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Beauty beyond appearance: Skin perceptibility as beauty factor

Stefan Hettwer^{1*}, Emina Besic Gyenge¹, Loya Schoeffel¹, Brigit Suter¹, Barbara Obermayer¹

Affiliation: ¹RAHN AG, RAHN-Cosmetic Actives, Doerflistrasse 120, 8050 Zurich, Switzerland

1. Introduction

The pursuit of anti-ageing interventions has been documented throughout human history, with early civilizations such as the Egyptians already used natural ingredients like milk and honey's humectant properties to maintain skin youthfulness [1]. The Greeks and Romans employed oleic acid-rich olive oil and various botanicals for skin preservation [2]. The 20th century marked a paradigm shift with the introduction of bioactive compounds like retinoids, peptides, and antioxidants, designed to mitigate dermal aging by enhancing cellular turnover and collagen synthesis [3]. This focus has predominantly been on the visual perception of skin, emphasizing the reduction of wrinkles, increased dermal elasticity, and the minimization of dyschromia.

While visual perception has historically dominated dermatological aesthetics, there is an emergent paradigm emphasizing the sensory conception of skin feel. This novel approach prioritizes the somatosensory experience of skin—its tactile properties rather than its optical attributes. The mechanoreceptors in the skin, particularly Meissner's corpuscles and Merkel cells, play a critical role in perceiving smoothness and softness [4], which can elicit hedonic responses and contribute to an alternative beauty framework that values sensory gratification. The condition of one's skin can profoundly influence psychological constructs such as self-esteem and confidence. Smooth and healthy skin is often correlated with perceptions of vitality and attractiveness, both intrapersonally and interpersonally. The tactile sensation of smooth skin can enhance self-efficacy and social confidence, aligning with psychological models such as Maslow's hierarchy of needs [5], where self-esteem is integral to achieving self-actualization.

Skin is frequently perceived as an indicator of physiological health and youthfulness, enhancing its attractiveness to others. Social comparison theory posits that individuals engage in comparative evaluations, and possessing smooth skin can serve as a positive reference point, augmenting social status and desirability. This attractiveness extends beyond visual appeal to encompass tactile allure, as smooth skin invites somatosensory engagement and interpersonal proximity. Cosmetic formulations can evoke the feeling of smooth skin but also of tension [6].

The tactile experience of smooth skin can exert significant biopsychosocial effects on both the individual initiating touch and the recipient [7]. For the toucher, the sensation of smooth skin can activate neural pathways associated with intimacy and social bonding, potentially increasing oxytocin secretion, which facilitates trust and emotional connection [8]. For the recipient, tactile engagement can reinforce perceptions of being valued and cared for, enhancing self-esteem and psychological well-being [9].

These observations are supported by different psychological models: The attachment theory underscores the importance of physical touch in emotional bonding [10]. The enhanced tactile quality of smooth skin can potentiate the efficacy of touch, fostering stronger affiliative bonds [11].

The self-perception theory suggests that individuals infer attitudes from their own behavior [12]. Experiencing smooth skin can lead to positive self-attributions, reinforcing self-esteem and confidence.

The social exchange theory conceptualizes social interactions as exchanges [13]. The hedonic pleasure derived from smooth skin can be viewed as a beneficial exchange, enhancing interpersonal relationships and social dynamics [8].

In summary, while the visual perception of skin has traditionally been the focal point of aesthetic standards, the sensory conception of skin feel presents a scientifically grounded alternative. By elucidating the psychological and physiological impacts of skin feel, both on self-perception and social interactions, this emerging concept can redefine dermatological aesthetics, promoting a comprehensive approach to beauty and psychosocial well-being.

2. Materials and Methods

Chicory Extract was manufactured by pressing the roots of *Cichorium intybus*, followed by filtration and appropriate preservation. (INCI: Water, Cichorium Intybus Root Extract, Pentylene Glycol, Citric Acid). The efficacy of Chicory Extract was evaluated through an *in-vivo* study assessing its impact on various skin parameters. The study employed a double-blind, placebo-controlled design involving Caucasian subjects, conducted in accordance with GLP, GCP, and ethical principles defined in the Declaration of Helsinki. Participants provided written informed consent and applied emulsions containing 3 % Chicory Extract (verum) or not (placebo) over a specified period. Measurements were taken 30 minutes after application, 7 days and 28 days after application.

Skin roughness was evaluated using AEVA and a frictiometer. Skin evenness was evaluated dermatologically and by the subjects themselves. Skin quality as well as skin luminosity were assessed dermatologically.

AFETS (Affective Facial Expression Tracking System) was used to track the emotional arousal of test subjects after application of cosmetic formulations. Electroencephalography was used to assess the emotional state of volunteers stroking the skin of the treated subjects. An EEG-32 channel dry electrode helmet was used. Alpha waves asymmetry served as a measure for positive or negative arousal [14]. This technique allowed for direct measurements of emotional perception, in contrast to devices measuring the stimulation of Meissner corpuscles only.

3. Results

Chicory Extract at 3 % was able to reduce skin roughness by 1.9 % after 7 days twice daily application and by 2.7 % after 28 days as measured by AEVA (fringe projection), significant over placebo (Figure 1, top left). Measurement of skin evenness by frictiometry revealed a smoothening of the skin by 29.4 % and 59.3 % after 7 and 28 days (Figure 1, top right). The effect was significant to initial condition and placebo, which did not show significant effects at all. This effect was confirmed by dermatological scoring (bottom left) and subjective survey (bottom right) of the study participants. Skin evenness improved by 51.6 % after 7 days and by 96.2 % after 28 days. The effect of placebo stayed below 31 %. The significant improvement of skin evenness over baseline and placebo was as such confirmed by 4 independent measurements with two different devices and two independent human assessments.

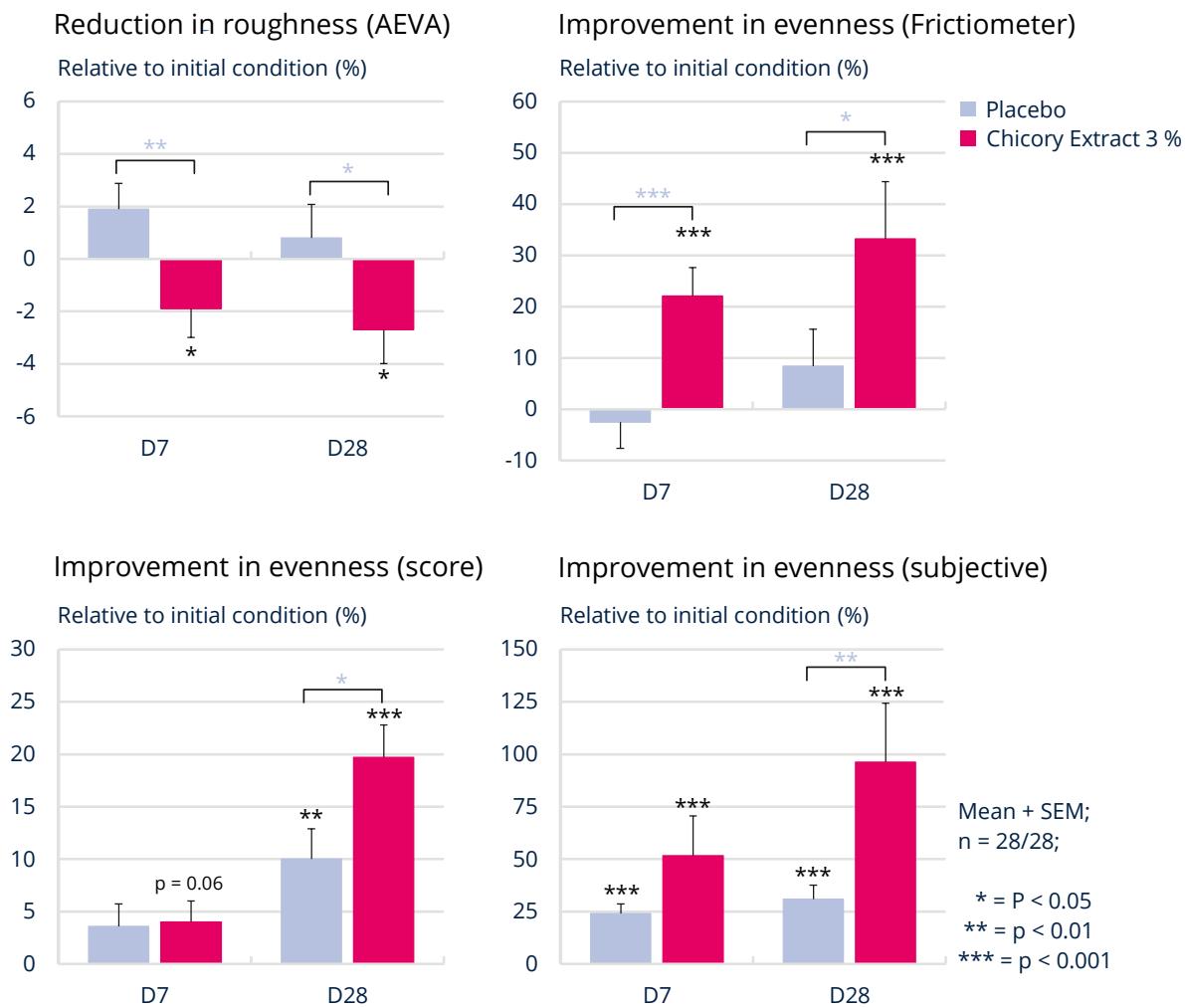


Figure 1: Assessment of skin roughness / evenness reveals superior activity of Chicory extract over placebo. Top left: Skin roughness assessed by AEVA. Top right: Skin evenness assessed by a frictiometer. Bottom left: Clinical scoring of skin evenness. Bottom right: Subjective survey of skin evenness.

Reduced skin roughness (= improved skin evenness) can translate to a better skin quality and brighter skin complexion or luminosity. Improved skin quality by 5.4 % and 17.8 %, significant over baseline and placebo was confirmed by dermatological inspection (Figure 2).

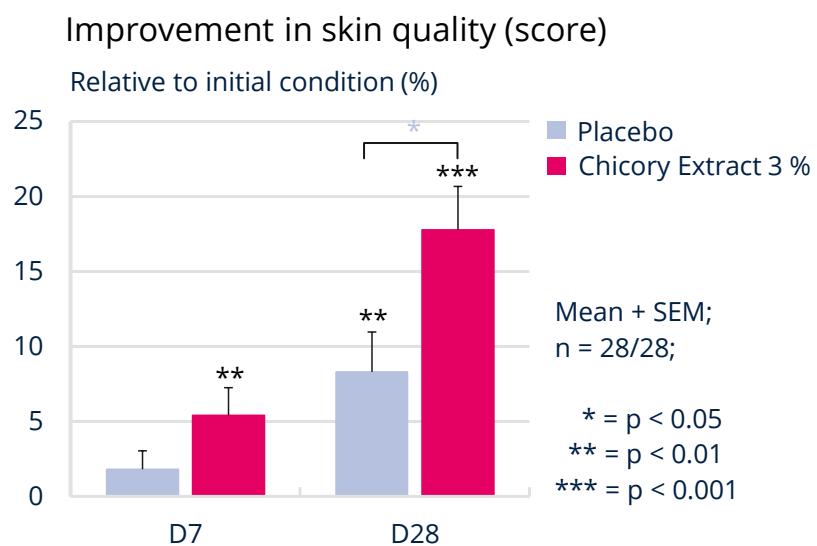


Figure 2: Improvement of skin quality by dermatological assessment.

Assessment of skin luminosity revealed an improvement in clinical scores of 8.8 % after 7 days and 31.3 % after 28 days, significant over baseline and placebo (Figure 3).

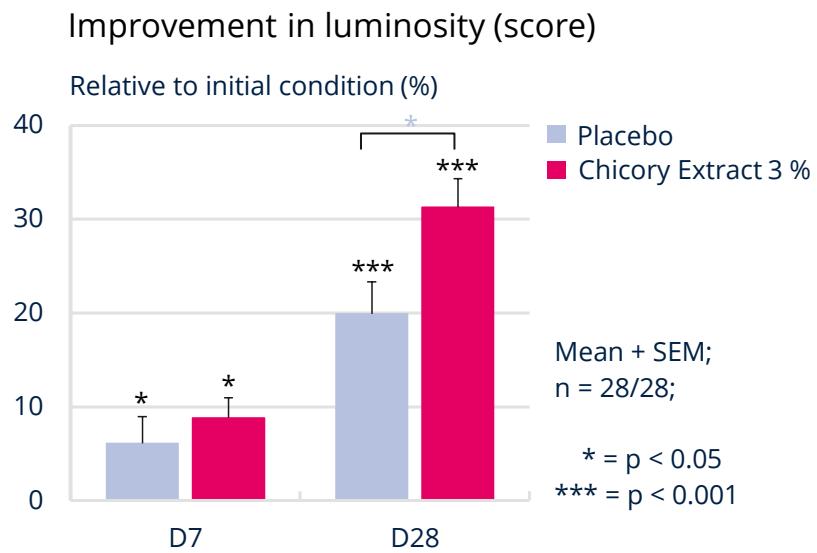


Figure 3: Improvement of skin luminosity by dermatological assessment.

Even and luminous skin may have an impact on the individual's emotional state. To elucidate any changes in the emotional landscape of the study subjects using one of the cosmetic formulations, an AFETS (Affective Facial Expression Tracking System) was used to determine

the emotional arousal 30 minutes after application of the cosmetic formulations (placebo or the same formulation including 3 % Chicory Extract)(Figure 4). At D0 (before application), both groups had a positive expectant feeling. 30 minutes after application, the group using 3 % Chicory extract had a feeling of positive excitement. Placebo group, on the other hand, had a feeling of tension with higher intensity. After 7 days, the excitement for the formulation containing 3 % Chicory extract reached a maximum. The feeling of tension in the placebo group reached a maximum as well. The intensity of the deflection was quite the same for both groups. After 28 days, the feeling of excitement for the verum group was only marginally reduced while the feeling of tension was strongly reduced, but did not enter the positive mood area. Overall, the use of 3 % Chicory Extract in a cosmetic formulation evoked positive feelings of excitement and joy while the same formulation without Chicory Extract evoked an unpleasant feeling of tension.

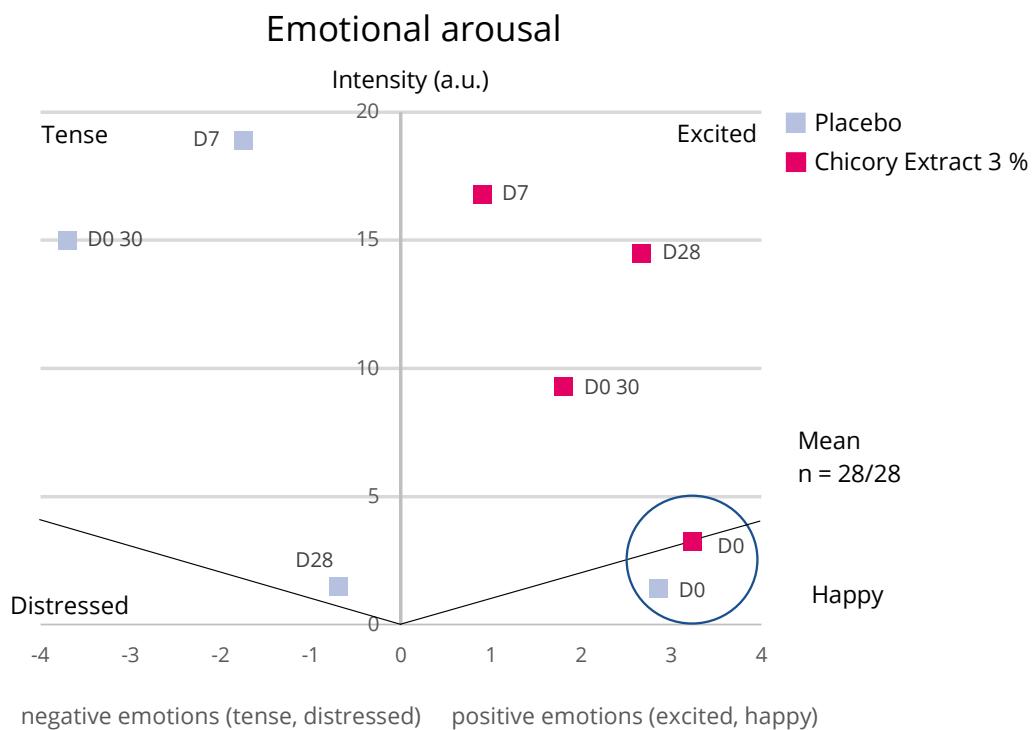


Figure 4: Emotional arousal after application and use of cosmetic formulations. The right side of the graph represents feelings of tension, the right side of positive excitement.

The above results showed a positive emotional arousal of the persons using the cosmetic formulations containing Chicory Extract. In the next experiment, we used electroencephalography to measure the emotional response of a person stroking the person who had used the cosmetic products. The question was whether 3% Chicory Extract included in the formulation made the skin more pleasant to others. We measured the positive affect of the stroking person as the asymmetry of alpha waves in the frontal cortex between the left (rational) and right (emotional) hemispheres. Indeed, the asymmetry increased significantly towards a pleasant perception when Chicory Extract had been applied to the person's arm. Placebo had the opposite effect (Figure 5).

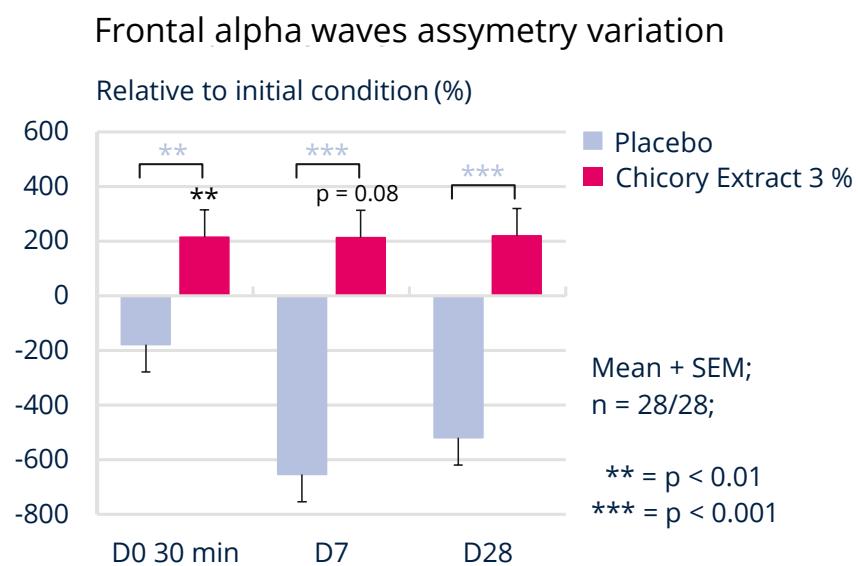


Figure 5: Improved alpha wave activity on the left frontal lobe of the brain after stroking the subject's arm treated with 3 % Chicory extract. The opposite effect was recorded for placebo.

4. Discussion

The findings of this study underscore the significant role of skin texture in shaping emotional experiences and social interactions. The application of Chicory Extract at a concentration of 3% demonstrated a marked improvement in skin smoothness and evenness, as evidenced by instrumental measurements and subjective assessments. The reduction in skin roughness and enhancement of skin luminosity were quantitatively confirmed through dermatological inspections and advanced imaging techniques, highlighting the efficacy of the Chicory Extract

in improving skin quality. These improvements in skin texture are not merely superficial; they translate into enhanced emotional states, as revealed by the Affective Facial Expression Tracking System (AFETS).

The emotional responses elicited by the Chicory Extract formulation were characterized by feelings of excitement and joy, contrasting sharply with the tension experienced by the placebo group. This divergence in emotional arousal underscores the psychological impact of tactile experiences, suggesting that the sensory qualities of skin can significantly influence emotional well-being. The sustained positive emotional responses observed in the Chicory Extract group over the 28-day application period further emphasize the potential of cosmetic ingredients to evoke enduring emotional benefits.

Moreover, the integration of social interactions into the cosmetic experience is pivotal in shaping the impressions we leave on others. The tactile allure of smooth and supple skin enhances social interactions, fostering positive emotional experiences and boosting confidence. This research highlights the importance of considering both the physiological and psychological dimensions of skin in the development of cosmetic products, advocating for a holistic approach to beauty that prioritizes emotional and social well-being alongside visual aesthetics.

5. Conclusion

In conclusion, the study presents compelling evidence for the transformative potential of cosmetic ingredients in redefining beauty standards. By emphasizing the interplay between skin texture, emotional responses, and social interactions, this research advocates for a paradigm shift in the beauty industry, encouraging the development of products that enhance not only appearance but also emotional and social experiences. The Chicory Extract represents a promising advancement in this direction, offering a new perspective on beauty that celebrates the sensory and emotional dimensions of skin. As the industry continues to innovate, embracing a comprehensive view of beauty that integrates physiological and psychological factors will be essential in meeting the evolving needs and expectations of consumers.

6. References

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