INVESTIGATION

Assessment of knowledge of skin cancer prevention and its relation with sun exposure and photo protection amongst gym academy members on the south of Santa Catarina, Brazil *

Avaliação do conhecimento quanto à prevenção do câncer de pele e sua relação com os hábitos da exposição solar e fotoproteção em praticantes de academia de ginástica do sul de Santa Catarina, Brasil

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Abstract: BACKGROUND: Skin cancer is the most frequent neoplasia in several parts of the world and also in Brazil. There is evidence of an increase in morbidity and mortality from skin cancer. Although the incidence of skin cancer is increasing, it is estimated that 45% of all preventable cancers worldwide are skin neoplasias. Several studies have emphasized the need for campaigns to encourage sun protection.
OBJECTIVE: To assess the knowledge about skin cancer prevention and its association with sun exposure and photo protection in gym members.
METHODS: We conducted a cross-sectional, descriptive and quantitative study during January to July 2009, including gym members of both sexes in the city of Criciuma. A self-administered questionnaire was used. The statistical analysis was conducted in a descriptive way in regards to the absolute and relative frequencies of the variables under study.
RESULTS: Of the 317 questionnaires studied, 62% were from women and 38% from men. Skin types II and III predominated, and the average age was 27.6 years. 94.3% of the participants reported that they had heard about the risks of sun exposure, mostly in terms of skin cancer risk (80.8%). Most participants, especially women, reported some form of sun protective measure.
CONCLUSION: The population studied, similar to that in other regions of Brazil and the world, is aware of the risks of excessive sun exposure and skin cancer prevention, but has not yet incorporated appropriate sun protection measures into their daily habits.
Keywords: Skin; Skin neoplasms; Solar radiation; Sunlight; Sunscreening agents; Ultraviolet rays

Resumo: FUNDAMENTOS: O câncer da pele é a neoplasia de maior incidência em várias partes do mundo e também no Brasil. Há evidências de aumento da morbidade e mortalidade por câncer da pele. Embora a incidência do câncer da pele esteja aumentando, há estimativas de que em todo o mundo 45% dos cânceres passíveis de prevenção sejam cutâneos. Diversos estudos têm enfatizado a necessidade de campanhas de incentivo à fotoproteção.
OBJETIVO: Avaliar o conhecimento quanto à prevenção do câncer da pele e relacioná-lo com os hábitos da exposição solar e fotoproteção em praticantes de academias de ginástica.
MÉTODOS: Foi realizado um estudo transversal, descritivo e quantitativo durante o ano de 2009, incluindo praticantes de academias de ginástica em Criciúma, SC, por meio de um questionário autoaplicável. A análise estatística foi realizada de forma descritiva das frequências absolutas e relativas das variáveis em estudo.
RESULTADOS: Dos 317 entrevistados, 62% eram do sexo feminino. Prevaleceram os fototipos III e II, e a média de idade foi de 27,6 anos. 94,3% dos entrevistados referiram já ter ouvido falar sobre os riscos da exposição solar, sendo o câncer da pele o mais citado (80,8%). A maior parte das pessoas confirmou o uso de alguma medida de fotoproteção, sendo a maioria delas mulheres.
CONCLUSÃO: A população estudada, assim como em outras regiões do Brasil e do mundo, tem noção dos riscos da exposição solar excessiva e das medidas preventivas para o câncer da pele, porém ainda não inseriu em seus hábitos as medidas de fotoproteção de forma adequada.
Palavras-chave: Luz solar; Neoplasias cutâneas; Pele; Protetores de raios solares; Radiação solar; Raios ultravioleta

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INTRODUCTION

Skin cancer in the neoplasia with the highest incidence in various parts of the world, including Brazil. There is evidence of a tendency to increasing morbidity and mortality by skin cancer. This increasing tendency can be attributed to multiple factors, amongst those: change of the population's habit in terms of physical protection and daily sun exposure; increasing incidence of ultraviolet radiation, mostly UVB and UVA, due to the thinning of the ozone layer; excessive valorisation of the tanned skin; and, mostly, increased exposure to ultraviolet radiation.[1,2] Although the incidence of skin cancer is rapidly increasing in many countries, there are some estimates that, worldwide, 45% of the preventable cancers are cutaneous.[3,4,5] Many studies have emphasized the need for campaigns that encourage photo protection.[6-8] Solar protection care must be taken in a broad way, encompassing the entire solar spectrum, including sunscreens and other general measures of photo protection. [9-11] Excessive or repeated solar exposure, especially during the hours of the highest radiation, can lead to various cutaneous risks, from degenerative lesions and acceleration of the ageing process to the development of neoplasias. [6, 12, and 13] This study aims to assess the knowledge in terms of skin cancer prevention and its relation to solar exposure habits and photo protection in gym members in the city of Criciúma, Santa Catarina, Brasil.

METHODS

A cross-sectional, observational, descriptive and quantitative study was performed during the year of 2009, including gym academy members from both sexes. The sample used in this work constituted of practicing gym academy members, from both sexes, during the period of January to July 2009. The authors would like to remark that, by using a sample from a gym academy, they dealt with people worried about health and that, in general, they tend to be informed about health issues. The statistical method selected for the calculations of the sample size was the formulation specified by Barbetta. A sample error of 5% and a confidence level of 95% were considered. The population size was 1020, resulting in a minimum sample of 288 questionnaires. The calculation of the simple random sample was proportional to the number of enrolments of each participant academy. A self-administered questionnaire was used in the study, with 24 objective questions and 3 open questions. The questions related to personal characteristics (sex, age, eye color, hair, phototype), socio-economic status, level of schooling, knowledge of harmful and beneficial aspects of ultraviolet radiation (open question) and preventive measures in terms of photo exposure and skin cancer, opinion on suntan and solar behaviour (time of sun exposure, use of sun protection). The data was entered into a database on the SPSS® (*Statistical Package for the Social Sciences*) program and verified by a second digitizer. The statistical analysis was performed in a descriptive way of the absolute (n) and relative (%) frequencies of the study variables. A bi-variate analysis was used for the qualitative variables using the chi-square test and results with $p< 0, 05$ were considered statistically significant. For the quantitative variable the average and standard deviation were used.

RESULTS

317 questionnaires were analysed. The general characteristics of the sample are described on table 1. From the 317 questionnaires studied, 62% (n=197) were from women and 38% (n=120) from men. On the sample studied the phototypes III (n=91) II (n=89) predominated.

Sources of information about the effects of the sun on the skin

From the 317 participants, 299 (94, 3%) reported having heard about the risks of solar exposure. From those, 63, 5% (n=190) were female and 36, 5% (n=109) male. The main sources of this information were the media (81, 1%) and doctors (32, 2%). School was quoted by 27, 8% of the participants and family by 23, 7%.

Knowledge about risks and benefits from solar exposure

The most quoted risks from solar exposure were skin cancer, in 256 questionnaires (80, 8%), cutaneous ageing in 169 (53, 3%) sunburn in 125 (39, 4%). Women quoted skin cancer, ageing and spots significantly more than men ($p<0,001$) (Chart 1). The benefit most quoted by the participants was the vitamin D synthesis, in 127 questionnaires (40, 1%). Other benefits were: strengthen the bones (23, 7%), tan (18, 3%), be healthier (15, 5%), look more attractive (8, 2%), mood improvement (6, 6%), amongst others quoted in smaller proportions.

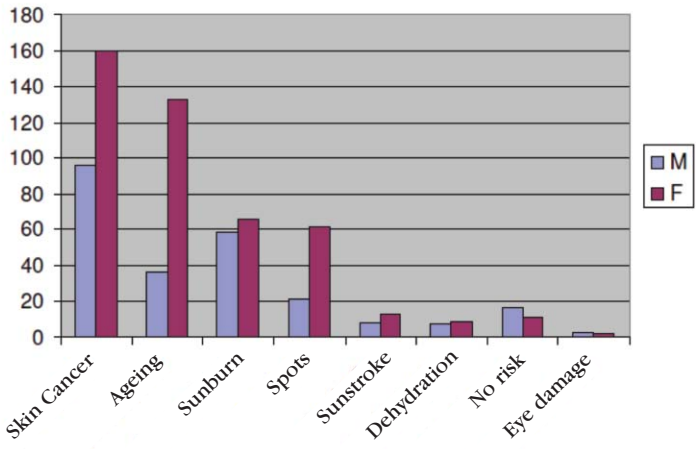
Opinions and attitudes in relation to sun exposure

When questioned if people look more attractive when tanned 68, 1% (n=216) agreed or strongly agreed, while only 9, 1% disagreed or strongly disagreed. When the question referred to their appearance when tanned, 214 (67, 5%) said they looked more attractive when tanned. From those, 70% (n=150) were women and 30% (n=64) men. 246 participants (77, 6%) denied using artificial indoor tanning at any

Table 1: Overall characteristics of the sample distributed by sex

Characteristic	Total	Masculine	Feminine	p
	N=317	N=120	N=197	
Average age (SD)	27,6(±10)"	24,8(±7,3)"	29,3(±11)"	
Age				0
<20 years	86 (27%)	44 (37%)	42 (22%)	
20-40 years	188 (59%)	73 (61%)	115 (58%)	
>40 years	43 (14%)	03 (2%)	40 (20%)	
Freckles	77 (24%)	28 (23 %)	49 (77%)	0.75
Hair color				0
Blond	36 (11%)	09 (8%)	27 (14%)	
Red	10 (3%)	01 (1%)	09 (5%)	
Brown	193 (61%)	64 (53%)	129 (65%)	
Black	78 (25%)	46 (38%)	32 (16%)	
Skin color				0.08
Black	05 (1,6%)"	04 (3,3%)"	01 (0,5%)"	
Brown	20 (6,3%)"	08 (6,7%)"	12 (6,1%)"	
Yellow	30 (9,5%)"	16 (13,4%)"	14 (7,1%)"	
White	193 (60,9%)"	70 (58,3%)"	123 (62,4%)"	
Light brown	69 (21,8%)"	22 (18,3%)"	47 (23,9%)"	
Eye color				0.13
Brown	204 (64%)	75 (63%)	129 (65%)	
Black	42 (13%)	13 (11%)	29 (15%)	
Green	53 (17%)	27 (22%)	26 (13%)	
Blue	18 (6%)	05 (4%)	13 (7%)	
Phototype				0
I	51 (16%)	19 (16%)	32 (16%)	
II	89 (28%)	28 (23%)	61 (31%)	
III	91 (29%)	46 (38%)	45 (23%)	
IV	60 (19%)	07(6 %)	53 (26%)	
V	22 (7%)	17 (14%)	05 (3%)	
VI	04 (1%)	03 (3%)	01 (1%)	
Spots and/or nevus				0.11
Up to 10	84 (26%)	34 (28%)	50 (25%)	
10-40	152 (48%)	49 (41%)	103 (53%)	
More than 40	81(26%)	37 (31%)	44 (22%)	
Schooling				0.43
Fundamental	22 (7%)	6 (5%)	16 (8%)	
Middle	140 (44%)	51 (42%)	89 (45%)	
Tertiary	155 (49%)	63 (53%)	92 (47%)	
Family income				0.05
1-3 minimum wages	53 (17%)	12 (11%)	41 (21%)	
4-6 minimum wages	93 (29%)	34 (28%)	59 (30%)	
7-10 minimum wages	124 (39%)	52 (43%)	72 (37%)	
>10 minimum wages	47 (15%)	22 (18%)	25 (12%)	
Ancestry				0
Italian	160 (50%)	69 (58%)	91 (46%)	
German/Polish	37 (12%)	15 (12%)	22 (11%)	
Portuguese/Spanish	75 (24%)	17 (14%)	58 (30%)	
Asian	07 (2%)	01 (1%)	06 (3%)	
African	15 (5%)	08 (7%)	07(4%)	
Other	23 (7%)	10 (8%)	13 (6%)	

moment in their lives. From the 66 that said they used indoor tanning 100% were female. When comparing phototype with the opinion about considering tanned people more attractive, most participant gym members that agreed or strongly agreed with this question were of phototypes III (35,6%) and II (28,5%). Referring to the ones that disagreed or strongly disagreed, 34, 5% were of phototype I and 31% of phototype II.



Graph 1: Distribution of opinions in terms of risks of sun exposure and sex

Sunburns

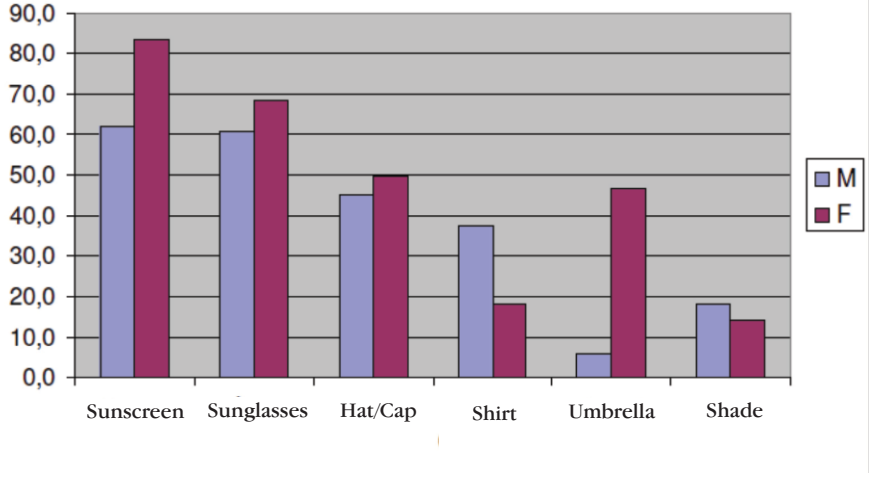
From the total of 36,3% (n=115) members that reported sunburn with blisters over their lifetime, the great majority had phototypes between I and IV (n=103). In most cases the sunburn happened during childhood. Of the participants with phototype I, 56,9% suffered sunburs along their life. In terms of sex, 37,1% of the women and 35% of the men reported sunburn (p=0,02).

Time and frequency of sunexposure

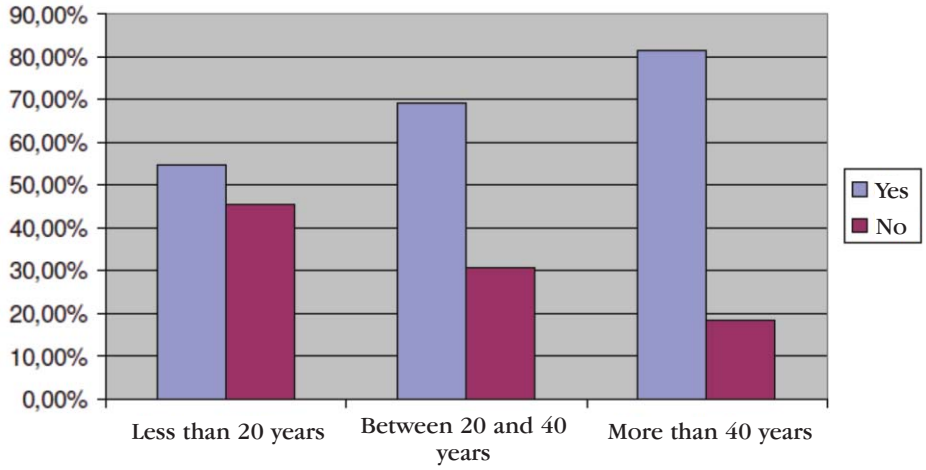
When questioned about the time when they most frequently stayed outdoors, 40% of the people said they were exposed between 10 am and 4 pm, 36% early in the morning and 24% after 4 pm. Most participants reported only occasional sun exposure (44, 5%). The reason most quoted for staying in the sun was leisure 40, 4% (n=128), followed by occupational (30%). An association between age and frequency of sun exposure was observed. As they got older, the percentage of individuals who exposed themselves daily to the sun decreased. A higher frequency of photo exposure was observed in individuals less than 40 years old, and the risk of daily exposure was more frequent in people between 20 and 40 years of age (56,5%).

Use of sun protection

An open question about skin cancer prevention measures was applied. The preventive measure mostly quoted, in 81,7% (n=259) was the use of sunscreen, followed by decrease of exposure between 10 am e 4 pm (52,7%), the use of cap/hat (24,9%) and follow-up with the dermatologist in 13,2% of the answers. When the members were asked about the use of these sun protection measures, 74, 1% (n=235) of them reported the use of some measure. The most frequent sun protection measures are listed in chart 2. From the 74,1% ones that reported some protection against the sun, 63% protected both face and body, 33,2% only the face and 3,8% only the body. An association between age group and sun protection was noted. As



Graph 2: Sun protection measures most frequently used by members according to sex



Graph 3: Distribution of the studied individuals according to age brackets and use of photoprotection

they get older, a higher percentage of individuals protect themselves against the sun. Also, 45, 3% (n=39) of the participants less than 20 years old do not use sun protective measures (Chart 3). In terms of sex, there was also a significant difference, where 67, 1% (n= 55) of those who did not protect themselves against the sun were males, and of those who did protect themselves, 72, 3% (n=170) were female. People with phototypes III, II and I were the ones who most used sun protection. An association between socio-economic status, schooling level and use of sunscreen was observed. The higher the socio-economic status and the schooling level the higher the percentage of individuals who used sunscreen. In terms of frequency of sunscreen use, most 45, 7% (n=145) only used during sun exposure and 29, 3% (n=93) used daily, while 24, 9% (n=79) of the participants did not use it in any circumstance. Amongst those who used, around 18% (n=42) always re-applied the sunscreen on the same day, 11% (n=26) re-applied it many times, 42, 4% (n=101) a few times and 29% (n=69) never re-applied. From those who used sunscreen daily 83, 9% (n=78) were women and from those who did not use in any occasion 57% (n=45) were men. The sun protection factor (SPF) most used was 30, with 26, 5%, followed by SPF 15 (22, 7%). The main reason for not using sunscreen was the lack of patience to apply it (34, 2%), followed by messing up the tan (31, 6%). A higher preoccupation with the fact that the sunscreen might mess up the tan is seen in women (p< 0,001). In terms of guidance when choosing the sunscreen 36, 5% follow the orientation from the media and a similar percentage of people (34, 7%) follow the orientation of the dermatologist. From the 110 members that chose the sunscreen by the guidance of the dermatologist, the great majority (87, 3%) were women and only 12, 7% (n=14) men.

DISCUSSION

Skin cancer prevention, especially of the non-melanoma skin cancers (NMSC), is achieved by limiting the exposure to natural sources (sun) and artificial (like tanning salons) of ultraviolet radiation (UVR). [14] As the effects of UVR in terms of NMSC are cumulative, it is expected that a reduction of sun exposure at any age might delay the rate of development of these tumors. [8, 15] By assessing the knowledge about skin cancer prevention and its relation with sun exposure and photo protection habits by gym academy members, this study allows some characteristics to be analysed.

Distribution of the phototypes

The Brazilian phenotypic distribution shows a great heterogeneity along the latitudes, reaching a level 89% of the population with fair skin in the urban areas of the states of Santa Catarina and Rio Grande do Sul, due to the strong presence of European immigration (German, Polish, and Italian). [16] In the population analysed, the prevalence of phototypes I and II was 44, 2%, higher than that of a study performed in Porto Alegre, where the prevalence was 42, 2%. [17] People seem to underestimate their ability to tan and overestimate the tendency to sunburn. This tendency to overestimate the cutaneous sensitivity goes against the findings from some studies, where the fair skinned population tend to underestimate their sensitivity to the sun and, consequently, to overestimate their skin pigmentation. [17,18] Cultural characteristics can influence these differences. In our country, especially on the southern regions, even people with some ability to tan might think they still have not achieved enough tanning when compared to the current patterns, as the skin color tends to get progressively darker the lower the latitude. [19]

Knowledge about risks and benefits of sun exposure

In the present sample, as seen in many other studies, knowledge about the relationship between sun exposure and skin cancer has been observed. [8,14,17,20,21] 299 participants (94,3%) said they had already heard about the risks of sun exposure and, from those, 80,8% know that the sunlight increases the risk of skin cancer. In a study performed at the National Institute of Cancer on the USA, it was found that 77% of the participants knew that the sun increases the risks of skin cancer. However, in this same study only 10% of the participants reduced or avoided sun exposure. [22] From all the people interviewed on the present study that knew about photo damage, 63,5% were female and, from the ones that did not know, 61,1% was men. This can be related to the fact that women are more worried about cosmetics and skin care. The perception that the tan is still a sign of beauty is still common, which can influence negatively the decision about sun protection. [20,17] On the present study tanning was the third more quoted benefit and one the principal reasons people do not use sunscreen, half of the respondents being female. People who know the risks of the sun but do not consider tan as a sign of beauty tend to better protect themselves. [14,17]

Sources of information about the effects of the sun on the skin

The media was quoted by the majority of the respondents and, in a smaller proportion, the doctor. A study performed on the USA revealed that the principal sources of information for the patients about sun protection are the television and magazines; and the sources that the patients would like to get the information from would be primary care doctors and dermatologists. [23] This fact shows the need for a more rigorous control of the information presented by the communication means. On the present study the doctors were the second most quoted, but by less than half of the people. The frequency of advice to skin cancer prevention by the health professionals is low, which demonstrates the importance of campaigns that encourage health professionals to include this information in their routine. This low frequency of medical advice for the prevention of skin cancer was observed in other researches. A study performed in the United States observed that, from the 787 million of outpatients' consultations in 1997, in only 1,5% this advice was provided. [24] When analysing the medical orientation in terms of sun protection, high risk patients had a higher potential for intervention, in other words, patients younger than 20 years of age reported that source of intervention less frequently than those aged 20 or more ($p<0,001$). This finding was similar to that of a study performed in Caxias do Sul, where the frequency of information was also lower to patients less than 20 years of age, contrary to what is recommended. [16] This data compares to that of an American study where it was observed that children get such advice less frequently than the rest of the patients. [24] These are worrying considerations, as it is known that childhood is a high risk period for the development of cancer in adult life. Intense exposure to solar radiation during young age significantly increases the risk of developing melanoma. [6] It is estimated that the regular use of sunscreen during childhood can decrease the incidence of skin cancer in approximately 78% of the population. [25]

Opinions about sun exposure and other sources of ultraviolet

Tanning is still seen as a sign of beauty by most of the respondents, 20,8% of them reporting the use of UVR salons and only a minority reported indifference or denied the fact that they looked more attractive when tanned. Women, despite being more aware than men about the risks of sun exposure, significantly think that tanning gives them a better appearance. This might be responsible for the fact that 100 % of the people interviewed who used UVR salons were female and also that more women avoided using sunscreen in order not to damage the tan. Boldeman et al found higher use of tanning salons amongst those who saw themselves as less attractive, and their main reasons were to get a tanned color (98%) and relax/get a good appearance (84%). [26] On the present study, 68,1% thought they looked more attractive when they were tanned. In a research conducted by Robinson et al (1997), 68% of the respondents said that "the person has a better appearance with a tanned skin". [27] Behavioural changes that led to increased exposure to ultraviolet radiation, both natural and artificial, were greatly boosted by the aesthetic valorisation of tanning. This valorisation resulted in the dissemination of outdoors activities and the use of clothing that leaves the body more bared. An immediate consequence of taking on these practices is that more people are more exposed and more frequently to ultraviolet radiation, one of the main etiologic agents of melanoma. [28]

Sunburns

The data showed a high prevalence of sunburns with blisters amongst gym academy members, most of them during childhood. The same was found in a study performed in Rio Grande do Sul, where the prevalence of sunburn was still higher (48,7%) and was associated with fair skin color. [8] Some studies suggest

that two or more sunburns with blisters before 18 years of age can double the risk of melanoma during adulthood. [6,18,29] In this study it could be also observed that, from the individuals with phototype I, 56,9% suffered sunburns along their lifetime. The tendency to sunburns is associated with the amount of melanine on the skin. [29,30] Fair skin and higher sensibility to the sun were independently associated with report of sunburn. [29,30] In countries like Brazil where the phenotypic distribution is highly heterogeneous and tanning is seemed as a sign of beauty, the risks of sunburn amongst people more sensitive to UVR seem to be increased, as they try, in vain, to get the same tan as the others.

Time of sun exposure

In the present study, 40,6% of the people are exposed during the times of higher intensity of the ultraviolet radiation, between 10 am and 4 pm. On the other hand, most people know that sun exposure has risks like skin cancer and photo ageing, amongst others. This data shows that knowledge does not necessarily lead to safe habits in relation to sun exposure. A relation between age and frequency of sun exposure was observed. The higher the age the lower the percentage of individuals who are daily exposed to the sun. These results are worrying because it is known that, although the clinical development of skin tumors happens predominantly at advanced ages, photo exposure is the highest ambient risk for the development of cutaneous neoplasias. [21] Young people are also a vulnerable group to the harmful effects of the sun, both because of the aesthetic aspect of tanning and because of the higher frequency of physical activity, mostly related to sports practice. [17] Men showed the highest prevalence of exposure to solar radiation as well as being more frequently employed in occupational activities associated with this type of radiation. This data are in agreement with the literature that shows that men are less worried and less knowledgeable about the harmful effects of ultraviolet radiation, as well as being more frequently employed in occupational activities related to sun exposure.

Use of sun protection

Data about sun protection, according to gender, are similar to that from international studies where it was observed that sunscreen use was more common among women. [4,6,8] The literature has plenty of studies that show that women, in general, take care of their health more frequently than men. In terms of skin care, aesthetic issues are probably involved. These factors could explain a higher frequency of sunscreen use and other photo protective measures by females. Amongst those who use sunscreen, most use a SPF equal to or higher than 15. A study about the melanoma risk performed in Rio Grande do Sul confirmed that sunscreen with SPF higher than 15 confers strong protection against the development of melanoma. [21] The lack of patience to apply the sunscreen was frequently quoted, suggesting that the use of others forms of sun protection like shade, caps and shirts should be encouraged. A tendency to recognize the importance of a dermatologic indication when choosing the sunscreen was observed, since the second source of advice most quoted was the dermatologist. The data from this study suggest a need to encourage health professionals, especially non-dermatologists, to offer their patients advice about skin cancer prevention.

CONCLUSION

Skin cancer is common in our country, and protection against the main risk factor, sun exposure, is still undervalued. It is necessary to reinforce the concepts and preventive aspects in order to decrease the incidence and the mortality from skin cancer in the population. The results from this study show that the population of gym academy members in the city of Criciúma, as well as in other regions of Brazil, has some notion of the harmful aspects of excessive sun exposure and skin cancer preventive measures, although they have not yet incorporated adequate photo protective measures into their habits. ❑

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