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DAILY APPLICATION OF PHOTOPROTECTION: CROSS-SECTIONAL STUDY IN PATIENTS OF DERMATOLOGICAL CARE PROCESS IN A TEACHING CLINIC IN THE CITY OF SÃO PAULO

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Abstract: Introduction: There are numerous photoprotection measures with proven efficacy in the literature, aiming to reduce the individual's sun exposure and prevent possible damage. However, there is an increase in the number of cases of melanoma and non-melanoma skin cancer, revealing that there is still low adherence to their daily application. Although there are studies carried out in national territory, they do not reflect the population reality of the country as a whole. São Paulo, being a state so diverse culturally, socially and phenotypically, manages to include people from different regions of Brazil. Objective: To study the population of São Paulo, whose age range varies from 11 to 84 years, males and females, who use sunscreen, and whether there was a low prevalence of its use. Methods: A cross-sectional and descriptive study was conducted with 59 participants at the PROMOVE teaching clinic in São Paulo. A QUIZZ was formulated based on similar studies, searched in the Pubmed and Web of Science databases. Data were analyzed and stratified by demographic characteristics (gender, family income, phototype). The exclusion criteria were incorrect completion of the QUIZZ and those who did not agree to sign the informed consent form. Results/Discussion: A total of 80 patients attended the campaign, and 21 individuals were excluded due to partial completion of the data. Regarding the daily use of photoprotection by the population, a prevalence of 44.06% was observed. Of these, 81.58% were women. The stratified analysis revealed a significant association between the use of sunscreen and variables such as gender, family income and phototype. Conclusion: There is a significant prevalence of non-use of topical photoprotection measures in the population studied. Gaps in adherence to these practices, in the diverse Brazilian population, indicate areas where awareness campaigns can be improved to reduce this prevalence.

Keywords: Photoprotection; Sunscreen; Prevalence; Brazilian population; Cross-sectional study.

INTRODUCTION

There are currently numerous photoprotection measures whose effectiveness has been proven in the literature. Among them, physical barriers can be mentioned, such as the use of clothing and accessories (hats and sunglasses) and physical-chemical barriers (sunscreens). They all have the same objective: to reduce the individual's sun exposure and prevent possible damage resulting from it. (CONSENSUS)

Brazil, the 5th largest country in terms of territorial extension, located in an intertropical region, with high rates of solar incidence for much of the year, is also the 7th most populous country in the world, with enormous socioeconomic and cultural diversity. These factors are fundamental to understanding the behavior of this population with regard to photoprotection.

Despite campaigns and information on photoprotection, there has been an increase in the number of cases of melanoma and non-melanoma skin cancer, revealing that there is still low adherence to its daily application.

Although photoprotection is a widely discussed subject, few studies have been developed addressing such a heterogeneous population. Although there are studies carried out in national territory, they do not reflect the population reality of the country as a whole. São Paulo, being such a culturally, socially and phenotypically diverse state, manages to encompass people from different regions of Brazil.

METHODOLOGY

This is a primary, cross-sectional, observational and descriptive study, carried out from the application of a QUIZZ in single dermatological consultations (one consultation per patient), in a joint effort at the "PROMOVE" teaching clinic, located in São Paulo, capital, on October 28, 2023. The study was approved by the ethics and research committee of ``*Centro Universitário São Camilo*``.

To provide a scientific basis for this work, the search strategies containing the descriptors and Boolean operators were: on the National Center for Biotechnology Information (NCBI) platform, as follows – ("Sunscreening Agents"[Mesh]) AND "Prevalence"[Mesh])) AND "Brazil"[Mesh], with a total of 9 articles found on June 20, 2023 in the Pubmed and PubMed Central databases; in the Web of Science database, on 06/30/2023, the following were performed: ("Photoprotection" [Topic] AND "Brazil" [Topic] OR "Brazilian population" [Topic]), in addition to ("doctor" [Topic], OR "medical professional" AND "photoprotection [Topic]), with a final result of 30 works.

All were analyzed in full by three different researchers, in order to reduce selection bias. After excluding duplicates and works whose content was not related to the theme or proposal, the bibliographic selection was concluded satisfactorily, with 16 works (including reviews, cross-sectional studies with application of QUIZZ, photoprotection consensus).

The QUIZZ was applied in order to establish the prevalence of photoprotection in the studied population, in addition to assessing their knowledge on this subject. Individuals of all ages (ranging from 11 to 84 years old) who agreed to participate in the study after reading and signing the Free and Informed Consent Form (FICF) were included, who attended a dermatological consultation during the campaign and answered the QUIZ developed for the study.

The patients excluded were those who did not agree to participate in the study, did not sign the FICF or who did not have complete data filled out on the collection form. The QUIZ was administered by medical students at the end of each consultation.

General data on the population were collected, such as nationality, age, sex, phototype and type of work (outdoors or indoors). In addition, there were 14 questions subdivided into two categories: the practice/use of photoprotection measures; knowledge about photoprotection, solar and ultraviolet (UV) radiation and the relationship between these and skin cancer.

Category 1: Practice/use of photoprotection measures
1 - *Does the person use photoprotection daily?*
2 - Does the person use sunscreen? (yes or no) 3- What is the sun protection factor (SPF)? 4- How often? 5- Quantity (number of teaspoons) associated with the application site • Face + Head + Neck • Chest + Abdomen • Back • Arms + Forearms • Thighs + Legs 6- The person reapplies during the day (how many times?)
7- Does the person wear a hat? (yes or no) 8- How often?

Regarding questions 1, 2, 4 and 5 of Category 2, the answers given as "Yes" were considered correct. Negative answers were considered as a deficit in knowledge about solar and UV radiation and the relationship with skin neoplasia.

Category 2: knowledge about solar and ultraviolet (UV) radiation and its relationship with skin cancer
1- Is UV radiation related to skin cancer? (yes or no)
2- Is solar radiation related to skin aging? (yes or no)
3- Have you learned about photoprotection? (yes or no) 4- Where/How? (parents; campaigns; advertisements; commercials; television / internet / social media)
5- Is it important to use sunscreen on cloudy days? (yes or no)
6- In winter, do you think it is important to use sunscreen? (yes or no)

The responses collected were analyzed and stratified according to the characteristics of the population. Furthermore, the frequency, location and quantity of sunscreen application were based on the guide of the Brazilian Society of Dermatology (SBD) – "Under the sun with health and well-being", found through active search:

- Face + Head + Neck: 2 teaspoons
- Chest + Abdomen: 2 teaspoons
- Back: 2 teaspoons
- Arms + Forearms: 2 teaspoons
- Thighs + Legs: 4 teaspoons

SBD recommends applying the product daily and reapplying it every 2 hours throughout the day.

Individuals who used sunscreen irregularly or only in environments with beaches/pools/parks were grouped and analyzed together for this study. In addition, the SPF used was grouped in three ways: SPF ≤ 30; SPF 30-50; SPF > 50.

Excel was used for statistical analysis of the data.

RESULTS

A total of 80 patients attended the campaign, all of whom were initially included in the research with the application of the QUIZZ. Twenty-one individuals were excluded due to partial completion of the data. Thus, the present study had a final number of 59 individuals interviewed (n=59).

Gender	**Number (%)**
Male	20 (33,9)
Female	39 (66,1)
Phototype	**Number (%)**
I-II	19 (32,20)
III-IV	30 (50,84)
V-VI	10 (16,95)
Age	**Number (%)**
≤ 19 years	14 (23,72)
20-59 years	29 (49,15)
≥ 60 years	16 (27,11)
Macroregion	**Number (%)**
North	0 (0)
Northeast	12 (20,33)
Southeast	43 (72,88)
South	1 (1,70)
Midwest	3 (5,08)
State	**Number (%)**
AL	1 (1,7)
CE	1 (1,7)
BA	3 (5,0)
SE	1 (1,7)
PI	2 (3,4)
PE	4 (6,8)
MG	2 (3,4)
SP	41 (69,5)
GO	3 (5,0)
PR	1 (1,7)
Work environment/occupation	**Number (%)**
Closed place	43 (72,88)
Outdoors	10 (16,94)
Retired/Unemployed	6 (10,17)

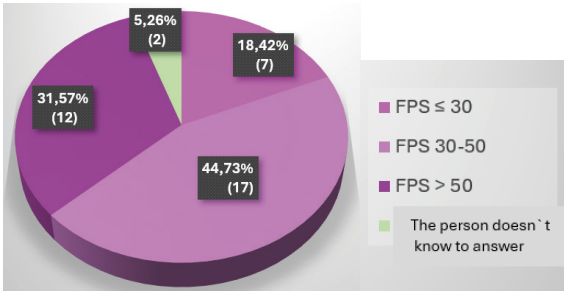
Table 1: characteristics of the population studied

Regarding the daily use of photoprotection by the population, a prevalence of 44.06% was observed (26).

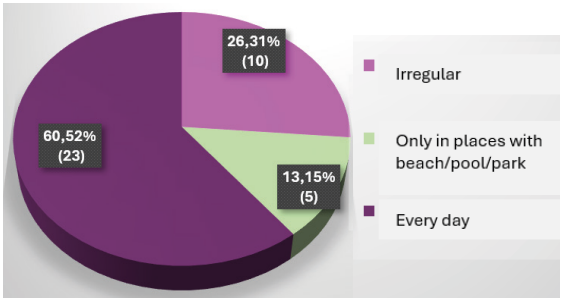
	Use of sunscreen
Gender	**Number (%)**
Male	7 (18,42)
Female	31 (81,58)
Phototype	**Number (%)**
I-II	12 (31,58)
III-IV	20 (52,63)
V-VI	6 (15,79)
Age	**Number (%)**
≤ 19 years	8 (21,05)
20-59 years	21 (55,26)
≥ 60 years	9 (23,68)
Macroregion	
North	0 (0)
Northeast	10 (26,31)
Southeast	25 (65,79)
South	1 (2,63)
Midwest	2 (5,26)
Work environment/occupation	**Number (%)**
Closed place	30 (78,94)
Outdoors	5 (13,15)
Retired/unemployed	3 (7,89)
Family income	**Number (%)**
Up to 1 minimum wage	7 (18,42)
1 to 3 minimum wages	21 (55,26)
3 to 5 minimum wages	7 (18,42)
5 to 15 minimum wages	3 (7,89)
TOTAL	**38 (100%)**

Table 2: use of sunscreen according to the characteristics of the population.

Of the patients who do not use sunscreen (21), 9.5% (2) have an income of up to 1 minimum wage; 52% (11) have a family income of 1 to 3 minimum wages; 19% (4) have 3 to 5 minimum wages; 19% (4) have 5 to 15 minimum wages.



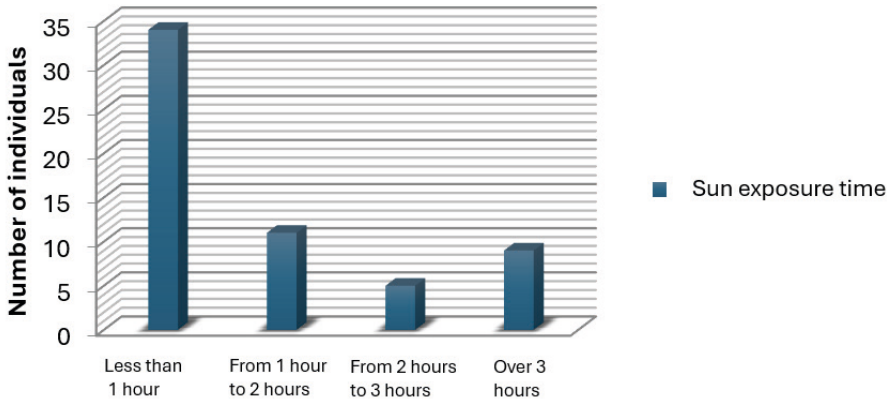
Graphic 1: Sun Protection Factor used by patients



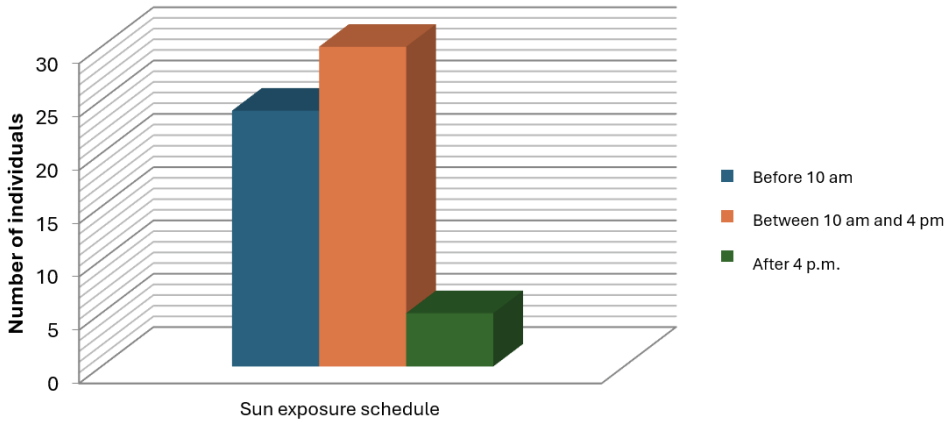
Graphic 2: Frequency of daily use of sunscreen in individuals who reported using it

1. Is UV radiation related to skin cancer?	**Number (%)**
Yes	47 (79,66)
No	12 (20,33)
2. Is solar radiation related to skin aging?	**Number (%)**
Yes	50 (84,74)
No	9 (15,25)
3. Have you already learned about photoprotection?	**Number (%)**
Yes	40 (67,79)
No	19 (32,20)
4. Is it important to use sunscreen on cloudy days?	**Number (%)**
Yes	40 (67,79)
No	19 (32,20)
5. In winter, do you think it is important to use sunscreen?	**Number (%)**
Yes	34 (57,62)
No	25 (42,37)

Table 5: Answers to questions related to knowledge about photoprotection, solar and ultraviolet (UV) radiation and their relationship with skin cancer



Graphic 3: Relationship between the number of patients exposed to solar radiation and the time of exposure



Graphic 4: Relationship between the number of patients exposed to solar radiation and the time of exposure

Body location	Teaspoons			Total of patients (N); (%)	Recommended by SBD (number of teaspoons) *
	< 2 tablespoons	***≥ 2 to 4 tablespoons***	***≥ 4 tablespoons***		
Face + Head + Neck	25 patients	10 patients	————	35 (92,10)	2 tablespoons
Arms + Forearms	8 patients	9 patients	————	17 (44,73)	————
Chest + Abdomen	4 patients	7 patients	————	11 (28,94)	————
Back	4 patients	5 patients	————	9 (23,68)	————
Thighs + Legs	10 patients	————	1 patient	11 (28,94)	4 tablespoons

Table 3: Number of patients using sunscreen according to application site and amount of sunscreen used (number of teaspoons) – N (total number) = 38.

* According to the Brazilian Society of Dermatology (SBD) guide – "Under the sun with health and well-being"

	Use of hats/caps (N=22)			**TOTAL**
	Every day (n=7)	Irregular (n=7)	Only in environments with beach / pool / parks (n=8)	**22**
Gender	**Number (%)**	**Number (%)**	**Number (%)**	**Number (%)**
Male	6 (85,71)	4 (57,14)	0 (0)	**10 (45,45)**
Female	1 (14,29)	3 (42,86)	8 (100)	**12 (54,54)**
Phototype	**Number (%)**	**Number (%)**	**Number (%)**	**Number (%)**
I-II	3 (42,86)	2 (28,58)	4 (50)	**9 (40,9)**
III-IV	3 (42,86)	5	2 (25)	**10 (45,45)**

V-VI	1 (14,29)	0 (0)	2 (25)	**3 (13,63)**
Age	Number (%)	Number (%)	Number (%)	**Number (%)**
≤ 19 years	4 (57,14)	2 (28,58)	0 (0)	**6 (27,27)**
20-59 years	1 (14,29)	3 (42,86)	7 (87,5)	**11 (50)**
≥ 60 years	2 (28,58)	2 (28,58)	1 (12,5)	**5 (22,72)**
Work environment / occupation	**Number (%)**	**Number (%)**	**Number (%)**	**Number (%)**
Closed place	3 (42,86)	4 (57,14)	8 (100)	**15 (68,18)**
Outdoors	3 (42,86)	3 (42,86)	0 (0)	**6 (27,27)**
Retired / unemployed / unemployed	1 (14,29)	0 (0)	0 (0)	**1 (4,54)**
Family income	**Number (%)**	**Number (%)**	**Number (%)**	**Number (%)**
Up to 1 minimum wage	1 (14,29)	0 (0)	2 (25)	**3 (13,63)**
1 to 3 minimum wages	3 (28,58)	1 (14,29)	4 (50)	**8 (36,36)**
3 to 5 minimum wages	3 (42,86)	4 (57,14)	2 (25)	**9 (40,9)**
5 to 15 minimum wages	0 (0)	2 (28,58)	0 (0)	**2 (9,09)**

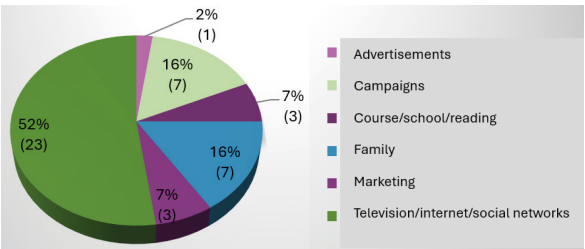
Table 4: Number of patients who use hats/caps according to frequency and characteristics of the population studied – N (total number) = 22

	QUIZZ									
Family income (N)	Question 1		Question 2		Question 3		Question 4		Question 5	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Up to 1 minimum wage (9)	7(78%)	2(22%)	8(89%)	1(11%)	5(56%)	4(44%)	5(56%)	4(44%)	5(56%)	4(44%)
1 to 3 minimum wages (32)	24(75%)	8(25%)	25(78%)	7(22%)	22(69%)	10(31%)	22(69%)	10(31%)	19(59%)	13(41%)
3 to 5 minimum wages (11)	10(91%)	1(9%)	11(100%)	0(0%)	8(73%)	3(27%)	8(73%)	3(27%)	7(64%)	4(36%)
5 to 15 minimum wages (7)	6 (86%)	1 (14%)	6 (86%)	1 (14%)	5 (71%)	2 (29%)	5 (71%)	2 (29%)	3 (43%)	4 (57%)

Table 6: Answers to questions related to knowledge about photoprotection, solar and ultraviolet (UV) radiation and their relationship with skin cancer in comparison with the patients' family income

	QUIZZ									
Use of sunscreen (N)	Question 1		Question 2		Question 3		Question 4		Question 5	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Yes (26)	24 (92%)	2 (8%)	25 (96%)	1 (4%)	21 (81%)	5 (19%)	23 (88%)	3 (12%)	21 (81%)	5 (19%)
No (33)	23 (70%)	10 (30%)	25 (76%)	8 (24%)	19 (58%)	14 (42%)	17 (52%)	16 (48%)	13 (39%)	20 (61%)

Table 7: Answers to questions related to knowledge about photoprotection, solar and ultraviolet (UV) radiation and their relationship with skin cancer compared to the use of sunscreen



Graphic 5: Relationship between participants who had knowledge about photoprotection and where they acquired knowledge

DISCUSSION

This cross-sectional study addressed the prevalence and patterns of photoprotection in a heterogeneous population that sought dermatological consultations in a community-based study in the city of São Paulo. The discussion of the results will be divided into two main categories: practice/use of photoprotection measures; and knowledge

about solar and ultraviolet (UV) radiation and their relationship with skin cancer.

PRACTICE/USE OF PHOTOPROTECTION MEASURES

The observation of a prevalence of 44.06% of daily use of photoprotection in the studied population highlights a significant scenario, but still below the ideal (ANDREOLA et al, 2018). This data highlights the continued need for awareness and education about the benefits of regular use of photoprotectors.

USE OF SUNSCREEN

The stratified analysis revealed a significant association between the use of sunscreen and variables such as gender, age group and work environment. The fact that 78.94% of those who work indoors use sunscreen highlights the importance of awareness even for those who are not directly exposed to the sun.

In addition, the probability of men not using sunscreen in relation to women is approximately 6.325. This indicates that, proportionally, men are more likely to not use sunscreen compared to women in the given group (DUPONT, PEREIRA, 2012; DUQUIA et al., 2007; LIMA et al., 2018; SILVA, DUMITH, 2019). It was also observed that, although the population is aware of the importance of using sunscreen and the risks of sun exposure without protection, the majority continues to choose not to apply such knowledge (ANDREOLA et al., 2018; DALLAZEM et al., 2019). The analysis of the characteristics of sunscreen application showed that most participants applied adequate amounts to the areas recommended by the Brazilian Society of Dermatology. However, special attention must be payed to less protected regions, such as arms and forearms, where only 44.73% of respondents applied the recommended amount (SBD Photoprotection Guide, 2022).

The use of hats/caps was observed in 36.36% of the population studied, with greater adherence among women and people in older age groups. This suggests a possible correlation between awareness and photoprotection practices with aging and gender (ANDREOLA et al., 2018; DUQUIA et al., 2007).

It is interesting to note that of the patients who do not use sunscreen, 52% have a family income of 1 to 3 minimum wages. This highlights the need for specific strategies to increase adherence in less favored socioeconomic groups (DALLAZEM et al., 2019).

Another association that can be made is between lower phototypes and greater use of sunscreen. Among the patients who used this photoprotection, 31.58% of them were phototypes I-II, compared to 15.79% of phototypes V-VI. One explanation that can be assumed is the false belief among the population that, because higher phototypes have more melanin and, therefore, greater protection against solar radiation, the use of sunscreen becomes unnecessary.

KNOWLEDGE ABOUT THE RELATIONSHIP BETWEEN UV RAYS AND SKIN CANCER

In comparison to the use of hats and caps, a relationship was noted between increased protection as family income increased, with approximately 50% of patients who used hats/caps having an income above 3 minimum wages (DALLAZEM et al., 2019). This same relationship can be extended to the level of knowledge about sun protection and its importance, with an increase in correct answers as family income increased (DALLAZEM et al., 2019). We also saw a high relationship between the use of sunscreen in individuals who had obtained some knowledge on the subject, demonstrating an important concern with protecting their

skin (SATTLER et al., 2014). Regarding the source of knowledge about photoprotection, more than half of the patients had obtained it through television/internet/social networks, with advertisements being the source of information that reached the smallest number of people (2%) (ANDREOLA et al., 2018).

CONCLUSION

We were able to conclude that there is a significant prevalence of non-use of topical photoprotection measures in the population studied, even though there is knowledge about the damage caused by sun exposure without this practice. In addition, there is also a perpetuation of somewhat flawed habits and knowledge on the part of people, and the lack of information ends up being passed on in a way that makes it difficult to routinely practice protective measures.

Gaps in adherence to these practices, among the diverse Brazilian population, indicate areas where awareness campaigns can be improved to reduce this prevalence. Therefore, it is essential to remodel the media, using more specific content for groups that have shown themselves to be less adept at using sunscreen, as well as more efficient information media.

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