Knowledge and habits of sun exposure in university students: a cross-sectional study in Southern Brazil*

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Abstract: Background: Excessive sun exposure is the major risk factor for skin cancer. Thus, sun exposure behavior is the major focus for prevention of this disease, since it is potentially modifiable. Increasing the knowledge on sun related habits and other skin cancer risk factors is fundamental in the development of preventive programs, especially when directed to young people.
Objectives: To assess the photoprotection habits and the knowledge about skin cancer in college students.
Methods: We conducted a cross-sectional study from Oct. 16 to Feb. 17, including 371 students from the Federal University of Santa Maria, RS, Brazil, through a self-administered questionnaire.
Results: The level of knowledge about skin cancer and photoprotection was unsatisfactory in more than 10% of the students. The occurrence of sunburn was extremely high among students, and 25% reported at least one episode of second degree sunburn. Proper use of sunscreen was referred by only 34% of individuals. Students who reported having received photo education in college were associated with a more consistent use of sunscreen.
Study limitations: health area represented a large part of the sample; instrument validated outside Brazil.
Conclusions: Young people are unaware of basic information about sun protection and exposure. Even among those with proper knowledge, the use of photoprotective measures is very low. The sun exposure has shown to be excessive in most of the students, which makes this population an important target for photo-educational measures.
Keywords: Health education; Primary prevention; Radiation protection; Skin care; Skin neoplasms; Solar radiation; Sunlight; Sunscreening agents

INTRODUCTION

Sun light is responsible for many biologic effects essential to life. However, when excessive, it can present risks to human health by causing sunburns, photoaging and photocarcinogenesis.[1] Sun exposure is related to the development of all types of SC, both melanoma and non-melanoma.[2]

Non-melanoma skin cancer (NMSC) has nowadays the highest incidence in Brazil and all over the world. According to data from the *Instituto Nacional de Câncer* (INCA), it corresponds to 30% of all malignant tumors registered in the country.[3] Melanoma is the second most common neoplasm diagnosed in young adults, only preceded by lymphomas. It is characterized by a high metastatic potential, being the main cause of death in Dermatology.[1,4]

From the point of view of primary prevention, sun exposure behavior became the main target, since ultraviolet radiation (UVR) is not only the main risk factor for skin cancer (SC) but also a modifiable risk factor. Therefore, the measures aiming to prevent SC should come from the knowledge of sun exposure habits and risk factors for different populations so that strategies can be established to modify the individuals' behavior in regards to the sun.[5]

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Many studies have highlighted the importance of photo-educational campaigns among the younger strata of the population because sun exposure at an early age has a crucial impact in the increased number of skin neoplasms.[6–13] For melanoma, for example, a history of sunburn at any point in life is associated to a higher occurrence but it seems to be more important in the first few decades of life.[11]

The young population is particularly subject to sun exposure due to the aesthetic importance of tanning and for performing more outdoor activities. Tanning habits are still encouraged socially and the worship of physical appearance leads to sun exposure in the most critical hours for UVR and to seeking extreme measures, such as artificial tanning booths.[13] For all this, this population would be associated to a higher risk of developing SC in the future.[2] Besides, teenagers are more concerned about behaviors accepted by their social circle and that can bring immediate benefits than long-term preventive measures, increasing their vulnerability to SC.[13]

Multiple studies have demonstrated that youngsters have knowledge regarding the damaging effects of the sun. Despite this, compliance to photoprotection measures is very low.[6-8,13,14] For this reason, it is necessary to detail the profile of the younger population in order to develop preventive strategies directed to this age group so as to increase their efficacy. Moreover, young people are the target for prevention and general health promotion programs because they are more receptive to preventive knowledge and to change in habits than the adult population.[13]

Therefore, this study proposed to evaluate the level of knowledge regarding the sun and SC and photoprotection and photoexposure habits in university students. We opted to conduct this study among university students because it is a representative portion of the young stratum of the general population (therefore, vulnerable to photoexposure) and, at the same time, a unique portion regarding the educational profile. We conducted a cross-sectional study through a self-applied questionnaire with undergraduate students of the Universidade Federal de Santa Maria (RS), Brazil.

The southern region of Brazil has the highest concentration of Caucasians, the highest concentration of UVA radiation and the highest indexes of melanoma in the country.[12] The city of Santa Maria (RS), where the study was conducted, is situated in a critical area for UVA radiation and is historically known by the colonization of Caucasian peoples, more specifically Germans and Italians. Great part of these immigrants and their descendants are dedicated to rural work, a factor known to be related to continuous sun exposure, many times since childhood.[15] Thus, the area where this study was conducted presents a population particularly susceptible to SC, for which strategies of SC primary prevention might have a significant impact in public health planning.

METHODS

Cross-sectional study performed with undergraduate students of the Universidade Federal de Santa Maria (RS), Brazil.

Calculation of the sample size was based in estimations from a study conducted by Castilho (2010) in the city of Taguatinga (DF), Brazil, who observed a prevalence of 25% of daily use of sunscreen among university students.[6] We adopted the level of significance of 5% with a margin of error of 5%, with the resulting calculated n of 285 individuals. To this value, we added 10% for occasional losses and refusals and 10% more for the control of potential confounding factors.

In order to guarantee the representativeness of the sample, we took some knowledge and sun exposure characteristics into consideration, inherent to certain professional areas, that could interfere with the results of the study. Therefore, all courses of the main campus of the Universidade Federal de Santa Maria were classified into strata: 1) courses in the health area, 2) courses of professional areas with more sun exposure and 3) courses not related to the health area and not related to professional areas with more sun exposure.

From that, we used the method of uniform stratified sampling, where two courses from each stratum were randomly selected with the Microsoft Excel 2013 function "ALEATÓRIOENTRE". For each selected course, an initial and a final semester were included in the sample. All students in these semesters were included in the sample. All students in these semesters were invited to participate in the study, excluding only those younger than 18 years of age. This way, the final sample was composed of 371 students.

Besides a better representativeness, the division into strata allowed for a comparative analysis of the results between the different study groups.

The instrument used for data collection was the questionnaire Sun Exposure and Behaviour Inventory (SEBI), previously validated and published in the Journal of the European Academy of Dermatology and Venereology, in 2013. This is a short self-applied questionnaire proposed for the use in large population studies to estimate sun exposure and related behaviors. It was developed based in three points: previous sun exposure, current sun exposure and current behaviors regarding the sun.[16]

The original English version was translated and adapted. To evaluate the knowledge on the subject and to know if the students had already been given any photo-educational guidance during their degree, some basic questionnaires were added and they are shown in chart 1.

1. Was there an approach to skin cancer and sun protection at any time during your graduation course?
   ( ) Yes ( ) No

   Do you agree with the following statements?
2. Ultraviolet radiation is related to skin cancer:
   ( ) Yes ( ) No
3. Solar radiation is related to skin ageing:
   ( ) Yes ( ) No
4. There is a genetic risk to skin cancer:
   ( ) Yes ( ) No
5. It is important to use sunscreen on cloudy days:
   ( ) Yes ( ) No
6. It is important to use sunscreen during winter:
   ( ) Yes ( ) No

Chart 1: Questions included in the data collection instrument used in the study

The interviewers were trained to standardize data collection, which took place from October 2016 to February 2017.

Data were analyzed in a descriptive fashion using the software Statistical Package for Social Science – SPSS (version 15.0 for Microsoft Windows), generating data of absolute (n) and relative (%) frequency. To verify the existence of the association between categorical variables, the Chi-Square test was used. For a continuous variable, we calculated the mean and standard deviation and their association was calculated by the ANOVA test. The level of significance adopted was of 5%.

The study was approved by the committee of ethics in research of the Universidade Federal de Santa Maria (CAAE 11466612.1.00005346). The participants were included after signing a consent form.

RESULTS

In the study, 371 students were included, 201 (54.3%) females with a mean age of 22.46 years (±5.09), ranging from 18 and 53 years. Regarding the origin, 302 (82%) of those interviewed came from Rio Grande do Sul, and 130 (35.1%) from the Santa Maria region and only 68 (18.4%) from other States.

In group 1, made by Medicine and Pharmacy students, 189 students were selected (50.9% of the sample). In group 2, made by the courses of Physical Education and Veterinary Medicine, 105 students were recruited (28.3% of the sample) and in group 3, made by Computer Engineering and Chemistry, 77 students were selected (20.8% of the sample). The initial semesters represented half of the sample (50.9%) and the final semester the other half (49.1%).

Regarding the phototype classification of Fitzpatrick, more than 70% of the sample (n=269) had a low phototype (I, II and III). Phototype II was the most prevalent and represented almost 30% of the sample (n=107). There was no difference in these characteristics between the groups, and the sample was homogeneous regarding the phototype. Data are presented in table 1.

Regarding the basic general knowledge on SC and photoprotection, it was considered "satisfactory" when the students answered 100% of the questions on the subject correctly. A wrong answer to any of the questions classified the knowledge of the student as unsatisfactory since the questions approached extremely basic knowledge for individuals that finished high school. Most students (85%) had a satisfactory performance and group 1 had a significantly better performance than groups 2 and 3 (p<0.001), as shown in chart 1.

When the questions were analyzed separately, almost all students knew the relationship between UVR and SC (except for 1 student). Group 2 had the worst performance regarding the questions about the association of SC and genetic risk, with 13.3% (n=14) of the individuals unaware of such association, and also in questions related to the necessity of using sunscreen in cloudy days (5.7% did not know) and in winter (8.6% did not know).

Group 3 had the worst performance regarding questions about solar radiation and skin photoaging (6.7% of the students were unaware of this association). Regarding the course semester, there were no relevant associations. Data are described in table 2.

Regarding past habits of sun exposure, the number of sunburns the students had already had was evaluated and we observed that 92.2% (n=341) of the individuals had already had at least one episode and, of these, 25% (n=93) reported more than 10 episodes.

Table 1: Sociodemographic profile and classification of phototypes of the sample

Variables	Frequency (n)	Percentage (%)
Sex		
Male	170	45
Female	201	54
Total	371	
Groups		
1. Health area	189	50.9
a) Pharmacy	62	16.7
b) Medicine	127	34.2
2. Areas with higher sun exposure	105	28.2
c)Physical education	37	9.9
d)Veterinary Medicine	68	18.3
3. Other areas	77	20.7
e)Computer Engineering	39	10.5
f)Chemistry	38	10.2
Total	371	
Semester of the graduation course		
Initial	189	50.9
Final	182	49.1
Total	371	
City of origin		
Santa Maria or region	130	35.1
Other cities – RS	172	46.5
Other States	68	18.4
Total	370	
Mean monthly income (R$)*		
Up to 2 MW	61	16.9
2 -| 4	96	26.6
4 -|10	124	34.4
10 -| 20	55	15.2
>20	25	6.9
Total	361	
Phototype		
I	64	17.3
II	107	28.9
III	98	26.5
IV	88	23.8
V	10	2.7
VI	3	0.8
Total	370	

MW = Minimum wage
*Mean monthly income refers to the main income of the student – from family or own.

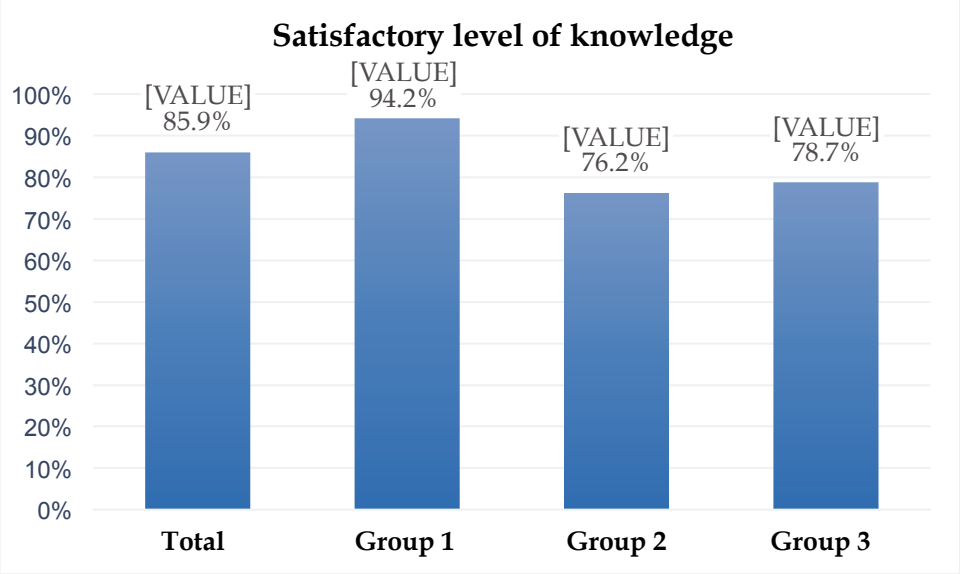

Figure 1: Percentage of students with a satisfactory level of knowledge in the sample and in each of the study groups.
Group 1= Health area; Group 2 = Areas related to more intense sun exposure; Group 3 = Other areas

Table 2: Knowledge about skin cancer and photoprotection: data related to the sample and to each of the groups in the study

Variables	Groups				*p*-value
	Total n (%)	Group 1 n (%)	Group 2 n (%)	Group 3 n (%)	
Is ultraviolet radiation related to skin cancer?					
Yes	368 (99.7)	189 (100.0)	104 (99.0)	75 (100.0)	-
No	1 (0.3)	0 (0.0)	1 (1.0)	0 (0.0)	
Is solar radiation related to skin ageing?					
Yes	358 (97.0)	187 (98.9)	101 (96.2)	70 (93.3)	0.045
No	11 (3.0)	2 (1.1)	4 (3.8)	5 (6.7)	
Is there a genetic risk related to skin cancer?					
Yes	340 (91.9)	182 (96.3)	91 (86.7)	67 (88.2)	0.006
No	30 (8.1)	7 (3.7)	14 (13.3)	9 (11.8)	
Is it important to use sunscreen on cloudy days?					
Yes	360 (97.3)	188 (99.5)	99 (94.3)	73 (96.1)	0.024
No	10 (2.7)	1 (0.5)	6 (5.7)	3 (3.9)	
Is it important to use sunscreen during winter?					
Yes	352 (95.1)	186 (98.4)	96 (91.4)	70 (92.1)	0.011
No	18 (4.9)	3 (1.6)	9 (8.6)	6 (7.9)	

Group 1 = Health area; Group 2 = Areas related to more intense sun exposure; Group 3 = Other areas

The frequency was similar between the groups. When asked about sunburn with blisters (2nd degree burn), over a quarter (n=95) of the sample had already experienced them. Group 1 reported the lower occurrence of blistering sunburns (78.7% did not have any episodes) and group 2 was associated to a higher frequency (36.2% had had at least 1 episode; p=0.035). results are shown in table 3.

Regarding skin phototype, 96.3% (n=258) of the students with low phototype reported having had at least one sunburn, with more than 30% (n=86) having had 10 or more and over a quarter (n=79) having had at least one episode of blistering sunburn. These findings were significantly higher than those found among students of higher phototypes (p<0.001 and p=0.016, respectively), as shown in figure 2.

Regarding the use of tanning booths, 5.4% (n=20) reported having already used them, with no association between groups. Regarding current habits of UVR exposure, more than half of the total sample (n=205) reported being tanned in the past 12 months prior to the collection, with approximately 15% (n=52) doing it intentionally through exposure to solar radiation or tanning booths. Group 2 had the higher incidence of recent tanning (66.7% of the students; p=0.021), as shown in table 3. Regarding gender, females were associated to a higher frequency of use of artificial tanning booths/ lamps (p=0.017) and to the higher frequency of intentional sun exposure for tanning (p=0.003).

Regarding the amount of daily sun exposure, 63% of the students (n=232) classified their exposure time as little. However, the students in group 2 had a significantly longer time of daily sun exposure than students in the other groups (p=0.001), both during work/academic activities (p<0.001) and during recreational activities (p<0.001), what was classified by the majority of the students as moderate or a lot.

When asked about the sun exposure time at the critical hours for UVB radiation (10h – 16h), 84.6% (n=314) of those interviewed said they were exposed during those hours of the day for

Table 3: Previous and current habits of solar exposure and artificial sources of ultraviolet radiation: data related to the sample and to each of the groups in the study

Variables	Total	Groups			*p*-value
		Group 1	Group 2	Group 3	
	n (%)	n (%)	n (%)	n (%)	
How many times in your life did you have a sunburn?					
None	29 (7,8)	15 (7.9)	8 (7.6)	6 (7.9)	0.955
1-10	248 (67,0)	127 (67.2)	68 (64.8)	53 (69.7)	
>10	93 (25,2)	47 (24.9)	29 (27.6)	17 (22.4)	
How many times in your life did you have a blistering sunburn?					
None	275 (74,3)	148 (78.7)	67 (63.8)	60 (77.9)	0.035
1-3	82 (22,2)	35 (18.6)	31 (29.5)	16 (20.8)	
>4	13 (3,5)	5 (2.7)	7 (6.7)	1 (1.3)	
Have you ever used artificial tanning booths?					
No	351 (94.6)	181 (95.8)	97 (92.4)	73 (94.8)	0.467
Yes	20 (5.4)	8 (4.2)	8 (7.6)	4 (5.2)	
Have you gotten tanned in the last 12 months?					
Yes	205 (55.3)	96 (50.8)	70 (66.7)	39 (50,6)	0,021
No	166 (44.7)	93 (49.2)	35 (33.3)	38 (49,4)	0,021
With which frequency do you expose to the sun or to tanning booths with the intention of tanning or feeling better?					
N/R	319 (86.0)	160 (84.7)	88 (83.8)	71 (92.2)	0.252
Às vezes	43 (11.6)	26 (13.8)	13 (12.4)	4 (5.2)	
F/A	9 (2,4)	3 (1.6)	4 (3.8)	2 (2.6)	

Group 1 = Health area; Group 2 = Areas related to more intense sun exposure; Group 3 = Other areas; N/R = Never or rarely; F/A = Frequently or always.

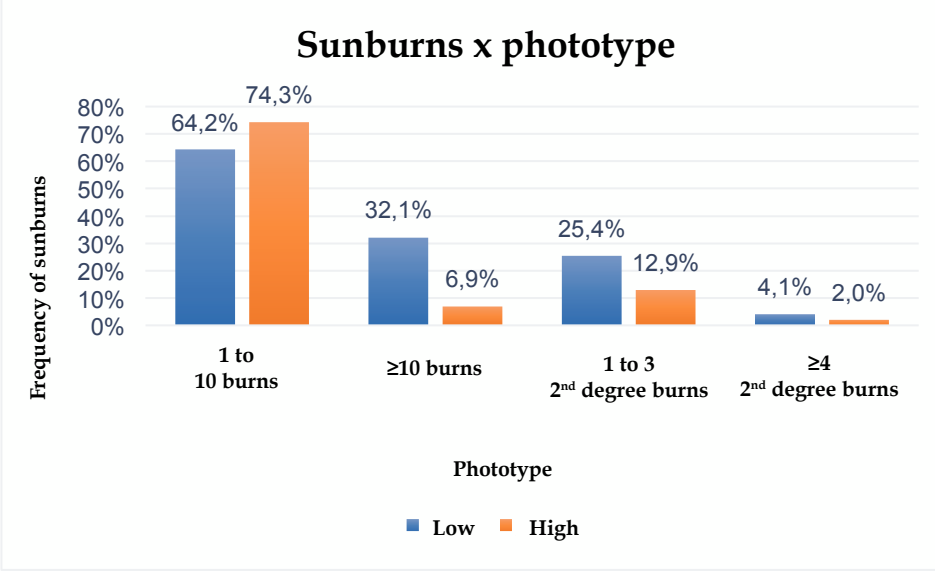

Figure 2: Illustrative graphs of the frequency of sunburns according to the classification of phototypes

up to two hours. The students in group 2 were the ones with longer time of sun exposure (three or more hours), and those in group 1 were those with less exposure (<2h), and this association was valid both for summer (p<0.001) and winter (p=0.006).

Regarding photoprotection habits, more than 30% (n=127) of the sample reported never or rarely using sunscreen and only 34% (n=127) of the students reported adequate use (frequently or always). This frequency was similar in all groups, as well as the frequencies of use of other sun protection measures: use of shirts with sleeves covering the shoulders was the most frequently used method (55.3%), followed by the use of sunglasses (48.8%), sunscreen and use of natural or artificial shades (28.6%). The use of hats or equivalent was reported by only 5.9% of the students (Table 4).

Among those interviewed that stated using sunscreen regularly, only 5.5% (n=19) used products with SPF<15. However, a third of the sample (n=111) did not know if the sunscreen used protected

Table 4: Frequency of use of sun protective methods: data related to the sample and to each of the groups in the study

Photoprotective measures	Total	Groups			*p*-value
	n (%)	Group 1 n (%)	Group 2 n (%)	Group 3 n (%)	
Sunscreen					
N/R	127 (34.3)	56 (29.6)	39 (37.1)	32 (42.1)	
Sometimes	11 (31.4)	59 (31.2)	34 (32.4)	23 (30.3)	0.232
F/A	127 (34.3)	74 (39.2)	32 (30.5)	21 (27.6)	
Sleeved shirts to cover the shoulders					
N/R	88 (23.7)	42 (22.2)	30 (28.6)	16 (20.8)	
Sometimes	78 (21.0)	36 (39.7)	30 (28.6)	12 (15.6)	0.039
F/A	205 (55.3)	111 (58.7)	45 (42.9)	49 (63.6)	
Hats covering the face, ears and neck					
N/R	308 (83.2)	165 (87.8)	82 (78.1)	61 (79.2)	
Sometimes	40 (10.8)	18 (9.6)	12 (11.4)	10 (13.0)	0.059
F/A	22 (5.9)	5 (2.7)	11 (10.5)	6 (7.8)	
Natural or artificial shades					
N/R	165 (44.5)	81 (42.9)	51 (48.6)	33 (42.9)	
Sometimes	100 (27.0)	49 (25.9)	30 (28.6)	21 (27.3)	0.655
F/A	106 (28.6)	59 (31.2)	24 (22.9)	23 (29.9)	
Sun glasses					
N/R	126 (34.0)	61 (32.3)	30 (28.6)	35 (45.5)	
Sometimes	64 (17.2)	33 (17.5)	23 (21.9)	8 (10.4)	0.095
F/A	181 (48.8)	95 (50.3)	52 (49.5)	34 (44.2)	

Group 1 = Health area; Group 2 = Areas related to more intense sun exposure; Group 3 = Other areas; N/R = Never or rarely; F/A = Frequently or always

against both UVB and UVA, and group 2 was associated to a lower degree of knowledge (40.2% did not know; p=0.007).

The use of SPF was not associated to the semester of the course in which the student was, neither with family income. On the other hand, female gender was associated to a higher frequency of sunscreen use (p<0.0001) and male gender was associated to a higher use of sleeves to cover the shoulders (p<0.001). Figure 3 represents the adequate use of photoprotection measures according to gender, being "adequate" the frequent use and "inadequate" when the student answered sometimes, rarely or never.

Figure 4 illustrates the reasons hindering the use of sunscreen, according to the students interviewed. The main reason was "lazy to apply the product", selected by 181 individuals (48.7%). The second most common reason was "the skin becomes very oily/I do not like the appearance of the skin with the product", selected by 100 students (27%). The price of the product was selected by 5.8% (n=22) of those interviewed as the main reason for not using the product and only 1.4% (n=5) did not use it for lack of information of the need of using it. Also, 63 students (17.1%) selected "other" reasons, among which they reported sunscreen allergy, stains in clothes and the use of tanning products, among others.

We evaluated the existence of an approach regarding SC and photoprotection during graduation and 46% (n=168) of the students confirmed that they received this type of information. Group 1 had the highest percentage of "yes" answers (73%), whereas the lowest percentage (14.4%) belonged to group 2 (p<0.001). In the third group, this index was of 23.7%.

We found a significant association between having received a photo-educational approach during graduation and the higher frequency of sunscreen use (p=0.033): among the students that received it, 39.9% (n=67) reported regular use of sunscreen compared to 29.9% (n=58) among those who were not given this information. These data are represented in figure 5.

DISCUSSION

The sample of this study was mainly made by individuals coming from Rio Grande do Sul with a low phototype (I, II and III) with representativeness of the regional population in the area of the study, where it is estimated that 89% of the population in urban areas is Caucasian.[10]

The level of knowledge about SC and photoprotection was satisfactory in more than 80% of the students, with a higher proportion among individuals of the health area. This is a good indicator because it shows that these professionals under training are prepared to spread the basic information about judicious sun exposure. Data from the literature show that the information that young people have in this respect do not generally come from health professionals, therefore, a scenario that can be modified.[7,13,14] On the other hand, when considering that the evaluated knowledge was extremely basic, it is worrisome that more than 10% of the sample had an unsatisfactory knowledge. University students represent a portion with unique education regarding the general population in which the lack of photo-educational knowledge tends to be even more frequent.

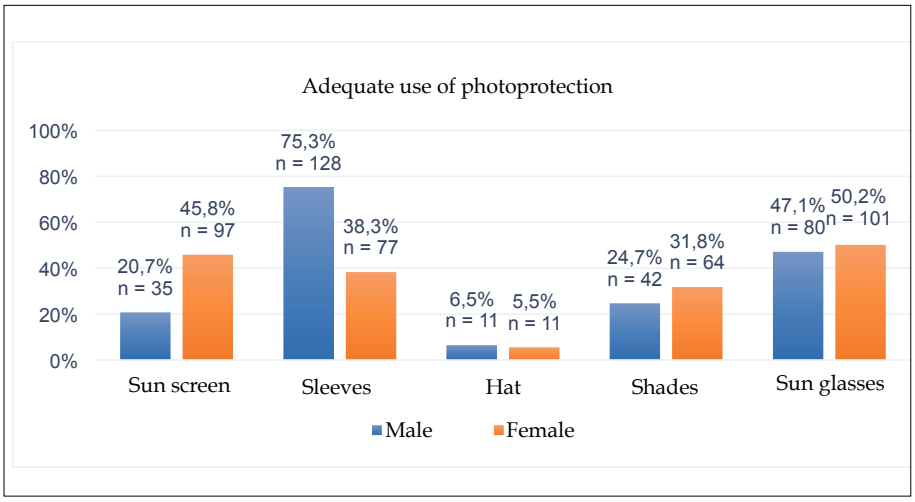

Figure 3: Frequency of the adequate use of the main photoprotective measures according to sex.
Source: Author

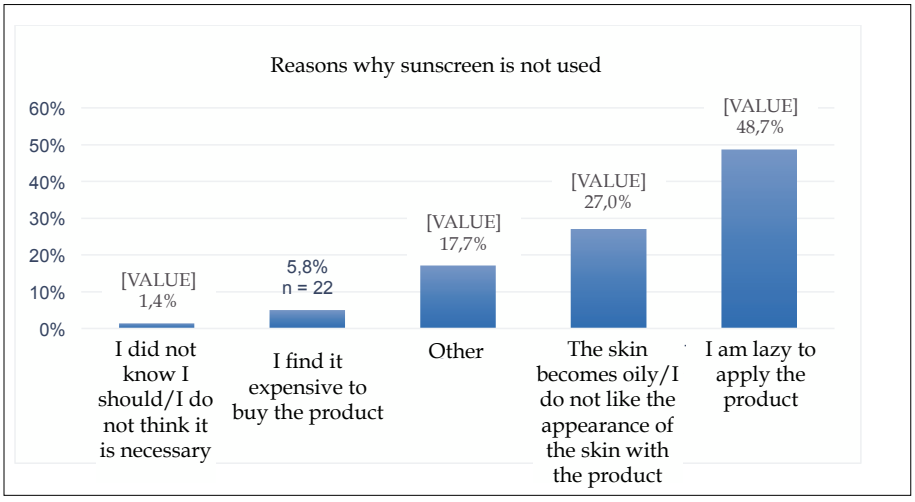

Figure 4: Reasons for not using sunscreen reported in the sample.
Source: Author

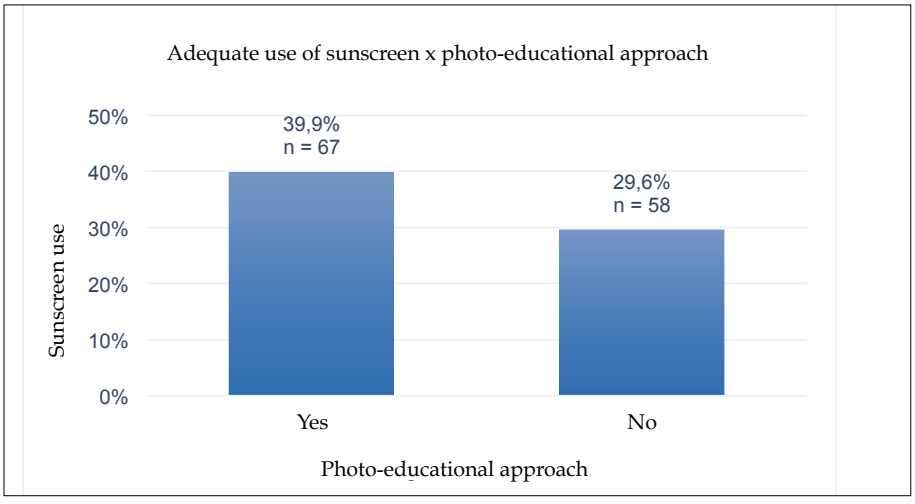

Figure 5: Association between photo-educational approach and sunscreen use. Source: Author

When asked about the risk factors for SC, almost all of those interviewed knew its relationship with UVR. However, the genetic risk factor was unknown to a great part of the students. These data are in accordance with the literature, confirming that the relationship between UVR and SC is widely known, what does not happen for the genetic risk, particularly among students that are not in the health area.[6]

The group of students in areas of activities with higher photoexposure was the group that demonstrated less knowledge about the need of using sunscreen during winter and in cloudy days, what is reason for great concern, both because it proves the lack of information on photoprotection and suggests that these people do not use sunscreen in many situations where it is indicated. Costa, in 2004, reported a low percentage of sunscreen use during all seasons among university students and associated this habit to the false conception that the sun is only harmful in summer, what seems to still be current.[8]

The results related to sun exposure habits and sun damage in the two first decades of life demonstrated a high frequency of sunburns, particularly among those with a lower phototype. More than one quarter of the sample had already had a blistering sunburn, with many students reporting more than one episode. It is estimated that the occurrence of two or more episodes of blistering sunburns before 18 years of age doubles the risk for melanoma during adulthood, what makes these results alarming.[13] Therefore, we can infer that at least a significant part of the individuals interviewed in this study already has an increased risk for the development of SC during their lives. This study shows a considerably higher frequency of sunburns (>90%) compared to previous studies in the south of Brazil, in which the prevalence was close to 50%, with populations with a similar profile.[11,14] The frequency of 2nd degree sunburns did not show a large variation.

More than 5% of the students reported having already used tanning booths. These devices are forbidden for aesthetic purposes in Brazil since 2009, i.e., eight years before data collection. Since the population studied is quite young (mean age of 22 years), this indicates that these individuals were exposed to this tanning method in a very early phase of their lives (probably before 16 years of age) or were exposed to illegal artificial tanning practices, what makes the situation even more problematic. A study published in 2010 by Castilho revealed the use of these devices in 3.5% of university students, indicating little progress in the elimination of this practice in Brazil along the last seven years.[6]

The frequency of students that had recent sun exposure enough to cause skin tanning was fairly high. A portion of those interviewed, mainly women, reported the habit of intentionally exposing to radiation with the aim of improving their appearance. An elevated frequency of tanning and intentional sun exposure particularly among women were also reported by Castilho in 2010.[6] This demonstrates that despite advances in the knowledge regarding sun damage, the culture of recreational exposure and worship to tanned skin are still present in the society, and this habit, common in former generations, perpetuates. It is clear that higher efforts regarding photo education in all age groups and media regulation to avoid encouraging these practices are needed, as already shown by other authors.[7,13]

Regarding the time spent in activities performed in the sun, it was demonstrated that group 2, made by Veterinary Medicine and Physical Education students was related to the longer time of exposure, both in activities related to the graduation and activities related to leisure. This reflects sun exposure as a true habit and this idea is reinforced by the fact that this group was also the one that presented more sun damage in the first two decades of life. Other Brazilian studies with populations of this age group had already shown elevated rates of exposure to the sun, intentional or not, and the critical times of the day for UVB.[6,13]

The frequency of the use of photoprotective measures was disappointing. The regular use of sunscreen was reported by only one third of the total sample and was more frequent in females. Brazilian studies conducted by Costa (2004), Benvenuto-Andrade (2007) and Castilho (2010) demonstrated sunscreen use rates between 20% to 25% and also a higher frequency among women.[6,8,13] Compared to these studies, our data show a slight increase in the use rates of sunscreen, although it remains inadequate.

The use of sleeves to cover the shoulders was more common among individuals of male gender, what is probably associated to the fact that the use of sleeved shirts is part of the traditional male apparel and that men use this type of clothing for this reason and not necessarily with the intention of protecting from the sun.[14] The use of sunglasses was a frequently used photoprotection method, probably also related to cultural and aesthetic reasons.[7] Although the use of shades as a some protection method was reported with certain frequency, we should remember that this method is not enough for photoprotection on its own.[17]

Among the low number of individuals that reported using sunscreen with the adequate frequency, a considerable portion reported using products with SPF<15 or not having information regarding SPF coverage or the UVA/UVB protection spectrum of the sunscreen, indicating that the reported some protection might not be effective against the harmful spectrum of solar radiation. Urasaki (2016) reported that more than 40% of the university students interviewed used SPF<15,[7] in accordance to our study. The students in group 2 were again associated to unfavorable results since almost half of them did not even know the features of the sunscreens they used.

Therefore, for all methods of photoprotection investigated, their use was way below ideal. We remind that in Brazil it is recommended the use of the highest possible number of combined photoprotection measures, and all days of the year and for all phototypes.[17]

Less than half of the students interviewed received some kind of photo-educational information, either in the initial semester or the final semester of graduation. The course of Medicine was the exception because it includes in its curriculum the topic photoprotection and SC in the discipline of dermatology. The group with lower knowledge was exactly the group that includes the professional areas with higher risk for photoexposure. Therefore, it is possible to infer that professors and managers of these areas are not trained to teach and encourage healthy habits of sun exposure to their students, demonstrating the need to plan photo-educational strategies for the faculty members as well.

The use of sunscreen was similar for all groups, however, the students who had received a photo-educational approach during graduation were significantly associated to a higher frequency of use. This supports that photo-educational measures are really effective and potentially habit-modifying, reinforcing their importance in the prevention of SC.[14]

For most of those interviewed, the main prohibitive reason for the use of sunscreen was "too lazy to apply the product", followed by "the skin becomes too oily/I do not like the appearance of the skin with the product". Benvenuto-Andrade, in 2007, demonstrated that "lack of patience" was the main reason why teenagers did not use sunscreen.[13] It is observed that the lack of habit, be it due to laziness or lack of patience, associated to the lack of information on photoprotection, is responsible for a large part of noncompliance to sunscreen use among young people. Surprisingly, for the current economic situation, only 5% of those interviewed referred to the price of sunscreen as an obstacle for its use. In Brazil, sunscreens still have a relatively high cost, but the analysis adjusted by income demonstrated that it did not significantly influence the use or nonuse of sunscreen. Differently, Fabris (2010) found a proportionality between the use of sunscreen and socioeconomic conditions among young adults enrolled in a gymnasium in Santa Catarina, Brazil.[14]

The data obtained with this study are important to direct educational actions for the prevention of SC.[8] Once the profile of exposure and sun protection of this university population was established, it is possible to develop targeted strategies for the main limitations referred to.

There are no reports in the literature associating these variables for university students of different areas of knowledge, hampering the comparison of results. Of note, we should highlight that group 2, made by students who had more sun exposure, was the group with the lowest level of knowledge about SC and photoprotection, the highest frequency of 2nd degree burns and the highest association with recent tanning. This combination of factors associated to the lack of a photo-educational approach identified in this study makes this subgroup a priority target for SC prevention strategies.

Study limitations

The selection of the sample did not take into consideration the number of students per class for each course. Since for each group two graduation courses were randomly selected, there was a mismatch between the number of students for each group. This generated a selection bias: the group of the health area corresponds to half of the total sample and this should be taken into consideration for the interpretation of the results.

A possible restraint bias can have occurred, even with self-applied questionnaires. For example, there is a possibility that students in the health area did not admit to negative attitudes, overestimating some results.

The SEBI questionnaire Version 2.0 was validated in the North American population, which is different from the Brazilian population in many aspects. There are no other studies using this instrument in Brazil nor of other validated questionnaires with the same purpose until the moment of finalizing this study.

Finally, we should consider that this is a prevalence study with no power to infer cause-effect relationships.

CONCLUSION

In this study we evaluated the behavior and knowledge of young university adults regarding sun exposure and protection, verifying excessive UVR exposure without effective sun protection, besides the clear deficiency of relative knowledge and photo-educational actions in the academic environment.

The study compared these variables among university students of different academic areas, verifying a good level off photo-educational knowledge and a higher frequency of healthy habits regarding sun exposure in the students of the health area. On the other hand, we verified a poorer knowledge, lower photoprotection compliance, higher occurrence of sun damage and longer time of sun exposure among students of professional areas related to higher photoexposure.

The solar exposure knowledge and behavior had little influence of socioeconomic characteristics of those interviewed and did not differ between students in the initial and final semesters of graduation, confirming the verified nonexistence of photo-educational measures in the academic environment. The importance of conducting such actions was also reinforced by the finding of a significant association of higher sunscreen use among those students who confirmed having received some kind of photo-educational information during graduation.

No other studies were found in the literature that evaluated knowledge and habits regarding sun exposure specifically in university students of professional areas under higher risk of solar exposure, making the study the pioneer in the evaluation of this subgroup of students. Our results point to this portion of the university population as a priority target for strategies of primary prevention of SC because it was associated to a behavior that can be harmful to the health of the skin. Therefore, we highlight the need of further studies involving this specific section of the population.

The university environment is favorable to photo-educational actions because it reaches a vulnerable population and, at the same time, with unique intellectual ability to incorporate habit changes. The results of this study can contribute to establishing effective preventive strategies to be adopted in this environment so they can bring about a real impact in the reduction of the incidence of SC in Rio Grande do Sul. ❑

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