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Article

Assessing Awareness and Practices of Sun Exposure and Sunscreen Use Among College Students in Saudi Arabia

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Abstract: Background: Excessive sun exposure is a significant risk factor for various skin conditions, including sunburn, premature aging, and skin cancer. This study aims to assess the awareness, attitudes, and practices regarding sun exposure and sunscreen use among college students in Saudi Arabia. **Methodology:** A cross-sectional study was conducted with 388 college students from various disciplines. Data were collected using a structured questionnaire covering demographic information, knowledge, and practices related to sun exposure and sunscreen use. Descriptive statistics, chi-square tests, and multivariate logistic regression analysis were employed to analyze the data. **Results:** The study comprised 53.9% females, with the majority aged 18-23 years. Formal education on sun exposure dangers was lacking for 43.0% of participants. The most recognized consequences of excessive sun exposure were sunburn (80.6%) and skin cancer (74.4%). Intermediate knowledge of sun exposure effects was most common (40.7%). Sunscreen use was inconsistent, with 27.3% never using it during peak sunlight hours. Factors influencing sunscreen use included weather conditions and healthcare provider recommendations. Males were significantly less likely to use sunscreen. First-year students and participants without formal education on sun exposure were less likely to use sunscreen regularly. **Conclusion:** Despite awareness of the risks associated with excessive sun exposure, sunscreen use among college students in Saudi Arabia is inconsistent and influenced by various factors, including gender and education level. These findings highlight the need for enhanced educational initiatives to promote regular sunscreen use and other sun protection behaviors to mitigate the risk of skin conditions associated with sun exposure.

Keywords: sunscreen; sun exposure; knowledge; practice; awareness; skin burns.

1. Introduction

The skin of a human has a surface area of about 1.5–2.0 m², making it the largest organ in the body. It acts as a powerful barrier protecting against harmful effects from foreign substances and environmental pollutants [1]. Sun exposure is a major cause of skin damage. Around half of the Saudi population devotes 10 hours or more to sun exposure each week, exposing themselves to significant ultraviolet (UV) radiation [2]. This excessive sun exposure is linked to various short-term and long-term detrimental effects on the skin [3]. UV exposure is identified as a modifiable risk element for

squamous cell carcinoma, basal cell carcinoma, melanoma, and other forms of skin malignancies [3–6]. Over the last forty years, there has been a consistent rise in the incidence of skin cancer globally, representing one-third of all cancer cases worldwide [7]. Notably, a substantial portion of an individual's lifetime sun exposure occurs during childhood and adolescence [8].

To protect yourself from the sun, avoid exposure between 10:00 a.m. and 2:00 p.m., seek shade, and use broad-spectrum sunscreen, along with wide-brimmed hats, protective clothing, and sunglasses [9,10]. Many sun protection programs have been implemented in numerous Western nations to increase public awareness of sun exposure risk and encourage the use of sun protection measures. An increase in awareness among populations has been observed. Nevertheless, compliance with sun protection remains insufficient [11]. In Saudi Arabia, there were few studies on this matter. Not much is known about the awareness of the Saudi population about the use of sun protection measures. Information from this study may help design effective interventions [12].

In 2010, Ahmad A. Al Robaee's study in Qassim Province found that although 56% were aware of the link between sun exposure and skin cancer, sunscreen use was only 8.3%. Factors associated with sunscreen use included gender, education, and skin type [2]. A 2022 study in Riyadh by Amal Al-Balbeesi et al. showed that while most participants had heard of sunscreen and used it before, knowledge gaps existed regarding its proper application and SPF recommendations [10]. More recently, in 2024, Emad Bahashwan's study in the Aseer region revealed that 16.0% of participants used sunscreen regularly, with a total of 74.0% reporting sunscreen use. Increased sun exposure correlated with higher awareness levels of sun damage, influencing sunscreen use [13].

These findings underscore the need for targeted educational efforts to enhance sunscreen knowledge and encourage its consistent use among the Saudi population. Raising public awareness is crucial, especially in a country like Saudi Arabia, where the climate predisposes its residents to significant sun exposure.

2. Materials and Methods

The study was conducted as a descriptive cross-sectional survey utilizing an online-administered questionnaire. The estimated study period ranged between 4 to 6 months. The cross-sectional design allowed for the collection of data from a specific population at a single point in time.

Participant Selection and Withdrawal

Inclusion Criteria:

All individuals who were older than 18 years, college students residing in Saudi Arabia, and willing to participate were included in the study.

Exclusion Criteria:

Individuals were excluded if they refused to consent, were non-communicative, or were non-college students younger than 18 years.

Study Procedures

A straightforward and clear online questionnaire was distributed among college students in Saudi Arabia. The questionnaire was designed in Arabic, based on a previously validated survey, with items and questions selected from a comprehensive literature review to ensure public comprehension. Participants received an online link that included detailed information about the survey's objectives, the target population, and a consent form for participation. Upon receiving approval from the Institutional Research Board, the survey was disseminated online. A sample of the questionnaire was provided in the appendix.

Data Collection and Management

Data was collected through an online survey designed using Google Forms and distributed to the target population in Arabic. The survey comprised several sections:

1. Consent for participation
2. Sociodemographic information
3. Awareness and Knowledge of Sun Exposure
4. Sunscreen Usage

The online format facilitated easy access and completion for participants, while the structured sections ensured comprehensive data collection relevant to the study objectives.

Data analysis:

The data analysis was conducted using SPSS version 26 and involved the use of descriptive statistics, chi-square tests, and multivariate logistic regression analysis. Descriptive statistics summarized the demographic characteristics and responses of participants through means, standard deviations, frequencies, and percentages. Chi-square tests were employed to examine the relationships between categorical variables, such as gender, age, educational level, and region, and participants' knowledge, attitudes, and practices regarding sun exposure and sunscreen use. A p-value of less than 0.05 indicated statistical significance.

3. Results

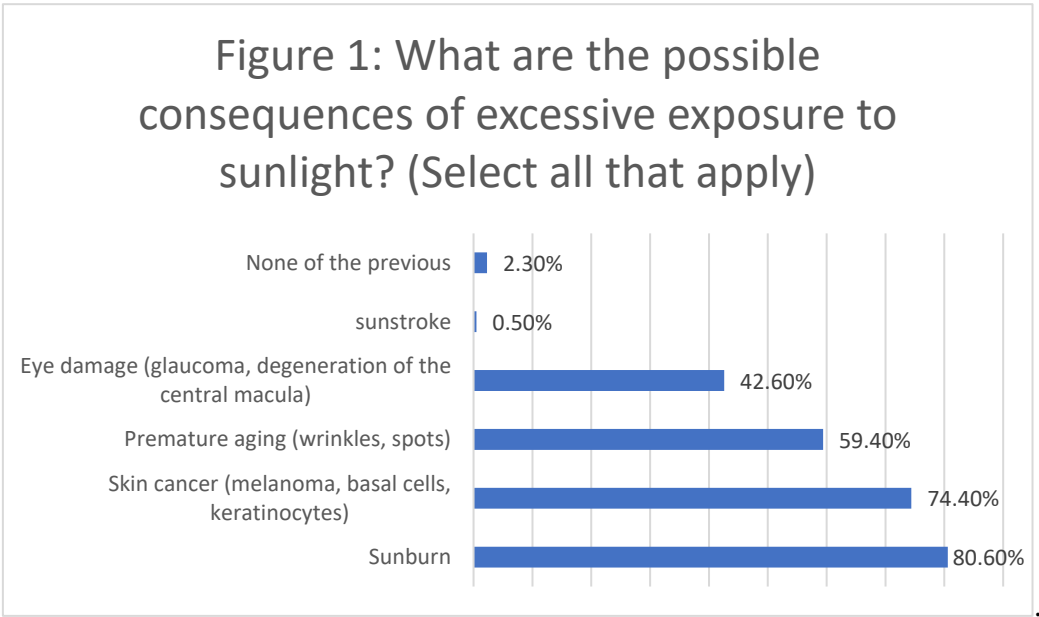
The study included 388 college students, with a slightly higher representation of females (53.9%) compared to males (46.1%). The majority of participants were aged between 18-23 years, comprising 68% of the sample. The most prevalent educational levels among participants were the 1st year (27.1%) and the 3rd and 5th years (both 15.2%) college students. The College of Health Sciences had the highest representation, with 36.3% of participants. Geographically, the participants were most commonly from the Eastern region (25.8%) and the Central region (21.1%) of Saudi Arabia. Regarding formal education about the dangers of sun exposure, 43.0% of participants reported not having received any, while 40.7% had received such education (Table 1).

Table 1. Demographic factors of the participants.

		Count	Column N %
Gender	Male	179	46.1%
	Female	209	53.9%
Age	18-20	132	34.0%
	21-23	132	34.0%
	24-26	111	28.6%
	27-29	9	2.3%
	30 or older	4	1.0%
Educational level	1st year	105	27.1%
	2nd year	42	10.8%
	3rd year	59	15.2%
	4th year	56	14.4%
	5th year	59	15.2%
	6th year	29	7.5%
	Intern	38	9.8%
College	College of Health Sciences (Medicine, Dentistry, Pharmacy, Laboratories, Health Informatics)	141	36.3%
	College of Human Sciences (Arabic/English, History, Geography)	37	9.5%
	College of Science (mathematics, physics, chemistry, statistics, biology)	41	10.6%
	Faculty of Sharia (Sharia, Islamic Studies, Regulations and Law)	45	11.6%
	College of Computer Engineering and Science	69	17.8%
	College of Business Administration	51	13.1%
	Other	4	1.0%
Region	Central region	82	21.1%
	Northern region	74	19.1%
	Southern region	63	16.2%
	Eastern region	100	25.8%
	Western region	69	17.8%
Have you received formal education (formal education means: education by schools,	No	167	43.0%
	Yes	158	40.7%

universities, or official awareness bodies in the Kingdom of Saudi Arabia) or information Not sure about the dangers of exposure to sunlight?	63	16.2%
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The study assessed the consequences of excessive sunlight exposure and participants' awareness and use of sunscreen. Among the 388 respondents, the most commonly identified consequences of excessive sunlight exposure were sunburn, cited by 80.6% of participants, and skin cancer (melanoma, basal cells, keratinocytes), mentioned by 74.4%. Premature aging (wrinkles, spots) was recognized by 59.4%, while 42.6% were aware of the risk of eye damage (glaucoma, degeneration of the central macula) (Figure 1).



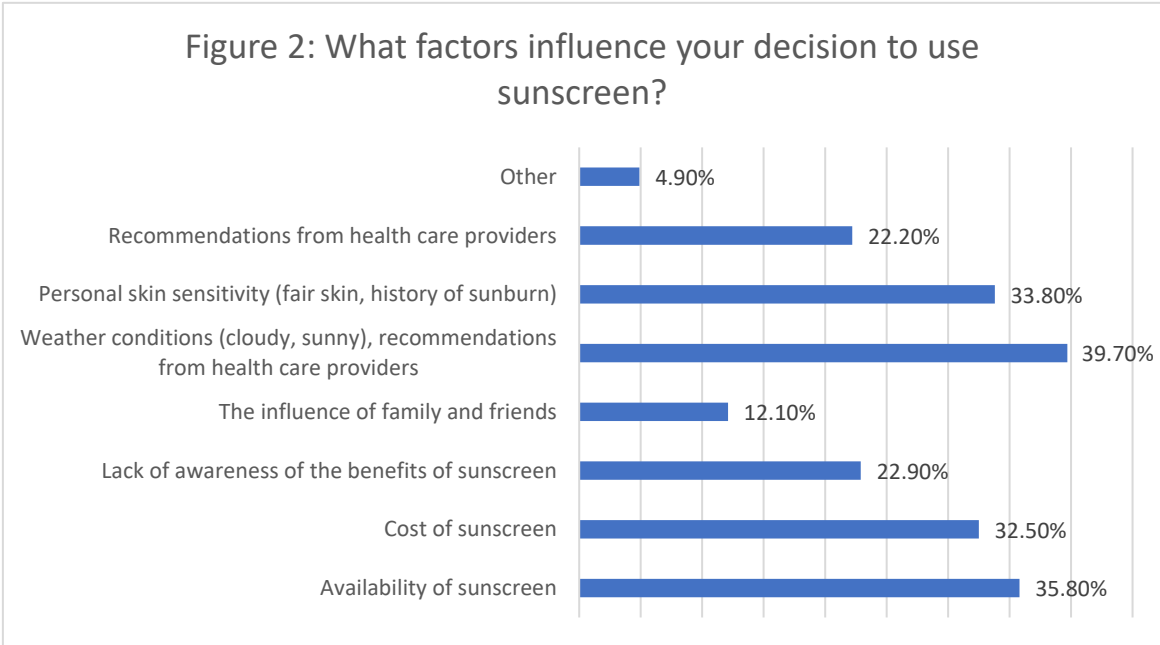
Regarding knowledge about the effects of varying sun exposure on different skin types and colors, 31.4% of participants reported knowing to some extent, followed by 26.8% with intermediate knowledge and 21.1% with good knowledge. Only 5.7% claimed excellent knowledge, while 14.9% admitted they did not know at all. When rating their knowledge of the harmful effects of skin exposure to sunlight, the most common response was intermediate knowledge (40.7%), followed by low knowledge (27.8%) and high knowledge (18.8%). Very low and very high knowledge were less common, at 8.8% and 3.9%, respectively. In terms of sunscreen usage during peak sunlight hours (10 am to 4 pm), 29.9% of participants reported using sunscreen sometimes, 27.3% never used it, and 22.9% used it rarely. Only 19.8% stated they always used sunscreen during these hours (Table 2).

Table 2. Level of awareness of the participants considering sun exposure and the importance of sunscreen.

		Count	Column N %
How much do you know about the effects of varying sun exposure on people with different skin types and colors?	I do not know at all	58	14.9%
	I know to some extent	122	31.4%
	Intermediate knowledge	104	26.8%
	Good knowledge	82	21.1%
	Excellent knowledge	22	5.7%
How would you rate your knowledge of the harmful effects of skin exposure to sunlight (e.g., sunburn, skin cancer, premature aging)?	Very low	34	8.8%
	Low	108	27.8%
	Intermediate	158	40.7%
	High	73	18.8%
	Very high	15	3.9%
Do you use sunscreen when you go out during peak sunlight period (10 am to 4 pm)?	Never	106	27.3%
	Rarely	89	22.9%
	Sometime	116	29.9%

Always	77	19.8%
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The factors influencing sunscreen use were weather conditions and recommendations from healthcare providers, which influenced 39.7% of participants. Other common factors included the availability of sunscreen (35.8%), personal skin sensitivity (33.8%), and the cost of sunscreen (32.5%) (Figure 2).



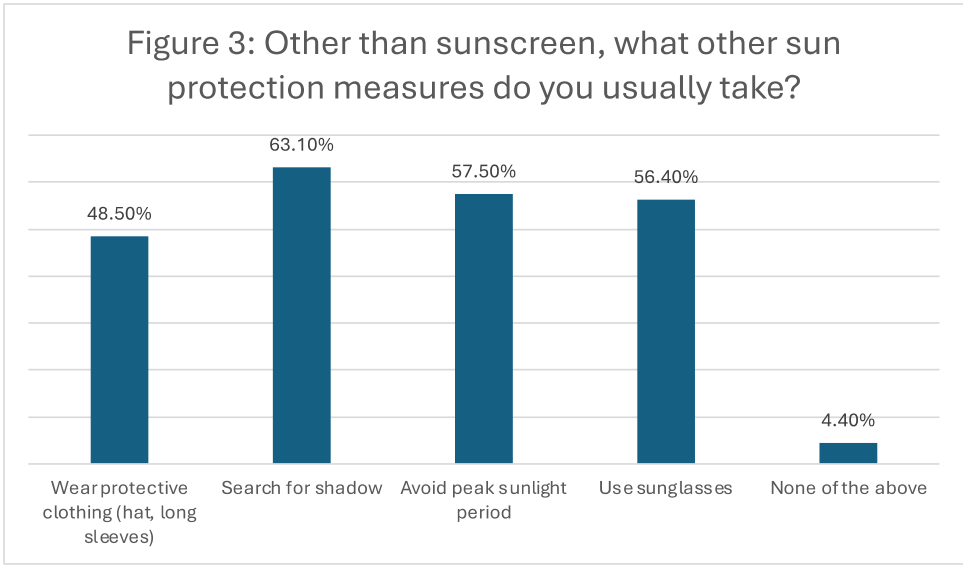
In terms of sunscreen use practices, 25.8% of participants reported never using sunscreen when outdoors, while 21.9% used it sometimes, and 21.4% used it rarely. Only 11.6% reported using sunscreen every time they were outdoors. Additionally, when asked if wearing a face covering such as a niqab provides adequate sun protection and eliminates the need for sunscreen, 31.4% agreed, while 25.0% remained neutral, and 17.0% disagreed. Regarding self-examination for unusual skin changes, 57.2% of participants reported never conducting self-examinations, while 26.8% did so rarely. Only 8.2% performed self-examinations every couple of months. Notably, 78.6% of participants had not been diagnosed with any sun-related skin conditions, while 21.4% were unsure. Knowledge of the sun protection factor (SPF) on sunscreen products was lacking, with 50.8% of participants unaware of its meaning. Conversely, 70.6% believed that regular sunscreen use could reduce the risk of skin cancer. Furthermore, 40.7% considered skin protection from the sun to be extremely important, and 26.8% deemed it very important (Table 3).

Table 3. Practice considering using of sunscreens.

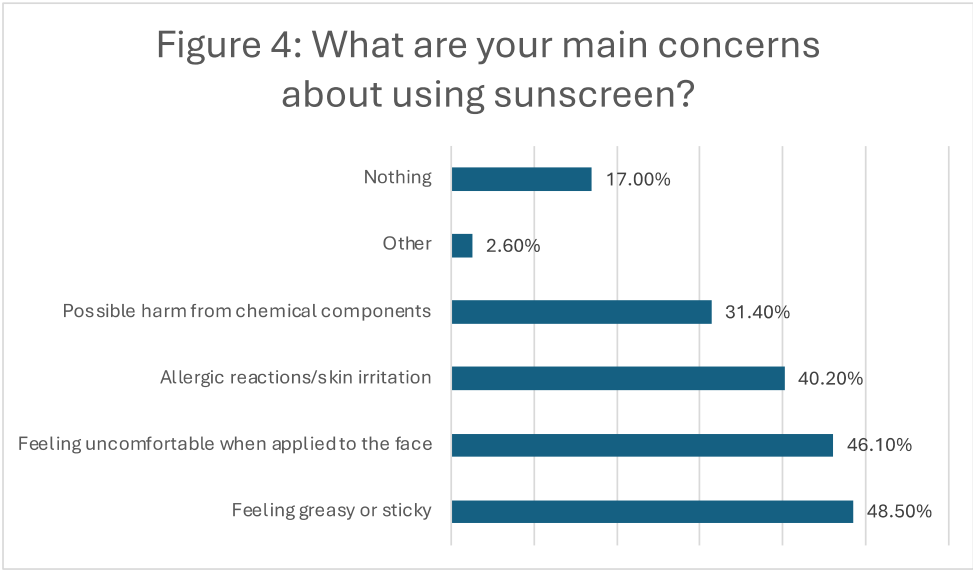
		Count	Column N %
How often do you use sunscreen when outdoors?	Never	100	25.8%
	Rarely	83	21.4%
	Sometime	85	21.9%
	Most time	75	19.3%
	Every time	45	11.6%
	Strongly disagree	39	10.1%
Do you think that wearing a covering over the face such as a niqab provides adequate protection against exposure to the sun's rays and eliminates the need for sunscreen?	Disagree	66	17.0%
	Neutral	97	25.0%
	Agree	122	31.4%)
How often do you self-examine for unusual signs or changes in the skin?	Strongly agree	64	16.5%
	Never	222	57.2%
	Rarely	104	26.8%
	Once a year	15	3.9%

Have you been diagnosed with any skin condition related to sun exposure (such as sunburn, skin cancer)?	Every couple of months	32	8.2%
	Every month	15	3.9%
	No	304	78.6%
	Yes	0	0.0%
Do you know what the sun protection factor (SPF) on sunscreen products means?	Not sure	83	21.4%
	No	197	50.8%
	Yes	85	21.9%
	To some extent, I have a general idea that I am not entirely sure	106	27.3%
Do you think it is important to protect your skin from the sun's rays?	Not completely important	14	3.6%
	Not important	31	8.0%
	Important	81	20.9%
	Very important	104	26.8%
	Extremely very important	158	40.7%
Do you think that using sunscreen regularly can reduce the risk of skin cancer?	No	42	10.8%
	Yes	274	70.6%
	Not sure	72	18.6%

Apart from sunscreen, the most common sun protection measures included seeking shade (63.1%), avoiding peak sunlight periods (57.5%), and wearing sunglasses (56.4%). Protective clothing was also popular, with 48.5% of participants using it (Figure 3).



Concerns about using sunscreen were prevalent, with 48.5% of participants feeling it was greasy or sticky, 46.1% feeling uncomfortable when applied to the face, and 40.2% worried about allergic reactions or skin irritation. Concerns about possible harm from chemical components were noted by 31.4% of participants (Figure 4).



The study investigated the frequency of sunscreen use among participants outdoors, analyzing various demographic factors. Males were significantly less likely to use sunscreen regularly compared to females. Among males, 44.7% never used sunscreen, while only 9.6% of females reported the same. Conversely, 17.7% of females used sunscreen every time they were outdoors, compared to just 4.5% of males. Sunscreen use varied by age group, with those aged 18-20 years and 21-23 years being more likely to use sunscreen sometimes or most of the time. Specifically, 29.5% of participants aged 21-23 used sunscreen sometimes. Participants aged 30 or older were the least likely to use sunscreen regularly, with 50.0% never using it and none using it every time they were outdoors. Sunscreen use also differed by educational level. First-year students were the most likely to never use sunscreen (43.8%), while second-year students showed more balanced responses, with 35.7% using sunscreen sometimes. Interns and 3rd-year students exhibited varied use patterns, with around 34.2% of interns and 28.8% of 3rd-year students rarely using sunscreen. Participants who had received formal education or information about the dangers of sun exposure were more likely to use sunscreen regularly. Among those with formal education, 17.7% used sunscreen every time they were outdoors, compared to 7.2% of those without formal education and 7.9% of those unsure about receiving such education; however, slight significance was reported ($P=0.067$) (Table 4).

Table 4. The relation between using of sunscreen and demographic factors.

		How often do you use sunscreen when outdoors?										P-value
		Never		Rarely		Sometime		Most time		Every time		
		Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	
Gender	Male	80	44.7%	41	22.9%	23	12.8%	27	15.1%	8	4.5%	0.000*
	Female	20	9.6%	42	20.1%	62	29.7%	48	23.0%	37	17.7%	
Age	18-20	47	35.6%	23	17.4%	21	15.9%	24	18.2%	17	12.9%	0.035*
	21-23	23	17.4%	32	24.2%	39	29.5%	19	14.4%	19	14.4%	
	24-26	25	22.5%	27	24.3%	23	20.7%	28	25.2%	8	7.2%	
	27-29	3	33.3%	1	11.1%	1	11.1%	3	33.3%	1	11.1%	
	30 or older	2	50.0%	0	0.0%	1	25.0%	1	25.0%	0	0.0%	
Educational level	1st year	46	43.8%	16	15.2%	16	15.2%	16	15.2%	11	10.5%	0.000*
	2nd year	8	19.0%	8	19.0%	15	35.7%	4	9.5%	7	16.7%	
	3rd year	8	13.6%	17	28.8%	13	22.0%	13	22.0%	8	13.6%	
	4th year	4	7.1%	16	28.6%	15	26.8%	12	21.4%	9	16.1%	
	5th year	15	25.4%	11	18.6%	16	27.1%	16	27.1%	1	1.7%	
	6th year	6	20.7%	7	24.1%	6	20.7%	5	17.2%	5	17.2%	
	Intern	13	34.2%	8	21.1%	4	10.5%	9	23.7%	4	10.5%	

College	College of Health Sciences (Medicine, Dentistry, Pharmacy, Laboratories, Health Informatics)	34	24.1%	34	24.1%	29	20.6%	28	19.9%	16	11.3%	0.156
	College of Human Sciences (Arabic/English, History, Geography)	5	13.5%	6	16.2%	14	37.8%	8	21.6%	4	10.8%	
	College of Science (mathematics, physics, chemistry, statistics, biology)	11	26.8%	8	19.5%	4	9.8%	10	24.4%	8	19.5%	
	Faculty of Sharia (Sharia, Islamic Studies, Regulations and Law)	21	46.7%	7	15.6%	8	17.8%	6	13.3%	3	6.7%	
	College of Computer Engineering and Science	19	27.5%	17	24.6%	16	23.2%	13	18.8%	4	5.8%	
	College of Business Administration	10	19.6%	10	19.6%	13	25.5%	9	17.6%	9	17.6%	
	Other	0	0.0%	1	25.0%	1	25.0%	1	25.0%	1	25.0%	
Region	Central region	13	15.9%	15	18.3%	21	25.6%	20	24.4%	13	15.9%	0.037
	Northern region	11	14.9%	18	24.3%	18	24.3%	15	20.3%	12	16.2%	
	Southern region	14	22.2%	17	27.0%	14	22.2%	12	19.0%	6	9.5%	
	Eastern region	39	39.0%	18	18.0%	22	22.0%	15	15.0%	6	6.0%	
	Western region	23	33.3%	15	21.7%	10	14.5%	13	18.8%	8	11.6%	
Have you received formal education or information about the dangers of exposure to sunlight?	No	47	28.1%	31	18.6%	38	22.8%	39	23.4%	12	7.2%	0.067
	Yes	34	21.5%	36	22.8%	35	22.2%	25	15.8%	28	17.7%	
	Not sure	19	30.2%	16	25.4%	12	19.0%	11	17.5%	5	7.9%	

4. Discussion

The current study provides valuable insights into sunscreen usage behaviors and the level of awareness regarding the risks of sun exposure among college students. These findings are critical as they highlight gaps in knowledge and practice, informing future educational interventions aimed at reducing the incidence of sun-related health issues, particularly skin cancer.

The data reveals significant gender differences in sunscreen use, with males significantly less likely to use sunscreen compared to females. This finding aligns with previous research indicating that females are generally more aware of and proactive about skin protection measures compared to males [14–17]. The higher usage of sunscreen among females could be attributed to greater awareness and societal norms that emphasize skin care for women [2,13]. Interventions targeting male students could help in bridging this gap by increasing their awareness and promoting sunscreen use.

Age also played a significant role in sunscreen usage patterns. Participants aged 18-20 and 21-23 years were more likely to use sunscreen sometimes or most of the time. This trend could be explained by increased health awareness and access to information among younger students, who are often more exposed to educational campaigns and social media messages regarding sun safety

[13,14]. In contrast, participants aged 30 or older were the least likely to use sunscreen regularly, with 50.0% never using it. This lower rate of usage among older participants may be due to a lack of targeted educational efforts toward this age group or ingrained habits formed over the years [18,19].

Education about the dangers of sun exposure appears to positively influence sunscreen use. Among participants who had received formal education, 17.7% used sunscreen every time they were outdoors, compared to 7.2% of those without formal education. This underscores the importance of formal educational programs in promoting healthy behaviors [20,21]. However, the insignificance level indicates that while there is a positive trend, it is not strong enough to conclusively affirm the impact without further investigation. Enhancing the quality and reach of educational interventions could potentially improve these outcomes.

The study also assessed participants' knowledge about the effects of sun exposure and their awareness of the importance of sunscreen. While almost one third of participants reported knowing to some extent about the effects of varying sun exposure on different skin types and colors, only 5.7% claimed excellent knowledge. Additionally, 40.7% rated their knowledge of the harmful effects of skin exposure to sunlight as intermediate, indicating a moderate level of awareness. This gap in knowledge suggests that there is room for improvement in educational efforts to enhance understanding of sun-related risks and the importance of preventive measures like sunscreen use.

The study identified several barriers to regular sunscreen use, including the perception that it is greasy or sticky, discomfort when applied to the face, and concerns about allergic reactions or skin irritation. These concerns are consistent with previous research highlighting common deterrents to sunscreen use [2,17,22,23]. Addressing these barriers through the development of more user-friendly sunscreen formulations and better education about the importance of sunscreen can help increase its usage. For example, promoting sunscreens that are non-greasy, hypoallergenic, and suitable for sensitive skin could alleviate some of these concerns.

Apart from sunscreen, other sun protection measures such as seeking shade, avoiding peak sunlight periods, and wearing sunglasses were also commonly practiced by participants. This holistic approach to sun protection is crucial as it reduces overall exposure to harmful UV rays. Encouraging a combination of protective behaviors, rather than relying solely on sunscreen, can enhance the effectiveness of sun safety strategies.

5. Conclusions

In conclusion, this study highlights the insufficient usage of sunscreen among university students in Saudi Arabia. Significant gender, age, educational level, and geographical differences were found in sunscreen use among college students. While females, younger participants, and those with formal education about sun exposure are more likely to use sunscreen regularly, significant gaps remain, particularly among males and older students. Addressing these disparities through targeted educational interventions and addressing barriers to sunscreen use can improve sun protection behaviors. Future research should explore the effectiveness of different educational strategies and the development of user-friendly sunscreen products to enhance compliance and reduce the risk of sun-related health issues.

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