Knowledge and Habits of Photoprotection in the Spanish Population. An Update Survey

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Article

Knowledge and Habits of Photoprotection in the Spanish Population. An Update Survey

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Abstract: Background/Objectives: As the incidence of melanoma and skin cancer are increasing, awareness campaigns can be a useful tool to prevent them. To optimize these campaigns, it is important to know what the population really knows about photoprotection and how they comply with photoprotection habits; **Methods**: We conducted a surveyed on knowledge, behavior and attitudes related to sun exposure in Spanish population all over the country. The results were analyzed globally and also differentiating by age between those under 25 years of age versus those over 25 years of age; **Results**: Responses from 12,597 respondents were analyzed. Globally, 97% associate bad sun exposure habits with skin cancer; however when, we analyze in more detail, the percentages of association between tanning and skin damage, as well as percentages of correct use of sunscreens and photoprotective attitudes are lower, especially in people under 25 years old.; **Conclusions**: The data from this survey reinforce the dermatologists need to promote greater awareness among the Spanish population, both, the skin damage induced by solar radiation and of good photoprotection and preventive habits, specifically in men and people under 25ys. To our knowledge this is the biggest survey to date performed in Spain.

Keywords: sunscreen; survey; photoprotection habits; sun-damage; tanning; cancer prevention

1. Introduction

According to WHO (World Health Organization) the incidence of both non-melanoma and melanoma skin cancers increased over the past decades, with more than 1.5 million new cases estimated in 2022. In 2022, an estimated 330,000 melanoma were diagnosed globally.1 This places skin cancer as an important public health problem. Non-melanoma skin cancers are most frequent in sun exposed areas of the body, implying that prolonged and repeated exposure to ultraviolet radiation (UVR) is an important causal factor [1].

In Spain, the risk of melanoma has increased in both men and women from 2003 to 2024. Specifically, it has gone from 12.0/100,000 to 15.1/100,000 cases in women and from 12.0 to 15.4 in men , which represents an annual increase of 1.1% and 1.2% respectively, as reflected by the Spanish Network of Cancer Registries (Redecan) and the Spanish Society of Medical Oncology (SEOM) [2]. The incidence rate of basal cell carcinoma, the most common of all SCs, has reached 253.23/100,000 persons per year in Spain [3].

The most common modifiable risk factor for skin cancer is exposure to UVR [4]. The damaging effects of UVR on the skin include the induction of immunosuppression, oxidative stress and inflammatory responses and the formation of cyclobutane pyrimidine dimers (CDP) or gene mutations such as mutations to p53 tumor suppressor genes, among others. These accumulative changes will lead to the formation of skin cancer [5], and also play an important role in skin photoaging [6].

Strong evidence (level I) suggests that regular sunscreen use decreases the risks of melanoma and NMSC [7,8]. In addition, oral antioxidants may counteract the oxidative stress and reactive oxygen species implied in DNA damage [8]. Among this, oral PLE (Polypodium leucotomos extract,

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Fernblock®) is the oral photoprotector backed by the greatest scientific evidence [9,10]. PLE supplementation has proven several photoprotective effects such as reduction of acute inflammation via Cox-2 enzyme inhibition, increased CPD removal, and reduction of oxidative DNA damage and p53 activation through post-translational modifications such as phosphorylation inducing tumor suppressive activities [11]. Several studies have been carried out, which demonstrate the continuous use of this supplement reduces the appearance of actinic keratoses and skin cancer in susceptible populations and improves the field of cancerization [12–14].

Knowing that photoprotection is key in the prevention of skin cancer, the challenge is to get this message across to the general population. Thus, basic sun protection messages should be sent (Table 1).

Table 1. Photoprotection messages for the general population [15].

Photoprotection messages for the general population
• Limit exposure during midday hours.
• Seek shade.
• Physical protection: Wear protective clothing, abroad-brimmed hat to protect the eyes, face and neck, sunglasses.
• Use and reapply broad-spectrum sunscreen of sun protection factor(SPF) 30+ - 50+.
• Avoid tanning beds.

These measures have been published and endorsed by different studies in the scientific literature [8]. However, we do not have clear data on whether the Spanish population knows the risks of sun exposure, the appropriate photoprotection measures that they should take or if they really apply them correctly on a day-to-day basis. This is why we decided to carry out the following study based on a large survey on photoprotection habits in Spain.

2. Materials and Methods

A cross-sectional descriptive survey study was carried out in a sample of the Spanish population during 2023. All data were recorded anonymously and treated in strict compliance with Spanish data protection laws (Law 41/ 2002 of 14 November and Law 15/1999 of 13 December). The study was based on a health survey of sun exposure and protection habits and practices conducted among general Spanish population.

A questionnaire on knowledge, behavior and attitudes related to sun exposure was used. The questionnaire was modified and partially based on one previously validated by the group of Troya-Martín et al. [16] The questionnaire was designed in such a way that it was self-tested and had five sections, and we select some of the questions performed that were more representative of Spanish population habits:

- a) General characteristics: sex, age, skin cancer history (familiar and/or personal), sunburn history.
- b) Knowledge between relationship of sun exposure and skin cancer: Do you know that bad habits lead to cancer?, Do you associate tanning with beauty, health or skin damage?, Do you know that blue light induces skin damage?
- c) Topical photoprotection habits: Do you use sunscreen?, Do you use SPF 30, 50 or 50+ sunscreen?, Do you usually use the sunscreen at specific times or all year round?, When do you apply the sunscreen before or after leaving home?, Do you reapply the sunscreen?, When choosing a photoprotector, do you pay attention to whether it is broad-spectrum?, How many solar products do you consume per year?, Do you use a different photoprotection depending on the moment?
- d) Oral photoprotection habits: Do you know the existence of oral photoprotection?
- e) Attitude about screening: Do you know the ABCDE rule for self-examination of moles?, How often do you go to the dermatologist?

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In addition, we wanted to see if there were significant differences between sex and also between those who were expected to have greater awareness about photoprotection. To analyze the latter, we compared respondents of 25 or less year old who were expected to have less knowledge versus respondents over 25 years old.

Statistical analysis: A global descriptive analysis has been carried out for each of the survey questions in which the percentages of the population for each of the possible answers have been defined, using frequency tables and graphs. In order to contrast the homogeneity of responses between the different groups defined by sex, age and minors vs. over 25 years of age, the relevant contingency tables have been calculated. As descriptors, the frequencies relative to the group defined by the crossover variable have been used and the Chi-square test has been used as a test of homogeneity. The validity conditions of said test have been controlled.

In case of significance of the Chi square we have used the residual analysis to determine in which situations/cells the significant differences were found. A significant difference was considered when the level of significance was less than or equal to 5% ($p<=0.05$). SPSS V23.0 software was used for the calculations.

3. Results

The results of the survey were analyzed globally and also differentiating between sex and age.

Not all the subjects answered all the questions, but the average response reached up to 99.86%.

3.1. General Characteristics:

In total, 12,597 inhabitants across Spain responded to the survey. They had access to the survey via email with prior consent, through social media (72%), through events of foundations Cantabria Labs works with (15%), the media (1%) or others (12%).

Among them, 11.427 were women (91%) , 1.155 men (9%) and 15 responders without defined gender.

Regarding age, 7,397 of the participants were over 45 years old (59%); 3,546 were between 31-45 ys old (28%), 930 were between 26-30 ys (7%); 484 were between 18-25 ys (4%) and 240 were under 18ys (2%). Up to 11,873 were over 25ys (94%) and 724 were younger than 25 years old (6%) (Figure 1).

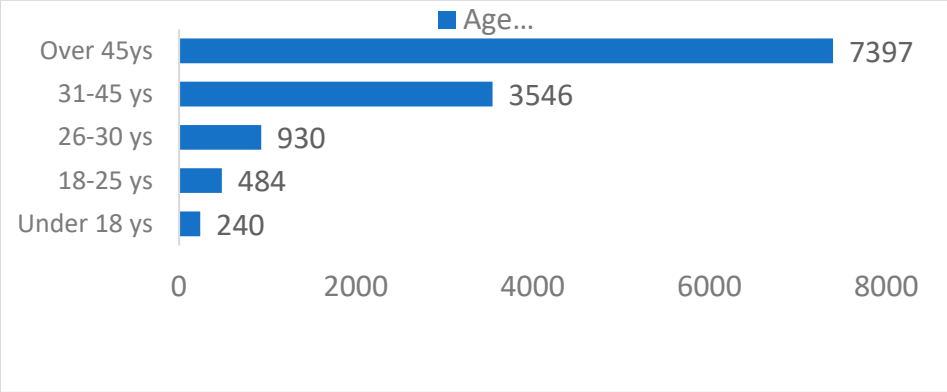

Figure 1. Distribution according to age of the 12,597 survey participants.

Forty-three percent (5,395) of the respondents reported a history of severe sunburn. Regarding sex, percentages of severe sunburn were up to 43% in women vs 40% in men with no significant differences, ($p>0.05$). Among the youngest group (under 25 years of age), 41% (297) responded affirmatively to this question, without significant differences ($p>0.05$) vs respondents over 25 years old.

Of all the respondents, 14% (1.792) referred skin cancer history. To note, this percentage was maintained in the youngest subgroup under 25ys (102 of the youngest participants). Regarding sex, less percentage of men reported skin cancer history vs women, , although not relevant as it was not significant (11% vs 14% respectively, $p<0.05$).

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3.2. Knowledge Between Relationship of Sun Exposure and Skin Cancer

3.2.1. Association between sun exposure and skin cancer. Globally, 97% associates bad habits of sun exposure with skin cancer. This percentage was lower (92%) in the youngest subgroup under 25ys, but not significant comparing to older respondents ($p>0.05$). Regarding sex, no significant differences were found either.

3.2.2. Association between sun-tanning and skin damage, beauty or health. Up to 55% of respondents (6,926) associated sun-tanning with skin damage, 22% (2,773) with beauty and 23% (2,898) with health (Figure 2). Regarding sex, among women a significant higher percentage compared to men associated sun-tanning with skin damage: 6,395 women (56%) vs 523 men (45%) ($p<0.01$). As for the association between sun-tanning and health, a significant higher percentage of men vs women had this concept. (32% vs 22%, respectively; $p<0.05$). No significant differences among sex were found for the association between sun-tanning and beauty (23% vs 22%). (Figure 3)

Within the youngest subgroup, only 48% (346) associates sun-tanning with skin damage, which was significantly less versus respondents over 25 ys ($p<0.05$). As for beauty and health up to 35% (255) and 17% (123) respectively associated sun exposure with these items, which was significantly higher percentages versus respondent over 25 ys ($p<0.01$ and $p<0.05$ respectively) (Figure 4)

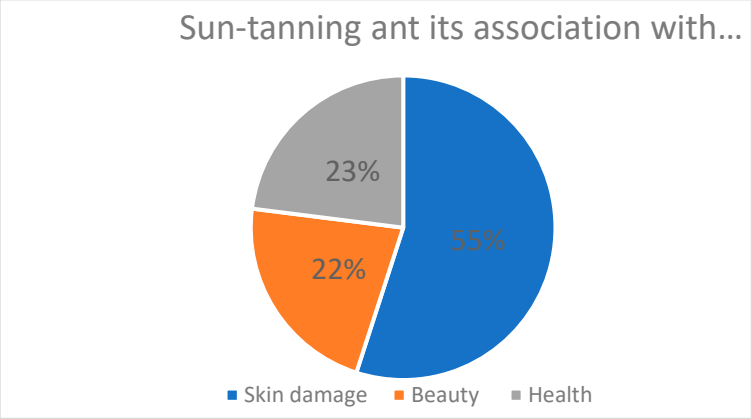

Figure 2. Perception of the meaning of being tanned, globally. It should be noted that the 45% of the surveyed does not associate it with skin damage.

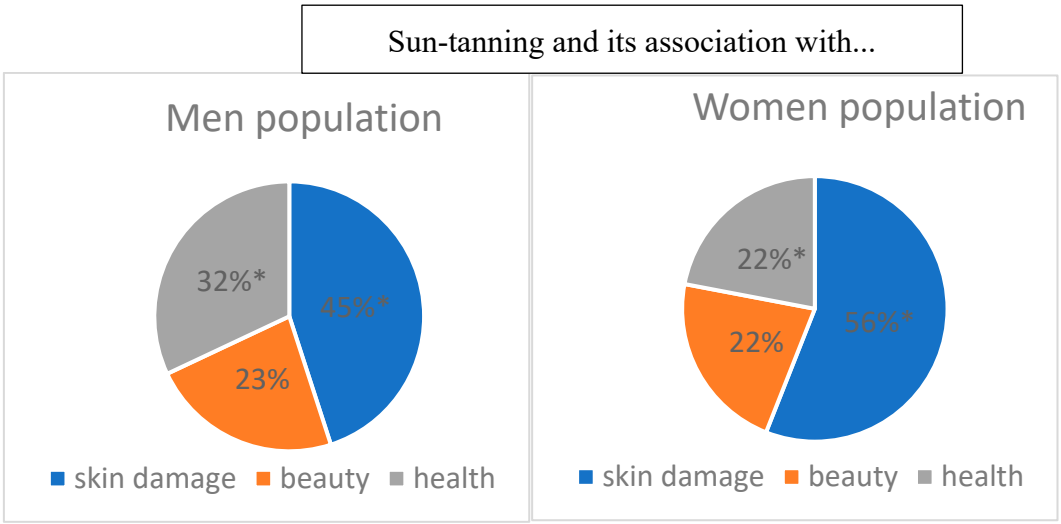

Figure 3. Differences between sex regarding sun-tanning association. Significant higher percentage of women associated it with skin damage (*). In contrast, we found a significant higher association with health in men respondents (*).

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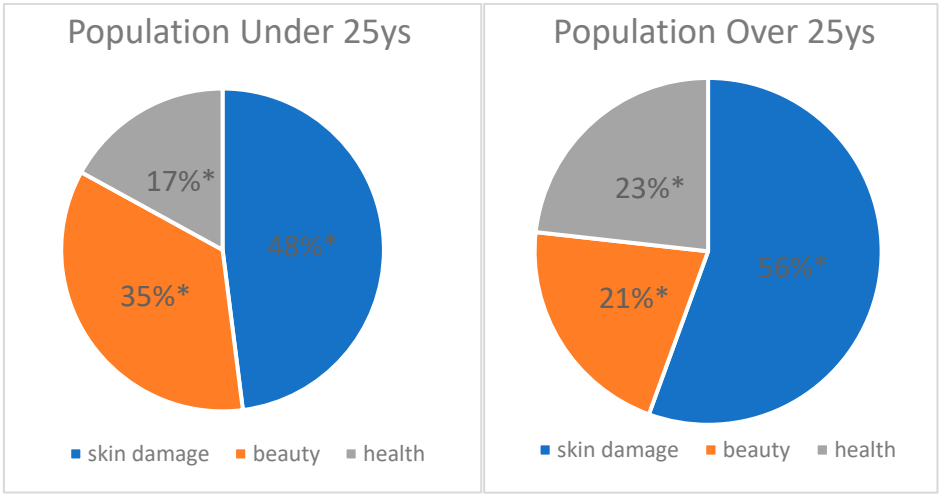

Figure 4. A significantly higher percentage of respondents under 25ys associated sun-tanning with beauty and health, p<0.01 and p<0.05, respectively (*) compared to those repondents over 25ys. p<0.05 (*).

3.2.3. *Association Between Blue Light and Skin Damage*. Globally, up to 54% (6,760) of the population knows that blue light induces skin damage. Regarding sex, up to 56% of women (6,359) vs 35% of men (398) knew about this association, which was a significant difference (p<0.01). The percentage was also significantly lower (48%) in the youngest subgroup compared to those over 25 ys p <0.05.

3.3. Topical Photoprotection Habits

3.3.1. The majority (97%) of respondents reported using sunscreen at some time (daily or at specific times) and mostly (80%) chose the highest SPF 50+. (Figure 5) Regarding sex, significantly more women than men use the highest SPF50+ (81% vs 67%, p<0.05). As for the youngest subgroup under 25 ys, no significant differences were found compared to respondents over 25 ys.(Figure 6)

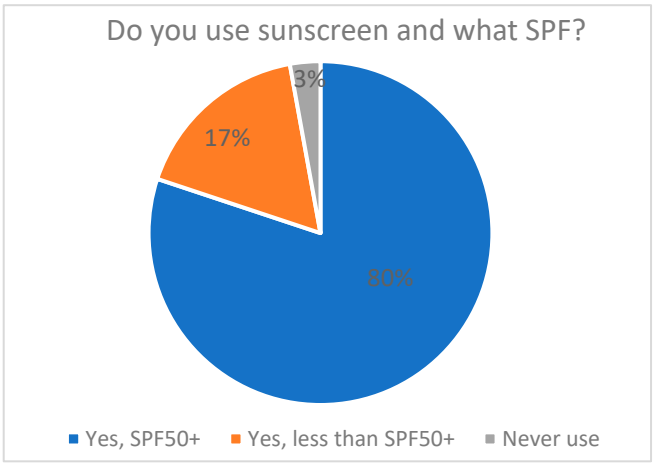

Figure 5. Remarkably, the majority of participants (80%) use SPF 50+ sunscreen.

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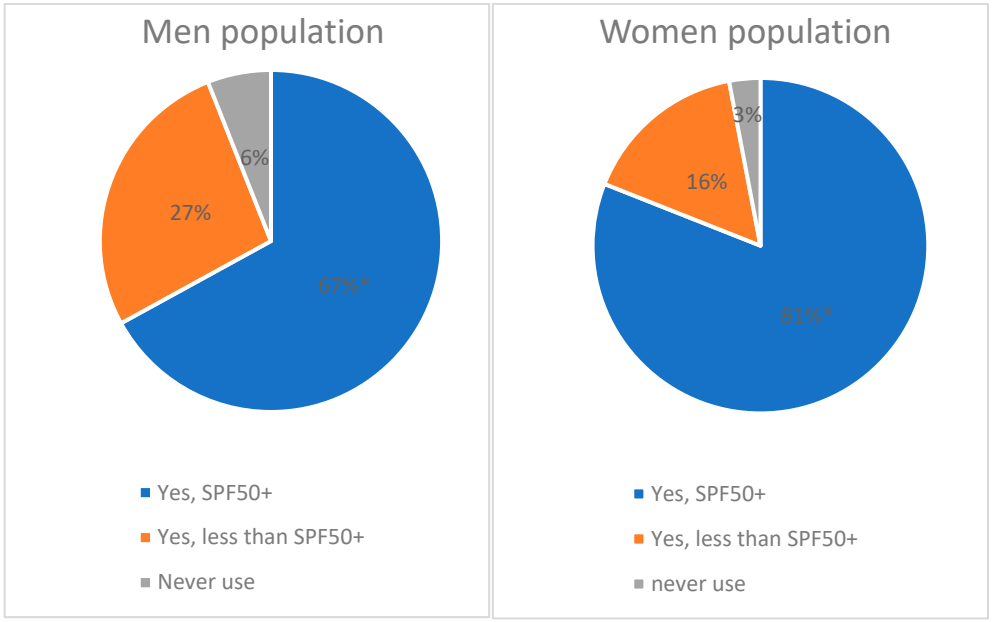

Figure 6. Habits of use of photoprotection cream according to SPF between women and men. Significantly more women choose SPF50+ compared to men, p <0.05 *.

3.3.2. More than 75% (9,435) of the participants chose broad spectrum sunscreens. Regarding sex, a significant higher percentage of women vs men (76% vs 67%, p<0.05) chose broad spectrum sunscreens. Among the youngest subgroup under 25 ys, the percentage was significantly lower compared to those over 25 ys, 59% vs 76%, respectively, p<0.01) (Figure 7).

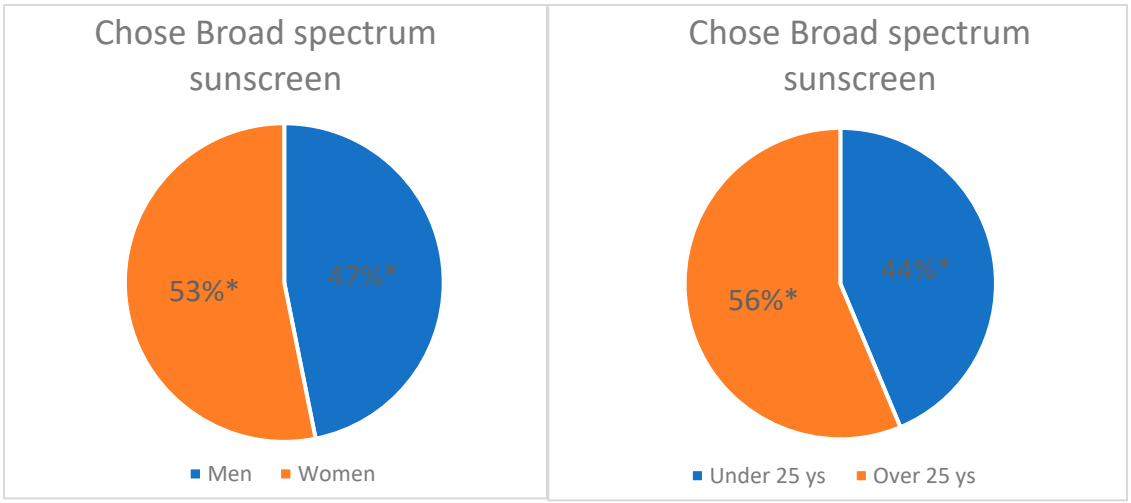

Figure 7. Habits of use of broad spectrum sunscreen according to sex (left image) and to age (right image). A significantly higher percentage of women choose broad spectrum sunscreens (p<0.05*). In addition, significantly higher percentage of people over 25ys compared to the youngest ones choose the broad spectrum sunscreens (p<0.01*).

3.3.3. Up to 64% of the surveyed affirmed that they use sunscreen regularly throughout the year (Figure 8). This percentage was significantly much lower in men than in women (21% vs 68%), p<0.001). (Figure 9) The percentage was also significantly lower in the youngest group compared to the respondents over 25 ys (46% vs 65%), p<0.001. (Figure 10)

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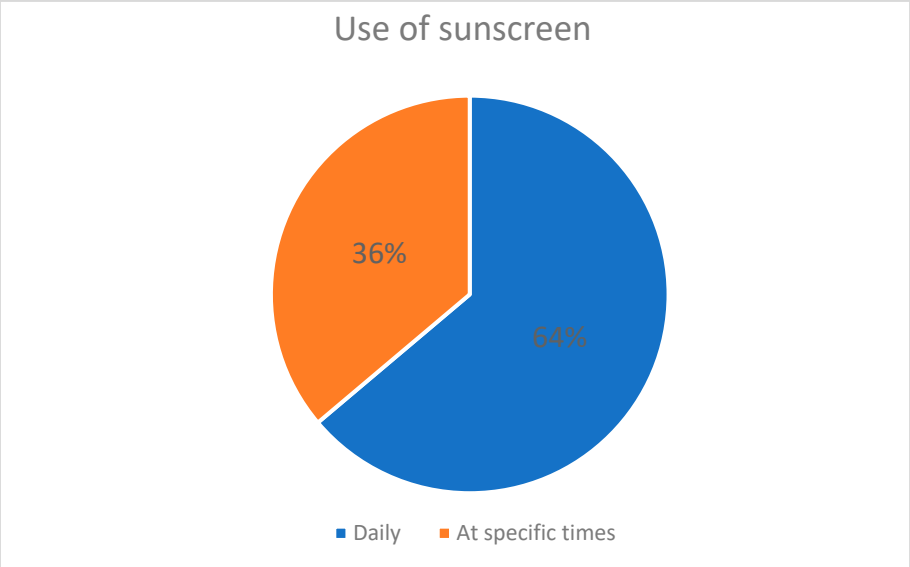

Figure 8. Habits of use of photoprotection cream during the year in the global population of the survey. Up to 2/3 of the respondents use sunscreen daily.

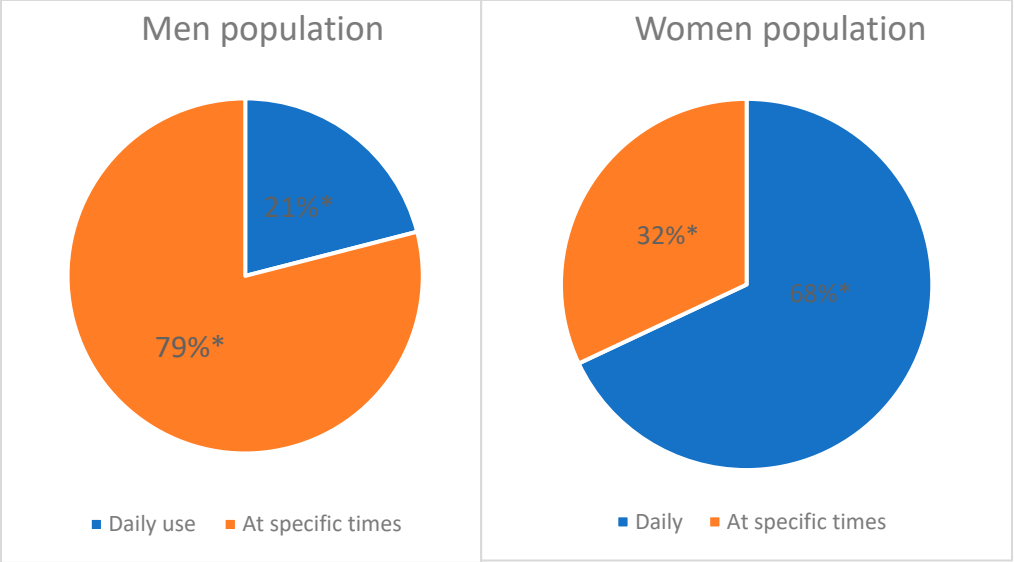

Figure 9. Habits of use of photoprotection cream during the year comparing men vs. women. The data show that a significant lower percentage of men use daily sunscreen ($p<0.05$*).

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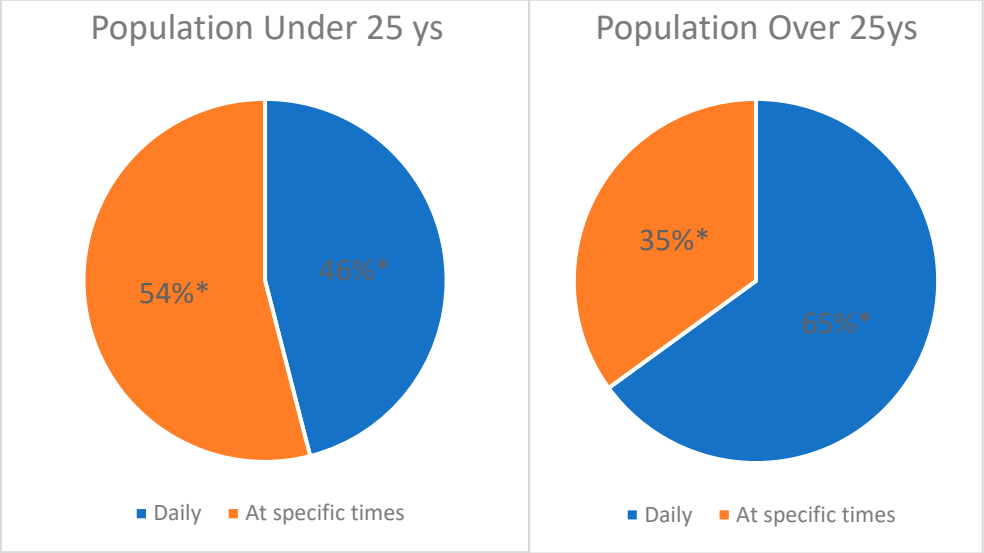

Figure 10. Habits of use of topical photoprotection during the year in the youngest group under 25ys vs over 25ys, showing significant differences as lower percentage of the youngest respondents use daily sunscreen ($p<0.05$*).

3.3.4. Up to 87% (11,010) of the surveyed use to apply the sunscreen before leaving home. This percentage is significantly lower in men than in women (61% vs 90%, $p<0.001$). It was also significantly lower within the youngest ones when compared with respondents over 25 ys (75% vs 88%), $p<0.01$.

3.3.5. Overall, up to 41% (5,200) of respondents never reapply the sunscreen. This lack of reapplication was even more frequent within the youngest ones (49%), although non- significant compared to respondents over 25 ys ($p>0.05$). No significant differences regarding sex was neither detected.

3.3.6. Only 51% (6,455) of the participants use 3 or more sunscreen containers per year. Up to 473 (4%) use the container open from the previous year. Up to 5,669 (45%) use 1 or 2 containers per year.

Regarding sex, a significantly lower percentage of men use 3 or more containers per year compared to women (30% vs 53%, $p<0.001$). When comparing those who use 3 or more containers in the youngest subgroup under 25 years vs. respondents over 25 ys, the percentages significantly differed from 37% vs 52%, respectively, $p<0.001$.

3.3.7. As for choosing a different sunscreen depending on the moment or body area, globally up to 17% (2,088) combine different products. On the contrary, up to 19% (2,386) use the same sunscreen for different areas and situations. Up to 55% (6,970) only chose differente product for face or body, regardless the situation. 9% of the respondents chose different product for daily use vs when the go to the beach. Regarding sex, significant differences were found in those who chose different sunscreen according to the area or activity, as only 7% of men vs 18% of women use to do it, $p<0.001$). Among those who use the same sunscreen for different situations or areas, the percentage was significantly higher in men (51%) compared to women (16%, $p<0.001$). As for the youngest group under 25 ys, a higher percentage use the same product regarding different situations, compared to respondents over 25ys (25% vs 19%, respectively, although non-significant, $p>0.05$).

3.3.8. Regarding the question about what consumers look at when choosing a sunscreen, 68% look at the SPF; 47% look at the additional characteristics (e.g. sweat-resistant, sebum-regulating activity, anti-aging, depigmenting, etc.); 42% look at the comfortable application; 37% look at the brand; 30% look at the pharmacist's recommendations and only 10% look if is sustainable. No significant differences were found between those under 25ys vs respondents over 25 ys. As for women, a significantly higher percentage when compared with men chose sunscreen based on SPF (70% vs 58%, $p<0.001$); based on the pharmacist´s recommendation (31% vs 26%, $p<0.01$) and based on additional characteristics as seborregulation, sweat resistant, etc (48% vs 40%, $p<0.01$) respectively. No significant differences were found in the rest of items.

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3.4. Oral Photoprotection Habits

The results reflected that 67% (8443) know about the existence of this option. However, among the 33% of those who did not know about oral photoprotection we found significant differences between sex, 65% of men unkown about it vs 30% of women, p<0.001. In the youngest subgroup no significant differences were found vs respondents over 25 ys (47% vs 32%, respectively, p>0.05).

Among the ones who were aware about oral photoprotection, only 15% (1,949) regularly use it. This percentage is significantly lower in men vs women (6% vs 16%, p<0.001) and between youngest people (10%, p<0.05 vs respondents over 25 ys).

3.5. Screening Preventive Attitude

Only to 34% (4,306) were aware about the rule of ABCDE signs for nevi screening. The percentage was significantly lower (27%) among the youngest ones when compared to respondents over 25 years (35%), p<0.01. There was also a significant difference (p<0.001) between knowledge of ABCDE signs among men (23%) vs women (35%). (Figure 11)

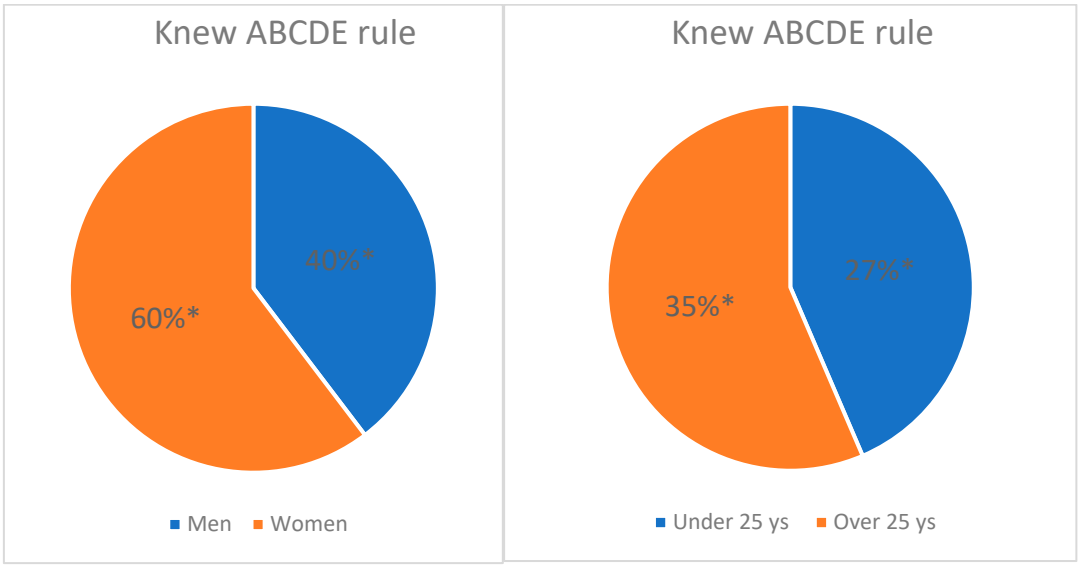

Figure 11. Screening preventing attitude evaluation based on knowledge of the ABCDE rule. A significantly higher knowledge about the ABCDE rule among women vs men and among respondents over 25 ys vs under 25 ys.(*p<0.05).

As for visits to the dermatologist, as many as 23% (2,929) of the respondents had never visited a dermatologist. Only 26% usually visit the dermatologist regularly every year. Within the youngest group, up to 37% never visited the dermatologist, significantly higher percentage than over 25 ys (22%), p<0.001. When comparing between sex, the number of men who had never attended to dermatologist was significantly higher than women (32% vs 22% respectively, p<0.05). (Figure 12).

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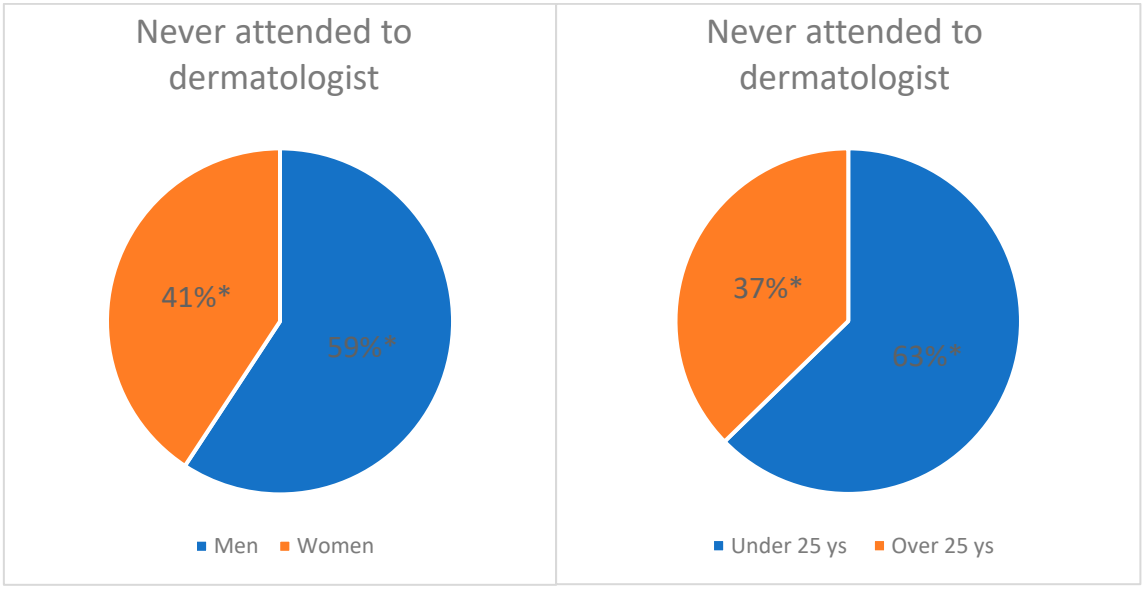

Figure 12. Screening preventing attitude evaluation based on visits to the dermatologist. A significantly higher percentage of men vs women and of the youngest respondents vs those over 25ys had never attended to a dermatologist, $p<0.05$ and $p<0.001$, respectively (*).

4. Discussion

To our knowledge, with 12,597 surveyed volunteers, this is the largest survey conducted in Spain. The information obtained from this survey was carried out among the Spanish population throughout all the country during the year 2023. Different locations have different degrees of sun exposure at different times of the year. Average daily UV radiation values in January of 2023 were 437J/m2 and 921J/m2 in Coruña city (north of Spain) and Almeria city (south of Spain), respectively. In August the average levels of UV were 4000 J/m2 in Coruña and 4543 J/m2 in Almería. We think it could be helpful for planning awareness-raising and health education actions regarding knowledge of the effects of sun exposure and photoprotection habits. This also supports the proposals that affirm that sun protection campaigns are needed to raise awareness of UVR potential damage, and to achieve changes in lifestyle that will arrest the skin cancers increase trend [15].

According to the results, most of the participants were aware of the relationship between sun exposure and skin cancer. However, when asked about tanning, up to 45% of the surveyed did no associated it with skin damage (even higher, 52%, among those under 25 years and 55% in the men subgroup). It is also notable that in the group of women the percentage that associates tanning with health and beauty is similar (22% in both items), while in the group of men the association of tanning with health is greater than with beauty (32% and 23%, respectively).

When exploring the photoprotection habits, we found that 80% of the surveyed affirmed that they use SPF50+ sunscreen, which is quite higher than percentages observed in 2016, when photoprotection habits were studied in a Community in eastern Spain (Catalonia). The authors surveyed 5,530 participants and observed that only 57.1% reported using a SPF 50+ sunscreen [17]. Further studies regarding the evolution of photoprotection habits over the years would be interesting. The subgroup of men should improve the use of SPF 50+ compared to women (67% vs 81%).

Some points to improve, based on the results of our survey, would be the use of photoprotection all year round, the reapplication of the photoprotector and subsequently the number of containers of solar photoprotection consumed. Only 64% of the respondents use the sunscreen all the year, and only 7% reapply the sunscreen more than 3 times during the day and up to 41% denied to reapply the sunscreen. This percentages was significantly lower in the subgroup under 25 years old. In parallel to what was previously mentioned, only 47% of those under 25 ys use sunscreen all year

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long. Among the subgroup of men compared to women, the data reflect that it should be improved the daily use of sunscreen all year round.

Knowledge about oral photoprotection should also be improved, since up to one third of the population surveyed did not know about it, and among the youngest, almost half were unaware of the concept and the benefits that proper oral supplementation can provide. In addition to improving knowledge of oral photoprotection, regular taking of it should be implemented since only 15% take it regularly.

As for the acute consequences of sun exposure, we observed that within the youngest population under 25 ys, 41% referred previous history of severe sunburn. This data in young people resulted better compared to data published in one study in 270 teenagers (between 14-17 years old) from Costa del Sol (south of Spain, with higher UV index up to an average daily UV radiation value of 4284J/m2 in august month) , were 74.4% referred sunburn history the previous summer. In this study, sunscreen was used by 47.8% and 1.1% wore long sleeves or trousers. Up to 60.7% stated they felt better when they were tanned, slightly higher than in our study where 52% found it healthy or beauty [18]. Reviewing previously published data on photoprotection in our country, we found a study carried out in preschool age in the population of southern Spain that collected data from 420 community colleges, 67.1% of the schools did not have written sun protection policies [19]. The photoprotection measures reported included mandatory use of a cap or hat (3.3%), use of sunglasses in outdoor areas (30%), and active encouragement of students to use sunscreen (50.7%) [19]. The study results showed that photoprotection policies and practices in south of Spain schools were mostly insufficient. Since the UV radiation exposure/tanning behaviors tend to start early in life, sun protection among children and young adults is critical to reduce these behaviors [19]. Previous studies demonstrated the cost-benefit ratio of educational interventions such as sun-safe habits programs and sun protection/sunscreen promotion [8,20].

Specifically, we proceed to analyze the photoprotection data in a particular population such as the Spanish sports population. To note, in this population most of the members are men and under 25 ys, which in our survey were the subpopulations with lower percentages of knowledge and use of photoprotection. We highlight the following published studies: One study included 129 handball players on a beach in Cádiz (South of Spain) found that up to 76.9% had suffered at least one sunburn event during the last year, 81.25% of the younger ones. With respect to photoprotection, up to 68% used sunscream with a protection factor of 30 or higher, although 35.4% of the group with younger participants did not reapply it. Up to 94% had not examined their body for skin damage during the previous year [21]. A similar study, conducted in 240 elite aquatics athletes , (71% men) obtained a mean rate of sunburn during the previous season was 76.7% [22]. The results were similar to those obtained in a survey of 72 elite Kitesurf participants, where of respondents had suffered at least one sunburn [23]. In another survey conducted among 657 marathon runners (72% men), it was found that glasses were the most widely used photoprotective method (74.7%), followed by photoprotective (sun protection factor [SPF] > 15) (61.9 %), the hat (52.2%) and finally, the clothes (7.4%). Up to 45% acknowledged they suffered a sunburn in the last year [24]. The beach guards of the Costa del Sol (South of Spain), is another group that was studied in 2018. The questionnaires answered by 109 were analyzed, obtaining that 78.0% were male and 77.1% had experienced at least one painful sunburn during the previous summer [25]. In another population subgroup of 1018 cyclists from the Andalusian federation (Southern Spain): 87.6% were male, 45.6% referred sunburn history during the previous year and only 39.2% reported sunscreen. In addition, 61.0% did not examine their skin regularly despite the fact that 34 subjects (3.4%) reported a personal history of skin cancer [26]. According to the data, in more sporty population subgroups, it is striking that the percentage of sunburns is higher than the 42% obtained in general population.

We found other studies in specific populations such as physical education teachers, health personnel, school population of the Costa del Sol (southern Spain), all concluding that photoprotection habits should be improved [27–29].

The data extracted from the Spanish survey, although they could be improved, are nevertheless better than those obtained in other surveys carried out in other countries.

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In an online survey that included 3,540,000 panellists across the world, they found 80% per cent of participants knew that sunlight can cause skin health problems (lower to the 97% found in our survey) [30]. The percentage of facial application of sunscreen daily was 60%, which was similar to the 64% found in our survey. Globally, the association between tanned skin and beauty was up to 72%, although less in Asian countries and among individuals with dark skin phototypes. Up to 83% reported history of sunburn, (higher than the percentage found in our survey) mainly in Australia, Canada, USA, Germany, France and Russia [30].

In other survey carried out on 5.964 volunteers from Asian countries, although 76%, and 55% of participants reported being aware that solar radiation contributes to premature aging and skin cancer, respectively, only 21% of respondents regularly applied sunscreen, and only 36% understood the significance of photoprotection during winter [31]. In the United States a recent nationwide survey explored sunscreen application habits among over 2.200 volunteers. The study also revealed that up to 82% of respondents said that protecting their skin from the sun was more important to them now than it was five years ago, yet only a fraction consistently apply sunscreen [32].

According to the results of our study, people younger than 25 years old had significantly less awareness and worse sun-protection habits. Within the oldest group with higher knowledge about the effects of the sun and higher awareness of the association between sun and skin damage, we also found better photoprotection habits: greater use of SPF, broad-spectrum creams, greater reapplication, application before leaving home, daily use throughout the year. This situation is worrisome since the solar damage accumulated in the first decades of life is decisive for the subsequent appearance of cancerous skin lesions. This same pattern is repeated when comparing the subgroup of men with that of women, where men have less knowledge and worse photoprotection habits than women. This supports that awareness about the effects of the sun on our skin should encourage greater photoprotection. Dermatologists could play a crucial role in improving this point.

Another point that should be improve is the screening attitude, as up to 23% of the surveyed (and 37% of those under 25 ys and 41% of men) had never attended to a dermatologist. In addition, only 34% knew the ABCDE rule, even less percentages in the youngest subgroup and men (27%).

From these data it can be deduced that it would be necessary to update and develop guidance programs on the effects of solar radiation and photoprotection habits that convey adequate information on solar effects and try to change the beauty canon by accepting the absence of tanning as something beautiful and healthy, or recommend the use of self-tanners instead of sun exposure for those who do not want to give up a darker skin tone. A main population target for these campaigns would be the group of the young people under 25 years, and men as we found significantly less consciousness about UV radiation damage and worse use of photoprotection sunscreens as well as less use of screening methods.

5. Conclusions

In conclusion, this is the first and largest study to assess sun protection habits in the global Spanish population including population gathered all over the country. It is of great help to identify the most deficient aspects regarding sun protection at the present time. The most needed awareness improvement should be in the association between being tanned and skin damage. This knowledge could lead to a greater compliance with sunscreen use. We should also promote the use of sun photoprotection daily and its reapplication throughout the day, as well as the knowledge of oral sun photoprotection. It is also important to increase education on self-examination (for example, the ABCDE rule) as well as awareness of the need to go to the dermatologist regularly.

Further studies are required to assess educational strategies in order to reduce the desire to have a suntan, and improve sun protection practices like the proper use of oral photoprotection and habits targeted to more specific risky groups as people under 25 ys, men, outdoor sporty population groups, sex, etc.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org.

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