Sunscreen's consumer behavior: influence of sensory aspects in the photoprotection habit and purchase motivation

O comportamento do consumidor de protetor solar: influência dos aspectos sensoriais no hábito de fotoproteção e motivação de compra

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ABSTRACT

Introduction: Using sunscreen is a behavior that reduces the risk of skin cancer, among other diseases. The consumer's preferences for sunscreen types can assist dermatologists in recommending the best product to their patients.

Objective: This study aims to indicate consumption and photoprotection habits, investigating answers to sun protection problems. Methods: An exploratory cross-sectional study, conducted through a questionnaire, with data collected directly from the participants.

Results: Among the 300 interviewees, 249 declared to consume sunscreens. We found that most consumers misused sunscreens, and this problem may be related to sensory perception after applying sunscreen to the skin. Also, consumers highlighted the importance of sensory perception, whether visual, tactile, or olfactory, when purchasing this type of product.

Conclusions: This research reveals that the sensory characteristics, compliance, real effectiveness under normal conditions of use, and the market demand for sunscreens are interconnected. Thus, we suggest that dermatologists balance the importance of sensory aspects, cost, and sunscreens brand when recommending them to consumers.

Keywords: Behavior;Cosmetics;Dermatology;Questionnaires;Perception;Sunscreeningagents; Sensation.

RESUMO

Introdução: *O uso de protetor solar é um comportamento que pode ajudar a reduzir o risco de câncer de pele, entre outras doenças. Uma melhor compreensão das preferências do consumidor de protetores solares pode auxiliar os dermatologistas na recomendação deste produto aos seus pacientes.*

Objetivo: *Indicar os hábitos de consumo e de fotoproteção, buscando respostas aos problemas relacionados à proteção solar.*

Métodos: *Estudo exploratório do tipo transversal, realizado por meio de questionário, tendo os dados sido coletados diretamente com os participantes.*

Resultados: *Dentre os 300 entrevistados, 249 mostraram-se consumidores de protetor solar. Detectou-se que grande parte dos consumidores faz uso incorreto de protetores solares, e esse problema pode estar relacionado à percepção sensorial após a aplicação do produto na pele. Além disso, destacou-se a importância da percepção sensorial, seja visual, tátil ou olfativa, como fator decisivo no momento da compra deste tipo de produto.*

Conclusões: *Esta pesquisa revela que características sensoriais, uso efetivo, real eficácia em condições normais de uso e demanda do mercado de protetores solares estão interligados. Dessa forma, sugere-se que os dermatologistas levem em consideração os aspectos sensoriais, o custo e a marca dos protetores solares ao fazerem suas recomendações aos pacientes.*

Palavras-chave: *Comportamento; Cosméticos; Dermatologia; Protetores solares; Percepção; Questionários; Sensação.*

Original Articles

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INTRODUCTION AND OBJECTIVE

Skin cancer is a serious public health problem worldwide. It is the most common malignant tumor in humans, affecting individuals from all countries, regardless of age, sex, or social status.[1] The main risk factor for skin cancer, melanoma, and non-melanoma, is excessive exposure to genotoxic and mutagenic ultraviolet (UV) solar radiation.[2] Other factors, such as skin color, light-colored eyes and hair, family or personal history of skin cancer, virus infection (human papillomavirus), immunosuppression (mainly transplant patients), environmental and occupational factors, may increase the risk of developing skin cancer.[3,4] Considering that the self-defense mechanisms against solar radiation are limited, the need to offer other means of photoprotection whenever there is exposure to the sun becomes evident. Thus, photoprotection measures include primary, effective, and low-cost preventive actions, through health education, such as wearing specific clothing, hats, and glasses for sun protection and avoiding exposure to the sun during times of higher radiation. Correct use of a suitable sunscreen is the most effective way to ensure adequate sun protection.[3,5,6]

In 2018, Brazil was in the third position in the world sunscreen consumption ranking, and it is the largest Latin American market.[7] However, most of the population misuses sunscreens, especially regarding the product's amount that should be applied to the skin, the uniformity, the frequency and the extension of the application area, as well as the need for reapplication every two hours.[8-12] The recommended amount of sunscreen is 2 mg/cm^2, which is the dosage used by manufacturers during performance tests and *in vivo* protection factor determination.[8]

According to the 2019-2020 Trends Notebook of the Brazilian Personal Hygiene Industry Association, one factor is essential in the category of sun protection products: a pleasant sensation.[13] Consumers usually choose a product that spreads easily, with a moderately moist tactile sensation during the application, quick drying, followed by a smooth, dry post-application sensation, a mattifying effect, and little or no noticeable residue on the skin.[13,14]

This study aims to assess the consumer market for sunscreens, consumers' lifestyle and usage, and to analyze how different attributes influence the sensory perception of the leading brands of sunscreen for the body and face.

METHODS

This is an exploratory study of observational nature, with a cross-sectional descriptive approach and structured primary data collection. It was conducted in a single moment, through a mixed questionnaire, with open and multiple-choice questions. The Research Ethics Committee of the Faculty of Pharmaceutical Sciences of Ribeirão Preto approved the study (CAAE 50815815.6.0000.5403). Clarifications about the study, as well as the link leading to the questionnaire were disseminated through social networks.

The questionnaire structure consisted of questions to determine the participant's profile, followed by questions to identify whether the participant fit the survey (whether he was a consumer of photoprotective products or not) and, finally, questions about the consumer behavior.

The sampling used in this work was non-probabilistic, of accessibility or convenience type, to reach and seek a population that consumes sunscreens. The questionnaire's answer was voluntary, and the confidentiality of the identity was guaranteed, with the online questionnaire open to answers for 15 days, in April 2016, aiming to capture around 100 responses from consumers.

RESULTS

During the study, 300 valid responses were obtained. Those who answered the question "Do you usually use sunscreen?" were considered sunscreen consumers, indicating that they always use sunscreen or when they are exposed to the sun. Thus, those who answered that they never use sunscreen had their answers considered ineligible. In total, 249 sunscreen consumers participated. Among the 51 participants who indicated never using sunscreen, [25] were men, and 26 were women.

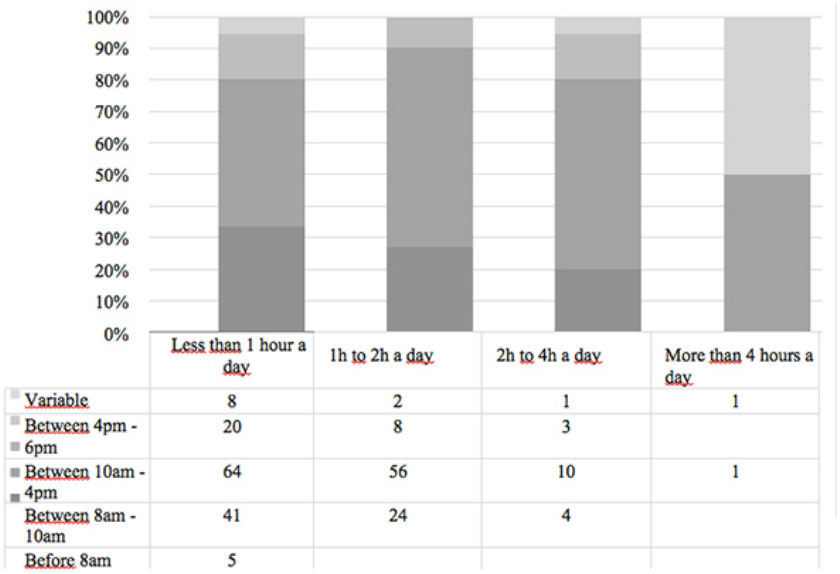
Through the distribution of consumers by age and sex, we found that the sample group was mainly composed of individuals between 17 and 35 years old, being considered a young audience. Also, the women's frequency was approximately five to six times higher than men, totaling 37 men and 211 women.

We classified the group of consumers according to the skin phototype through self-assessment, following the Fitzpatrick scale. There was a higher incidence of participants with skin type II (39%), followed by type III (35%), type IV (16%), type I (9%), and type V (1%).

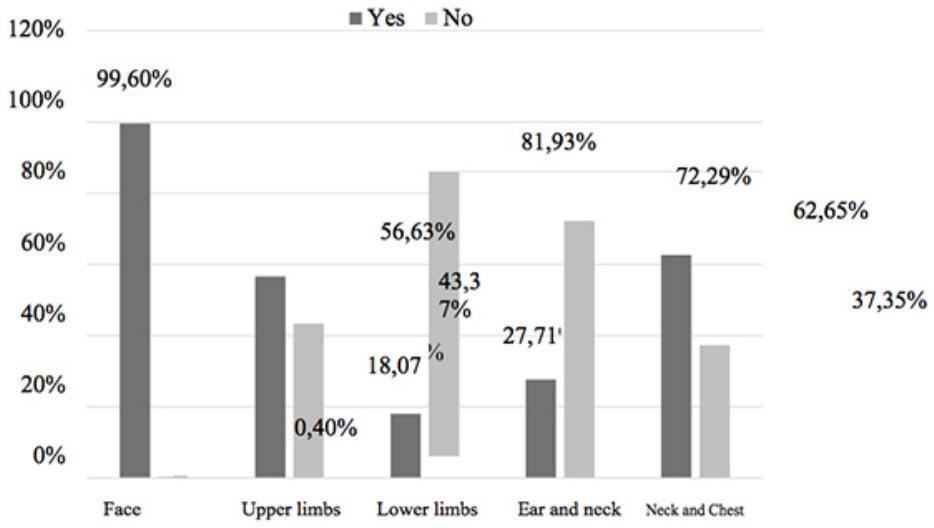
Consumers were asked about the exposure time and the time of day when they were most exposed to the sun. Graph 1 describes the results. We observed that 52% of consumers (131 participants) answered that they expose themselves between 10 am and 4 pm, a period when solar irradiation is more harmful to the skin,15 and 11 of them claimed to be exposed to the sun by more than two hours a day.

After the sample was adequately characterized, the study addressed topics related to the choice, application, and motivators for purchasing sunscreen. Initially, consumers were asked about the application of sunscreens. Graph 2 depicts the users' answers to the question "In which areas of the body does the sunscreen usually go?". The results found that most of the consumers (99.06%) use the product on the face. However, only 62.65% of consumers protect other regions often exposed, such as the neck and chest. According to the answers, we found that 43.37%, 72.29%, and 81.93% of the participants do not habitually apply sunscreen to the upper limbs, ear and neck, and lower limbs, respectively.

In the answers to the questions "Which sun protection factor (SPF) do you use?" and "Do you follow the use indications present on the product packaging?" almost half of the users (49.4%) stated SPF 30. In comparison, 47.8% stated using SPF greater than 30. Only 56.2% claimed following the instructions



Graph 1: Frequency of responses classified by time of exposure and time of day when consumers are exposed to the sun



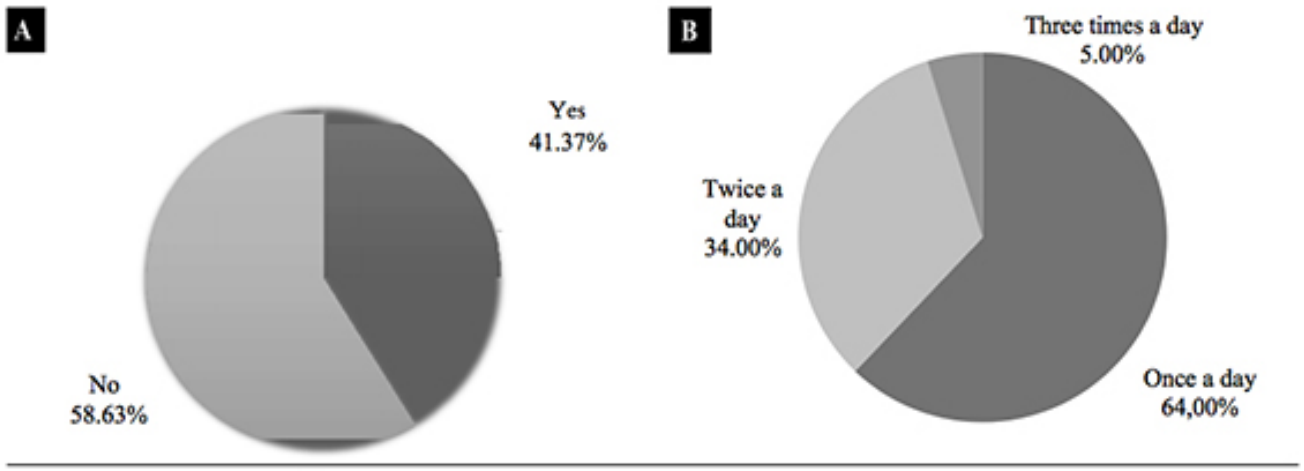
Graph 2: Percentage of consumers who have the habit of applying sunscreen to certain regions of the body

for use described on the product packaging. To check whether they followed these instructions, users answered the questions "Do you reapply the sunscreen?" and "How often do you reapply it?" Graph 3 describes the answers. We observed that only 41.4% of sunscreen consumers reapply the product throughout the day (Graph 3A). Among those who reapply the sunscreen (103 individuals), 62.1% answered that they reapplied only once a day, while 33.0% reapplied twice a day, and 4.9%, three times a day (Graph 3B).

Regarding the questions related to consumers' products texture, we observed that users prefer lotions since 56.2% of the participants replied using sunscreen with lotion texture. Within this category, 26.1% of users chose anti-grease lotion.

To better understand what causes the participants' difficulty using the product, they answered the question "If you don't use or stopped using sunscreen, explain the reason".

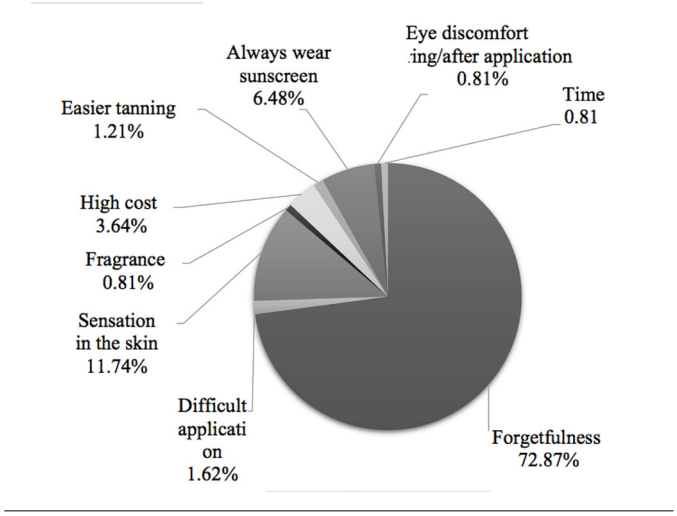
In addition to six multiple-choice alternatives, this question presented an open-ended question, where the participan-



Graph 3: Percentage of consumers who reapply sunscreen. **A.** Percentage of consumers who reapply. **B.** Among the consumers who reapply, the frequency, in percentage, of that reapplication

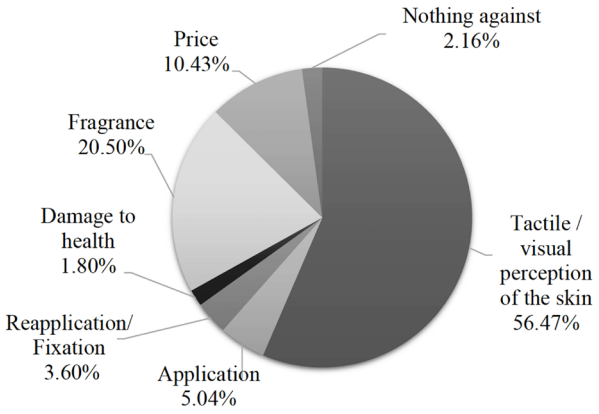
ts could describe their reasons in detail. Therefore, open-ended responses underwent thematic analysis and were subsequently integrated into multiple-choice answers. The categorization was conducted according to nine different themes: forgetfulness, fragrance, always use sunscreen, difficult application, high cost, eye discomfort, skin sensation, easier tanning, and time. Seven responses were not categorized because they did not fit the themes. From the analysis shown in Graph 4, we observed that 72.9% of the responses cited forgetfulness as a reason why consumers stopped using sunscreen. The second main reason for not using sun protectors was the sensation they cause on the skin, a theme mentioned in 11.7% of the responses.

Also, users had to answer the open-ended question "What do you like least about a sunscreen?". Thus, each participant had the opportunity to describe their opinion without the influence of answers predefined by the questionnaire. The thematic analysis of the obtained answers previously categorized the responses. The categorization was conducted according to seven different themes: tactile/ visual perception of the skin, damage to health, application, fragrance, reapplication/ fixation, price, and nothing against it. Among the answers obtained, ten were not categorized because they did not fit the proposed themes. According to these data (Graph 5), most responses are related to the products' sensory aspects since 56.7% cited characteristics related to the tactile and visual perception of the skin, and 20.5% cited the fragrance of the products as the least pleasing feature in a sunscreen. Of the remaining responses, in decreasing order, 10.4% cited characteristics related to price, 5.0% to the application of the product, 3.6% to reapplication/ fixation, 2.2% claimed to have nothing against sunscreens, and, finally, 1.8% of the answers were related to some health damage that they believed to have during the use of photoprotection.

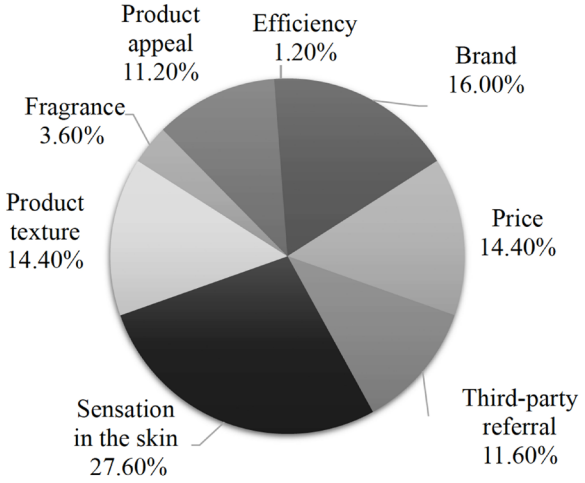


Graph 4: Reasons why consumers of sunscreens stop using them

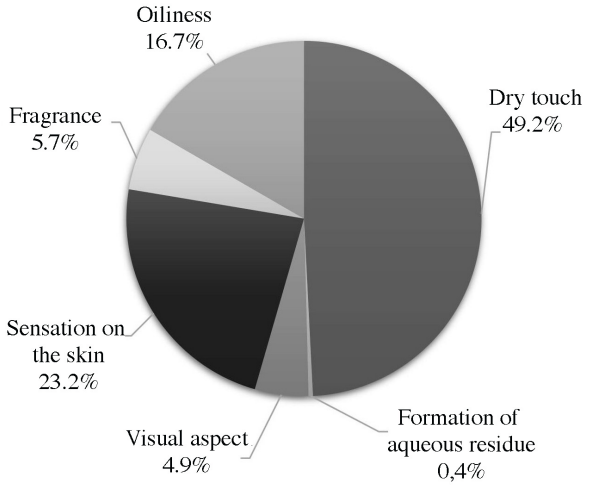
The question "When buying sunscreen, what defines your choice?" was added to the questionnaire to detect the purchasing motivators for sunscreens consumers. There was also an open-ended question in addition to eight multiple-choice questions, where the participant could describe his answer. Therefore, the thematic analysis of responses obtained previously categorized the solutions for the assessment of free responses. For the final analysis, these data were integrated with those obtained in the multiple-choice options. The categorization was conducted according to nine different themes: brand, price, indication of third parties, design/ packaging, sensation on the skin, texture, fragrance, product appeal (claim), and effectiveness. According to the data obtained (Graph 6), no participant indicated the design/



GRAPH 5: Percentage of responses, by theme, about what the participant least likes in a sunscreen



GRAPH 6: Features that define consumers' choice of sunscreen



GRAPH 7: Sensory characteristics that define the purchase choice of sunscreen

packaging as a purchase motivator. However, the skin sensation was the most chosen theme, mentioned in 27.6% of the responses. The sunscreen brand proves to be a great purchase motivator (16.0%), as well as price and texture, both frequent in 14.4% of answers. The importance of sensory perception, whether visual, tactile, or olfactory, is also highlighted as a decisive factor when purchasing a product. We also noticed the great importance of third party referrals (11.6%) at the time of the purchase decision, especially when health professionals make the referral. In the question "Regarding the guidance on the need to use sunscreen, who made the indication?", the dermatologist proved to be the leader in indication (57%), followed by family members (18%), media (14%), other professionals (7%), and friends (4%).

In the question "When choosing a sunscreen, assuming you don't know the brands and prices of any of them, which sensory characteristic would be the most decisive?", pre-analysis and analysis were conducted in the same way as the previous question. The categorization was carried out according to six different themes: dry touch, visual aspect, fragrance, aqueous residue formation, skin sensation, and oiliness. Among the answers obtained, four of them were not categorized because they did not fit the objective of the question (Graph 7). In decreasing order of frequency, dry touch was the most mentioned, followed by skin sensation, oiliness, fragrance, and visual aspect.

DISCUSSION

This study evidenced that the respondents not using sunscreens were lower than those found in the literature.[16-21] However, it revealed that many people still do not use sunscreen when exposed to UV radiation. This research's result is surprising and highlights the health concern, as Brazil has a continental dimension, with almost all the territory located between the Equator and the Tropic of Capricorn, and it is considered the country with the greatest territory extension close to the sun.[5] This study reveals that more than half of consumers are exposed to the sun in the period when solar irradiation is more harmful to the skin. Therefore, educational measures for sun exposure should be intensified and disseminated in Brazil, to prevent the development of damage caused by sun exposure, considering that epidemiological data that points to a continuous increase in skin cancer incidence.[4]

In Saudi Arabia, the prevalence of regular sunscreen use was found at a rate of only 23.7% of participants.[16] In Turkey, low levels of sun protection habits have also been reported in children and adolescents.[19,21] In Australia, in studies focused on children, only 58% were protected against sun exposure through the use of sunscreens. [22] In comparison, only 37% of teenagers and 33% of adults reported using sunscreen during outdoor ac-

tivities on summer weekends, in addition to other methods of sun protection.[18]

In Brazil, studies applying a questionnaire to a sample of university students found that most university students in the city of Campinas (SP) do not adequately protect themselves from sun exposure.[23] Still, more than 60% of medical students in Fortaleza never or rarely apply sunscreen.[20] An analytical cross-sectional study of a Brazilian university in Taquaritinga (DF),[17] reported that only 25% of university students used sunscreen daily.

We found that the number of women who answered the questionnaire was greater than the number of men, and it may be considered a limitation of this study. Still, it is curious that among the people who claimed never to have used sunscreen, approximately half are men. Moreover, among consumers, men represented only a little more than a fifth of the participants. Such data suggest that, even with the fact that women predominantly composed the study sample, there is a gender influence on sun protection habits and behavior.[16,20,21,23–26] When there is a more equitable proportion of men and women, women are more likely to use sunscreen and be aware of the connection between sun exposure and skin cancer.[16] Gender and also age, educational level, self-esteem, and skin type are factors that affect sun exposure habits and sun protection behavior.[25] Analyzing the time and period of the day of sun exposure, our results were better. A similar study, covering students aged 14 to 18, found that the most common time interval and sun exposure period among students was two h/day between 10 am and 4 pm during the week.[21] From the classification of the consumer phototype, a multiethnic sample was not observed. Respondent consumers predominantly had skin phototypes II and III. A recent study conducted in the USA observed in multiethnic sampling that, although the skin cancer incidence is higher among non-Hispanic whites, minority populations are often diagnosed with more advanced disease and are more prone to poor results.[27] Furthermore, the study concluded that this outcome is related to the fact that public health education and interventions to promote sun protection behaviors are consistently directed towards non-Hispanic whites.[27–29] Therefore, leading public health education efforts and conducting interventions to promote sun protection in minority populations can be a beneficial approach to discuss skin cancer morbidity and mortality in these groups.[27]

Corroborating the low rate of sunscreen reapplication revealed in this study, in Italy, it was observed that, in addition to the low adherence by adolescents, only 50.4% of them reapplied the sunscreen.[30] This research also reveals that consumers tend to ignore the sunscreen application in some body areas, especially ears, neck, and lower extremities.[31] Also, consumers are not comfortable using the adequate amount of formulation, and generally, they apply less than recommended.[9–11] Thus, one can think that the desired protection would not be as effective as indicated on the label.[11] Therefore, it is essential to highlight the need for greater attention concerning the user's adhesion for the most appropriate use of the photoprotector, as recommended by the manufacturer, to reach the SPF indicated on the packaging when using the product.

In contrast to the old trends in sunscreens, there is currently high consumer demand for products that present a pleasant sensation and provide a more refined aesthetic appearance.[13,32] Thus, the vehicle used in the formulation impacts the product's sensory attributes, inducing the consumer to use it.[33] Consequently, sunscreens with bad sensory characteristics will be less used.[33] Among the unwanted sensory aspects, there is the perception, after application, of oily, hot and sweaty skin; the presence of a film or residue on the skin surface; and opaque white colors, associated with many formulations, especially those consisting of inorganic filters.[33]

When consumers in this study were asked about the motivators for buying sunscreens, the skin sensation, the texture, the brand, and the price stood out. The formulations' sensorial dry touch properties proved to be essential for the purchase decision among these sensory characteristics. It is in line with the scientific literature since the demand for sunscreens with a light consistency, and easy scalability was always more significant in the Brazilian market, as consumers prefer to keep their skin dry and not shiny.[13,14] Also, consumer demands have increased with the amplified market offer of products manufactured in South Korea and Japan, due to the smooth sensation, ease of spreading, and suitability for mixed or oily skin.[13]

In 2017, a study assessed both purchase drivers and sunscreen use,[34] and it identified that the primary use motivators were to prevent sunburn, skin cancer, and premature skin aging.[34] Moreover, the main factors that influenced sunscreen purchase decisions were water and sweat resistance, price, recommendations from friends and family, followed by fragrance and pleasant texture.[34] A 2018 study, covering a sample of medical students, found that the most critical characteristics of sunscreens that influenced the product choice were SPF, texture, and protection against solar radiation.[20]

Expanding to the clinical area, these are essential points for the dermatologist to observe when prescribing sunscreens. Questions related to purchase motivation become crucial for the knowledge of consumer behavior, but more than that, they become important allies for the dermatologist to understand how his patients behave.

CONCLUSIONS

Considering the answers obtained through the questionnaire, we notice that most consumers acquire sunscreen critically and rigorously. When choosing and buying, they consider factors such as the perceived sensation when using them. However, consumers were still careless about the correct use of sunscreens: most of them do not follow the directions for use described on the packaging label; they apply the sunscreen only on some parts of the body; many forget to use it, and when they remember, they don't reapply the product throughout the day. Several factors indicated low adhesion and misuse of sunscreen. Among

them, the study revealed that part is related to the product's sensory properties.

Also, the consumer is not yet aware of the total benefit of the sunscreen. However, the sensory characteristics are essential in the purchase process's preference, being as decisive as the brand and its price. This research reveals that the sensory aspects, the effective use, the real effectiveness under normal conditions of use, and the market demand are interconnected.

Knowledge of such topics reveals a range of essential information for the dermatologist to achieve a more modern and effective therapeutic approach. Knowing patients' behavior helps understand what impacts treatment can have on their quality of life and assists the physician in understanding more modern and humane therapeutic approaches. ●

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