of fourteen healthy subjects were “dry shaved” to produce skin irritation and disrupt the skin barrier. TEWL measurements were made pre and post “dry shaving”, and 4, 24, and 72 hour post initial test article application. Test article applications were made following post-shave, 4, 24, and 48 hour measurements.

Study #2 - Skin Hydration: Hydro-Alcoholic Wipes

The objective of the second study was to determine the potential of HJE20® and HJE80** in combination with glycerin (1%) to increase skin hydration when added to a hydro-alcoholic wipe. Twelve healthy females with dry, lower legs participated in the study. One application of the experimental wipes was applied to the appropriate test site followed by Corneometer measurements every 30 minutes for two hours.

Study #3 - Skin Hydration: Non-Alcoholic Wipes

The objective of the third study was to determine the potential of HJE20® and HJE80** in combination with glycerin (1%) to increase skin hydration when incorporated into a non-alcoholic, nonwoven wipes. Twelve healthy females with dry lower legs were enrolled into the study. One application of each experimental wipe was applied to the appropriate site on the lower leg of each subject. Skin hydration was measured every 30 minutes up to four hours.

Proposed Mechanisms of Action of HJE and Glycerin


Conclusions

• Hydrolyzed Jojoba Esters, when incorporated into a baby wipe, increased barrier recovery over the vehicle wipe at all time points (p<0.05). (Figure 3)

• Hydrolyzed Jojoba Esters, when incorporated into a baby wipe, produced faster barrier recovery than the wipe containing 0.5% bisabolol at the 4 and 24 hour measurements (p<0.05). (Figure 3)

• Hydrolyzed Jojoba Esters, when incorporated into a baby wipe, decreased skin erythema over the vehicle wipe (p<0.01). (Figure 4)

• Hydrolyzed Jojoba Esters, when incorporated into a baby wipe, decreased skin erythema equal to that of the known anti-irritant, bisabolol (p<0.05). (Figure 4)

• Hydrolyzed Jojoba Esters, when combined with glycerin in a non-woven, increased skin hydration over the vehicle wipe and other marketed non-alcoholic wipes (p<0.05) and increased skin hydration over the vehicle wipes within hydro-alcoholic wipes (p<0.05). (Figures 5 and 6)

References
Delivery of Hydrolyzed Jojoba Esters to the Skin from Wipes: Beneficial Effects on Barrier Function and Skin Hydration


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