

ASSESSMENT OF SKIN HYDRATION AND SOFTENING EFFECTS OF COLLOIDAL OAT FRACTION CONTAINING CREAM

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Synopsis

A concentrated colloidal oat fraction in a O/W cream has been compared with a reference O/W emollient cream for stratum corneum hydrating and skin surface softening effects in a double-blind randomized study in 10 healthy female volunteers whose skin had been made dry and irritated by repeated applications of sodium dodecylsulfate. Stratum corneum hydration was assessed through conductance measurements. Skin surface smoothness was evaluated through a visual plus tactile subjective assay and by profilometry of skin surface casts. All methods demonstrated recovery of the skin following one week's treatment with either product. This improvement was sustained a week later. It is concluded that the tested oat extract enriched cream has a hydrating and softening effect on the skin surface which is "similar or superior to that of a conventional O/W strongly moisturizing cream".

Riassunto

È stata verificata l'attività emolliente ed idratante di una emulsione O/W contenente una frazione colloidale di avena paragonata ad una crema emolliente di confronto. Il controllo è stato effettuato sulla cute di 10 volontarie sane irritate con una soluzione di dodecilsulfate di sodio. L'idratazione dello strato corneo è stata verificata con misure di conduttanze, mentre l'azione emolliente è stata valutata sia visivamente che mediante la profilometria. I dati ottenuti dimostrano che entrambe le creme migliorano lo strato cutaneo fin dopo la prima settimana. La crema arricchita con avena colloidale ha dimostrato di possedere un'attività idratante ed emolliente senz'altro simile e talvolta superiore ad una crema convenzionale fortemente idratante.

Introduction

Emollients are increasingly used in dermatology and skin care because they offer protection and stratum corneum hydration by their lipidic capital nature. Furthermore the latter has a softening effect on keratins. In dermatological practice they are often associated with anti-inflammatory/antipruritic ingredients such as mineral powders (silicate, zinc oxide) or organic compounds (starch) (1,2). In that respect oat extracts in powders have been long used, especially in skin diseases of children which are mostly exudative or pruritic.

Recently a new preparation* has been proposed for such dermatoses as eczema, diaper dermatitis, senile itch, seborrheic dermatitis, ichthyoses and all chronic skin diseases characterized by sustained irritancy and dryness. A softening effect is claimed by the use of a colloidal oat concentrate together with, even if not occlusive, a strong hydrating effect. As such creams based on oat extracts are not currently in widespread use throughout France, a double blind randomized comparison was made with a well-known moisturizer in respect of skin surface hydration and softening effects.

Material and methods

Products

The reference product was a O/W emulsion enriched with lipid, glycerol and sodium pyrrolidone carboxylate and containing 10% primrose oil.

The tested preparation was a O/W emulsion enriched with allantoin, glycerol and NaCl and containing 1% of a concentrated colloidal oat meal extract.**

*Aveenocream, PROMEDICA Laboratories

** AVEENO®: S.J. Johnson, Rydelle Lab. Racine (Wisc.) USA

Protocol

The experiment was conducted with 10 healthy female volunteers (19-39 years of age, mean sd 32 ± 5.6) in a double-blind randomized manner. Two weeks prior to starting treatment, both volar forearms of each volunteer were made dry and irritated by daily application of 4% sodium dodecyl sulfate (SDS) in water for 15 days (3,4).

Then either the tested or reference creams were applied and gently rubbed on the skin of either the dominant or dominate volar forearm according to a previous randomized allocation. The application was repeated once a day in the evening for 7 days.

Assessment

The day before start treatment (DO), the day after the end of treatment (DS) and 7 days later (D15) the following assessments were made in the morning:

- 1- A blind visual and tactile assessment of skin smoothness by an expert, on a continuous scale.
- 2- A stratum corneum (SC) conductance measurement using Courage and Khazaka CM 820 corneometer (5).
- 3- A profilometric study of the skin surface (6,7,8).

This comprised the taking of a silicone (Silflo®) skin replica of about 5 cm² area. A positive cast (Araldite AY 103) was made from the replica, and scanned for profilometry perpendicular to the main furrow direction along 15 mm. Five parallel scans were run, 500 µm a part. Assessment parameters were the mean depth of 10% deeper furrows and of the rest of furrows, the mean furrow spacing and the total length of profile related to assessment length.

Statistics

A one-way (time) analysis of variance was made on visual-tactile assessment data.

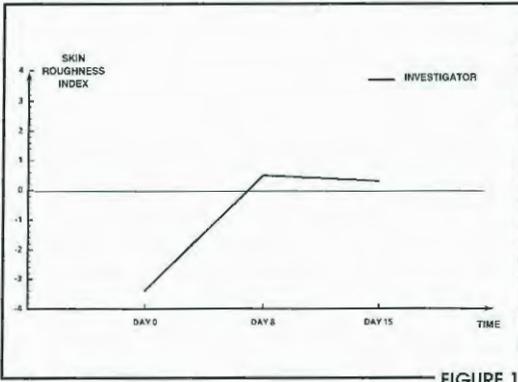
A two-way analysis variance (time, treatment) followed by Student-Newman-Keuls-Test was made on corneometer assessment and on each skin relief parameters, using PCSM Delta-soft R.

Results

VISUAL AND TACTILE ASSESSMENT

(Fig. 1)

Before treatment the reference treated areas were less rough than the Aveenocream treated ones. No difference was observed by day 0, day 8 and 15. This would have given an advantage to Aveenocream. But none of the differences or variations were statistically significant.

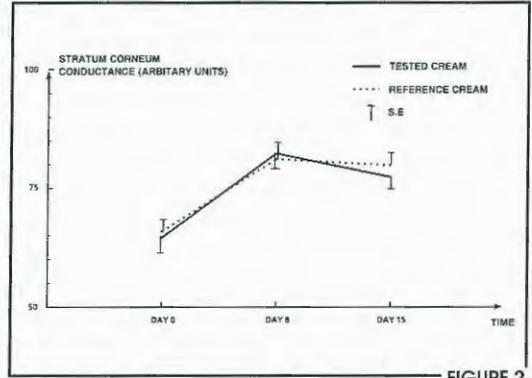


Psychosensorial evaluation of skin roughness

STRATUM CORNEUM CONDUCTANCE

(Fig. 2)

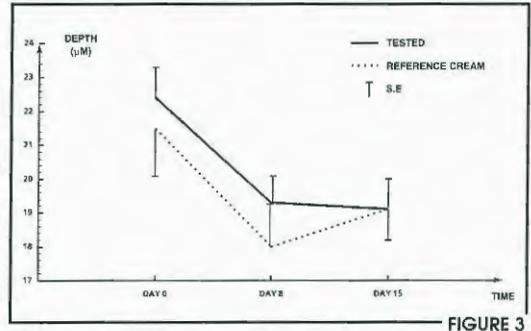
With both creams the skin conductance rose significantly ($p < 0.05$) by day 8 (i.e. the day following the end of treatment). Although the conductance value decreased by day 15 (78.6) (i.e. after a week without treatment) compared to day 8 (81.8 and $p < 0.05$) it remained higher than before treatment, at day 0 (65 and $p < 0.05$).



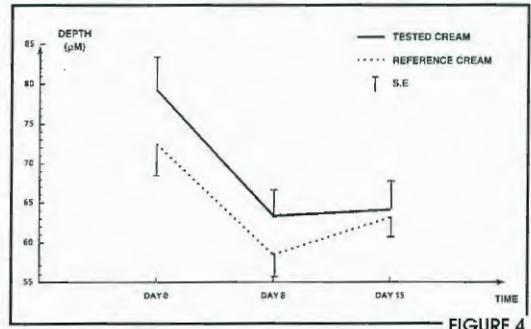
Stratum corneum conductance

Skin relief parameters

All relief parameters displayed the same non symmetrical V-shape variations with time. Following a week's treatment a strong reduction in the depth of both types of furrows was observed (fig. 3 and 4).



Depth of deeper furrows



Depth of shallower furrows

The same held true for the furrow spacing (fig. 5) and the actual profile length (fig. 6). These reductions were significant ($p < 0.05$).

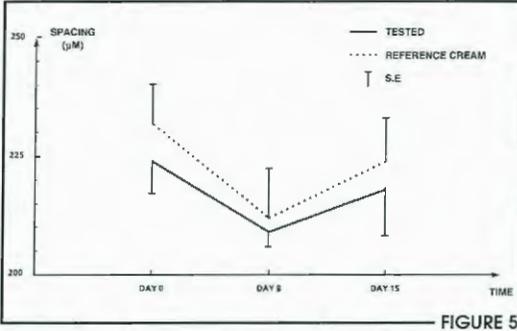


FIGURE 5

Spacing of skin surface furrows

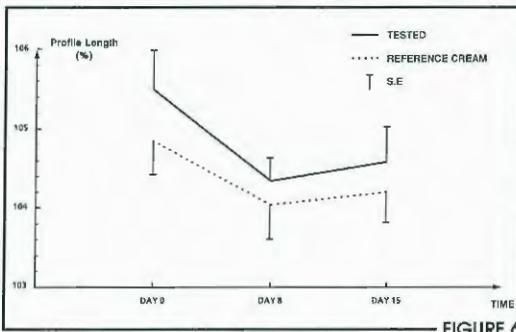


FIGURE 6

Profile length of skin surface

One week after the end of treatment a stabilization or a slight increase (spacing of furrows) was noticed but this was not statistically significant.

Before treatment areas treated with the reference product had less deep and less spaced furrows and a shorter profile length than the areas treated by Aveeno cream. The same difference was also found one day after the end of treatment (day 8) but disappeared a week later for the depth of both types of furrows owing to slight increase of the parameter in reference-treated areas. However the difference was not statistically significant.

Discussion

A concentrated colloidal oat fraction in a O/W cream was compared to a well known emollient O/W cream in respect of SC hydrating and skin surface softening effects in a double-blind randomized study in 10 healthy female volunteers whose skin had been made dry and irritated by repeated application of SDS. While SC hydration was assessed through conductance measurements, skin surface smoothness was evaluated through a subjective visual and tactile assay and by profilometry of skin surface casts. All methods provided similar results and showed a rapid recovery of the skin surface following one week's treatment with either product. Without any further treatment this improvement was sustained a week later except for a slight and not significant worsening of some profilometric parameters in reference product-treated areas.

The correlation of conductance with profilometric results is compatible with the well-known influence of hydration on smoothing of the skin surface relief. The latter also correlated with the subjective assessment of smoothness but had a lower variation coefficient, especially when the depth of deeper furrows was concerned. A good correlation between the 4 parameters of skin was also observed. Hydration of SC is associated with a decrease of the mean depth of furrows and reduction in both furrow spacing and total profile length. The mechanisms of such changes is supposed to include a folding of the plateaus inducing numerous shallow furrows and accordingly a reduction in both the mean depth and spacing of furrows. Moreover a strong swelling of the bottom of main furrows would be responsible for their decrease in depth and shortening of the total profile length.

Although a small group was used in this investigation, it clearly demonstrated that an ointment based on a concentrated colloidal oat ex-

tract had a similar or higher hydration and softening effect on a human SC than a conventional W/O greasy cream and consequently could be of interest in the treatment of chronic irritant or itchy dermatoses.

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