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Critical Analysis of Make-Up Formulations for Vitiligo Skins

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ABSTRACT

Vitiligo is a disease prevalent in one to two percent of the global population. It is characterized by non-pigmented blotches dispersed throughout the skin and can affect individuals of both genders and all age groups. Vitiligo affects only skin appearance; it is a non-transmissible disease and causes no further harm to the skin. There are several methods designed to treat and improve skin appearance; "camouflage" products are widely used to mask skin blotches. These products are of opaque color and are capable of covering a great extension of skin. The aim of this work was to critically analyze market products designed to treat vitiligo, describing and comparing their compositions to the ideal parameters described in scientific literature. Products of similar compositions and same key ingredients albeit with a huge price difference were identified; the price discrepancy is usually justified by the use of unusual active compounds. It is concluded that products aimed at treating vitiligo should be better and further explored in Brazil, evidencing there is market demand for such products. Also, the formulations of such products vary in composition.

Keywords: Vitiligo; Camouflage; Skin; Make-up

INTRODUCTION

Vitiligo is a depigmentation skin disorder; skin melanocytes, the cells responsible for the production of melanin, the pigment which confers color to the skin, undergo cell death [1-3]. Among skin diseases worldwide, vitiligo is the most prevalent, affecting 1 to 2% of the global population [2].

The disease affects a great portion of the young population; the first signs appear before they reach to 20 year of age. Children, individuals from all races, and both genders could affect equally [3,4]. It is still unknown the real cause for the disease, but there are several hypotheses which suggest the melanocytes of the patients are destroyed somehow. Other theories suggest autoimmune mechanisms, redox imbalances, genetic background oxidative stress, neural disorders and even influence from other autoimmune diseases such as diabetes and alopecia play a role on the development of vitiligo [5-8].

As there are several possible causes for the disease, it is difficult to find a proper treatment for it, even less likely a cure. As the disease develops, the patients reach out for different therapies in order to combat it, not because it harms their health, but because it damages their self-esteem by drastically affecting their appearance [8-10]. There are studies which have investigated the social and psychological effects of this disease, usually linked to low self-esteem and depression. There are some therapies which attenuate the development of skin blotches, such as the use of ultraviolet light, topical application of creams and corticoid drugs, depigmenting treatments and even the acquiring of permanent tattoos [10-13].

Cosmetic skin camouflage is efficient in improving overall satisfaction and self-esteem of vitiligo patients. Studies carried out assessing DLQI (Dermatological Life Quality Index) evidenced improvements in patient life after the use

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of cosmetic camouflage [13]. Vitiligo patients went through explanatory classes and made use of cosmetic camouflage for a month; DLQI improved from 5.90 to 4.48 (the lower the value, the lesser the impact on life quality of the individual) [9,13,14].

Camouflage in a general context means "hiding something". The use of cosmetic camouflage started during World War II and continues till today. It was actually first used by individuals who are suffering from vitiligo [15]. Cosmetic camouflage of vitiligo blotches involves usually make-up, such as bases and other products designed with certain characteristics, which include color, opacity, long duration, being waterproof and resistant to sweat, having good adherence to skin, ease of application and removal, allergenicity, photosensitization and finally a viable cost [15,16].

The main aim of this work was to analyze and compare commonly commercialized make-up products designed to treat vitiligo, describing their composition according to ideal parameters for these products reported in scientific literature and also evidencing properties and functions of each product which stand out in comparison to other products.

MATERIALS AND METHODS

This work is a bibliographical review which was carried out using Google Scholar and Scielo platforms to look for studies in national and international scientific literature. The following key-words were used: camouflage, vitiligo, make-up, skin, raw materials, and cosmetics. These keywords were searched for in Portuguese, Spanish and English.

Discussion and results were based on the products from eight brands which commercialize products designed to work as cosmetic camouflage to treat vitiligo. The brands chosen were the largest available in the world market which commercialize products for vitiligo that could be obtained in Brazil.

Analysis consists of comparison between products, assessing their characteristics, formulation composition and market appeal. For such, key ingredients were assessed: consistency agents, emollients, sensorial modifiers, covering agents and active compounds. The choice of key ingredients relied upon the observation of ideal properties for these products. The research was comprised from 2010 to 2019.

Results and Discussion

Camouflage make-up is developed differently from traditional make-up, as it is designed to neutralize or hide skin disorders. Some properties are important for the make-up to work as intended: (a) maintaining natural and opaque appearance; (b) not being transferable to clothes; (c) being water, sweat and heatproof; (d) being of long duration; (e) free of odors; (f) non-comedogenic; (g) being non-sensitizing; (h) having a wide range of available colors in order to appeal to all races and ethnicities; (i) good covering capabilities; (j) non-occlusive [15,17].

The most common formulations for camouflage make-up include correctives and cream bases used in emulsions [17]. Such emulsions can be classified regarding the phases which compose them: water in oil (W/O), oil in water (O/W) or water in silicone (W/Si). W/O emulsions contain a greater amount of oil compounds and can suspend the pigments used in make-ups. O/W emulsions contain a greater amount of water content and are generally more fluid. W/Si emulsions have silicon as the external phase, and thus their sensorial properties are more pleasant; they also dry faster and can be more efficient in oily skins [16,17].

Beyond emulsions, anhydrous bases can be used in order for better waterproof products to be obtained. Several oily materials are incorporated into these bases such as silicon, mineral oil, vegetal oil, animal oil, fatty acids, fatty alcohols and synthetic esters associated with waxes of different melting points; the aim for the use of these compounds is improvement of texture and cream viscosity. High concentrations of pigments can be added to these formulations in order to properly cover skin blotches [18,19].

In liquid base formulations, the concentration of pigments varies from 25 to 50%, and in pasty formulations this concentration can increase to up to 60%. The most commonly used pigments are inorganic, obtained from minerals such as titanium dioxide and iron oxides. Beyond these, synthetic dyes can also be used, but are done so to a lesser extent in comparison to natural pigments [18,19]. As the technology is much advanced, pigments with specific characteristics were developed. These pigments can facilitate dispersion, make the formulation more pleasant to touch and generally feel more natural. Some pigments can also have optic diffusion effects, widely used to attenuate skin accidents [19,20].

There is a great range of make-up brands spread worldwide. Among these few are Lóreal (also responsible for the make-up brands Vichy and Lancome), Esteé Lauder (owner of MAC and Clinique), Shiseido (owner of Bareminerals, Laura Mercier and Nars) [21]. Thus, eight products designed for vitiligo camouflaging from different market brands were chosen and analyzed, as shown in table 1

Description of appeal and of functions of key-ingredients and critical analysis of each product are shown in Table 2. Product 1 contains fewer ingredients and the amount of powder components is greater in comparison to the major structural components (bee wax plus liquid paraffin) and thus the product can be considered a paste (Table 2).

Table 1: Products for camouflage of vitiligo.

Product	Label	Brand
1	Covermark Foundation – 28g	Covermark
2	Vichy Dermablend Fluid Base SPF 25 – 25mL	Dermablend
3	Dermacolor Camouflage Cream 30 g	Kryolan professional make-up
4	Continuous Coverage – 30 mL	Clinique
5	Dermacol Make-up Cover	Dermacol
6	Corretivo Studio Finish SPF 35 – 7g	MAC
7	Corretivo Full Cover – 15mL	Make up Forever

Table 2: Key ingredients, functions and appeal of the assessed products.

PRODUCT 1		
Appeal	**Cosmetic form**	**Key-ingredients and functions**
High pigmentation, does not block pores, hypoallergenic, long duration, waterproof. Perfect use for blotches and birthmarks, vitiligo, psoriasis, scars or burns and other skin imperfections	Anhydrous paste	• **Iron oxides**: covering and color pigments • **Magnesium carbonate**: absorbing and opacifying agent • **Talc**: sensorial modifier, absorbing agent. • **Titanium dioxide**: covering agent
PRODUCT 2		
Great area of skin covering, natural effect, matte effect, 24 hours of hydration, long duration, non-comedogenic, hypoallergenic, hides dark circles under the eyes and irregular skin tonalities	Emulsion	• **Titanium dioxide:** covering agent, sun blocker • **Iron oxides**: color pigments • **Magnesium sulfate**: agglutination agent • **Pentylene glycol**: humectant • **Aluminum hydroxide**: absorbing and opacifying agent, pigment • **Disteardimonium hectorite**: wax (emollient and consistency agent)
PRODUCT 3		
High amount of pigments, ideal for correcting and covering deformations, discolorations and tattoos in the skin, waterproof, sun blocker, long duration	Anhydrous paste	• **Ascorbyl palmitate:** antioxidant • **Black 2 CI 77266 (nano):** pigment • **Blue 1 Lacquer CI 42090:** dye • **Carmine CI 75470**: dye • **Green chromium hydroxide CI 77289:** pigment • **Green chromium oxides CI 77288:**pigment • **Ferric ferrocyanate CI 77510:** pigment • **Iron oxides:** covering and color pigments • **Magnesium myristate:** drying agent • **Manganese violet CI 77742:** pigment • **Mica:** brightening agent • **Red 22 Lacquer CI 45380:** dye • **Red 28 Lacquer CI 45410:** dye • **Red 36 CI 12085:** dye • **Red 40 Lacquer CI 16035:** dye • **Red 7 Lacquer CI 15850:** dye • **Titanium dioxide:** covering agent • **Ultramarine oxides CI 77007:** pigment • **Yellow 10 Lacquer CI 47005:** organic pigment • **Yellow 5 Lacquer CI 19140:** organic pigment • **Yellow 6 Lacquer CI 15985:** organic pigment

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PRODUCT 4		
Long duration, complete and opaque covering, camouflage of imperfections, birthmarks, scars, sun blocker	Emulsion	• **Aluminum hydroxide:** absorbing agent • **Bismuth oxychloride:** inorganic dye • **Diasterdimonium hectorite:** suspension agent • **Iron oxides:** inorganic color agents • **Magnesium aluminum silicate:** adsorbing agent • **Mica:** sensorial modifier • **Talc:** adherence and adsorbing agent • **Titanium dioxide:** sun blocker
PRODUCT 5		
Waterproof, hypoallergenic, sun blocker SPF 30, extreme and complete covering, 24 hours duration, recommended for all types of skin and for treatment of vitiligo, melasma, tattoos, dark circles under the eyes, marks, burns, acne	Anhydrous paste	• **Alumina:** absorbing and opacifying agent • **Iron oxides:** inorganic color pigments • **Silica silylate:** volume agent • **Talc:** sensorial modifier, absorbing agent • **Titanium dioxide:** sun blocker
PRODUCT 6		
Emollient base, soft and creamy, opaque covering, sun blocker SPF 35, soft and invisible skin correction, long duration, recommended for all skin deformations, natural matte appearance	Anhydrous paste	• **Silica:** oil absorber • **Titanium dioxide:** sun blocker
PRODUCT 7		
Matte appearance, high area of covering, long duration, non-oily texture, waterproof, camouflage of imperfections, scars, hyperpigmentation, burns and tattoos	Emulsion	• **Diasteardimonium hectorite:** suspension agent • **Iron oxides:** inorganic pigments • **Magnesium sulfate:** volume agent • **Polyethylene:** powder agglutination agent • **Dimethyl silica silylate:** suspension agent • **Titanium dioxide:** covering agent
PRODUCT 8		
Rod-shaped product which easily spreads and adheres to the skin, perfectly covering any imperfections. Contains "reflex powder" which corrects the appearance of all types of discoloration while not accentuating skin lines	Anhydrous paste	• **Alumina:** absorbing and opacifying agent • **Barium sulfate:** opacifying agent • **Iron oxides:** pigments • **Mica:** sensorial modifier • **Polyethylene:** powder agglutinizing agent • **Silica:** oil absorber • **Sodium magnesium silicate:** agglutinizing agent • **Talc:** sensorial modifier, absorbing agent • **Titanium dioxide:** sun blocker • **Ginger extract:** soothing agent

*Research Source: Personal Care Products Council 2019 [22].

Product 2 is an emulsion with a higher content of emollient alkanes (tridecane and undecane) and emollient esters (hexyl laurate), both of average carbon chain size. This composition justifies the product appeal of a matte appearance. It also confers spreadability to the product, average drying time and a dry feeling to the skin. This formula has a covering agent and more absorbing compounds than product 1.

Product 3 is a mix of several different pigments, including blue and red pigments, in order to better mimic skin tonalities. The product appeal as a sun blocker is due to the presence of titanium dioxide, which is a physical sun blocker. The product is also a paste formed by mixtures of waxes (from bee, carnauba, candelilla) and acetyl palmitate with emollients which allow the waxes to better mix with themselves, such as glycerin stearate and hydrogenated poly-isobutene. Product 4, on the other hand, has as its oil phase an alkane polymer of average carbon chain (polydecene), which better absorbs pigments. Among all products assessed, this is the product which contains two active compounds: sodium hyaluronate (hydrating agent) and allantoin (relaxing agent).

Product 5 also has an appeal as a sun blocker due to the presence of titanium dioxide as a physical filter. It has a lower amount of waxes and a higher content of emollients in association with the pigments. This product contains alumina; only this and product 7 use this material as a covering and absorbing powder. Product 7 contains thickening agents and silicon-based emollients, such as dimethicone/vinyl dimethicone copolymer and cyclopentasiloxane, respectively. Other emollients are alkanes of average carbon chain (isododecane) or emollient esters (octyldodecyl myristate and polyglyceryl-3-diisostearate), which also act as emulsifiers. The product formulation also contains allantoin, which acts as a relaxing agent, and caper extract, which is an antioxidant active compound and also has some UV blocking activity.

Product 6 has fewer raw materials in its composition, much like product 1. From a total of eight components, five are emollients (jojoba oil, octyldodecanol, hydrogenated poly-isobutene and synthetic bee wax). The other three components are powders used as covering agents and sun blockers. This product has vegetable oil in its composition.

Product 8 is a paste and contains the higher amounts of raw materials in comparison to the other formulations. It contains compounds which function as sensorial modifiers and can camouflage expression lines, pores and skin irregularities. Such compounds include dimethyl ether (PEG/PPG-36/41, dimethicone PEG-10 and sorbitane sesquiisoesterate, which are also film-forming and emulsifiers. Also, this formulation associates emollients of several carbon chain sizes, such as dimethicone, capric acid triglycerides, dipentaerythrtiyl hexahydroxy-stearate, hydrogenated polydecene and microcrystalline waxes. This product contains natural extracts from peony rhizomes and from ginger.

All products contain titanium dioxide and zinc oxides. These compounds are vital for conferring covering to the formulation and act as physical sun blockers. Iron oxides are often used as they can mimic black, brown, red and yellow skin tonalities; in association with titanium dioxide, which is white, different desired tonalities can be achieved [17,19,20].

CONCLUSION

There is a lack of variety due to poor national investment on cosmetic products aimed in treating vitiligo. Even though only a small fraction of the Brazilian population suffers from the disease, commercial brands should invest in this sector of medical camouflage, which comprises not only vitiligo, but other skin diseases as well. None of the products here described are manufactured in Brazil, which means they have higher market price. All products assessed were varying in composition. Titanium dioxide is frequently used as a covering agent, which limits the range of colors that can be achieved, limiting the options for treatment of vitiligo in skins of darker tonalities.

Conflicts of Interest

The authors declare no conflict of interest.

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