11-2 Biophysical effects after cutaneous application of dermatological products made from sediment of mineral waters Lanjarón-Capuchina by skin bioengineering methods

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The study was designed to distinguish the skin response after the continuous application (three months) of two different osmotic dermatologic products: a Moisturizing Emulsion and a Facial Mask, both elaborated from Lanjarón-Capuchina mineral water (dry residue: 19.871 mg/l; chloride (Cl\(^-\)): 8.867 mg/l; sodium (Na\(^+\)): 3.941 mg/l; calcium (Ca\(^{2+}\)): 1.423 mg/l; magnesium (Mg\(^{2+}\)): 235 mg/l; sulphate (SO\(_4^{2-}\)): 448 mg/l; bicarbonate (HCO\(_3^-\)): 1.732 mg/l and iron (Fe\(^{2+}\)): 28 mg/l).

Objectives: The main objective of the present study was to determine the in situ biomechanical behaviour of skin in response to the use of two dermatologic products manufactured from the sediments (saline muds) of Capuchina water. The impact of the osmotic products on the biomechanical behaviour of human skin, its pH, sebum output, barrier function and dermal density was quantified in healthy volunteers using several non-invasive approaches.

Material and Method: Experimental data were obtained in 38 healthy women aged 32 to 58 years (41.4±5.9 years) with no prior skin problems of any relevance. Written informed consent was obtained from each participant.

Subjects were instructed to apply the moisturizing cream (Emulsión Hidratante del Balneario de Lanjarón) to the face each day after a cleaning routine in the morning and evening. Once a week, the participants applied the face mask (Máscara Facial del Balneario de Lanjarón) for 20 minutes.

The biological response was registered by means of five non-invasive techniques: Cutometer, Sebumeter, pH-meter, Reviscometer and Tewameter (TEWL).

Formerly safety tests were performed on cosmetic.

Results: The results suggest that skin response may be modified and/or controlled, significantly reducing skin sebum (6%), TEWL (21%) and skin fatigue due to repeted suction (30%) after 15 days of treatment and stabilized after approximately 60 days.

On the other hand, a considerable increase of total skin elasticity \(U_a/U_f\) (19%), skin resistance to maximum extension \(U_f\) (5%), and dermal redensification evaluated by means of the
Reviscometer (6%) was observed. The pH and cutaneous viscoelasticity (Uv/Ue) determinations have resulted irrelevant and not significant.

Conclusions: We can conclude that:

1. Dermatological products prepared with Lanjarón-Capuchina sediment are safe and healthy for the skin.
2. Sebum without affecting the skin barrier function is regulated.
3. After 30 days of treatment significantly reduces transepidermal water loss. That is, the skin barrier function is enhanced.
4. Skin pH is not affected after treatment implantation.
5. There is a significant increase in dermal density, which begins to occur after a month of treatment.
6. Increased skin resistance to suction (firmness) from 15 days occurs and rises slightly to 90 days.
7. Considerably increases the elasticity of the skin, which at 30 days of treatment is estimated at 20%, remaining at these values until the end of the study.
8. By repeated skin suction, skin fatigue considerably decreased, 30% from baseline.

Overall treatment application normalizes the amount of sebum, without greatly altering the ecology and skin barrier function, clearly favouring the biomechanical properties of the skin, especially the parameters that are modified by time.

Keywords: Dermatological products, Osmotic pressure, Skin care, Antiaging, Non-invasive method