

Foundations Tone Effect on the Moisture Level of the Stratum Corneum

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Abstract

The aim of this study was to compare the effect of two foundations, of different tones, on the moisture level of the stratum corneum. These foundations are equal in composition, except for the percentage of pigments, being one light-colored and the other one dark. We report significant differences between moisture levels after the application of the products of different tones, so we conclude that the amount of pigment affects the parameter under study.

Introduction

Nowadays there are a variety of products for skin care in the market, which explains a substantial volume of sales. According to the PROEXPORT report, cosmetic and toiletry sector in Latin America mobilized an amount close to USD 51.944 million in 2008 [1], where the main markets are Brazil, Mexico, Venezuela, Argentina and Colombia. And according to the global picture, cosmetic industry is constantly growing. As stated by Euro monitor, Latin America will experience accelerated market dynamics in the world until 2013 (3.8% per year), due to the increasing demand for care products for hair, skin and fragrances, which have strong advertising campaigns and wide acceptance.

Within this group of products we can mention foundations, which aim to even out the skin color, giving luminosity, coverage, color, moisture, texture, and a healthy and natural skin appearance [2].

One of the keys to keep the skin healthy is to maintain or to improve the water level. The water content in the stratum corneum (SC) and superficial lipids are important factors in the appearance and function of the skin. A disruption of the balance between them may lead to clinical manifestations of dryness [3].

In cosmetic effectiveness studies, measuring moisture level of SC, provides important information about the biophysical properties and the barrier function of the skin. With the right amount of water in the SC, skin maintains its barrier function intact, it feels soft and flexible, keeping a healthy appearance [4].

Instead, dry skin shows alterations in the lipid bilayer, which are associated with increased levels of fatty acids and decreased levels of ceramides in the SC. Furthermore, deficiencies in this barrier promote evaporation of water, known as transepidermal water loss [5]. For these reasons, there are many products that have moisturizing as their claim.

In the present study, the effect of two foundations with two different tones on moisture levels of the stratum corneum is compared figure 1.

Materials and Methods

Test sample: foundations

We selected two foundations available in the market under the following considerations: The belonging to the same brand and the same line declared in the advertising, being equal in composition, except for the percentage of pigments (Table 1); being one of a light tone and the other one dark.

Subjects for *in vivo* evaluation

The moisture level assessment was conducted with the participation

of 42 volunteer residents from Bogotá, who were selected from the database of Effectiveness Evaluation Laboratory, under the following inclusion criteria, and according to the recommendations contained in Colipa Guide [4]: being free from skin diseases, not being pregnant or in a lactating stage, being female, and being in the age range between 25 and 50 years. After giving informed consent to take part in the study, the group was divided into two subgroups, with the participation of 21 volunteers in the evaluation of each foundation. Both groups attended in the same dates, and were subjected to the same conditions. The assessment areas were calves, because measurements in this area show less variability of the data with the measuring equipment used [6].



Figure 1: Used pigments in cosmetic products. <http://www.e178.magistersystems.com/pigmentos.html>.

LIGHT TONE PIGMENTS	%
IRON OXIDE TYPE 1	0.72
IRON OXIDE TYPE 2	0.20
IRON OXIDE TYPE 3	0.03
DARK TONE PIGMENTS	%
IRON OXIDE TYPE 1	1.63
IRON OXIDE TYPE 2	0.40
IRON OXIDE TYPE 3	0.22

Table 1: Pigments percentage in foundations.

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Application procedure

After an acclimatization process, with controlled temperature and relative humidity, application areas were delimited, being equivalent in both calves. Seven 4 cm × 4 cm zones were marked for the application of each product under evaluation as well as for a negative control, without product.

After baseline measurements were performed using the probe of SKICON 200EX equipment, a standardized amount (50 µl) was applied on areas of each of the foundations under evaluation. After control times, the applied foundation was with down with the help

of a paper towel, simulating a normal makeup removal, and then the measurements were taken.

Measurement equipment

The instrument SKICON 200EX measures the conductance of a high frequency current of 3.5 MHz. Conductance values of the skin are given in units of micro siemens (uS) [7]. The moisture level of the skin surface is proportional to the conductance through the stratum corneum.

Statistical evaluation

Measurements were performed in triplicate and the average

Table 2. Moisture level for light tone foundation.

Control times	Datum (n)	Before (µS)	After (µS)	Significancy (p<0.05)
30 Minutes	21	31.367	67.250	0.000
18 Hours	21	32.250	46.633	0.000
24 Hours	21	33.042	45.267	0.000

Table 3. Moisture level for dark tone foundation.

Control times	Datum (n)	Before (µS)	After (µS)	Significancy (p<0.05)
30 Minutes	21	30.398	53.556	0.000
18 Hours	21	31.745	34.111	0.200
24 Hours	21	30.859	31.070	0.922

Table 4. Moisture level for negative control.

Control times	Datum (n)	Before (µS)	After (µS)	Significancy (p<0.05)
30 Minutes	21	32.583	31.283	0.219
18 Hours	21	32.583	32.967	0.835
24 Hours	21	32.583	33.05	0.787

Table 5. Comparative evaluation of moisture level between light and dark foundation.

Control times	Datum (n)	Moisture levels		Significancy (p<0.05)
		Light foundation (µS) (After- Before)	Dark foundation (µS) (After - Before)	
30 Minutes	42	35.883	23.158	0.012
18 Hours	42	14.383	2.366	0.000
24 Hours	42	12.225	0.211	0.000

Average moisture levels for light tone foundation.

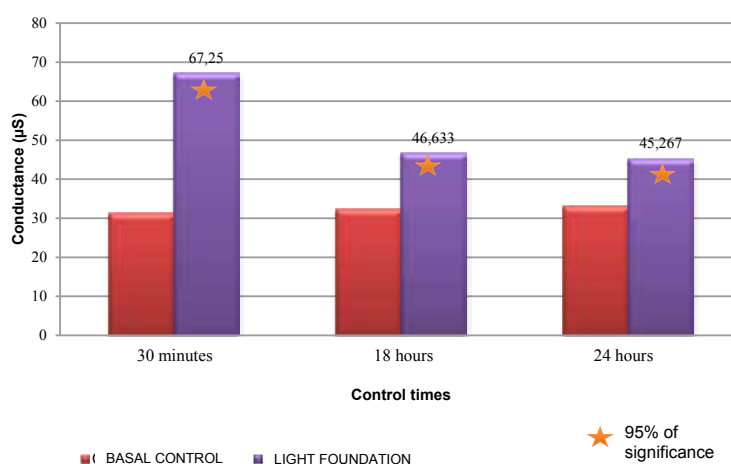


Figure 2: Light foundation effect on the moisture level of the stratum corneum.

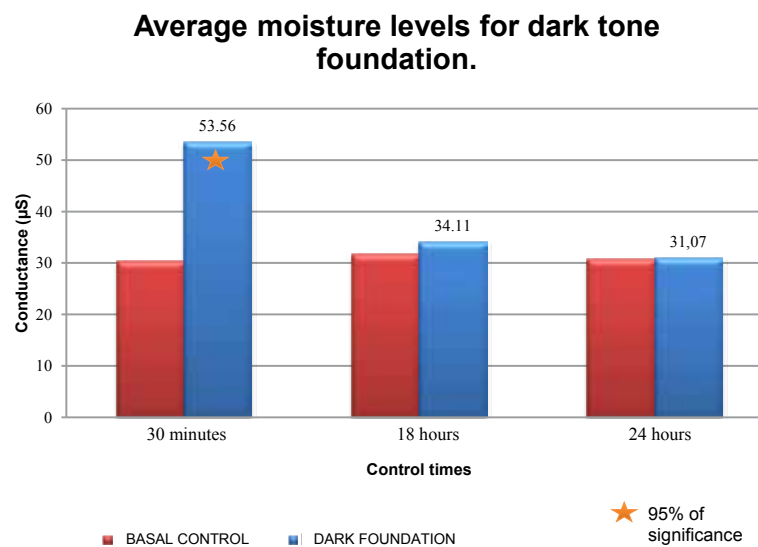


Figure 3: Dark foundation effect on the moisture level of the stratum corneum.

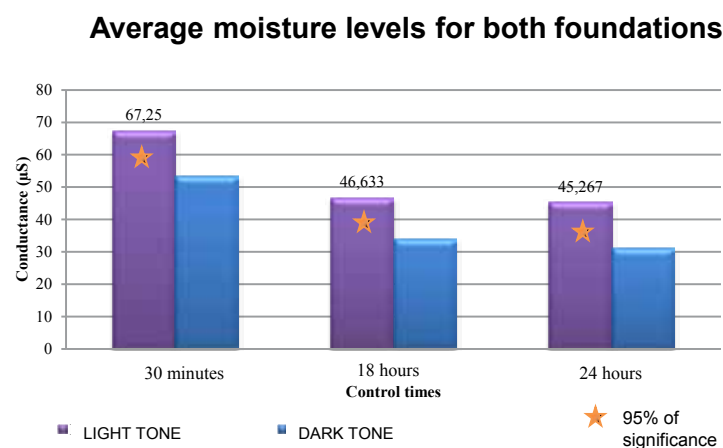


Figure 4: Comparative graphic of the effect on the moisture level of the stratum corneum for both foundations.

value of the moisture level per volunteer was calculated by measuring time and by tone foundation. We used the paired t Student test to compare differences between measurement times after application of foundation, and the independent Student t test [8] to compare the effect of two foundations. The significance level chosen was 0.05. Statistical calculations were performed using SPSS version 18.0.

Results

Table 2 shows the moisture level values obtained after the application of Light Tone foundation, reporting a significant increase in all-time control (Figure 2). Table 3 shows the moisture level values obtained after application of dark tone foundation, reporting a significant increase only in the control time of 30 minutes, after application of the product (Figure 3). Table 4 shows the moisture level values of the negative control in each of the control times established for the study. No significant difference is reported in any of them. Table 5 shows the comparative assessment of the moisture level between both foundations, showing significant differences between them at all

established times in the study (Figure 4), being higher moisture levels with light tone foundation than with dark tone foundation, in other words skin's moisture levels decrease with increasing pigments content.

Conclusions

There are significant differences in moisture levels of the skin, after the application of foundations of different tones. According to what was observed in the present study, the amount of pigment in the formulation affects the moisture level in SC, and this result could be considered for the development of new cosmetic products.

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