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Risk Factors for Cutaneous Melanomas and Level of Awareness in Society

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ABSTRACT

Background: Skin cancers have become a significant public health problem and increasing over the years. Two crucial risk factors for skin cancers are; phenotypic traits and sun-induced ultraviolet exposure. The risk of disease can be significantly reduced with sun protection. This study aimed to determine the knowledge levels of sun protection and sun avoidance behaviors of healthcare professionals and other professionals who have not yet been diagnosed with any cutaneous cancer.

Materials and Methods: Between February and August 2022, the participants without a diagnosis of malignancy were evaluated. Demographic and clinical characteristics of patients related to skin cancer, including age and gender, were recorded. The questionnaire was applied to each participant, including the level of knowledge about sun protection and sun protection habits.

Results: The mean age was 37 years. Of the participants, 116 were healthcare workers, and 392 were other professionals. The knowledge of sun protection among healthcare workers was given by doctors significantly higher than in others. However, other professions obtained sun protection information primarily through media communication tools ($p<0.0001$). The knowledge of using sunscreen half an hour before going out in the sun was higher in healthcare workers ($p=0.009$). Also, knowledge of reapplying sunscreen after swimming was higher among healthcare workers ($p=0.009$). We determined that sunscreen use and sunscreen >30 sun protection factor were higher in healthcare workers ($p<0.0001$, $p=0.001$, respectively). It is noteworthy that there was an insufficient number of nevus screening in both groups.

Conclusion: Although the level of knowledge of individuals about taking protective measures against sun exposure is high, it was observed that individuals' attitudes and behaviors related to sun protection were insufficient. Campaigns to encourage the public to protect themselves from the sun within a general health program through doctor-supported social media tools may contribute to the elimination of the deficiencies we have identified.

Keywords: Sun exposure, Melanoma, Cancer, Ultraviolet light, Sunscreen



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Introduction

Cutaneous melanoma is the world's 17th most common cancer type as of 2020 [1]. In recent years, there has been a marked increase in the incidence of the disease [2,3]. According to Surveillance, Epidemiology, and End Results data, the median age at which the disease is diagnosed is 65. Between 2000 and 2017, the annual incidence in people ≥ 65 years has increased by approximately 60% from 50.1 per 100,000 (100,000) people to 80. There was no significant change in the disease incidence in the younger group [4,5]. Patients with malignant melanoma are also at increased risk for second primary melanoma [6] and the occurrence of additional invasive melanoma is associated with increased mortality [7]. Two major risk factors are associated with cutaneous melanoma: The first is the person's phenotypic traits. Having red or blond hair, light eye color, and common freckles are associated with an increased risk for melanoma [8]. Congenital melanocytic nevi, atypical nevi (asymmetric, irregular borders, multiple colors, and diameter >5 mm), and common nevi are other important phenotypic features associated with increased melanoma risk [9]. The second important, and also modifiable, major risk factor is sunlight-induced ultraviolet (UV) [10]. Since UV-B light from the sun (wavelength: 280-320 nm) can penetrate the skin more than UV-A (320-400 nm), the potential for DNA damage is much higher. However, depending on the location and season, UV-A is exposed 20-40 times more frequently than UV-B [11]. Therefore, the primary prevention of skin cancers is possible by reducing UV exposure through sun protection behaviors. Sunscreen is considered an essential adjunct to other forms of protection against UV rays from the sun and an important component of public health campaigns to prevent skin cancer. This study aimed to screen health professionals and other professionals who have not yet been diagnosed with any cutaneous cancer in terms of malignant melanoma risk and investigate their awareness levels.

Materials and Methods

Between February and August 2022, individuals without a diagnosis of malignancy who applied to the Internal Medicine Outpatient Clinic of Basakşehir Cam and Sakura City Hospital, a tertiary care center, were evaluated. Individuals ≥ 18 years, who could understand and fully answer the survey questions, and who had no history of cancer, including melanoma, were included in the study. Individuals under 18 years and those restricted from going out due to health problems were not included in the study. Cross-sectional demographic information of the patients, including age and gender, was recorded. Educational status, histories associated with childhood sunburns, and family histories associated with malignancy were obtained. Hair, eyes, skin colors, and freckles on any part of their body were investigated by physical examination.

All participants were asked 21 questions about the contents of the surveys, and the details are given below in the form of sub-headings, respectively.

This study was approved by University of Health Sciences Turkey, Basakşehir Cam and Sakura City Hospital Ethics Committee (file no: 2022.01.33, date: 01.02.2022). The ethical committee had agreed to the retrospective analysis of routinely collected clinical data without prior informed consent of patients. The data sets used and/or analyzed during the present study are available from the corresponding author on reasonable request.

The Knowledge Level of the Participants About Sun Protection

Firstly, the participants were asked survey questions measuring information about sun protection;

- Q: Do you know how to protect yourself from the sun?

A: Yes/No

- Q: If yes, from whom did you get the recommendations?

A: Relatives/Media (Internet, newspaper, magazine, TV etc.)/Doctors

- Q: Do you know that you should not go out in the sun between 10:00-14:00?

A: Yes/No

- Q: Did you know that you have to apply sunscreen 30 minutes before going out in the sun?

A: Yes/No

- Q: Did you know that you have to reapply sunscreen every 2-4 hours?

A: Yes/No

- Q: Do you know that you need to reapply sunscreen after swimming in the sea or pool?

A: Yes/No

- Q: Do you know that you need to reapply sunscreen after extreme sports activities?

A: Yes/No

- Q: Do you know how much sunscreen you should apply?

A: Yes/No

- Q: Did you know you have to put on a hat before going out in the sun?

A: Yes/No

- Q: Did you know you have to wear sunglasses before going out in the sun?

A: Yes/No

- Q: Did you know you have to wear tight-fitting clothes before going out in the sun?

A: Yes/No

Sun Avoidance Behaviors of the Participants

After the evaluation of the knowledge level, survey questions were asked to the participants about sun protection behaviors;

- Q: How often do you avoid the sun?

A: Never/Rarely/Sometimes/Often/Always

- Q: How often do you apply sunscreen before going out in the sun?

A: Never/Rarely/Sometimes/Often/Always

- Q: What is the sun protection factor (SPF) of the sunscreen you apply?

A: No protection/2-12 SPF/12-30 SPF/ >30 SPF

- Q: Would you reapply sunscreen?

A: Yes/No

- Q: If yes, how often do you apply sunscreen?

A: Never/Every 6 hours/Every 2-4 hours/Every 1-2 hours

- Q: On which parts of your body do you apply sunscreen?

A: Any part of the body/face-arms-legs/all over the body

- Q: Do you wear a hat before going out in the sun?

A: Yes/No

- Q: Do you wear clothes that cover your body before going out in the sun?

A: Yes/No

- Q: Do you wear sunglasses before going out in the sun?

A: Yes/No

- Q: How often do you sunbathe in summer?

A: Every day/Several times a week/Several time a month/Never

- Q: Have you ever used an indoor tanning bed?

A: Yes/No

- Q: Have you ever had a nevus screening?

A: Yes/No

Statistical Analysis

Statistical analysis of the results was calculated with the SPSS v 20.0 program. The data conformity to the normal distribution was tested with the Kolmogorov-Smirnov test. Participants were evaluated in two subgroups as health workers and other professions. Parametric data obtained were expressed as mean \pm standard deviation values. Analysis of categorical variables in both subgroups was evaluated using the chi-square test. A p-value below 0.05 was considered statistically significant.

Results

History and Phenotypic Features of the Participants

A total of 508 adults, 337 women, and 171 men, were included in this study. The mean age of all cohorts was 37. One hundred sixteen

were health professionals, and 392 were other professions. 68.5% of the participants were university graduates, 17.5% were high school graduates, and 14% were primary school graduates. For the family history, 76.6% had no cancer history, 21.9% had a history of solid or hematological malignancy, and 1.6% had a history of malignant melanoma. In terms of phenotypic hair color, 61.2% of them were brown, 31.9% were black, 6.1% were yellow, and 0.8% were red. Considering the eye color, 63.8% of them were brown, 16.9% were hazel, 8.3% were green, 6.7% were black, and 4.3% were blue. According to the Fitzpatrick skin type scale, 3.1% of the individuals had type 1, 34% had type 2, 52.9% had type 3, and 9.8% had type 4 skin phenotype. Freckling was present in 18.9% of the individuals, while 81.1% did not have freckles. When questioned regarding childhood bullous sunburns, it was learned that 76.6% of the individuals had never had it, 14.2% had it once, and 9.3% had it more than once. The details of the age, gender, occupation, educational status, and phenotypic characteristics of the patients are given in Table 1.

The Knowledge Level of the Participants about Sun Protection

After the participants included in the study were divided into two groups as healthcare professionals and other professionals, they were asked questions regarding sun exposure and preventive measures. To the question "From whom did you get the recommendations", healthcare professionals stated that they learned from the doctor at a statistically significant rate compared to individuals in other professions (46.7% vs 25.7%; $p < 0.0001^*$). On the other hand, when the same question was asked to individuals from other professions, they also stated that they learned mostly from the media, which was statistically significant (50.8% vs 30.5%; $p < 0.0001^*$). There was no statistically significant difference between the two groups in terms of those who answered "yes" to the question "Did you know that you have to apply sunscreen 30 minutes before going out in the sun?" found high (9.6% vs 1.9%; $p = 0.009$). While there was no statistically significant difference between those who answered "yes" to the question "Do you know that you need to reapply sunscreen after swimming in the sea or pool?" in both groups, those who answered "no" were found to be higher in healthcare than other professionals (20.2% vs 9.5%; $p = 0.009$). There was no statistically significant difference between the two groups in terms of other questions asked ($p > 0.05$). The details of the participants' knowledge levels on sun protection are given in Table 2.

Participants' Sun Avoidance Behaviors

Health workers and other professionals were asked about their habits related to sunscreen use. The answers to the question "How often do you apply sunscreen before going out in the sun" were "Never, rarely, sometimes, often, always" The "often" response was found to be higher in healthcare workers, which was statistically

Table 1. History and phenotypic features of the participants			
History and phenotypic features		n=508	%
Age		37±12	13-80
Gender	Male	171	33.66
	Female	337	66.33
Occupation	Health worker	116	22.8%
	Other professions	392	77.2%
Education	Elementary school	71	14.0%
	High school	89	17.5%
	Graduate school or university	348	68.5%
Family history	None	389	76.6%
	Other than skin cancer	111	21.9%
	Melanoma	8	1.6%
Hair color	Brown	311	61.2%
	Black	162	31.9%
	Yellow	31	6.1%
	Red	4	0.8%
Eye color	Brown	324	63.8%
	Hazel	86	16.9%
	Green	42	8.3%
	Black	34	6.7%
	Blue	22	4.3%
Fitzpatrick skin type	1	16	3.1%
	2	173	34%
	3	269	52.9%
	4	50	9.8%
Freckle	Presence	96	18.9%
	Absence	412	81.1%
Bullous sunburn in childhood	None	389	76.6%
	Once	72	14.2%
	Many	47	9.3%

significant (23.3% vs 11%; <0.0001). In individuals belonging to other professions, the “sometimes” response was found to be higher, which was statistically significant (30.6% vs 18.1%; $p<0.0001$). The answers to the question “What is the SPF of the sunscreen you apply” were “no protection, 2-12 SPF, 12-30 SPF, >30 SPF”. A statistically significant “>30 SPF” response was found to be higher in healthcare workers (62.1% vs 42.1%; $p=0.001$). The “no protection” response was found to be higher in the group of other professions, which was statistically significant (41.3% vs 24.1%; $p=0.001$). The answers to the question “If yes, how often do you apply sunscreen?” were “never, every 6 hours, every 2-4 hours, every 1-2 hours”. The response of “every 2-4 hours” was statistically significantly higher

in healthcare workers (12.1% vs 8.7%; $p=0.047$). The answers to the question “How often do you sunbathe in summer” were answered, “every day, several times a week, several times a month, never.” A statistically significant “several times a month” response was found to be higher in healthcare workers (56.9% vs 36.2%; $p=0.001$). In individuals belonging to other professions, the answers to “several times a week and never” were found to be higher, respectively [(28.1% vs 18.1%; $p=0.001$) and (26.5% vs 19%; $p=0.001$)]. There was no statistically significant difference between the two groups regarding other questions asked ($p>0.05$). The habits of healthcare workers and other professionals related to the use of sunscreen are given in Table 3 with details.

Table 2. The knowledge level of the participants about sun protection

		Other profession		Health worker		P
		n	%	n	%	
Do you know how to protect yourself from the sun?	Yes	332	84.7%	106	91.4%	0.066
	No	60	15.3%	10	8.6%	
If yes, from whom did you get the recommendations?	Relatives	78	23.6%	24	22.9%	<0.0001*
	Media**	168	50.8%	32	30.5%	
	Doctor	85	25.7%	49	46.7%	
Do you know that you should not go out in the sun between 10:00-14:00?	Yes	316	95.2%	105	99.1%	0.072
	No	16	4.8%	1	0.9%	
Did you know that you have to apply sunscreen 30 minutes before going out in the sun?	Yes	300	90.4%	104	98.1%	0.009*
	No	32	9.6%	2	1.9%	
Did you know that you have to reapply sunscreen every 2-4 hours?	Yes	268	80.7%	92	86.8%	0.155
	No	64	19.3%	14	13.2%	
Do you know that you need to reapply sunscreen after swimming in the sea or pool?	Yes	313	79.8%	105	90.5%	0.021*
	No	79	20.2%	11	9.5%	
Do you know that you need to reapply sunscreen after extreme sports activities?	Yes	295	88.9%	97	91.5%	0.438
	No	37	11.1%	9	8.5%	
Do you know how much sunscreen you should apply?	Yes	268	80.7%	89	84.0%	0.455
	No	64	19.3%	17	16.0%	
Did you know you have to put on a hat before going out in the sun?	Yes	305	77.8%	98	84.5%	0.182
	No	87	22.2%	18	15.5%	
Did you know you have to wear sunglasses before going out in the sun?	Yes	313	94.3%	99	93.4%	0.738
	No	19	5.7%	7	6.6%	
Did you know you have to wear tight-fitting clothes before going out in the sun?	Yes	170	51.2%	60	56.6%	0.332
	No	162	48.8%	46	43.4%	

*Statistically significant, **Internet, newspaper, magazine and television etc.

Discussion

This study aims to evaluate healthcare professionals' and other professionals' awareness levels and habits regarding sun protection. In our survey, more than 80% of healthcare professionals and other professionals stated that they have knowledge about sun protection. We noticed that the knowledge levels were similar in both groups, except for using sunscreen. From the point of the source of information, it was seen that health professionals received more information from doctors in terms of exposure to sunlight and possible risks. On the other hand, individuals from other professions accessed this information mainly through social media tools such as the internet, newspapers, magazines, and television, in accordance with the literature [12-14]. The awareness level of using sunscreen 30 minutes before sun exposure and after swimming was higher than expected in healthcare workers [15]. Our study showed that health

workers' knowledge level is higher than other professionals. As a remarkable finding, our study revealed that the recommendation of the information by the doctor was associated with a higher level of sun protection knowledge.

When we evaluated sun protection habits, the frequency of using sunscreen before going out in the sun was found to be proportionally higher in healthcare workers. To the question, "How often do you apply sunscreen before going out in the sun?" the answers "sometimes" and "newer" were mainly received from other professionals, in line with the literature [16]. Although the frequency of use of sunscreens with high SPF levels was proportionally high among healthcare workers, both healthcare professionals and other professionals mostly preferred sunscreen with an SPF rating of 30 and above, in line with the information in the literature [17].

Table 3. Participants' sun avoidance behaviors						
Count		Other profession		Health worker		
		Column n %	Count	Column n %	Count	
How often do you avoid the sun?	Never	24	6.1%	4	3.4%	0.648
	Rarely	49	12.5%	11	9.5%	
	Sometimes	151	38.5%	49	42.2%	
	Often	125	31.9%	38	32.8%	
	Always	43	11.0%	14	12.1%	
How often do you apply sunscreen before going out in the sun?	Never	107	27.3%	20	17.2%	<0.0001*
	Rarely	87	22.2%	31	26.7%	
	Sometimes	120	30.6%	21	18.1%	
	Often	43	11.0%	27	23.3%	
	Always	35	8.9%	17	14.7%	
What is the SPF of the sunscreen you apply?	No protection	162	41.3%	28	24.1%	0.001*
	2-12 SPF**	6	1.5%	0	0.0%	
	12-30 SPF	59	15.1%	16	13.8%	
	>30 SPF	165	42.1%	72	62.1%	
Would you reapply sunscreen?	Yes	298	76.0%	80	69.0%	0.126
	No	94	24.0%	36	31.0%	
If yes, how often do you apply sunscreen?	Never	298	76.0%	80	69.0%	0.047*
	Every 6 hours	59	15.1%	19	16.4%	
	Every 2-4 hours	34	8.7%	14	12.1%	
	Every 1-2 hours	1	0.3%	3	2.6%	
On which parts of your body do you apply sunscreen?	Any part of the body	58	14.8%	13	11.2%	0.537
	Face-arms-legs	162	41.4%	48	41.4%	
	All over the body	171	43.7%	55	47.4%	
Do you wear a hat before going out in the sun?	Yes	27	8.1%	8	7.5%	0.847
	No	305	91.9%	98	92.5%	
Do you wear clothes that cover your body before going out in the sun?	Yes	162	48.8%	46	43.4%	0.332
	No	170	51.2%	60	56.6%	
Do you wear sunglasses before going out in the sun?	Yes	19	5.7%	7	6.6%	0.738
	No	313	94.3%	99	93.4%	
How often do you sunbathe in summer?	Every day	36	9.2%	7	6.0%	0.001*
	Several times a week	110	28.1%	21	18.1%	
	Several time a month	142	36.2%	66	56.9%	
	Never	104	26.5%	22	19.0%	
Do you use artificial bronzer?	Yes	333	84.9%	106	91.4%	0.76
	No	59	15.1%	10	8.6%	
Have you ever had a nevus screening?	Yes	380	96.9%	110	94.8%	0.280
	No	12	3.1%	6	5.2%	

*Statistically significant, **SPF: Sun protection factor

Additionally, it was observed that the frequency of re-application of sunscreen at certain periods was higher in healthcare workers. This leads us to conclude that, indirectly, individuals from other professions do not have sufficient knowledge about the use of sunscreens [18]. Regarding sunbathing frequency, we observed that health workers sunbathed more frequently, either several times a month or never. On the contrary, individuals from other professions sunbathe either several times a week or several times a month. Based on this, we assume that healthcare professionals avoid the sun more than other professionals. Despite the high level of knowledge of the participants, we observed that avoiding the sun, frequency of sunscreen use, and wearing clothes that cover the body were insufficient in both groups. In particular, the use of hats and sunglasses was relatively high. However, it is noteworthy that there was a deficient number of nevus screening in both groups.

Study Limitations

The major limitations are that the study was conducted in a single center, a tertiary healthcare institution. Also, it had a cross-sectional design, and the survey was conducted in the spring and summer seasons when the sun exposure increased. Large-scale epidemiological studies spanning a whole year may contribute to the elimination of these biases.

Conclusions

Although the level of knowledge of individuals about taking protective measures against sun exposure is high, it was observed that individuals' attitudes and behaviors related to sun protection were insufficient. Campaigns to encourage the public to protect themselves from the sun within a general health program through doctor-supported social media tools may contribute to the elimination of the deficiencies we have identified.

Ethics

Ethics Committee Approval: This study was approved by University of Health Sciences Turkey, Basaksehir Cam and Sakura City Hospital Ethics Committee (file no: 2022.01.33, date: 01.02.2022).

Informed Consent: Retrospective study.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Concept: T.K., F.F., S.E., Ç.E.K., Design: T.K., F.F., Data Collection or Processing: .E., Ç.E.K., Analysis or Interpretation: T.K., F.F., Literature Search: T.K., F.F., Writing: T.K., F.F., S.E., Ç.E.K.

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