

## Awareness & attitude toward sunscreen use and sun protection in Al-Jouf region, Saudi Arabia

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**ABSTRACT**

**Background:** Skin protection is an important issue that is neglected by a large sector of the community. Using sunscreens protects skin from harmful sun rays and subsequent burns. It is important to determine the level of community's awareness about sunscreen role in skin protection to be design the appropriate health education program. This study aimed to assess the level of awareness of residents in Al-jouf region, Saudi Arabia toward sunscreens and define the factors that have an impact on adoption of sun protection practices. **Methodology:** This is a questionnaire-based cross-sectional study. An online questionnaire was distributed among residents in Al-Jouf provinces. **Results:** About half of the studied population use sunscreen, particularly the females, before exposing to the sun. More than half of participants use sunscreen to prevent sunburn (62.8%) and to avoid dark skin spots (71.6%). However, many participants did not use sunscreens because of their high cost and inconvenience. One-third of sunscreen users applied it when exposed to the sun only (34.1%), and during summer (96.9%). Moreover, 53.6% of our study population use less than a quarter of a teaspoon and apply it to their face and hand only (47.5%). Regarding their opinion on the reapplication of sunscreen, 28.4% of participants reapply for sunscreens after taking a shower while 55.9% do not reapply it. **Conclusion:** Participants' attitudes toward sunscreen use were variable. Improper use of sunscreen was recognized and this will need awareness programs on the effective use of sunscreen.

**Keywords:** Sunscreen use, awareness, attitude, practices, skin protection.

**1. BACKGROUND**

Sun rays have many beneficial and harmful effects on the skin. Despite being the main source of vitamin D, there are harmful effects of sun Ultraviolet (UV) radiation as it may cause many skin diseases including skin cancer. Cumulative levels of UV rays distress the average growth and appearance of dermatophytes resulting in shin damage and burning (Al Jasser et al., 2020).

Furthermore, long-term exposure to sun rays results in skin pigmentation (e.g., melasma), aging, and cancer (Al Ghamdi et al., 2016).

Solar and artificial exposure to UV radiation has increased the risk of cancer skin globally. In Saudi Arabia, due to its climate, skin cancer ranks 9<sup>th</sup> cancer among both sexes (Alamri et al., 2016). However, it can be prevented by proper skin protection afforded by protective wear, and the proper use of sunscreens that have an essential role in protection against UV rays (Sultana, 2020). Using sunscreens protects skin from harmful sun rays and subsequent burns. However, a large sector of the community is not aware of the proper ways of skin protection using sunscreens. Thus identifying deficits in knowledge, behaviors, and attitude toward skin protection by using sunscreens can be a preliminary step in preventing skin cancer.

The current study has assessed the level of awareness (knowledge, attitude, and practices) of residents in Al-Jouf region, Saudi Arabia, toward sunscreens.

## 2. RESEARCH METHODOLOGY

The current study is a questionnaire-based cross-sectional study carried out among residents (Saudi and non-Saudi) in Al-Jouf provinces including Sakaka, Alqurayyat, Dumat Aljanal, Tabarjal, and Sawyer. The study duration was between 9-2021 and 2-2022. This was done via the distribution of an online questionnaire on all sectors of the community in Al-Jouf region including employees, university students, physicians, householders, and workers. Inclusion criteria include any person (Saudi and non-Saudi) resident in Al-Jouf region. Sample size calculation shall be carried out by an online tool (The Survey System Creative, Research Systems), and it was estimated to be 400 individuals.

### Ethical considerations

Ethical approval (no. 8-08-43, 2022) was attained from the Local Committee of Bioethics of Jouf University. The study follows the ethical guidelines of the 1975 Declaration of Helsinki. The 1st question of the questionnaire was about the consent to participate in the study.

The questionnaire was an open-source and validated questionnaire on sunscreen use (Al Jasser et al., 2020). It involves 5 sections: section (1) involves general information (such as age, gender, educational level, residency, and marital status); section (2) general questions about sunscreen use; section (3) questions about sunscreen application; section (4) questions related to the sunscreen type and consumption; and section (5) questions about sun exposure role in skin cancer.

### Data analysis

Data were fed to the computer and analyzed using IBM SPSS software version 20.0. (Armonk, NY: IBM Corp). Qualitative data were described using numbers and percentages. Quantitative data were described using mean and standard deviation.

## 3. RESULTS

### Sociodemographic data

The study enrolled 408 participants and most of them were females (83.8%). Table 1 illustrates general information of participants where 56.9% were aged between 20-30 years, 66.7% have bachelor's degrees, 74.5% live in Sakaka, and 60.8% were single.

**Table 1** Sociodemographic data of the participants (n = 408)

Q	I. Sociodemographic data	No. (%)
1	Age (years)	
	18-20 years	59 (14.5%)
	20 – 30 years	232 (56.9%)
	31 – 40 years	59 (14.5%)
	> 40 years	58 (14.2%)
2	Gender	
	Male	66 (16.2%)
	Female	342 (83.8%)
3	Educational level	
	Non-educated	1 (0.2%)
	Secondary school	78 (19.1%)

	Diploma	36 (8.8%)
	Bachelor	272 (66.7%)
	Postgraduate	21 (5.1%)
4	Residency	
	Sakaka	304 (74.5%)
	Qurayyat	32 (7.8%)
	Dumat aljandal	22 (5.4%)
	Tabarjal	13 (3.2%)
	Sawayr	37 (9.1%)
5	Marital status	
	Single	248 (60.8%)
	Married	160 (39.2%)

**Awareness and attitude about role of sunscreen in skin protection**

In a total of 408 participants, 64% were using sunscreen with various frequencies, whereas 36 % never used sunscreen. The main reasons for sunscreen use were to prevent sunburn (62.8%) and the development of dark skin spots (71.6%). Most of the participants preferred to use creamy sunscreens however the majority of consumers (85.8%) use only one tube per month and most of them think its price is not affordable), and do not know its type or its role in protection from UV rays. Regarding the application of sunscreen, nearly half of the participants (49.8%) apply sunscreen before going out in less than 10 minutes. Moreover, 53.6% of our study population use less than a quarter of a teaspoon and apply it to their face and hand only (47.5%). Regarding their opinion on the reapplication of sunscreen, 28.4% of participants reapply for sunscreens after taking a shower while 55.9% do not reapply it. Table 2 illustrates all participants' responses regarding sunscreen use.

**Table 2** Participants' responses regarding the sunscreen use (n = 408)

Q	II. General questions about sunscreen use	No. (%)
1	How often do you use sunscreen?	
	Never	147 (36.0%)
	Rarely	71 (17.4%)
	Sometimes	81 (19.9%)
	Often	59 (14.5%)
	Always	50 (12.3%)
2	The reason(s) for not using sunscreen:	(n = 147)
	It is ineffective	24 (16.3%)
	It is expensive	43 (29.3%)
	It is time-consuming	40 (27.2%)
	It is inconvenient	39 (26.5%)
	I have allergy	8 (5.4%)
	I have not heard about it	31 (21.1%)
3	The reason(s) for using sunscreen:	(n = 261)
	To avoid skin cancer	48 (18.4%)
	To avoid sunburns	164 (62.8%)
	To avoid the development of dark skin spots	187 (71.6%)
	To avoid skin wrinkling	100 (38.3%)
	Doctor recommendation	25 (9.6%)
	Family or friend endorsement	33 (12.6%)
	Social media guidance	32 (12.3%)
	Read about it	40 (15.3%)
	Other	5 (1.9%)
4	When do you apply sunscreen during the day?	(n = 261)
	Only with outdoor activity	71 (17.4%)

	Only around noon time	26 (6.4%)
	With outdoor activity and around noon time	75 (18.4%)
	Whenever I am exposed to the sun	89 (21.8%)
5	Do you tend to intentionally get exposed to the sun for a longer time?	(n = 261)
	Yes	80 (30.7%)
	No	181 (69.3%)
6	Parts of the body to be covered with sunscreen:	(n = 261)
	Face only	82 (31.4%)
	Face and hands	124 (47.5%)
	All exposed areas of skin	55 (21.1%)
7	The amount of sunscreen applied on your face:	(n = 261)
	Less than a quarter of teaspoon	140 (53.6%)
	Quarter to half of teaspoon	100 (38.3%)
	More than a half of teaspoon	21 (8.0%)
8	When do you usually apply sunscreen before going out?	(n = 261)
	Less than 10 minutes before going out	130 (49.8%)
	10-20 minutes before going out	97 (37.2%)
	More than 20 minutes before going out	34 (13.0%)
9	When do you reapply sunscreen?	(n = 261)
	Every 2-3 hours	48 (18.4%)
	After I sweat excessively	22 (8.4%)
	After I swim	34 (13.0%)
	After I take a shower	74 (28.4%)
	I do not reapply it	146 (55.9%)
10	Do you use a sunscreen that protects against both ultraviolet A and ultraviolet B (UVB) sun rays?	(n = 261)
	Yes	131 (50.2%)
	No	14 (5.4%)
	I do not know	116 (44.4%)
11	Do you use water-resistant sunscreen?	(n = 261)
	Yes	68 (26.1%)
	No	95 (36.4%)
	I do not know	98 (37.5%)
12	What sunscreen preparation do you prefer to use?	(n = 261)
	Cream	209 (80.1%)
	Lotion	36 (13.8%)
	Spray	15 (5.7%)
	Stick	1 (0.4%)
13	How many tubes (or bottles) of sunscreen do you use per month?	(n = 261)
	One	224 (85.8%)
	Two	30 (11.5%)
	Three	4 (1.5%)
	Five	2 (0.8%)
	More than five	1 (0.4%)
14	Do you think that the commercially available sunscreens are affordable (i.e. good price that is not expensive)?	(n = 261)

Yes	93 (35.6%)
No	130 (49.8%)
I do not know	38 (14.6%)

Regarding skin response after sun exposure for half an hour, most of the sample population were skin type 4 (rarely burn, tans well), and the duration of overall exposure during the day most of them (54.5%) was less than one hour. Transportation from home to university (53.4%) was given as a reason for sun exposure, followed by outdoor work or activity (49.5%), and the majority 63.5% were during the period from 10 AM to 3 PM. Besides using the sunscreen, other methods for sun protection were reported as wearing protective face cover such as the niqab and staying in shade, avoiding going out during times with high sun intensity, and wearing sunglasses (table 3).

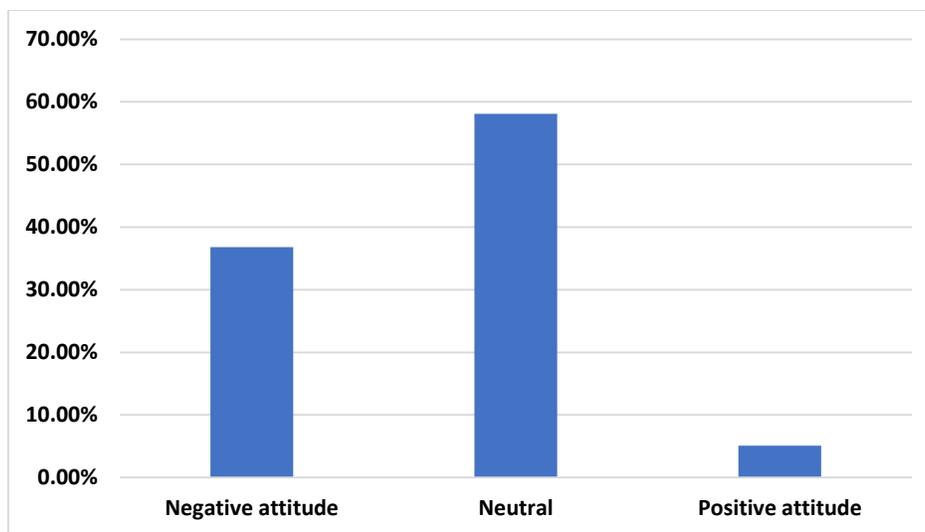
**Table 3** Participants' responses regarding sun exposure & cancer skin (n = 408)

1	The type of skin:	No. (%)
	Type 1 (Always burns, never tans, very fair skin)	60 (14.7%)
	Type 2 (Usually burns, then tans)	80 (19.6%)
	Type 3 (May burn, tans)	88 (21.6%)
	Type 4 (Rarely burns, tans)	141 (34.6%)
	Type 5 (Very rarely burns, tans, dark brown skin)	29 (7.1%)
	Type 6 (Very rarely burns, tans, very dark brown skin)	10 (2.5%)
2	Hours of the sun exposure every day:	
	Less than 1 hour	223 (54.7%)
	1 – 3 hours	129 (31.6%)
	More than 3 hours	56 (13.7%)
3	The reason(s) for exposure to sun:	
	Transportation from home to the university	220 (53.9%)
	Leisure/recreational	82 (20.1%)
	Outdoor work or activity	204 (50.0%)
	To get enough vitamin D	73 (17.9%)
	Other	4 (1.0%)
4	The time of exposure to sun:	
	Between 10 am and 3 pm	259 (63.5%)
	Before 10 am or after 3 pm	96 (23.5%)
	All-day	53 (13.0%)
5	How many sunburns have you had in the past?	
	0	291 (71.3%)
	1	62 (15.2%)
	2	35 (8.6%)
	3	5 (1.2%)
	>3	15 (3.7%)
6	Have you had skin cancer in the past?	
	Yes	1 (0.2%)
	No	407 (99.8%)
7	Did any family members have skin cancer in the past?	
	Yes	2 (0.5%)
	No	406 (99.5%)

Statistical analysis of the level of awareness & attitude toward sunscreen use and sun protection revealed that 36.8% of participants have positive attitudes toward sunscreens, 58.1% were neutral due to lack of knowledge, and only 5.1% have negative attitudes toward sunscreen use (table 4a, figure 1). The overall score of awareness & attitude toward sunscreen use and sun protection was about 37.72 % (table 4b).

**Table (4a)** Awareness & attitude toward sunscreen use and sun protection (n = 408)

Awareness & attitude toward sunscreen use and sun protection	N	Negative attitude	Neutral attitude	Positive attitude
		(<33.33%)	(33.3% - 66.6%)	(≥67.67%)
		No. (%)	No. (%)	No. (%)
Responses about sunscreen use	408	215 (52.7%)	144 (35.3%)	49 (12.0%)
Responses on sunscreen application	261	207 (79.3%)	36 (13.8%)	18 (6.9%)
Responses on type and overall consumption	261	92 (35.2%)	154 (59.0%)	15 (5.7%)
Responses on sun exposure and skin cancer	408	150 (36.8%)	212 (52.0%)	46 (11.3%)
Overall	408	150 (36.8%)	237 (58.1%)	21 (5.1%)



**Figure 1** Attitude toward sunscreen use and sun protection

**Table (4b)** Descriptive analysis of the score of awareness & attitude toward sunscreen use and sun protection (n = 408)

Awareness & attitude toward sunscreen use and sun protection	N	Range score	Total Score Mean ± SD.	% Score Mean ± SD.
Responses about sunscreen use	408	(0 – 11)	3.36 ± 3.10	30.50 ± 28.15
Responses about sunscreen application	261	(0 – 4)	0.97 ± 0.87	24.33 ± 21.86
Responses on type and overall consumption	261	(0 – 5)	1.92 ± 0.98	38.47 ± 19.55
Responses on sun exposure and skin cancer	408	(0 – 8)	3.23 ± 1.76	40.41 ± 21.98
Overall	408	(0 – 28)	8.44 ± 5.29	37.72 ± 16.10

SD: Standard deviation, Good perception is marked by 1 and other choices took zero

#### 4. DISCUSSION

Sunscreens can hinder the UV rays from the skin layers by reflecting, absorbing, or scattering them. Consequently, they are recommended for protection from sunlight; particularly for those who are exposed to the sun for long periods during noon, and persons with light skin color (Al Robaee, 2010). Identifying deficits in community knowledge and behavior regarding the importance of sun protection and how to use the sunscreens can serve as a starting point for primary preventive interventions (AlGhamdi et al., 2016). The current questionnaire-based study has evaluated the Knowledge, attitude, and practices toward sun exposure, and sunscreens in Al-Jouf region, Saudi Arabia. This will help in defining the deficits in their knowledge and so designing suitable community educational camps to increase their awareness on the proper protection from sun rays.

Results of the current study showed that women (83.8%) were more likely to use sunscreen than men, which was expected because women are more concerned about their appearance and the effect of ultraviolet radiation on their skin. The majority of the participants were single (60.8%), aged between 20-30 years (56.9%), and had a bachelor's degree (66.7%). In a total of 408 participants, 64% were using sunscreen with various frequencies, whereas 36 % never used sunscreen. The refrain from using

sunscreen was mainly precipitated by wrong information about its effectiveness, price, or expected complications. The main reasons for sunscreen use were to prevent sunburn (62.8%) and the development of dark skin spots (71.6%). However, their concepts about when and how to use them are controversial. Most of the participants preferred to use creamy sunscreens however the majority of consumers (85.8%) use only one tube per month and most of them think its price is not affordable, and do not know its type or its role in protection from UV rays.

Regarding skin response after sun exposure for half an hour, most of the sample population were skin type 4 (rarely burn, tans well), and the duration of overall exposure during the day most of them (54.5%) was less than one hour. Most of them (71.3%) have no previous history of sunburns, and family history of cancer skin was positive in less than 1%. Besides using sunscreen, other ways to protect from sun rays were reported. In partial accordance with our results, a study conducted by Alsudairy et al., (2018) revealed that 72.6% of participants were female. However, 80.3% of the participants did not use sunscreen and their reasons were not spending much time in the sun (44.4%), forgetting to apply sunscreen (23.7%), or not favoring the texture of the skin (17.4%). This study recommended expanding health education programs on the importance of sunscreen.

In a study conducted on 450 medical undergraduates in SKIMS Medical College, Bemina Srinagar, it was found that only 48.88% utilized sunscreen; especially females (66.66%) and 41.48% of males think sunscreen is not necessary. In addition, 77.27% of sunscreen users are for cosmetic reasons while 22.75 % for medical causes. Regarding the application of sunscreen, the majority were using  $\frac{1}{4}$  teaspoonful, only once in the morning before going out which may reflect low knowledge about the appropriate amount required. Most females and males only use it in summer. The most common sites for sunscreen application were the face and hands followed by the neck and arm and none for the body, ears, or legs (Tilwani et al., 2018).

Another study in South Africa has evaluated the population's awareness of skin cancer awareness and sunscreen use. Their results indicate a serious shortage in knowledge about the proper protection from sun rays. They reported that 50% of the white respondents use sunscreen regularly but the use among the black and Indian respondents is markedly decreased (Dlova et al., 2018). Another study was conducted by Alzahrani et al., (2018) on the ways of protection from the sun and the use of sunscreens among medical personnel at King Abdulaziz University Hospital, Jeddah. They stated that 40% of the participants indicated that they always seek shade to avoid the sun rays during peak hours and 44.4% of the studied population never uses sunscreen due to laziness, tiredness, lack of time, or feeling no need for sunscreen.

A study assessed the awareness of protection from sun exposure among university students in Saudi Arabia. They noticed that most of the participants were aware of the harms of unprotected sun rays; however, they think that sunscreens are harmful to the skin. A large percent of the participants (>40%) feel discomfort on the skin from using sunscreen. Only one-third of the participants use sunscreens as a sun protection factor (Almuqati et al., 2019). In a Jordanian-based survey including 2000 participants with various skin types, 56.7% of them were using sunscreen; particularly females (73.1%), with an average age of 27.9 years. They clarified that 71.9% of participants used sunscreen once daily in the morning before going out and 26.1% applied it 2-3 times daily.

Regarding the time of application, 45% applied sunscreen 15-30 minutes before going out, whereas 12% immediately before they went out, and 43 % between 5-10 minutes of leaving their homes. When they ask about the amount only (3%) of participants knew how much sunscreen to apply, while the remaining majority (97%) didn't. 19.2% reapplied sunscreen after washing or wiping skin, while 80.8% did not. Among participants, 32.2% learned about sunscreen from a friend followed by 29.7% from healthcare providers, and 17.6% from media resources. Moreover, 40% of participants did not believe that sunscreen is needed during winter months, and 70.6% believed it was not necessary while indoors. The majority of respondents 65.4% believed that the face and hands are the only skin areas where sunscreen should be applied. 25.8% thought the face is the only area that needs protection from the sun, and 8.8% thought the entire body should be protected (Al-Qarqaz et al., 2020).

The overall assessment of participants' awareness about sunscreen use revealed that the % scores of general knowledge about sunscreen, the sunscreen application, the type of sunscreen used and overall consumption, and sun exposure and skin cancer were  $30.50 \pm 28.15$ ,  $24.33 \pm 21.86$ ,  $38.47 \pm 19.55$ , and  $40.41 \pm 21.98$ , respectively. In addition, 36.8% have a negative attitude, 58.1% were neutral and only 5.1% have a positive attitude. This indicates the urgent need to hold educational campaigns to clarify the importance and role of sunscreen in the protection of harmful rays and skin diseases.

## 5. CONCLUSION

Females are more interested in using sunscreen, particularly before exposure to the sun by less than 10 minutes, and a large percent of them do not reapply sunscreen. Different attitudes toward sunscreen use were recorded. However, improper use of sunscreen was noted, and thus an awareness program on the effective sunscreen use in our community is required.

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**Ethical approval**

The study was approved by the local committee for bioethics (LCBE) of Jouf University (LCBE No: 8-08-43, 2022).

**Authors' contribution**

All authors shared in the distribution of the questionnaire, collection of data, and statistical analysis. All authors have prepared the manuscript and shared in the manuscript's revision.

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**Conflicts of interest**

The authors declare that there are no conflicts of interests.

**Data and materials availability**

All data associated with this study are present in the paper.

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