INVESTIGATION

Photoexposure and risk factors for skin cancer: an evaluation of behaviors and knowledge among university students

Fotoexposição e fatores de risco para câncer da pele: uma avaliação de hábitos e conhecimentos entre estudantes universitários

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Resumo: FUNDAMENTOS: O câncer da pele é a neoplasia mais frequente no Brasil. Compreender as atitudes que influenciam a proteção e a exposição aos raios solares é extremamente importante para sua prevenção.
OBJETIVOS: Avaliar hábitos de fotoexposição e fotoproteção, bem como conhecimento de fatores de risco para câncer da pele, tendo por fim delinear os padrões de comportamento dos jovens perante os efeitos solares.
MÉTODOS: Distribuíram-se questionários autoaplicativos a 368 universitários, na faixa etária dos 20 anos, dos cursos de Medicina, Educação Física, Direito e Comunicação Social de instituição de ensino privada em Taguatinga (DF).
RESULTADOS: O uso diário de fotoprotetor foi significativamente maior entre as mulheres. A prática de bronzeamento artificial foi baixa (3,5%), referida apenas por mulheres. O uso de filtro solar com fator de proteção maior do que 15 ou igual a 15 foi referido por 278 estudantes. De modo geral, mais de 90% dos estudantes acreditam na associação entre radiação ultravioleta e câncer da pele. Apesar disso, apenas 43,5% acreditam na genética como fator de risco. Entre os que rejeitam a hipótese do fator de risco genético para carcinogênese cutânea, 86,2% são acadêmicos das Ciências Humanas (Direito e Comunicação Social).
CONCLUSÃO: Esses dados permitem orientar medidas nos níveis individual e coletivo, colaborando para a prevenção de lesões cutâneas.
Palavras-chave: Estudantes; Fatores de risco; Neoplasias cutâneas; Protetores de raios solares; Raios ultravioletas

Abstract: BACKGROUND: Skin cancer is the most common neoplasm in Brazil. It is extremely important to understand the attitudes that influence protection from and exposure to the sun's ultraviolet rays in order to prevent this clinical condition.
OBJECTIVES: To evaluate photoexposure and photoprotection habits and knowledge of risk factors for skin cancer, with the purpose of describing behavioral patterns of university students in relation to the effects of the sun.
METHODS: Self-administered questionnaires were distributed to 368 students, aged 20-29 years, from courses in the areas of Medicine, Physical Education, Law and Social Communication, in a private education institution in Taguatinga-DF..
RESULTS: The daily use of photoprotector was significantly higher among women. The use of tanning beds was low (3.5%), and was mentioned only by women. The application of sunscreen with sun protection factor (SPF) equal to or greater than 15 was reported by 278 students. In general, over 90% of the students believe in the association between ultraviolet radiation and skin cancer. Nevertheless, only 43.5% believe in genetics as a risk factor. Among those who reject genetics as a risk factor for skin cancer, 86.2% are Human Sciences students (Law and Social Communication).
CONCLUSION: Results may help the establishment of individual and collective preventive measures, helping to avoid skin lesions.
Keywords: Skin neoplasms; Students; Sunscreen agents; Ultraviolet rays; Risk factor

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INTRODUCTION

Skin cancer is the neoplasm of highest incidence in Brazil.[1] It is extremely important to understand the attitudes that influence protection from and exposure to the sun's ultraviolet rays in order to prevent this disease. The cult of the body and the aesthetic value of tanned skin, associated with messages circulated by the media, may lead to prolonged and, at times, unprotected sun exposure.[2,3,4] In particular, young individuals constitute a vulnerable group to inappropriate sun exposure, either due to the influence of aesthetic values or the practice of outdoor physical activity.[5]

National estimates of non-melanoma skin cancer (basal cell and spinocellular carcinoma) for 2008 were of 115,000 new cases. The Federal District was responsible for 930 cases. Despite the high lethality of melanoma, its incidence is still low; however, a significant increase in the number of melanoma cases in the white population has been observed. [6]

Among the risk factors that contribute to the occurrence of skin lesions, genetic factors, family history of skin cancer, and ultraviolet radiation (UV) are well established. UV rays, in addition to facilitating genetic mutations, have a suppressive effect on the skin immune response. [7] In general, personal or family history of melanoma constitutes the greatest risk factor. [1,6,8] The use of photoprotectors as an effective protection measure has been widely discussed in the literature and is recommended for the prevention of all skin neoplasms. [5]

In this study sun exposure and sun protection habits among university students were described. In addition, knowledge about genetic and environmental (UV radiation) risk factors for skin cancer was evaluated.

METHODS

Study design: a cross-sectional analytical survey was conducted with 368 students in their twenties, in a private higher education institution in Taguatinga-DF, from February to April 2007.

Population and sample: students from Health Sciences courses (Medicine and Physical Education) and Human Science Courses (Law and Social Communication) were invited to participate in the research. Disciplines from various terms of the selected courses were drawn for the sample. The distribution of students according to gender was proportional among the courses – table 1. Based on another study that investigated a similar issue[9], the estimated sample size for a two-tailed test was 322 individuals. The level of significance was (α) 5% and statistical power, 0.90.

Data collection: The research was conducted with a standardized self-administered questionnaire constituted by 18 items. The questionnaires were distributed by two fourth-year students of Medicine. Personal data (gender, age, and course of study), and information about phenotypic characteristics (skin, hair and eye color), sun exposure habits (intentional sun exposure, use of tanning bed; time of day individuals sunbathe), preventive measures against photoexposure (use of photoprotectors or other means of protection), occurrence of previous skin lesions (sunburn with blistering and skin cancer), and knowledge about the relationship between ultraviolet radiation/genetics and skin cancer were collected. Overall, 368 questionnaires were answered; however, some of the interviewees did not answer all of the questions. Due to this fact, percentages were calculated based on the number of questions answered. This did not influence significantly the results obtained.

Statistical analysis: Data description was expressed by absolute (n) and relative (%) frequency. The association between variables such as gender, graduation course, and groups of students from Health and Human Sciences was investigated with the employment of the Chi-square test for dichotomous variables. The software *Probabilitas*® version 1.0 was used. All tests had a 0.95 reliability rate.

Ethical considerations: This study was approved by the ethics committee of the University Hospital of the Catholic University of Brasilia. The objectives of the research were explained to students during the administration of the questionnaires. Students participating in this project were assured verbally that their answers would remain anonymous.

RESULTS

1. Phenotypic characteristics

The study population was constituted by individuals with an average age of 22.1 ± 5.2. Of these, 45.1% (n=166) were men and 54.9% (n=202), women. Answers to the question about skin color showed that 49% (n=181) of the interviewees were white, 38% (n=140) were medium-dark complexioned, 5% (n=18) were black, and 8% (n=29) were yellow. Regarding eye color, 88.7% (n=282) of individuals had black or brown eyes, and 11.3% (n=36) had green or blue eyes. A total of 91% (n=332) had brown or black hair, whereas 9%, (n=33) of individuals were blond or red-haired.

2. Sun exposure habits

The habit of sunbathing was observed in 12.8% (n=47) of the interviewees. Among these, 57.5% were women. A similar proportion was seen in a separate analysis of graduation courses. The practice of artifi-

cial tanning was low, referred only by 3.5% (n=7) of women. About 50% of the interviewees (n=175) stated the preference for sunbathing between 10 a.m. and 4 p.m. A significant statistical difference between genders was not observed – table 1. A total of 66.9% (n=206) participants sunbathed for pleasure, whereas 10.1% (n=31) were exposed to the sun for occupational reasons.

3. Photoprotection measures

Overall, 83.9% (n=308) of the participants confirmed the use of sunscreen. However, less than 25% (n=75) apply it on a daily basis. A significant statistical difference among irregular sunscreen users was not observed in relation to gender or graduation courses. A significant statistical difference ($p<0.01$) between daily users of sunscreen of both genders was found – table 1. The application of sunscreen during outdoor physical activity was mentioned by 68.8% of the students. The Sun Protection Factor (SPF) used by the students ranged from 10 to 60, with a median around 30. Of the 283 interviewees who mentioned the SPF used, it was shown that 98.2% (n=278) use SPF equal to or greater than 15. The use of other means of protection such as sunglasses, t-shirts, and hats was indicated by more than 70% of the students.

4. Sunburn and skin cancer

Nearly 20% (n=76) of the interviewees reported a history of sunburns with blistering. Of these, 62.5% were women. A total of 78.6% (n=287) of the participants denied the occurrence of lesions. Interviewees did not report cases of melanoma or non-melanoma skin cancer.

5. Knowledge about risk factors

The investigation about knowledge of the risks offered by ultraviolet radiation revealed that 92.7% (n=341) of the participants believe in the association between skin cancer and UV rays (Graph 1). It was observed that 43.5% (n=160) of the students support the association between genetics risk and skin cancer. However, a significant statistical difference ($p<0.001$) was found between the opinions of students from

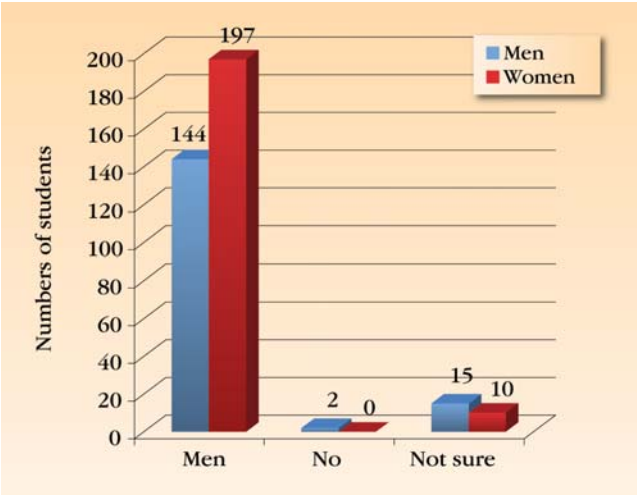
Table 1: Distribution of the sample, sun exposure habits and use of photoprotector among university students

Distribution of university students*							
Graduation Courses	**Men (%)**		**Women (%)**		**p**	**Total**	
Law	46 (46,0)		54 (54,0)		0,98	100	
Social Communication	35 (34,3)		67 (65,7)		0,14	102	
Physical Education	53 (57,6)		39 (42,4)		0,09	92	
Medicine	32 (43,2)		42 (56,8)		0,95	74	
Areas of Knowledge							
Health Sciences	85 (51,2)		81 (48,8)		0,42	166	
Human Sciences	81 (40,0)		121 (60,0)		0,51	202	
Sun exposure habits*							
Sunbathing	**Yes**		**No**				
Men	20 (12,5)		140 (87,5)		0,98	160	
Women	27 (13,1)		179 (86,9)			206	
Artificial tanning beds							
Men	0 (0,0)		167 (100)		0,05	167	
Women	7 (3,5)		194 (96,5)			201	
Sunbathing hours	Lower risk†		Higher risk‡				
Men	79 (52,3)		72 (47,7)		0,61	151	
Women	91 (46,9)		103 (53,1)			194	
Photoprotector use*							
General Activities	Daily	p	Irregularl	p	Never	p	Total
Men	19 (11,5)	<0,01	105 (63,6)	0,99	41 (24,9)	<0,01	165
Women	56 (27,7)		128 (63,4)		18 (8,9)		202
Outdoor physical activity	Always		Sometime		Never		
Law	19 (18,6)		68 (66,7)		15 (14,7)		102
Social Communication	20 (20,0)		60 (60,0)		20 (20,0)		100
Physical Education	15 (16,3)		65 (70,7)		12 (13,0)		92
Medicine	21 (28,8)		40 (54,8)		12 (16,4)		73

* Presentation of data in frequency and percentage: n (%)

† Period of the day before 10 a.m. and after 4 p.m

‡ Period of the day between 10 a.m. and 4 p.m



Graph 1: Perception of ultraviolet radiation as a risk factor for skin cancer

Health and Human Sciences courses. Among participants who believe in genetics as a risk factor, 72.5% are students of Medicine and Physical Education. Among those who refute this hypothesis, 86.2% are students of Law and Social Communication (Graph 2).

DISCUSSION

The study population was predominantly constituted by light-skinned students with dark eyes and hair. Nonetheless, skin color is a very subjective and controversial notion and answers to this question should be, ideally, evaluated by the researchers.

The association between tanned skin, health, and beauty tends to weaken with time. Practically 90% of the students denied the habit of sunbathing. Nonetheless, we still identified cases of artificial tanning beds use by women (3.5%).[9,10,11]

Even though information about the negative effects of sun exposure when the sun's ultraviolet rays are the strongest is widely available, [1,12,13] 175 students (50.7%) still choose to sunbathe between 10 a.m. and 4 p.m. Due to the young age of participants, this behavior may be related to social activities, outdoor physical activity, and the desire to enjoy the day. [14,15]

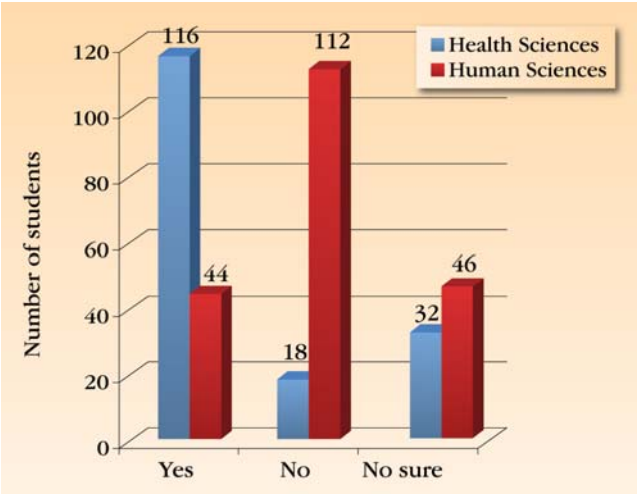
Recreational sun exposure was the most prevalent form of exposure among the students. Both occupational exposure and exposure during leisure time did not show significant differences in relation to gender or graduation courses. Hora *et al.*[16] found similar reasons for exposure; however, they observed a slight tendency of higher occupational exposure among men.

In the Federal District there is a high incidence of sun rays throughout the year. Thus, there is a greater need for photoprotection. More than 80% of the interviewees reported irregular use of photo protector. In 1995, Angeli *et al.*[15] showed that only 36.9% of the population in their twenties used sunscreen. These results strengthen the notion that young individuals have become increasingly more acceptant of photoprotective measures over the last decades.[14]

The regular use of photoprotectors during general activities and outdoor physical activity by students is still limited, as indicated by other studies. [14,16,17] The greater tendency of women to wear sunscreen on a daily basis as compared to men – table 1 – is in accordance with the literature. The data suggest that women are more concerned about their appearance and beauty, thus avoiding the harmful effects of the sun. [14,16,18] Despite this fact, the Central West region of Brazil, according to estimates for 2008, had the second highest national incidence of non-melanoma skin cancer among women. [2]

Among the recommendations for a healthy sun exposure, the use of sunscreen with SPF of at least 15 is advised for its strong protection against the development of skin cancer. [13,14,16,19,20] Of the 238 interviewees who mentioned SPF, it was observed that 98.2% wear sunscreen with SPF equal to or greater than 15, which probably reflects greater awareness about the harmful effects of the sun. Cokkinides *et al.*[17] showed in a study with adolescents that the greater the perception about the benefits of photoprotection, the higher the SPF used. However, SPF is only one of the measures that should be constantly emphasized, such as daily use of sunscreen and other physical means of protection, application of sunscreen 20 minutes before sun exposure and reapplications every two hours. [19]

Among the students who reported previous episodes of sunburn with blistering, 62.5% were women. This predominance was also observed in other studies. [16,21] The literature indicates that repeated episodes of sunburn or incidence of sunburn with



Graph 2: Perception of genetics as a risk factor for skin cancer

blistering double the risk of melanoma.[9,20,22] However, Maia *et al*. [23] did not categorize sunburns as a risk factor for basal cell carcinoma, except in individuals with skin type III – Fitzpatrick's classification – with a history of severe sunburn.

As expected, there were no reports of skin cancer among the students. This can be explained by the reduced sample size constituted mainly by young adults, since skin neoplasms occur more frequently in the elderly. [1,2]

Ultraviolet radiation (UV), especially UVB – wavelength between 290nm and 320 nm – is an established risk factor for skin lesions, because in addition to causing mutations in the DNA of keranocytes, it also has a suppressive effect on the skin immune system. [1,2,24] Knowledge about the association between exposure to UV rays and skin cancer was confirmed (Graph 1), in accordance with other works in the medical literature. [1,5,9,12,14,16] This knowledge not always results in adequate practices of photoprotection.

Skin neoplasms, especially melanoma, can be considered multifactorial polygenic diseases.[2,24] It is estimated that 14% of patients who receive the diagnosis of melanoma show positive family history of this neoplasm. [8] Avilés *et al*.[24] show that homogeneity in the HLA-DQA1 locus could probably be a potential predisposing factor for skin cancer in individuals exposed to other risks, both genetic and environmental.

Genetics as a risk factor was not highly associated with skin carcinogenesis by the students (43.5%). However, this association was stronger among Health Sciences students (Graph 2). This may be due to the knowledge acquired by these individuals throughout the course of their studies. Those that refute this association (86.2%) are students in the area of Human Sciences, who probably do not receive this type of health orientation in their courses. This difference was statistically significant, $p<0.001$, which may reflect a potential deficiency in the knowledge of risk factors by the Human Sciences group.

CONCLUSION

Generally, photoprotective measures are adopted by most participants; however, they are practiced irregularly and not always during intentional sun exposure. Women tend to protect themselves from photo damage more than men. The risk factor associated with UV radiation is well known, although genetics is not strongly linked to carcinogenesis, especially among Human Sciences students.

Prospective studies should be conducted in order to identify inappropriate habits of photoexposure and photoprotection among young adults. In this way, it is possible to recommend measures at the individual and collective level which aid in the prevention of skin lesions.

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