

# Awareness Of Skin Cancer And Practice Of Photoprotective Behaviours Among Medical Students

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## Research Article

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# Abstract

**Background:** Skin cancer is a serious health problem in our society, and UV radiation is the most significant agent in its development. Photoprotection and awareness of the risks of developing skin cancer are the basic pillars in its prevention. As future healthcare professionals, medical students' knowledge of these questions is likely to influence the effectiveness with which they can promote appropriate behavior regarding sun exposure among their patients. Our objective was to assess the knowledge and awareness of photoprotection among medical students and their behavior regarding sun exposure.

**Methods:** A Google questionnaire comprising 54 questions about the risks of skin cancer and photoprotective habits was developed. 228 participants were recruited to the study, of whom sixth-year and fourth-year students were the most and least strongly represented groups, respectively. Statistical analysis was performed using IBM SPSS Statistics 26.

**Results:** Significantly more fifth- and sixth-year students had knowledge of the meaning of the sun protection factor (SPF) than those in pre-clinical years ( $P=0.006$ ), and more of them were aware of the risks of developing skin cancer ( $P=0.039$ ). A higher percentage of female than male students took FPS into account when buying sunscreen ( $P=0.023$ ), and male students are more likely to be reluctant to apply sunscreen than female students ( $P=0.022$ ). A higher proportion of women than men in the study used sunscreen for outdoor activities ( $P=0.015$ ).

**Conclusions:** Prevention of sun overexposure is a public health priority, and medical students will be in charge of informing the general population in the future. Most students who are currently studying medicine have some knowledge of skin cancer prevention, although there are significant differences between sexes and year of study. However, their behavior indicates that their knowledge does not consistently translate from theory into practice.

## Background

Skin cancer is a significant health problem in our society, and UV radiation is the most important environmental agent in its development. Photoprotection and awareness of the risk of developing skin cancer are therefore the basic pillars for the prevention of these tumors.

Skin cancer prevention programs have improved the general population's knowledge about the damaging effects of sun exposure and the benefits of photoprotection. However, the increase in the prevalence of skin cancer over the years indicates that these programs have failed to increase general awareness about the disease and have not led to a change in people's behavior. There is a growing consensus among scientists that, in order to successfully change the population's behavior, individual and social and environmental approaches, including motivational strategies, need to be adopted. The responsibility for this rests with public health promoters, who provide the general population with the essential information

about prevention. However, these professionals are also well placed to help develop the health interventions they will promote<sup>1</sup>.

Therefore, medical students' knowledge of photoprotection, prevention and the risk of developing skin cancer is likely to influence the effectiveness with which they, as future healthcare professionals, encourage their patients to adopt appropriate behavior to avoid sun exposure.

Our objective was to assess the knowledge and awareness of photoprotection among medical students at the University of Salamanca, and to assess their behavior regarding sun exposure in order to identify opportunities to improve their aptitudes and the attitudes they may adopt with their future patients.

## Methods

### Design of the study

In order to assess the knowledge and photoprotective habits of medical students of the University of Salamanca, a Google questionnaire was prepared (<https://www.google.es/intl/es/forms/about/>), consisting of 54 questions related to the risk of developing skin cancer and to photoprotective habits. It was shared through the main social networks used by the medical students of the University of Salamanca (Facebook and WhatsApp), and through the University's institutional email system.

The questionnaire was divided into six sections: 1) student characteristics of age, sex and year of medical degree course; 2) personal and family history of skin cancer; 3) phenotypic features of students linked to predisposition to skin damage caused by sun exposure and risk of developing skin cancer; 4) students' theoretical knowledge about photoprotection and the importance of adequate prevention; 5) actual habits of students with regard to sun exposure; 6) students' awareness of the importance of photoprotection and of the risk factors of skin cancer. In order to complete the questionnaire, the students had to identify themselves with their university ID and password; this ensured that they could only access the questionnaire on one occasion.

### Characteristics of participants

We received a total of 228 responses (representing about 25% of the students in the Medical Faculty). Sixth-year and fourth-year students were the most and least strongly represented groups, respectively. 78% of the participants were women, and 22% were men.

### Statistical analysis

A descriptive analysis was conducted, and chi-squared tests were used to assess whether there was a relationship between pairs of qualitative variables. Statistical significance was concluded for values of  $P < 0.05$ . Analyses were conducted using the IBM SPSS Statistics 26 application.

## Results

Almost half of the 228 surveys (48.3%) were completed by fifth- and sixth-year students. 83.8% (191) of the students said that they knew what the sun protection factor is, and 77.2% (176) claimed to know what the UV index is. 84.7% of participants (193 students) said that they looked at the SPF when buying sunscreen. A large majority of students (81.6%) considered UV radiation to be the most important risk factor for the development of skin cancer. In spite of the awareness of the influence of UV radiation on the development of skin cancer, more than half of the participants (58.4 %, 133 students) were reluctant to apply sunscreen and 43.4% (99 students) admitted that they did not reapply sunscreen after swimming or bathing. 53.9% of the participants (123 students) used sunscreen for outdoor activities, but only 29.8% (68 students) used sunscreen when they merely went outside on a sunny day. In total, 46.9% (107 students) had been sunburnt at least once in the previous summer, and 16.2% (37 students) admitted that they had been sunburnt several times. 61.8% (141 students) enjoyed sunbathing to acquire a tan, but only 3.5% (8 students) had ever visited a tanning salon. Table 1 shows the distribution of responses of the students who completed the questionnaire.

Table 1  
Distribution of responses in the group of students who completed the questionnaire.

Question	Frequency (%) answering 'Yes'
I know what SPF is	191 (83.8%)
I know what the UV index is	176 (77.2%)
I am at risk of developing skin cancer	72 (31.5%)
I am reluctant to use photoprotection before sun exposure of any kind	133 (58.4%)
I reapply sunscreen when I get out of the water	129 (56.6%)
I use photoprotection for outdoor activities	123 (53.9%)
I use photoprotection when I go outside on a sunny day	68 (29.8%)
SPF is the factor that determines what type of sunscreen I buy (vs. price)	193 (84.7%)
Sun exposure is the most important factor in developing skin cancer (vs. family history and geographic location)	186 (81.6%)
I have not been sunburnt this summer (vs. once and several times)	84 (36.9%)

Students in the fifth and the sixth years of their medical studies were significantly more likely to understand the meaning of SPF than those in their preclinical years ( $P= 0.006$ ). The percentage of female students for whom SPF is an important factor when buying sunscreen was significantly higher than that of male students ( $P= 0.023$ ) (Table 2). The students in the clinical (4th to 6th years) stage of their training were significantly more likely to be aware of the risk of developing skin cancer ( $P= 0.039$ ) than preclinical students. Male students were significantly more likely to be reluctant to apply sunscreen than

female students ( $P= 0.022$ ), and, similarly, significantly more female than male students used sunscreen when they did outdoor activities ( $P= 0.015$ ). Although applying sunscreen when going out on a sunny day was infrequent in the students overall, the practice was significantly more common among females ( $P< 0.00001$ ).

Table 2  
Differences in responses by sex of students

Question	Frequency (%) answering 'Yes'		<i>P</i>
	Women	Men	
I know what SPF is	152 (86.4%)	39 (76.5%)	0.089
I know what the UV index is	133 (75.6%)	43 (84.3%)	0.188
I am at risk of developing skin cancer	52 (29.5%)	20 (39.2%)	0.2
I am reluctant to use photoprotection before sun exposure of any kind	96 (54.5%)	37 (72.5%)	<b>0.022</b>
I reapply sunscreen when I get out of the water	103 (58.5%)	26 (51.0%)	0.36
I use photoprotection for outdoor activities	103 (58.5%)	20 (39.2%)	<b>0.015</b>
I use photoprotection when I go outside on a sunny day	63 (35.8%)	5 (9.8%)	<b>&lt; 0.0001</b>
SPF is the factor that determines what type of sunscreen I buy (vs. price)	155 (88.0%)	38 (74.5%)	<b>0.023</b>
Sun exposure is the most important factor in developing skin cancer (vs. family history and geographic location)	147 (83.5%)	39 (76.5%)	0,127
I have not been sunburnt this summer (vs. once and several times)	65 (36.9%)	19 (37.2%)	0.992

In spite of the changes related to the knowledge of skin cancer and SPF among students in the latter years of the degree, this does not frequently seem to have a direct impact on their behavior. There are no differences between the year of the degree and the use of sunscreen after coming out of the water, or when doing outdoor activities, the reasons for buying sunscreen or the number of times students had been sunburnt in the previous summer ( $P> 0.05$ ) (Table 3). In this regard, there is a lack of transfer of acquired knowledge into daily habits. The sex of the participants was a relevant factor in determining their photoprotective behaviors, whereby, female students more frequently adhered to them.

Table 3  
Frequency of responses by stage of students' medical training.

Question	Frequency (%) answering 'Yes'		P
	1st -4th	5th -6th	
I know what SPF is	91 (77.1%)	100 (91.7%)	<b>0.006</b>
I know what the UV index is	89 (75.4%)	87 (79.8%)	0.56
I am at risk of developing skin cancer	28 (23.7%)	44 (40.4%)	<b>0.039</b>
I am reluctant to use photoprotection before sun exposure of any kind	69 (58.5%)	64 (58.7%)	0.441
I reapply sunscreen when I get out of the water	66 (55.9%)	63 (57.8%)	0.788
I use photoprotection for outdoor activities	64 (54.2%)	59 (54.1%)	0.387
I use photoprotection when I go outside on a sunny day	29 (24.6%)	39 (35.8%)	0.161
SPF is the factor that determines what type of sunscreen I buy (vs. price)	99 (83.9%)	94 (86.2%)	0.882
Sun exposure is the most important factor in developing skin cancer (vs. family history and geographic location)	90 (76.3%)	96 (88%)	0.288
I have not been sunburnt this summer (vs. once and several times)	41 (34.7%)	43 (39.4%)	0.781

## Discussion

In this study we have explored the awareness of the risk of developing skin cancer and photoprotective behaviours in a sample of medical students in a Spanish university in order to identify opportunities for improving the education protocols in this area of knowledge. Although photoprotection is not included as a specific topic in the syllabus of undergraduate dermatology degree courses in Spain, the information related to it is presented in different areas of the program as part of the preventive measures for skin cancer and photosensitive dermatitis, as is also the case in France<sup>2</sup>. In general terms, the students in our group show a level of awareness of skin cancer prevention that is similar to that reported in other studies from the USA<sup>3</sup> and Europe<sup>2,4</sup>, although there are differences in the surveys related to students' sex and year of study.

The sex of the students is relevant to their photoprotective behavior. Specifically, female students are more likely to adhere to preventive behaviors. In addition, male students were less likely to be aware of the importance of photoprotection, and less prone to taking active solar photoprotective measures. Sex differences in knowledge and behavior have been observed in other studies<sup>2,3</sup>, and it is possible that these contribute to the higher incidence of and mortality from skin cancer in men<sup>5,6,7</sup>.

On the other hand, the data show differences in how widespread is the knowledge regarding skin cancer prevention and awareness of the risks of developing skin cancer between students in the last years of their degree (who have studied the discipline of Dermatology) and those in their early years. Nevertheless, this does not seem to have a direct influence on their behavior, which suggests that transfer of the knowledge acquired into daily habits is poor. Other studies have also revealed a limited application of the knowledge of photoprotective habits in the behavior of medical students<sup>2,3,4</sup>. Although the extent of knowledge of the concepts of SPF and UV index is satisfactory, this knowledge does not appear to consistently inform their attitudes to photoprotective measures. In fact, we found attitudes that are in favor of tanning, such as intentional sun exposure, were quite widespread although the use of tanning salons was very infrequent. The only two studies on the Spanish population, in groups of students of the Complutense University of Madrid and the University of Las Palmas de Gran Canaria, showed very similar findings, which suggests that, beyond their academic training, there are very widespread habits that affect the behavior of the younger population<sup>8,9</sup>.

When conducting studies on behaviors and photoprotective habits via questionnaires about a specific practice, we have noted that participants tend to provide the expected socially acceptable responses<sup>10</sup>, although this limitation was ameliorated by the fact that the answers were anonymous. The study was carried out in a Spanish University, which means that it may be difficult to extrapolate the results to other populations, although our results are very similar to those found in other studies. The most significant limitation in this study is the selection bias arising from many students not completing the survey. It is likely that those who did participate were more interested in the subject and had better knowledge of the topic than those who did not.

## Conclusions

Prevention of solar overexposure is a public health priority, and medical students will be in charge of informing the general population in the future. In general terms, they show an adequate level of knowledge of skin cancer prevention, with significant differences based on sex and the stage of medical studies. However, their behavior seems to show a lack of transfer of theoretical knowledge into practice. The results of this study show that we need to make progress in that area and that it would be advisable to reinforce training on photoprotection in the educational programs of students pursuing a Degree in Medicine.

## List Of Abbreviations

UV: Ultraviolet

SPF: Solar Protection Factor

## **Declarations**

### **Ethics approval and consent to participate**

The study was approved by the Ethics Committee of the University Hospital of Salamanca.

Informed consent was obtained from all participants.

All methods were carried out in accordance with relevant guidelines and regulations.

### **Consent for publication**

Not applicable.

### **Availability of data and materials**

The data will be available upon request to the corresponding author.

### **Competing interests**

The authors declare that they have no competing interests

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### **Author contributions**

LR was responsible for the literature search and writing the manuscript. JMGD collected the data and undertook the initial statistical analysis. LPT and ACF assisted with data collection and manuscript editing. DRN and DRB collaborated in the statistical analysis. CRC supervised and coordinated the statistical analysis and the production of the manuscript. JC developed the initial hypothesis, supervised and coordinated the statistical analysis, the production of the manuscript, and the approval of the final version for publication.

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