Prevalence and correlates of skin cancer risk behaviors in Madrid (Spain)

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A R T I C L E   I N F O

Article history:
Received 5 April 2010
Accepted 9 July 2010

Keywords:
Ultraviolet rays
Skin neoplasms
Health surveys

A B S T R A C T

Objective: To estimate the prevalence and correlates of skin cancer-related behaviors in a representative sample of the population of the region of Madrid (Spain).

Methods: We performed a cross-sectional study based on a telephone survey. A total of 2,007 participants aged 18-64 years completed a questionnaire that included items on knowledge about the risk of skin cancer, sun exposure, the use of ultraviolet (UV) lamps and sunburn during the previous year. Logistic regression models were constructed, adjusted for gender, age, educational level and employment status.

Results: Sun exposure as a risk factor for skin cancer was identified by 92.3% of participants and artificial tanning by 73.6%. Knowledge of risk factors was greater among university graduates and women (P<0.001). A total of 14.6% were usually exposed to the sun in the summer during the hours of maximum UV radiation, while 4.3% had used UV lamps during the previous year; the use of these lamps was more frequent among women (P<0.001) and young people (P<0.05). The prevalence of sunburn was 13.2% and was lower among women: odds ratio (OR) 0.68 (95% CI: 0.51-0.90); this prevalence declined with greater age (p linear trend <0.001) and was higher among students: OR 1.60 (95% CI: 1.07-2.40).

Conclusions: Numerous sociodemographic factors are related to UV radiation exposure and sunburn, with young people at highest risk. UV exposure is more frequent among women, whereas sunburn is more common among men.

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Prevalencia y factores relacionados con las conductas de riesgo de cáncer de piel en Madrid (España)

R E S U M E N

Objetivo: Estimar la prevalencia y los factores asociados a las conductas relacionadas con el cáncer de piel en una muestra representativa de la Comunidad de Madrid (España).

Métodos: Estudio transversal basado en encuesta telefónica. Un total de 2,007 personas de 18-64 años completaron un cuestionario sobre conocimiento de riesgos del cáncer de piel, la exposición al sol, el uso de aparatos de bronceado artificial y quemaduras solares durante el último año. Se elaboraron modelos de regresión logística, ajustando por sexo, edad, nivel educativo y situación laboral.

Resultados: Un 92,3% identificaron la exposición al sol como un factor de riesgo para el cáncer de piel, disminuyendo al 73,6% para el bronceado artificial. Este conocimiento es mayor entre las personas con educación superior y en las mujeres (p<0,001). El 14,6% estuvieron expuestos al sol en verano durante las horas de máxima radiación ultravioleta (UV), y el 4,3% utilizaron lámparas UV en el último año, siendo más frecuente en las mujeres (p<0,001) y jóvenes (p<0,05). La prevalencia de quemaduras solares fue del 13,2%, siendo menor en las mujeres (odds ratio [OR] de 0,68; IC95%: 0,51-0,90), disminuyendo a medida que aumenta la edad (p de tendencia lineal <0,001) y más alta entre los estudiantes (OR de 1,60; IC95%: 1,07-2,40).

Conclusions: Se detectan numerosos factores sociodemográficos asociados a la exposición a la radiación UV y las quemaduras solares, siendo la población más joven la de mayor riesgo. La exposición a radiación UV es más frecuente entre las mujeres, mientras que las quemaduras solares son más comunes en los hombres.

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Introduction

Ultraviolet (UV) radiation has various effects on health. Some are positive, such as the production of vitamin D3, essential for bone mineralization. A protective effect, mediated by vitamin D3, has also been suggested against multiple sclerosis and the development of prostate cancer, although the evidence is still not conclusive. Other effects are negative, acting as a risk factor for skin cancer, immunosuppression and cataracts. Malignant skin tumours, basal cell carcinoma and spinoepidermoid carcinoma as well as melanoma, are a growing problem in Spain due to their steady increase in recent decades. Annual increases in
mortality of 2% have been recorded for melanoma, and the incidence of this neoplasm ranges between 4 to 9/100,000 for men and 3 to 10/100,000 for women. Despite this increase, similar to that seen in other countries in southern Europe like Portugal and Greece, the mortality rate from melanoma in Spain is still one of the lowest in Europe, probably because of the characteristics of the cutaneous pigmentation of the population. Nevertheless, the increase in this disease could reflect changes in the sun exposure habits of the Spanish population.

There is strong evidence that solar radiation is the main environmental risk factor for the three main types of skin cancer, with the effect increasing as the intensity of exposure rises. There are variations in the relationship between the types of cancer and their localization regarding the time and type of sun exposure, but this association is seen even for short-term intermittent exposures and basal cell carcinoma or melanoma. Scientific evidence also supports the relationship between exposure to artificial sources of UV radiation and certain types of skin cancer, increasing the risk of melanoma, squamous cell carcinoma and basal cell carcinoma. In the summer, UV radiation in the Madrid region reaches very high values on the UV index, but until now there have been no studies describing the patterns of exposure and its distribution among the population of this region. The estimation of these parameters, using information from self-reported questionnaires, would be very useful for the more efficient planning of skin cancer prevention interventions within the framework of the Regional Plan for the Prevention and Control of Cancer, and could serve as a reference for other countries in southern Europe with high levels of insolation.

Methods

Study design and population

A cross-sectional study carried out in 2007 as part of the Sistema de Vigilancia de Factores de Riesgo de Enfermedades No Transmisibles (SIVFRENT) [Behavioural Risk Factor Surveillance System for non-communicable diseases] of the Madrid region, which continually monitors the health habits and preventive practices of the non-institutionalised population aged 18-64 years. A total of 2,007 participants were selected in a representative way from the household directory for fixed line telephone services (covering 92% of all households), by stratified sampling with proportional allocation of the population structure according to gender, age and geographical area. The interviews were conducted using a Computer Assisted Telephone Interviewing (CATI) system, for one week each month, except for August.

Study variables

The questionnaire was drawn up from questions normally used with an adult population and structured into four sections: 1) Knowledge: Do you think that prolonged exposure to the sun is a risk factor for skin cancer? (Yes, No, Not sure); Do you think that prolonged exposure to UV ray lamps is a risk factor for skin cancer? (Yes, No, Not sure); 2) Protective measures: Do you use protection against the sun in summer? (Always, Nearly always, Sometimes, Never); 3) Use of artificial sources of UV radiation: Have you used UV ray lamps for tanning during the last year? (Yes, No); and 4) Effects: Have you suffered sunburn during the last 12 months, including any occasion when an area of skin, even only a small one, was red for more than 12 hours? (Yes, No).

Data analysis

Logistic regression models were constructed differentiated for each indicator, simultaneously introducing the following analysis variables: gender, age (18-29, 30-44 and 45-64 years of age), educational level (university, higher secondary education, lower secondary education, primary education or below), and employment status (employed persons, students, houseworkers, unemployed persons/retired). Prevalence odds ratios (OR) were calculated with their corresponding 95% confidence intervals (95%CI). The first-order interactions between gender, age, educational level and employment status were also calculated in each
Results

The response rate (completed interviews as a percentage of the total sum of completed, partially completed and incomplete/refused interviews) was 65.1%. The sample studied was similar in structure in terms of age and gender to the population between 18 and 64 years of age in the Madrid region.

Regarding knowledge of risk factors, 92.3% [95% CI: 91.0-93.4] knew that prolonged sun exposure is a risk factor for skin cancer and 73.6% [95% CI: 71.6-75.5] knew about the association of skin cancer with prolonged exposure to UV ray lamps. Table 1 shows the odds ratio (OR) adjusted for gender, age, educational level and employment status. Knowledge of these risk factors was higher among women than among men. No differences were seen for the use of clothing as sun protection, 78.2% used sun creams and 60.8% sunglasses with protective lenses against ultraviolet radiation (Table 2). Women more frequently used sun creams and sunglasses than men, but less frequently used clothing as sun protection. The use of clothing as a protective measure increased with age (p linear trend <0.001). The use of creams was higher among those of 30-44 years of age than among those of 18-29 years of age, estimating an OR of 1.60 [95% CI: 1.07-2.40].

No statistically significant interactions were found between the variables studied.

Discussion

The main results of this study suggest that most of the population, especially among people of a higher educational level and women in general, knows the relationship between exposure to UV radiation and skin cancer. The most commonly used protection was sun cream, and a variable distribution was seen by gender, age and educational level, according to the types of measures employed.

d Odds ratios adjusted for the rest of the variables in the table.

b Normally use: always or nearly always.

differences for the use of sunglasses. There was less use of creams and sunglasses as the educational level decreased (p linear trend <0.001), but no differences were seen for the use of clothing as a protective measure. For employment status, statistically significant differences were only detected in the adjusted model, with a lower use of sunglasses among students.

Finally, Table 3 shows the prevalence and risk of exposure to UV radiation and sunburn in the last year. Some 14.6% stated that they sunbathed always or nearly always between 12 midday and 4 in the afternoon for tanning, 4.3% used UV ray lamps in the last 12 months and 13.2% suffered sunburn in the last 12 months. The habit of sunbathing in the summer between 12 midday and 4 in the afternoon for tanning was seen more frequently among women and young people. No clear pattern was seen for educational level or employment status. The use of UV ray lamps for tanning was also higher among women. No differences were seen for the use of UV tanning equipment by educational level after adjustment for the rest of the sociodemographic variables. Regarding employment status, a lower use of such equipment was recorded for students. Women reported suffering less sunburn throughout the last year than men, OR of 0.58 [95% CI: 0.41-0.85]. In addition, as age increased the probability of sunburn decreased (p linear trend <0.001). By educational level, those with lower secondary education suffered less frequently from sunburn in the last year (OR of 0.58; 95% CI: 0.39-0.87). By employment status, students were the group that most frequently reported sunburn in the last year, estimating an OR of 1.60 [95% CI: 1.07-2.40].

No statistically significant interactions were found between the variables studied.
Table 3
Prevalence and risk of exposure to ultraviolet radiation and sunburn in the last year, according to sociodemographic variables

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
<th>ORa (95% CI)</th>
<th>P value</th>
<th>%</th>
<th>ORa (95% CI)</th>
<th>P value</th>
<th>%</th>
<th>ORa (95% CI)</th>
<th>P value</th>
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<tr>
<td></td>
<td>Total</td>
<td>2,007</td>
<td>14.6</td>
<td>4.3</td>
<td>13.2</td>
<td></td>
<td></td>
<td></td>
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<td><strong>Gender</strong></td>
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<tr>
<td>Men</td>
<td>984</td>
<td>11.5</td>
<td>1</td>
<td>&lt;.001</td>
<td>6.6</td>
<td>4.05 (2.39-6.86)</td>
<td>&lt;.001</td>
<td>10.8</td>
<td>0.68 (0.51-0.90)</td>
<td>.008</td>
</tr>
<tr>
<td>Women</td>
<td>1,023</td>
<td>17.5</td>
<td>1.72 (1.32-2.24)</td>
<td>&lt;.001</td>
<td>6.6</td>
<td>4.05 (2.39-6.86)</td>
<td>&lt;.001</td>
<td>10.8</td>
<td>0.68 (0.51-0.90)</td>
<td>.008</td>
</tr>
<tr>
<td><strong>Age</strong></td>
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<tr>
<td>18-29</td>
<td>540</td>
<td>20.0</td>
<td>1</td>
<td></td>
<td>8.0</td>
<td>1</td>
<td></td>
<td>30.4</td>
<td>1</td>
<td></td>
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<td>30-44</td>
<td>768</td>
<td>13.0</td>
<td>0.66 (0.47-0.93)</td>
<td>.017</td>
<td>3.7</td>
<td>0.35 (0.21-0.59)</td>
<td>&lt;.001</td>
<td>10.4</td>
<td>0.31 (0.22-0.43)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>45-64</td>
<td>699</td>
<td>12.0</td>
<td>0.64 (0.44-0.93)</td>
<td>.019</td>
<td>2.2</td>
<td>0.24 (0.12-0.46)</td>
<td>&lt;.001</td>
<td>3.0</td>
<td>0.09 (0.05-0.15)</td>
<td>&lt;.001</td>
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<td><strong>Educational level</strong></td>
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<tr>
<td>University</td>
<td>615</td>
<td>13.8</td>
<td>1</td>
<td></td>
<td>4.7</td>
<td>1</td>
<td></td>
<td>14.3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Higher secondary education</td>
<td>697</td>
<td>16.8</td>
<td>1.14 (0.83-1.57)</td>
<td>.407</td>
<td>4.7</td>
<td>1.09 (0.64-1.86)</td>
<td>.754</td>
<td>16.9</td>
<td>0.82 (0.58-1.14)</td>
<td>.238</td>
</tr>
<tr>
<td>Lower secondary education</td>
<td>473</td>
<td>13.3</td>
<td>0.98 (0.68-1.40)</td>
<td>.905</td>
<td>4.0</td>
<td>0.95 (0.52-1.76)</td>
<td>.880</td>
<td>9.5</td>
<td>0.58 (0.39-0.87)</td>
<td>.009</td>
</tr>
<tr>
<td>Primary education or below</td>
<td>222</td>
<td>12.2</td>
<td>0.94 (0.57-1.55)</td>
<td>.809</td>
<td>2.3</td>
<td>0.69 (0.25-1.90)</td>
<td>.469</td>
<td>6.3</td>
<td>0.82 (0.43-1.55)</td>
<td>.537</td>
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<td><strong>Employment status</strong></td>
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<td></td>
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</tr>
<tr>
<td>Employed</td>
<td>1,470</td>
<td>14.1</td>
<td>1</td>
<td></td>
<td>4.8</td>
<td>1</td>
<td></td>
<td>12.3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Students</td>
<td>181</td>
<td>23.2</td>
<td>1.25 (0.80-1.97)</td>
<td>.323</td>
<td>3.9</td>
<td>0.33 (0.14-0.79)</td>
<td>.012</td>
<td>37.0</td>
<td>1.60 (1.07-2.40)</td>
<td>.022</td>
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<tr>
<td>Houseworkers</td>
<td>205</td>
<td>13.7</td>
<td>0.84 (0.53-1.35)</td>
<td>.481</td>
<td>2.4</td>
<td>0.49 (0.18-1.31)</td>
<td>.153</td>
<td>2.4</td>
<td>0.49 (0.19-1.25)</td>
<td>.136</td>
</tr>
<tr>
<td>Unemployed/retired</td>
<td>151</td>
<td>9.3</td>
<td>0.67 (0.37-1.20)</td>
<td>.174</td>
<td>2.0</td>
<td>0.52 (0.16-1.71)</td>
<td>.280</td>
<td>7.9</td>
<td>1.06 (0.55-2.03)</td>
<td>.870</td>
</tr>
</tbody>
</table>

a Odds ratios adjusted for the rest of the variables in the table.

b Frequency: always or nearly always.

Regarding age and educational level, creams were most used by interviewees of 30–44 years of age and those with the highest educational level. These results are compatible with those observed in other countries. As already described in the literature, there is a discrepancy between the knowledge that the population has about the risk of sun exposure and the level of protective measures taken to avoid its effects. Our results also show this discrepancy, which is probably due to the different levels of skin tanning still being considered as attractive and an indicator of good health.

Exposure to solar radiation in the peak afternoon hours is low in the UK, much lower than that recorded in Israel. As in other countries, the prevalence of sunburn is much lower than that seen in the Anglo-Saxon countries, using artificial UV exposure, a percentage considerably lower than that in Israel (28%).

As already described in the literature, there is a discrepancy between the knowledge that the population has about the risk of sun exposure and the level of protective measures taken to avoid its effects. Our results also show this discrepancy, which is probably due to the different levels of skin tanning still being considered as attractive and an indicator of good health.

In our study, the prevalence of sunburn in the last year (13.2%) is much lower than that seen in the Anglo-Saxon countries, using artificial UV exposure, a percentage considerably lower than that in Israel (28%).

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resistant skin phototype, a study published in 2008 showed how the percentage of people suffering sunburn was 9.1% due to the influence of strong prevention campaigns.17 Although women sunbathe more often, they suffer less sunburn than men, a finding consistent with those of other authors.24,25,27,28,31–34 It is possible that the greater use of protective sun creams by women may have influenced these results, although the difference could also be due to variations in total sun exposure times, as in general men spend more time outdoors than women.35 According to our results, the youngest people in the study, who also have a higher sun exposure, have a higher incidence of skin lesions, as indicated in other studies.18,24,25,27,28,32,33,36 Irrespective of age, students have a greater probability of suffering sunburn, as seen in previous reports.32,36 However, no clear association was found between sunburn and educational level, a relationship that has contradictory information in the literature. Although some studies have found no relationship,25,27,28 others have found a greater probability of sunburn for people with the highest educational level,2,25,27 or for those with a low educational level.33 Finally, there did not appear to be a higher risk of sunburn for employed people, which could suggest that its occurrence is linked to leisure-time sun exposure, looking for a tan.38

There are certain methodological limitations in our study that should be pointed out, in order to obtain a better interpretation of the results. Data have not been obtained for those over 64 years of age, among whom there are many cases of skin cancer, or for those under 18 years of age, where prevention is very important. The general way of measuring the variables has not allowed the gathering of detailed information, for example, about the level of protection of sun creams or the frequency of application, the inclusion of which would be useful in subsequent surveys. Although subject to the classic memory bias of this type of measurement, self-reported information from questionnaires has demonstrated an acceptable validity.37,38 Another limitation is related to the differences in the questions and response categories used in questionnaires, which make comparison between studies difficult, leading to a recent proposal for standardized measurements.14

This study is based on a broad representative sample (in terms of age and gender) of a region that has 13.5% of the population of Spain. Nevertheless, it is possible that people with a low educational level could be underestimated.39 The telephone questionnaire of SIVFRENTE (A Behavioural Risk Factor Surveillance System for non-communicable diseases in the Madrid region), in which the section about sun exposure was included, has shown a good reproducibility and convergent validity as compared to home surveys.39 Moreover, the distribution of the interviews throughout all the months of the year avoids estimates being influenced by seasonal variability. For example, a higher prevalence of sunburn has been described by those interviewed in the summer.32

In summary, most of the population, especially people with a high level of education and women in general, know the relationship between exposure to UV radiation and skin cancer, even if a discrepancy was seen between this level of knowledge and the use of protective measures and sun exposure habits. The use of sun creams is the most frequently used protective measure, and one in seven people normally sunbathe during the summer in the peak afternoon hours, with this habit being more frequent among women and young people. Some 13.2% of the sample population suffered sunburn in the last year, with a higher risk among men, young people and students. These results indicate the need to maintain preventive strategies to continue improving knowledge about the risk of exposure to UV radiation and reduce risk behaviour to exposure, as well as strengthening environmental protection measures, such as guaranteeing that public recreational spaces have abundant shady areas for protection against direct exposure to the sun.

Author contributions

I. Galán and E. Cámara designed the study. I. Galán performed statistical analysis. I. Galán, A. Rodríguez, L. Díez and E. Cámara significantly contributed to the interpretation of the data and to the article writing. All authors read and approved the final manuscript.

Financial support

This study was funded by the Madrid Regional Health Authority, Spain.

Conflict of interest

None declared.

Acknowledgements

We thank the interviewers and respondents, as well as Miguel de la Fuente for the fieldwork support.

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