

Reflectance confocal microscopy and Image Analysis to Evaluate the Efficacy of a Topical Facial Serum with 20% Vitamin C in Improving Signs of Aging

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INTRODUCTION

Vitamin C is known for its antioxidant potential and activity in prevents and reverts signs of aging, also by the collagen biosynthetic pathway¹. Photoprotective properties of topically applied vitamin C have also been demonstrated², placing this molecule as a potential candidate for use in the prevention and treatment of skin aging.

OBJECTIVE

A clinical study to evaluate the effect of a topical antioxidant serum containing 20% of vitamin C in different forms (Ascorbic acid, Ascorbyl Methylsilanol Pectinate and Ascorbyl Glucoside) associated with ferulic acid and *Ginkgo biloba* extract in photodamage skin in Brazilian subjects.

METHODS

A total of 10 subjects (women) ages 18 to 60 years, with Fitzpatrick skin types II to IV, applied the topical antioxidant serum once a day, for 30 days. Clinical assessments were made at the beginning and after 30 days of daily treatment.

Efficacy evaluation included skin image analyses and reflectance confocal microscopy.

The apparatus of digital photography imaging system is connected to research software that enables evaluation of visible and UV spots, pores, wrinkles, and texture³.

In vivo reflectance confocal microscopy (RCM) is based on the imaging of light reflected by living tissue. The confocal images are registered in gray scale, where white represents the total reflected light and black is associated with the region without reflection. The images are recorded in the presence of an endogenous contrast, which can be provided by microstructures, such as melanin, or cellular organelles⁴.

RESULTS

Topical application of 20% vitamin C serum was an effective treatment of photoaged skin. With image analysis apparatus, it was observed reduction of number of wrinkles (Fig. 1) and improvement of skin texture (roughness and pores), and reduction of visible and UV spots, showing an effective bright effect (Fig. 1) to the global face skin.

CONCLUSIONS

The valuable results provided scientific clarification about the effects of 20% vitamin C serum on skin. In summary, the studied formula led to a clinically apparent improvement of the photodamaged skin observed by the reduction of number of wrinkles and improvement of skin texture (roughness and pores), and reduction of visible and UV spots, showing an effective bright effect to the global face skin. Also, 20% vitamin C serum improve epidermis structure and promoted a more uniform collagen fiber distribution. These results suggesting a positive influence of topical vitamin C over parameters characteristic for sun-induced skin aging.

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Figure 1.: Improvement of photodamaged skin assessed by image analysis apparatus, emphasizing effective bright effect (A and B) and reduction of wrinkles (B and C).

To evaluate the efficacy of anti-aging products, several parameters can be analyzed by means of RCM. Initially, it is possible to evaluate the thickness of different layers of the epidermis. In this study the use of 20% Vitamin C serum for 30 days enhanced the thickness of the granular layer and spinous layer. This result could be related to the moisturizing effect of the studied formula in the deeper layers of the epidermis. This should provide improvement in skin appearance, such as the reduction of wrinkles.

This technique also allows one to analyze the cellular density in a specific layer of the epidermis, furnishing a more accurate conclusion about the possible effect of a product on the layer thickness. In other words, if the number of cells remains the same with increasing thickness, the formulation probably acts as moisturizer. If the number of cells rises, the effect most likely corresponds to cell renewal. In this case, the number of cells remains the same, reinforce the moisturizing effect of 20% Vitamin C serum.

With aging, the keratinocytes become more irregular, and areas with heterogeneous pigmentation (spots) become evident⁴. After 20% Vitamin C serum treatment, the keratinocytes were more uniformly distributed and homogeneous (Fig. 2A). It was also observed a reduction on heterogeneous pigmentation that emphasize the bright effect of the formula (Fig. 2B).

Changes also occur in the epidermal-dermal junction with photoaging. Hence, a formulation with anti-aging effects that acts on collagen fibers must improve the homogeneity of these fibers in the epidermal-dermal junction, as well as increase their amount, which diminishes with age⁴. It is possible to note a more uniform fiber distribution after 20% Vitamin C serum treatment and increase amount of fiber demonstrated by bright images as compared to the initial ones (Fig. 2C). Moreover, it is possible to measure the papillary diameter that is known to be enlarged with age. A non significant statistically reduction of papillary diameter was observed after treatment.

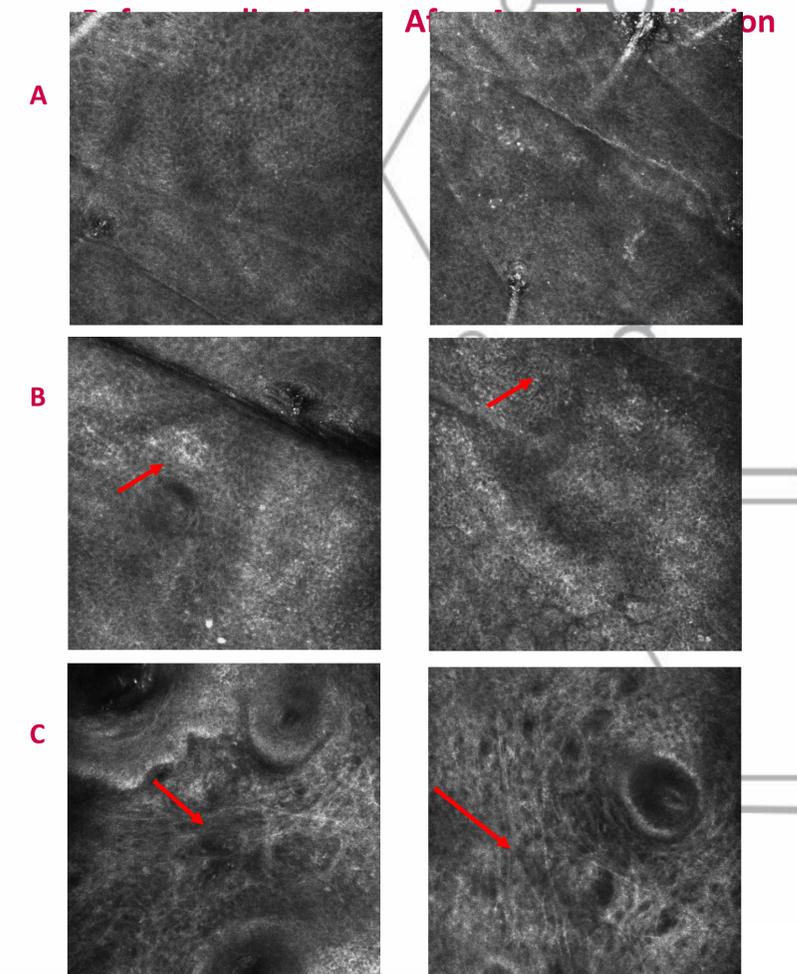


Figure 2: Cellular epidermal features obtained by RCM emphasizing the keratinocytes more uniformly distributed and homogeneous (A), reduction on heterogeneous pigmentation (B) and a more uniform and increase collagen fiber distribution (C) after vitamin C serum treatment.

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