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Research Article

Assessing the Knowledge, Attitude, Practice towards the Sun Exposure and the use of Sunscreen by the General Population in Makkah, Saudi Arabia

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Abstract

Context: Sunlight exposure is a major cause of melanoma and non-melanoma skin cancer (NMSC). The sunscreen use can reduce the risk of developing melanoma and NMSC.

Purpose: To assess the knowledge, attitude, and practice of the general population of Makkah city, Saudi Arabia related to sun exposure and the use of sun protection.

Methods and Material: The present study is a descriptive cross-sectional study including 577 participants from the general population of Makkah city, Saudi Arabia using an online pretested Arabic questionnaire designed via Google Forms.

Results: More than three-quarters of the respondents (78.4%) stated that sun exposure is harmful; of these, 61.9% stated that tanning, pigmentation, burns, skin cancer, and aging are potential risks that result from sun exposure. Further, 39.5% of the participants sometimes used sunscreen, while 23.9% of them regularly used sunscreen when exposed to the sun; the majority (75.1%) was unaware of the different forms of sunscreens. The factors associated with the regular use of sunscreen were female gender, aged between 18-25 years, and single. The majority of the respondents admitted that sunscreen use is necessary for protection against harmful ultraviolet radiation (88.9%); however, only 34.7% of them used other protective methods such as avoiding exposure to the sun (84.0%) and seeking shade (72.0%).

Conclusions: According to the results, various attitudes toward the usage of sunscreen were found. Most of the respondents believed that exposure to the sun are harmful. However, the rate of sunscreen use by our population was average despite their reasonable awareness of the effects of sun exposure. This implies the need for health education campaigns and programs.

Keywords: sun exposure; sunscreen; sun protection; photo protection; ultraviolet radiation; skin cancer

Introduction

Sunlight exposure, specifically ultraviolet radiation (UVR), has a wide range of benefits. Such benefits are not only limited to vitamin D activation, but also include reducing the risk of cardiovascular diseases, breast cancer, malignant transformation of colorectal tumors, multiple sclerosis, type 2 diabetes, and obesity (Hoel et al., 2016). Nevertheless, sunlight exposure is the root of many skin problems such as tanning, burning, pigmentary changes (e.g., melasma, lentigines), and skin aging. It is also a major cause of melanoma and non-melanoma skin cancer (NMSC), including basal and squamous cell carcinoma (AlGhamdi et al., 2016; Reichrath et al., 2014). In addition, it can cause extracutaneous manifestations such as cataract formation, immune suppression, and the activation of latent viruses (Al-Mutairi et al., 2012).

According to the WHO, the mortality rate due to UVR overexposure is up to 60,000 fatalities annually worldwide. Of these deaths, malignant melanomas are responsible for 48,000 fatalities, while the remaining 12,000 are due to skin carcinomas. UVR acts by directly damaging the DNA, causing mutations to the genes involved in DNA repair, oxidative stress, and inflammation (Narayanan et al., 2010). The sunscreen use can reduce the risk of developing melanoma and NMSC (Green et al., 1999; Green et al., 2011).

A previous study at King Saud University measured the knowledge, attitude, and practice of the general population of Saudi Arabia related to sun exposure and sun protection (AlGhamdi et al., 2016). It was found that 55% were aware of the correlation between sun exposure and skin cancer and 67.7% were aware that sun exposure can cause sunburn. Females, middle class, and higher educated people had higher awareness than other participants. Regarding sunscreen use, only 23.7% were using it regularly, with more prevalence among women and employed respondents. While, 90% of the population used clothes as a protective measure (AlGhamdi et al., 2016).

Another study from the College of Medicine, Qassim University, Saudi Arabia assessed the knowledge of the general population of Qassim province on the association of sun exposure with skin cancer, revealing the low use of sunscreen despite a good level of knowledge. Overall, 56% of the respondents were aware of the correlation between sun exposure and developing skin cancer, but the sunscreen use was only reported by 8.3% of the population. Sunscreen use was related to the following sociodemographic factors of being female, having higher level of education, and social class (Al Robaee, 2010).

A cross-sectional study was performed at the outpatient dermatology clinics of four hospitals in Lima, Peru to evaluate the patients' knowledge, attitude, and practice related to sun exposure and sun protection. It showed an acceptable level of awareness of risks of sun exposure; however, a large percentage of the population failed to integrate the regular sunscreen use as a practice in their daily life. Moreover, 93.4% of the patients were cautious about the risks of sun exposure, with a greater level of awareness among university students. In total, 78.9% were aware of sunscreen and 52.3% of the patients used it regularly; however, only 38.4% used sunscreen daily and 61.6% used it occasionally (Thomas-Gavelan et al., 2011).

Another study conducted by the College of Medicine at the University of Baghdad, Iraq evaluated the awareness of medical students on the negative impacts of sun exposure. It showed that most students were knowledgeable about the negative impacts and risks of unprotected sun exposure, but only one-third of the students used sunscreen regularly. Further, while 93% of females used sunscreen, only 25% of males did. Knowledge on the types of sunscreen, its reapplication, and the proper way of using it was low among the population (Al Battat et al., 2021).

Skin cancer is the most typical form of cancer worldwide and the ninth most common malignancy in Saudi Arabia (Almuqati et al., 2019). Therefore, this study aimed to assess the knowledge, attitude, and practice of the general population of Makkah, Saudi Arabia related to sun exposure and sunscreen use.

Methods

A cross-sectional descriptive study was conducted from April, 2022 to December, 2022 via Google Forms in Makkah, Saudi Arabia. A biomedical ethics committee of Umm Al-Qura University in Makkah, Saudi Arabia approved the distribution of the survey using snowball sampling. Our study included the general population aged above 18 years from Makkah; exclusion criteria included participants who did not belong to Makkah. A modified questionnaire from previous published studies was used, face validity was assessed by four dermatology experts and then a pilot study was conducted to establish reliability and consistency before distribution (Al Robaee, 2010; Thomas-Gavelan et al., 2011; Al Battat et al., 2021).

The sample size was calculated using Open Epi version 3.0 with a 95% confidence interval (OpenEpi Menu, 2022), with 385 participants; but the questionnaire was distributed among 630 participants.

The questionnaire was pretested on 20 individuals with slight modifications according to their feedback before distributing. An online link from Google Forms website was sent to the participants via social media applications. The link included an informed consent form and explained the anonymous and voluntary nature of the survey.

The questionnaire consisted of four parts. The first part included the sociodemographic data on the participants, while the second and third parts assessed the participants' knowledge and attitude towards sun exposure and sunscreen use. The fourth part evaluated those factors affecting knowledge, attitude, and practice.

Statistical Analysis

R Studio (R version 4.1.1) was applied to perform the statistical analysis. We described the categorical variables using frequencies and percentages. The factors associated with the regular sunscreen use were evaluated applying Pearson's Chi-squared test or Fisher's exact test, whenever required. A multivariate logistic regression model was designed to explore the independent predictors using the significantly associated factors from the univariate analysis as the independent variables. The results were expressed as odds ratios (ORs) with 95% CI. Statistical significance was considered at $p < 0.05$.

Results

Sociodemographic and skin-related characteristics:

A total of 577 participants responded to the online questionnaire. The majority of the participants were females (n = 416, 72.1%) and all of them resided in Makkah, Saudi Arabia. The most common age categories were 18–25 years (n = 255, 44.2%) and > 40 years (n = 229, 39.7%). Almost half of the participants were married (n = 287, 49.7%) and the majority (n = 415, 71.9%) had obtained a University degree. The most common Fitzpatrick skin type was type III (n = 263, 45.6%), whereas the combined skin type (oily and dry skin) was reported among 219 participants (38.0%). Only 9 participants (1.6%) indicated a positive family history of skin cancer (Table 1).

*Fitzpatrick skin types included type I (always burns, never tans), type II (burns, then tans), type III (sometimes burns, moderately tans), and type VI (never burns, intensely tans).

Sun exposure and sun protection behavior: Over three-quarters of the respondents (78.2%) stated that sun exposure is harmful; of these, 61.9% stated that tanning, pigmentation, burns, skin cancer, and aging are potential risks that result from exposure to the sun (**Figure 1A**). Importantly, 39.5% of the participants sometimes used sunscreen, while 23.9% of them regularly used sunscreen when exposed to the sun. Based on the submitted responses, the most dangerous periods for sun exposure were 10 am to 2 pm (44.4%) and 10 am to 4 pm (39.2%). The majority of the respondents admitted that sunscreen use is necessary for protection against harmful UVR (88.9%); however, only 34.7% of them used other methods for protection. Of the latter group, the most common approaches other than the sunscreen use included avoiding exposure to the sun (84.0%) and seeking shade (72.0%, **Figure 1B**). The application of sunscreen was the most important way of protection from UVR, as indicated by 44.2% of the sample, followed by the avoidance of sun exposure **(38.0%, Table 2).**

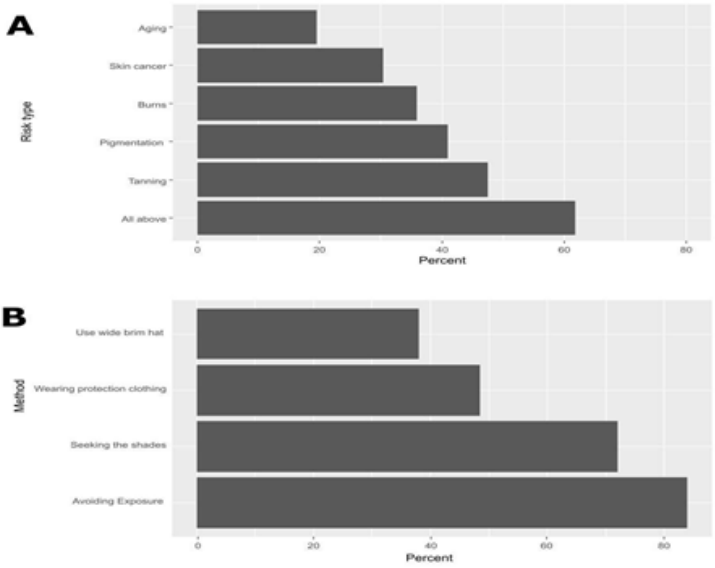

Figure 1: A) Participants' responses to the items related to harm from sun exposure (panel A, n = 494), B) methods used for sun protection other than sunscreen (panel B, n = 217).

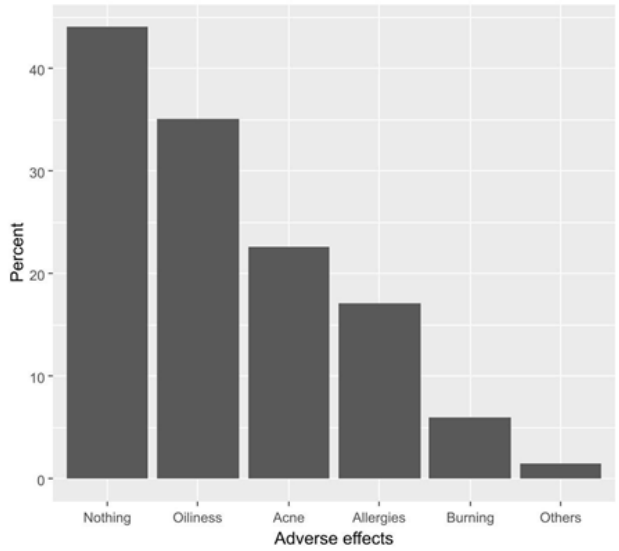

Figure 2: Reported subjective side effects from using sunscreens

Variable	Category	N (%)
Gender	Male	161 (27.9%)
	Female	416 (72.1%)
Age	18-25 years	255 (44.2%)
	26-30 years	64 (11.1%)
	31-40 years	29 (5.0%)
	Over 40 years	229 (39.7%)
Marital status	Single	272 (47.1%)
	Married	287 (49.7%)
	Divorced	18 (3.1%)
Level of education	Below secondary school	11 (1.9%)
	Secondary school	109 (18.9%)
	University	415 (71.9%)

	Post-graduate	42 (7.3%)
Fitzpatrick skin type*	Type I	16 (2.8%)
	Type II	129 (22.4%)
	Type III	263 (45.6%)
	Type IV	169 (29.3%)
Type of skin	Normal	130 (22.5%)
	Oily	164 (28.4%)
	Dry	64 (11.1%)
	Combined	219 (38.0%)
Family history of skin cancer	Yes	9 (1.6%)
	No	568 (98.4%)

Table 1: Sociodemographic and skin-related characteristics (n = 577).

Variable	**Category**	**N (%)**
Do you think that exposure to the sun is harmful?	Yes	451 (78.2%)
	No	126 (21.8%)
Use a sunscreen when exposed to the sun	No	211 (36.6%)
	Sometimes	228 (39.5%)
	Yes	138 (23.9%)
The most dangerous period for exposure to the sun is …	8–10 am	15 (2.6%)
	10 am–2 pm	256 (44.4%)
	10 am–4 pm	226 (39.2%)
	2–4 pm	80 (13.9%)
Sunscreen is necessary for protection from harmful Ultra Violet (UV) light from the sun	Yes	513 (88.9%)
	No	64 (11.1%)
Do you use other methods to protect yourself from the UV light of the sun	Yes	200 (34.7%)
	No	377 (65.3%)
The most important way of protection from UVR is …	Using sunscreen	255 (44.2%)
	Avoiding exposure	219 (38.0%)
	Wearing protective clothing or seeking shade	93 (16.1%)
	Other	10 (1.7%)

Table 2: Sun exposure and sun protection behavior (n = 630).

Factors associated with and predictors of the regular use of sunscreen:

The results of the univariate analysis (Chi-squared test or Fisher's exact test) showed that the regular sunscreen use was associated with being female (94.2% vs. 5.8% among males, $p < 0.0001$), aged between 18 and 25 years (58.7% among participants aged 18–25 years vs. 26.8%, 10.1%, and 4.3% among those aged > 40 years, 26–30 years, and 31–40 years, $p < 0.0001$), and single (62.3% among single participants vs. 34.8% among married participants and 2.9% among divorced participants, $p < 0.0001$). In addition, the sunscreen use differed significantly based on the Fitzpatrick skin type ($p = 0.010$) and type of the skin ($p = 0.008$, **Table 3**).

Based on the multivariate binary logistic analysis, and considering the male gender as the reference group, the female gender was the sole independent predictor of an increased rate of the regular sunscreen use (OR = 9.54, 95% CI, 4.45 to 23.1, $p < 0.0001$). Conversely, considering the normal skin group as the reference group, those participants with dry skin were less likely to regularly use sunscreen (OR = 0.41, 95% CI, 0.16 to 0.96, $p = 0.046$**, Table 4).**

Variable	Category	Regular use of sunscreen		
		No, N = 439	Yes, N = 138	Sig.
Gender	Male	153 (34.9%)	8 (5.8%)	<0.0001
	Female	286 (65.1%)	130 (94.2%)	
Age	18–25 years	174 (39.6%)	81 (58.7%)	<0.0001
	26–30 years	50 (11.4%)	14 (10.1%)	
	31–40 years	23 (5.2%)	6 (4.3%)	
	Over 40 years	192 (43.7%)	37 (26.8%)	
Marital status	Single	186 (42.4%)	86 (62.3%)	<0.0001
	Married	239 (54.4%)	48 (34.8%)	
	Divorced	14 (3.2%)	4 (2.9%)	
Level of education	Below secondary school	9 (2.1%)	2 (1.4%)	0.054
	Secondary school	93 (21.2%)	16 (11.6%)	
	Graduate	304 (69.2%)	111 (80.4%)	
	Postgraduate	33 (7.5%)	9 (6.5%)	
Fitzpatrick skin type	Type I	11 (2.5%)	5 (3.6%)	0.010
	Type II	86 (19.6%)	43 (31.2%)	
	Type III	202 (46.0%)	61 (44.2%)	
	Type IV	140 (31.9%)	29 (21.0%)	
Type of skin	Normal	106 (24.1%)	24 (17.4%)	0.008
	Oily	127 (28.9%)	37 (26.8%)	
	Dry	55 (12.5%)	9 (6.5%)	
	Combined	151 (34.4%)	68 (49.3%)	
Family history of skin cancer	No	434 (98.9%)	134 (97.1%)	0.228
	Yes	5 (1.1%)	4 (2.9%)	

Table 3: Factors associated with the regular use of sunscreen (n = 630).

Variable	Category	OR	95% CI	Sig.
Gender	Male	Ref.	Ref.	
	Female	9.54	4.45, 23.1	<0.0001
Age	18–25 years	Ref.	Ref.	
	26–30 years	0.77	0.34, 1.67	0.514
	31–40 years	1.17	0.35, 3.64	0.788
	Over 40 years	0.97	0.48, 1.95	0.930
Marital status	Single	Ref.	Ref.	
	Married	0.72	0.38, 1.34	0.302
	Divorced	0.48	0.11, 1.71	0.188
Skin type	Type 1	Ref.	Ref.	
	Type 2	1.39	0.43, 4.98	0.596
	Type 3	0.61	0.19, 2.14	0.414
	Type 4	0.42	0.13, 1.50	0.157
Type of skin	Normal	Ref.	Ref.	
	Oily	1.39	0.73, 2.68	0.321
	Dry	0.41	0.16, 0.96	0.046
	Combined	1.15	0.65, 2.07	0.642

OR = Odds ratio, CI = Confidence interval; Ref indicates the reference group.

Table 4: Predictors of the regular use of sunscreen.

Patterns of the use of sunscreen and reported adverse events:

Focusing on sunscreen users (n = 366), the majority of the respondents did not know about the type of sunscreen (whether chemical or physical) and 38.0% did not know about the type of SPF used. However, SPF was the most common factor that influenced the choice of sunscreen (57.1%), followed by personal experience (54.9%) and prescriptions (48.1%). Almost half of the respondents (52.2%) used sunscreen once a day and

31.7% of them do not care about the amount of time that it is left on the skin. Additionally, the most common amounts of sunscreen applied ranged between one-quarter of a teaspoon up to one teaspoonful (72.4%). Sunscreen was applied more frequently on the exposed parts of the body (47.8%) and users applied these products in both summer and winter (50.8%). More details about the patterns of using sunscreen are provided in **Table 5.** Adverse events were reported by 35.1% and 22.6% of individuals as oiliness and acne were observed, respectively but fewer than half of the participants (44.0%) reported no adverse events **(Figure 2).**

Perceptions of skin protection and sunscreen:

Regarding the perceptions of the sample, approximately one-third of the participants indicated that sunscreen protects from heat (34.5%) and may lose its effects after sweating or swimming (39.3%). Moreover, about two-thirds of the sample declared that sun protection in Saudi Arabia is necessary (67.4%) and that medical knowledge increases one's awareness of sun protection (67.8%). The majority of the respondents (85.4%) did not know about the components of sunscreen. Only 36.9% of the participants were ready to advise people about sun protection **(Table 6).**

Variable	Category	N (%)
Type of sunscreen preferred	Chemical	62 (16.9%)
	Physical	29 (7.9%)
	Do not know	275 (75.1%)
Type of SPF preferred	Do not know	139 (38.0%)
	SPF 15	2 (0.5%)
	SPF 30	24 (6.6%)
	SPF 50	127 (34.7%)
	Over SPF 50	74 (20.2%)
Do you think that SPF 50 is different from SPF 30 sunscreen?	No	35 (9.6%)
	Yes	134 (36.6%)
	Do not know	197 (53.8%)
Factors affecting the choice of sunscreen*	SPF	209 (57.1%)
	Personal experience	201 (54.9%)
	Origin	41 (11.2%)
	Friends' advice	142 (38.8%)
	Prescription	176 (48.1%)
	Internet	82 (22.4%)
	I do not buy any	25 (6.8%)
Amount of sunscreen applied to the face	Do not know	70 (19.1%)
	One-quarter of a teaspoon	100 (27.3%)
	Half a teaspoon	74 (20.2%)
	1 teaspoonful	91 (24.9%)
	2 teaspoonfuls	28 (7.7%)
	Over 2 teaspoonfuls	3 (0.8%)
How often do you use sunscreen in a day?	Do not use	51 (13.9%)
	Once	191 (52.2%)
	Twice	52 (14.2%)
	Over twice	22 (6.0%)
	Not sure	50 (13.7%)
Time you apply sunscreen before exposed to the sun	Do not care about the time	116 (31.7%)
	5 min	69 (18.9%)
	10 min	57 (15.6%)
	15 min	69 (18.9%)
	20 min	28 (7.7%)
	25 min	5 (1.4%)
	30 min	12 (3.3%)
	Over 30 min	10 (2.7%)
Season in which sunscreen is used	None	24 (6.6%)
	Summer	152 (41.5%)
	Winter	4 (1.1%)
	Both	186 (50.8%)

For how long participants have been using sunscreen	Do not use	58 (15.8%)
	Weeks	23 (6.3%)
	Months	81 (22.1%)
	Years	204 (55.7%)
Where do participants apply sunscreen on their body	Do not use	33 (9.0%)
	Face	95 (26.0%)
	Face and neck	63 (17.2%)
	All exposed parts of the body	175 (47.8%)

*A multiple-response variable

Table 5: Patterns of the use of sunscreen (n = 366).

Variable	Category	N (%)
Sunscreen protects from heat	No	212 (36.7%)
	Yes	199 (34.5%)
	Do not know	166 (28.8%)
Medical knowledge increases awareness of sun protection	No	26 (4.5%)
	Maybe	160 (27.7%)
	Yes	391 (67.8%)
Sun protection in Saudi Arabia is …	Not necessary	28 (4.9%)
	Necessary sometimes in the year	160 (27.7%)
	Necessary	389 (67.4%)
Important content looked for in sunscreen	Do not know about components	493 (85.4%)
	Physical sunscreens such as titanium oxide and zinc oxide	46 (8.0%)
	Chemical components such as avobenzone	38 (6.6%)
Sunscreen may lose its effect after sweating or swimming	No	69 (12.0%)
	Maybe	281 (48.7%)
	Yes	227 (39.3%)
Ready to advise people about sun protection	No	115 (19.9%)
	Sometimes	249 (43.2%)
	Yes	213 (36.9%)

Table 6: Perceptions of skin protection and sunscreen.

Discussion

In our study, the number of female participants was double the number of male participants, which might be due to the healthier lifestyles led by women, showing interest in skin care, and fear of aging. Hence, they show greater concern about their appearance (Al Robaee, 2010; Thomas-Gavelan et al., 2011; Al Battat et al., 2021).

A total of 44.2% of the respondents were between 18 to 25 years. This observation demonstrates young Saudis increasingly using the internet, and media campaigns have made them aware of the need to use sunscreen. A community-based study conducted in Shanghai, China, showed similar findings to our study. It was observed that women, higher socioeconomic status, and younger age were the factors which concerned about the sun protection and hence, were inclined to use sunscreen (OpenEpi Menu, 2022). Childhood is an optimal age to inculcate preventive measures as lifestyle habits and attitudes are still in the developing stage (CDC, 2002).

The majority of the respondents (71.9%) had a higher education degree and most samples had Fitzpatrick skin type III. The type III skin is medium-colored skin characterized by their ability to gradually tan and sometimes mildly burn. Similarly, in a Danish study, 41% of respondents claimed to have skin type III or IV, indicating only sometimes or rarely getting sunburned (Ravnbak, 2010). Further, 28.4% had oily skin, 38% had combined skin and 1.6% had a family history of skin cancer.

The present study observed participants agreeing on sunlight being harmful, with 61.9% mentioning that several risk factors for sun exposure such as aging, burns, pigmentation, skin cancer. Our findings on skin cancer were consistent with a previous study from Qassim province (Al Robaee, 2010). About 78.2% of the participants agreed that sunlight is harmful with 23.9% using sunscreen regularly and 36.6% not using at all. Similarly, AlGhamdi et al. (2016) observed 23.7% using sunscreen, while 41% never using it and Alshaalan et al. (2022) found 36% participants had never used sunscreen.

The majority of the participants (44.2%) considered sunscreen as the most important protective method, but only 23.9% used it regularly. A Saudi Arabian study reported that only 38.8% agreed on sunscreen being protective, while 54.8% applied it as a protective method (Alshayeb et al., 2022). Our results were also similar to a past study in the United States where seeking shade and wearing a hat were practices for avoiding sun exposure (Shuk et al., 2012). Only 7.9% of the respondents favoured physical sunscreen and 16.9% preferred chemical sunscreen; 75.1% were unaware of the different forms of sunscreens. Around 36.6% of the participants believed SPF 50 sunscreen to be significantly different from SPF 30 sunscreen, but majority did not know the difference. More than 50% of the participants preferred SPF 50 or higher, but 6.6% preferred SPF 30 and 38% were unaware of the SPF number or its protection effectiveness.

In a study conducted by the University of Miami's Department of Dermatology and Cutaneous Surgery, most dermatologists agreed on using sunscreens with FDA approval for preventing skin cancer and photo aging. Patients are advised on using broad-spectrum sunscreen with SPF 30 or above, but they also recommend their patients to use sunscreens with SPF 50 or above, for greater protection (Farberg et al., 2017).

Sunscreen should be reapplied every two hours when outdoors, specifically during swimming, excessive sweating, and towelling off (Al Battat et al., 2021). Only 6% of our participants used sunscreen over twice a day, but the rest did not apply much as recommended, and 13.9% did not apply at all. Many sources recommend applying sunscreen 15–20 minutes before sun exposure for effective and even application (Mancuso et al., American Academy of Dermatology Association, 2022).

The time duration of applying sunscreen before sun exposure is as follows: 18.9% applied sunscreen 5 or 15 minutes before exposure, while 15.6% applied it 10 minutes. The damaging effects of UVR on the skin diminish with regular sunscreen use at recommended dosages. Our study observations showed 55.7% of the participants applying sunscreen for years, and 22.1% for months.

Based on past research, 78% of adults only applied sunscreen on their faces (Agarwal et al., 2018). According to our sample; sunscreen was applied to all exposed body parts, followed by the face only (26%), and face and neck (26%). However, researchers found that sunscreen did not affect the mean skin temperature or core-to-skin thermal gradient, which are indicators of heat dissipation (Connolly & Wilcox, 2000).

Daily usage and regular reapplication of sunscreen with zinc oxide and titanium dioxide are specifically suggested for UVR-B protection (Gonzaga, 2009). Our study reported complaints on oiliness (35.1%) as majority had combined skin. Other complaints like acne (22.6%) and allergies (17%) were related to active or extra components with burning sensation in few cases (Al Battat et al., 2021). A study also reported acne as the most observed side effect of sunscreen application, followed by allergies (Agarwal et al., 2018).

We found that 67.8% of the participants stated that medical knowledge increases one's awareness of sun protection.

Strengths: It is the first population-based study in Makkah to evaluate the prevalence of sunscreen use and study the factors associated with sunscreen use among adults. We surveyed a relatively large sample size of community members with fair questions about sun protection behaviors.

Limitations: First, young participants were prevalent and majority had a medium socioeconomic level. Also, the questionnaire was limited based on participants' knowledge on sunscreen, especially as the most used protective approach.

Conclusion

The study conducted was a first-of-a-kind cross sectional study in Makka, Saudi Arabia that evaluated various attitudes toward the use of sunscreen. Females were the major participants as they are more concerned about their skin care. Lifestyle habits and positive attitude were also essential for at the initial stages of life for incorporating preventive measures since childhood. Most of the respondents believed that exposure to the sun are harmful. The most common approach reported in our study to protect against UVR was avoiding sun exposure after sunscreen use, followed by seeking shade. However, the rate of sunscreen use by our population was average despite their reasonable awareness of the effects of sun exposure. This implies the need for health education campaigns and programs, to obligate schools, hospitals, and organizations to spread awareness and educate society about the need for sunscreen and hazards of sun exposure. A majority of respondents said having medical knowledge increases sun protection awareness.

The study findings highlight the need for more health education programs to promote a change in attitude and behavior rather than just education about sun protection and sunscreen use in Makkah, Saudi Arabia. Finally, environment and culture varied by location in Saudi Arabia for which study with an equal number of participants in each age group, region, and the socioeconomic level is recommended.

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References:

1. Agarwal, S. B., Godse, K., Patil, S., & Nadkarni, N. (2018). Knowledge and attitude of general population toward effects of sun exposure and use of sunscreens. Indian Journal of Dermatology, 63(4), 285.
2. Al Battat, R., Aram, D., Hanoon, A. M., & AyyedKadhim, O. (2021). Awareness about Sun Protection among Medical Students. Annals of the Romanian Society for Cell Biology, 25(6), 15216-15227.
3. Al Robaee, A. A. (2010). Awareness to sun exposure and use of sunscreen by the general population. Bosnian Journal of Basic Medical Sciences, 10(4), 314.
4. AlGhamdi, K. M., AlAklabi, A. S., & AlQahtani, A. Z. (2016). Knowledge, attitudes and practices of the general public toward sun exposure and protection: A national survey in Saudi Arabia. Saudi Pharmaceutical Journal, 24(6), 652-657.
5. Almuqati, R. R., Alamri, A. S., & Almuqati, N. R. (2019). Knowledge, attitude, and practices toward sun exposure and use of sun protection among non-medical, female, university students in Saudi Arabia: A cross-sectional study. International Journal of Women's Dermatology, 5(2), 105-109.
6. Al-Mutairi, N., Issa, B. I., & Nair, V. (2012). Photoprotection and vitamin D status: A study on awareness, knowledge and attitude towards sun protection in general population from Kuwait, and its relation with vitamin D levels. Indian journal of Dermatology, Venereology and Leprology, 78, 342.
7. Alshaalan, Z. M., Ghazy, A. A., Altaymani, A. M., & Alruwaili, A. J. (2022). Awareness & attitude toward sunscreen use and sun protection in Al-Jouf region, Saudi Arabia. Medical Science, 26.
8. Alshayeb, Z., Alsaadoun, D., Alyaseen, H., Albadan, M., Alyaseen, S., & Alhussain, B. (2022). Knowledge, attitude, practice and perception of sunscreen among Saudi population. Medical Science, 26(128).
9. American Academy of Dermatology Association. SUNSCREEN FAQS [Internet]. 2022 [cited 2022 Nov 26]. Available from: https://www.aad.org/media/stats-sunscreen
10. CDC. Guidelines for school programs to prevent skin cancer [Internet]. 2002. [cited 2022 Nov 27]. Available from: https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5104a1.htm
11. Connolly, D. A. J., & Wilcox, A. R. (2000). The efforts of an application of suncream on selected physiological variables during exercise in the heat. Journal of Sports Medicine and Physical Fitness, 40(1), 35.
12. Farberg, A. S., Glazer, A. M., Rigel, A. C., White, R., & Rigel, D. S. (2017). Dermatologists' perceptions, recommendations, and use of sunscreen. JAMA Dermatology, 153(1), 99-101.
13. Gonzaga, E. R. (2009). Role of UV light in photodamage, skin aging, and skin cancer: importance of photoprotection. American Journal of Clinical Dermatology, 10, 19-24.

14. Green, A. C., Williams, G. M., Logan, V., & Strutton, G. M. (2011). Reduced melanoma after regular sunscreen use: randomized trial follow-up. Journal of Clinical Oncology, 29(3), 257-263.
15. Green, A., Williams, G., Nèale, R., Hart, V., Leslie, D., Parsons, P., ... & Russell, A. (1999). Daily sunscreen application and betacarotene supplementation in prevention of basal-cell and squamous-cell carcinomas of the skin: a randomised controlled trial. The Lancet, 354(9180), 723-729.
16. Hoel, D. G., Berwick, M., Gruijl, F. R., & Holick, M. F. (2016). The risks and benefits of sun exposure 2016. Dermatoendocrinology, 8 (1): e1248325.
17. Mancuso, J. B., Maruthi, R., Wang, S. Q., & Lim, H. W. (2017). Sunscreens: an update. American Journal of Clinical Dermatology, 18, 643-650.
18. Narayanan, D. L., Saladi, R. N., & Fox, J. L. (2010). Ultraviolet radiation and skin cancer. International Journal of Dermatology, 49(9), 978-986.
19. OpenEpi Menu. Open Source Statistics for Public Health [Internet]. [cited 2022 Nov 27]. Available from: https://www.openepi.com/Proportion/Proportion.htm
20. Ravnbak, M. H. (2010). Objective determination of Fitzpatrick skin type. Danish Medical Bulletin, 57(8), B4153.
21. Reichrath, J., Leiter, U., Eigentler, T., & Garbe, C. (2014). Epidemiology of skin cancer. Sunlight, Vitamin D and Skin Cancer, 120-140.
22. Shuk, E., Burkhalter, J. E., Baguer, C. F., Holland, S. M., Pinkhasik, A., Brady, M. S., ... & Hay, J. L. (2012). Factors associated with inconsistent sun protection in first-degree relatives of melanoma survivors. Qualitative Health Research, 22(7), 934-945.
23. Thomas-Gavelan, E., Sáenz-Anduaga, E., Ramos, W., Sánchez-Saldaña, L., & Sialer, M. D. C. (2011). Knowledge, attitudes and practices about sun exposure and photoprotection in outpatients attending dermatology clinics at four hospitals in Lima, Peru. Anais brasileiros de dermatologia, 86, 1122-1128.

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