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LEVEL OF KNOWLEDGE AND AWARENESS SAUDI ARABIA'S ADULTS HAVE ABOUT DAYTIME SUNSCREEN PROTECTION

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Abstract

Background: Protecting skin from ultraviolet (UV) radiation is critical, and sunscreen is the most important defense against such harmful radiation. Although the risks are well known of sun exposure, little has been explored on awareness and use of sunscreen among adults in Saudi Arabia. **Objective:** The purpose of this study was to evaluate level of knowledge and awareness of adults towards the use of daytime sunscreen protection in Saudi Arabia. Methods: From July to December 2024, a cross-sectional study was undertaken employing a self-devised questionnaire addressed via social media. The study population consisted of Saudi adults 18 to 60 years of age residing in the Riyadh area. Attitudes, behaviors, and knowledge of participants' attitudes toward sun exposure and sun protection were assessed in a total of 392 participants. **Results:** Of the participants, 78.3 percent recognized the harm from sun exposure, but only 60.7 percent reported using sunscreen regularly. The vast majority (86.0%) identified the importance of sunscreen in protecting against UV, but a far lower percentage (61.2%) used other protective measures. Of interest is that 38% were not adequately informed of what types of sunscreens were suitable and 47.7% preferred SPF 50. Low and high levels of knowledge derived from sunscreen use had values of 50.5% and 2.6%, respectively. The correlations between knowledge of sunscreen protection and demographic factors, such as gender ($P < 0.0001$), age ($P = 0.017$), educational level ($P = 0.001$), and Fitzpatrick skin type ($P = 0.022$), were statistically significant. **Conclusion:** Despite high awareness of sun exposure risks, little is known or utilized about sunscreen among Saudi adults. The results indicate the importance for educational interventions targeted at increasing understanding and practise protective behaviours related to sun safety, especially in regions with high UV exposure. Broad public health strategies are necessary to close the knowledge practice gap and promote implementation of effective sun protection practices.

Keywords: Sunscreen, Protection, Skin cancer, Sun exposure.

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Introduction:

Any cream, spray, or lotion used on the skin to help shield it from the sun's harmful rays is referred to as sunscreen, sometimes called sunblock. Sunscreens can also be found in lip balms, moisturizers, and various makeup products, such foundation [1]. There are two varieties of sunscreen available: chemical and physical. Chemical sunscreens absorb solar radiation by acting like sponges. Physical sunscreens, sometimes referred to as mineral sunscreens, reflect sunlight and function as a shield [2]. Elevated cumulative UV radiation levels have the potential to harm skin cells and result in pigmentary changes, photoaging, burning, photoallergic or phototoxic reactions, immunosuppression, and skin malignancies [3]. Sunscreen is essential for protection from skin cancers such as basal cell carcinoma and melanoma [4].Five to ten minutes of excessive exposure to sunlight may result in damage to delicate skin areas, since UV radiation does a lot of harm and can cause inflammatory conditions and premature aging responses [5].According to the WHO, excess ultraviolet radiation exposure causes 60,000 deaths annually, of which 48 thousand are caused by malignant melanomas and 12 thousand by skin carcinomas [6].

Cross-sectional study was conducted among adults in Aseer region, Saudi Arabia. From 2022-2023. According to the data, 40.3% of the participants were men and 59.8% of the participants were women. In terms of age, the majority of participants (37.5%) were between the ages of 26 and 35, and 16.0% of them frequently used sunscreen. Overall, 74.0% of participants used sunscreen. Men were more likely than women to have negative opinions about sun protection, but women also practiced sun protection more frequently. Furthermore, 1.25 percent of participants reported having skin cancer in the past, 81.0 percent believed that skin cancer might be fatal, and 19.0 percent were unaware about the disease's effects. Additionally, the findings showed that solar exposure significantly improved awareness levels ($p < 0.05$), suggesting that more sun exposure was linked to a greater understanding of the negative impacts of sun. Furthermore, sunscreen use was strongly positively correlated with awareness level ($p < 0.01$), indicating that those who were more informed were also more likely to use sunscreen[7].

Another preformed research in Al-Jouf region, Saudi Arabia, 2021-2022. The results showed approximately 50% of the people under study, especially the women, use sunscreen before going outside. More than half of people apply sunscreen to avoid dark skin patches (71.6%) and to prevent sunburn (62.8%). However, due to their high cost and inconvenience, a large number of participants did not use sunscreens. Just 34.1 percent of sunscreen users used it when they were in direct sunlight, and 96.7 percent did so in the summer. Furthermore, only 47.5% of the participants in their survey apply it to their hands and faces, and 53.6% of them use less than a quarter of a teaspoon. In regards to the participants' views on reapplying sunscreen, 28.4% of them do so after taking a shower, whereas 55.9% do not. To sum up, the viewpoints of the participants regarding the use of sunscreen varied. It has been established that improper use of sunscreen occurs, necessitating education campaigns about safe sunscreen application[8].

Additionally, a cross-sectional study was conducted in 2016 to assess the knowledge, attitudes, and practices of non-medical female students at King Abdul-Aziz University, Saudi Arabia's Sulaymaniyah campus about sun exposure and the usage of sun protection. Most of the sample, it turned out, knew of the dangers of exposure to the sun without protection. Nonetheless, 34.1% of respondents said they believed sunscreen to be hazardous. The most popular approaches to protecting oneself from the sun were finding shade and dressing in protective gear (58.1% and 43.1%, respectively). Just one third of our group (23.6%) used sunscreen. Nonetheless, the majority of students (64.9%) were unaware of sunscreen products' ability to protect against the sun[9].

Unfortunately, there's limited researches on the knowledge and awareness of daytime sunscreen use among adults in Saudi Arabia. Due to the huge importance this topic hold, this study was conducted.

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Objective:
The primary aim of this study was to assess the level of awareness and knowledge regarding the use of daytime sunscreen protection among adults of both genders in Saudi Arabia.

Methodology:
Study design and Setting:
A cross-sectional study conducted between July 2024 to December 2024, based on a self-structured questionnaire, to assess the awareness and knowledge of using daytime sunscreen among adults in Saudi Arabia.

Subject: Participants, recruitment and sampling procedure:
The study's population consist of all men and women, Saudi, who were over eighteen years old and living in the Riyadh region. Data were collected using a questionnaire that distributed through social media and evaluate individuals' attitudes, behaviors, and knowledge about sun exposure and sunscreen use. Sample recruiting approach rely on social media platform.

Sample size:
To guarantee a suitable sample size, the Raosoft sample size calculator was used to establish the minimum sample size for this investigation. In order to get a 95% confidence interval with a 5% error margin, a sample size of approximately 385 people was suggested as minimum.

Inclusion and Exclusion criteria:
The inclusion criteria were Saudi population, males and females, ages ranging from 18 to 60 years old, from all provinces of the Kingdom of Saudi Arabia and subjects who would agree to participate in this study and complete questionnaires. Males and females, non- Saudi, under 18 years old Exclusion criteria.

Scoring system:
The scoring system include 6 questions in Section 2, 10 questions in Section 3, and 6 questions in Section 4. For Yes/No questions, the correct answers scored 1 point, while incorrect answers receive 0 points. Questions with multiple possible answers given points based on their proximity to the best answer.
The total score for Section 2 have a maximum of 12 points, Section 3 have a maximum of 30 points, and Section 4 have a maximum of 10 points. To determine the overall level of knowledge, the scores from each section summed to form the Overall Score, with a maximum of 52 points. The overall scores then be categorized as follows: High Overall Score (40-52), Moderate Overall Score (26-39), and Low Overall Score (0-25).

Pilot test:
For the purpose of testing the questionnaire's simplicity and the feasibility of the study, it was distributed to 20 individuals, who were asked to complete it. As a result, the data from this pilot phase were excluded from the final study results.

Analyzes and entry method:
The "Microsoft Office Excel Software" program was used to enter all of the acquired data, which were subsequently coded and tabulated using the relevant statistical significance tests to ascertain the

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correlations between the variables. The SPSS software was used to enter all of the data.

Results:

Table (1) displays various demographic parameters of the participants with a total number of (392). Mean age of participants is 30.6, standard deviation is 12.1, thus a majority of younger participants—31.6% are 23 years or less, 46.2% are 25 years old or younger. While this translates into a stark gender disparity of 83.7 percent of the sample being female, it is possible that research important to the gendered appeal or needs would be skewed if this trend was not considered. With regard to marital status, the overwhelming majority (59.7%) are single, a trend that may be broad social tendencies in the younger population. Overall, educational attainment is mostly high (58.9% with a bachelor's degree), and this may be related to higher health awareness and engagement. Diversity in skin type distribution was shown, as there was a large proportion (42.9%) of combined skin. However, the data is also important because 99% report no family history of skin cancer.

Table (1): Sociodemographic characteristics of participants (n=392)

Parameter		***No.***	***Percent (%)***
Age (Mean:30.6, STD:12.1)	Less than 23	124	31.6
	23 to 25	85	21.7
	26 to 40	96	24.5
	More than 40	87	22.2
Gender	Female	328	83.7
	Male	64	16.3
Marital status	Single	234	59.7
	Married	135	34.4
	Divorced	19	4.8
	Widowed	4	1.0
Educational level	Middle school	7	1.8
	High school	79	20.2
	Diploma	30	7.7
	University student	22	5.6
	Bachelor's degree	231	58.9
	Postgraduate degree	23	5.9
Type of skin	Normal	87	22.2
	Oily	92	23.5
	Dirty	45	11.5
	Combined	168	42.9
Fitzpatrick skin type	Type I	47	12.0
	Type II	129	32.9
	Type III	145	37.0
	Type IV	52	13.3
	Type V	10	2.6
	Type VI	9	2.3
Family history of skin cancer	No	388	99.0

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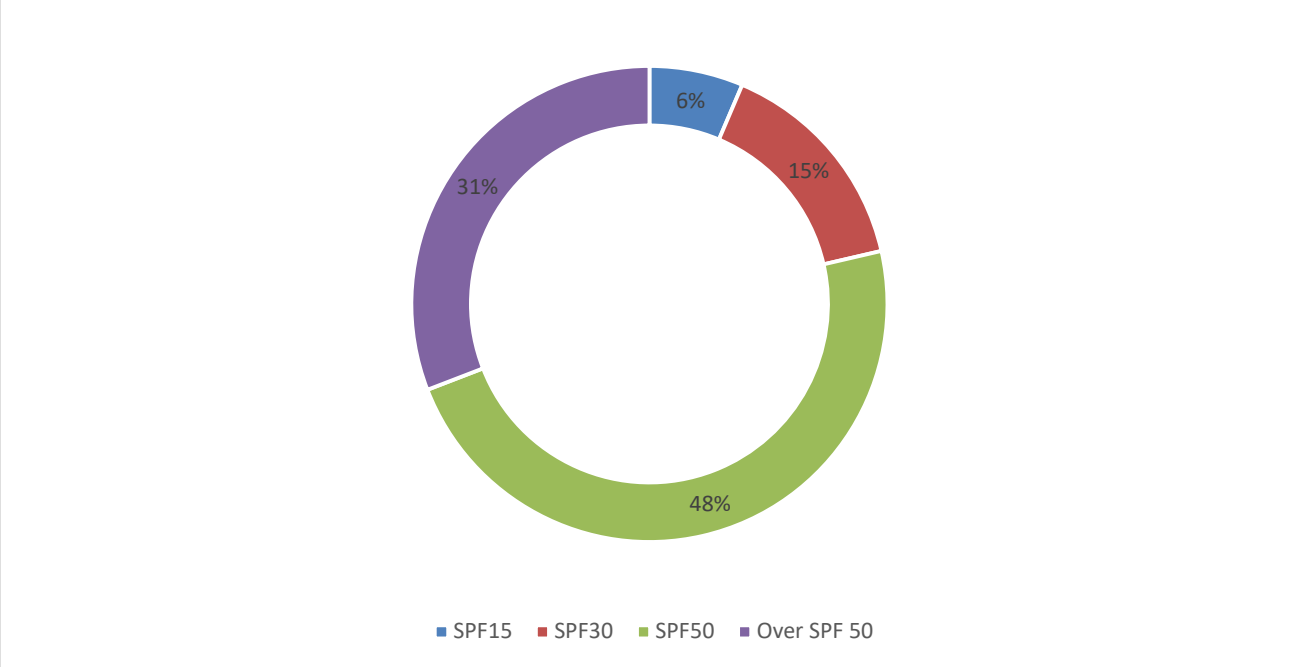
	Yes	4	1.0

As shown in figure 1, data from 392 respondents is analyzed and when compared, displayed divergent preferences for selecting the sun protection factor (SPF). In terms of shades, SPF 15 was chosen by 6.4% of participants, or 25 individuals. Meanwhile, SPF 30 grew in popularity, elected by 59 people, 15.0%, of the respondents. For example, a total of 187 participants preferred SPF 50, chosen by 47.7% of participants, which was the most significant preference observed. In addition, 30.9 percent of the sample (121 respondents), preferred products with an SPF greater than 50.

Figure (1): Illustrates type of SPF among participants.



As shown in Table 2, the data of the presented table includes some critical insights about public perception and behavior about sun exposure and protection among the participants of 392 members. According to 78.3 percent, sun exposure is harmful, which shows the growing public awareness regarding sun related health risks. Yet this awareness does not lead to protective behavior, since only 60.7 per cent stated that they applied sunscreen when they went out in the sun. Of note, the consensus agrees that the sun exposure risk period is from 10 AM to 2 PM and that 51.5 percent of respondents agree. A strong 86.0% of respondents agree that sunscreen is essential to protect from UV, however, a dubious 61.2 % do not practice other forms of protection.

Table (2): Parameters related to sun exposure and sun protection behavior (n=392).

Parameter		***No.***	***Percent (%)***
Do you think that exposure to the sun is harmful?	No	85	21.7
	Yes	307	78.3
Use a sunscreen when exposed to the sun	No	154	39.3
	Yes	238	60.7
The most dangerous period for exposure to the sun is	8–10 am	13	3.3

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	10 am–2 pm	202	51.5
	10 am–4 pm	138	35.2
	2–4 pm	39	9.9
Sunscreen is necessary for protection from harmful Ultraviolet (UV) light from the sun	No	55	14.0
	Yes	337	86.0
Do you use other methods to protect yourself from the UV light of the sun	No	240	61.2
	Yes	152	38.8

As shown in figure (2), These data report out on high-risk periods for sun exposure and critically call them out. Out of a total sample of 392 individuals, 202 reports (51.5% of the total observations) occurred at the most perilous time from 10-2pm. The consequence is this significant percentage of the solar proprietary numbers, which coincide during the hour hours with peak solar radiation rates. The 10 am to 4 pm window contains 138 individuals, which is 35.2% of the total sample and compares other time segments. Low exposure frequencies are shown during the times of 8–10 am (3.4% 13 individuals) and 2–4 pm (10% 39 individuals), which indicates that exposure occurs less during the peak hours.

Figure (2): Illustrates the most dangerous period for exposure to the sun among participants.

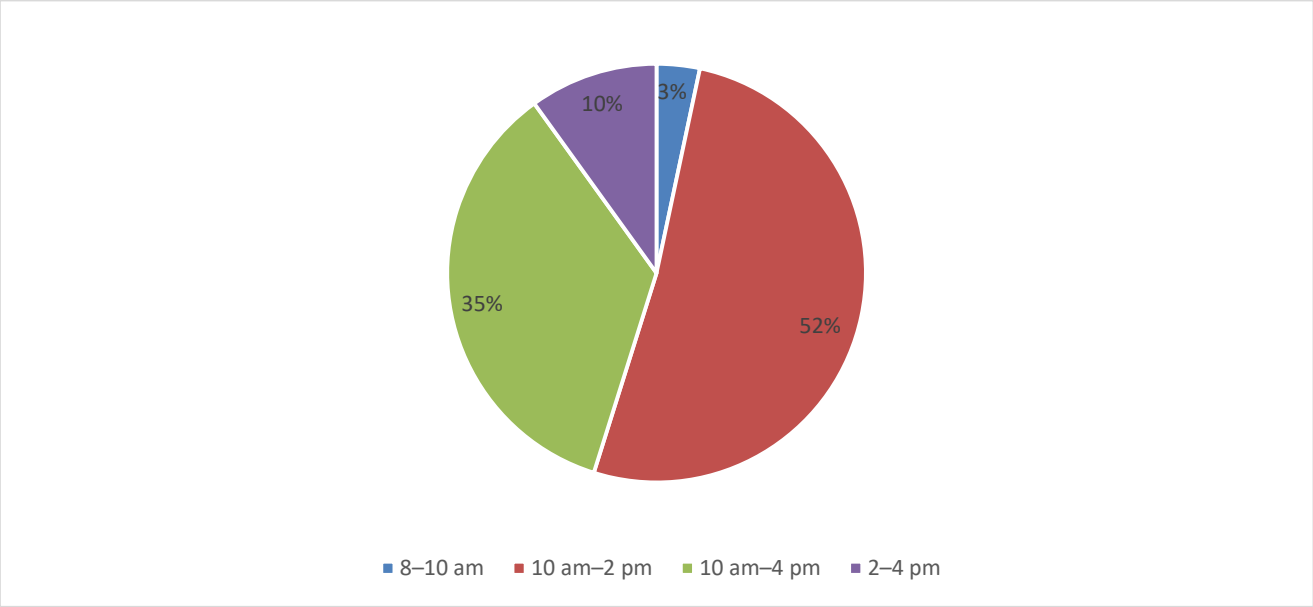

Table 3 shows important knowledge and application gaps in the use of sunscreen among the sample of 392 participants. The subjects expressed receiving only 38% of the information regarding the type of sunscreen that should suits their needs best. This amounts to 62% respondents who struggled with defining a preferred type of sunscreen. However, while 47.7 per cent of participants chose SPF 50 it did so, therefore, in reflection of their knowledge its importance. But 59.4 percent of participants too think that there's a difference between SPF 30 and SPF 50 — a gap between what they know and how they act. The additional findings of inconsistent application habits are evidenced by 37.2% of respondents not considering the timing of application prior to sun exposure indicating the need for increased educational efforts.

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Table (3): participants' patterns of the use of sunscreen (n=392).

Parameter		***No.***	***Percent (%)***
Type of sunscreen preferred	Chemical	104	26.5
	Physical	45	11.5
	Do not know	243	62.0
Type of SPF preferred	SPF15	25	6.4
	SPF30	59	15.1
	SPF50	187	47.7
	Over SPF 50	121	30.9
Do you think that SPF 50 is different from SPF 30 sunscreen?	No	37	9.4
	Yes	233	59.4
	I don't know	122	31.1
Factors affecting the choice of sunscreen *	SPF	184	46.9
	Personal experience	195	49.7
	Origin	60	15.3
	Friends' advice	126	32.1
	Prescription	121	30.9
	Internet	84	21.4
	I don't buy anything	50	12.8
Amount of sunscreen applied to the face	One-quarter of a teaspoon	122	31.1
	Half a teaspoon	90	23.0
	1 teaspoonful	64	16.3
	2 teaspoonfuls	39	9.9
	Over 2 teaspoonfuls	10	2.6
	Do not know	67	17.1
How often do you use sunscreen in a day?	Do not use	57	14.5
	Once	157	40.1
	Twice	76	19.4
	Over twice	59	15.1
	Not sure	43	11.0
Season in which sunscreen is used	None	71	18.1
	Summer	27	6.9
	Winter	91	23.2
	Both	203	51.8
Time you apply sunscreen before exposed to the sun	Do not care about the time	146	37.2
	5 min	59	15.1
	10 min	54	13.8
	15 min	69	17.6
	20 min	13	3.3
	25 min	17	4.3
	30 min	19	4.8

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	Over 30 min	15	3.8
For how long participants have been using sunscreen?	Do not use	99	25.3
	Weeks	61	15.6
	Months	232	59.2
Where do participants apply sunscreen on their body?	Do not use	69	17.6
	Face	97	24.7
	Face and neck	96	24.5
	All exposed parts of the body	130	33.2

Results may overlap

Table 4 provides paints an interesting response to skin protection and sunscreen use among 392 individuals, showcasing both excellent awareness and woeful knowledge. Public confidence in sun safety products is called into question on the basis of this finding, that only 36.2 per cent believe that sunscreen provides effective protection against heat. On the other hand, the number that acknowledges the importance of medical knowledge in encouraging people to protect themselves against the sun (76,3%) very well shows that health education work provide the grounds for a better understanding of sun protection strategies. While this is promising since 70.4% said they needed sun protection in the harsh climate of Saudi Arabia. 74.2% stated that they are not aware about what is comprising sunscreen is a pivotal area for intervention. In addition, the large group of participants who claimed to be willing to advise others on the use of sun protection (58.7%) in contrast to the 46.2 % who were uncertain of sunscreen efficacy in various situations highlights the crucial need for multidimensional and targeted educational programmes intended to debunk sunscreen myth.

Table (4): participants' perceptions of skin protection and sunscreen (n=392).

Parameter		***No.***	***Percent (%)***
Sunscreen protects from heat	No	156	39.8
	Yes	142	36.2
	I don't know	94	24.0
Medical knowledge increases awareness of sun protection	No	43	11.0
	Yes	299	76.3
	Maybe	50	12.8
Sun protection in Saudi Arabia is	Not necessary	23	5.9
	Necessary sometimes in the year	93	23.7
	Necessary	276	70.4
Important content looked for in sunscreen	Do not know about components	291	74.2
	Physical sunscreens such as titanium oxide and zinc oxide	47	12.0
	Chemical components such as avobenzone	54	13.8
Sunscreen may lose its effect after sweating or swimming	No	68	17.3
	Yes	143	36.5
	Maybe	181	46.2
Ready to advise people about sun	No	68	17.3

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protection	Yes	230	58.7
	Sometimes	94	24.0

Table 5 shows that a sample of 392 participants knows and is aware of daytime sunscreen protection and provides interesting insight into public understanding of sun safety. However, only 2.6% of respondents demonstrated high knowledge and awareness of sunscreen protection and therefore there is a critical knowledge gap when it comes to how to protect their skin from damage and skin cancer. However, 46.9% showed a moderate level of knowledge, meaning that they are aware of the benefits of sunscreen, but could not explain on which days and in what ways they protect themselves from sunlight. The highest proportion — 50.5 per cent — had low knowledge and awareness.

Table (5): Shows knowledge and awareness about daytime sunscreen protection score results.

	Frequency	**Percent**
High knowledge and awareness of sunscreen protection	10	2.6
Moderate knowledge and awareness	184	46.9
Low knowledge and awareness of sunscreen	198	50.5
Total	392	100.0

Table (6) shows that knowledge and awareness about daytime sunscreen protection has statistically significant relation to gender (P value=0.0001), age (P value=0.017), educational level (P value=0.001), Fitzpatrick skin type (P value=0.022). It also shows statistically insignificant relation to marital status, type of skin.

Table (6): Relation between knowledge and awareness about daytime sunscreen protection and sociodemographic characteristics.

Parameters		***knowledge and awareness level***		***Total (N=392)***	***P value****
		High or moderate knowledge and awareness	**Low knowledge and awareness of sunscreen**		
Gender	Female	184	144	328	0.0001
		94.8%	72.7%	83.7%	
	Male	10	54	64	
		5.2%	27.3%	16.3%	
Age	Less than 23	71	53	124	0.017
		36.6%	26.8%	31.6%	
	23 to 25	48	37	85	
		24.7%	18.7%	21.7%	
	26 to 40	41	55	96	
		21.1%	27.8%	24.5%	
	More than 40	34	53	87	
		17.5%	26.8%	22.2%	
Marital status	Single	129	105	234	0.054
		66.5%	53.0%	59.7%	
	Married	56	79	135	

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		28.9%	39.9%	34.4%	
	Divorced	7	12	19	
		3.6%	6.1%	4.8%	
	Widowed	2	2	4	
		1.0%	1.0%	1.0%	
Educational level	Middle school	1	6	7	0.001
		0.5%	3.0%	1.8%	
	High school	34	45	79	
		17.5%	22.7%	20.2%	
	Diploma	7	23	30	
		3.6%	11.6%	7.7%	
	University student	17	5	22	
		8.8%	2.5%	5.6%	
	Bachelor's degree	121	110	231	
		62.4%	55.6%	58.9%	
	Postgraduate degree	14	9	23	
		7.2%	4.5%	5.9%	
Type of skin	Normal	45	42	87	0.086
		23.2%	21.2%	22.2%	
	Oily	37	55	92	
		19.1%	27.8%	23.5%	
	Dirty	19	26	45	
		9.8%	13.1%	11.5%	
	Combined	93	75	168	
		47.9%	37.9%	42.9%	
Fitzpatrick skin type	Type I	25	22	47	0.022
		12.9%	11.1%	12.0%	
	Type II	75	54	129	
		38.7%	27.3%	32.9%	
	Type III	71	74	145	
		36.6%	37.4%	37.0%	
	Type IV	18	34	52	
		9.3%	17.2%	13.3%	
	Type V	2	8	10	
		1.0%	4.0%	2.6%	
	Type VI	3	6	9	
		1.5%	3.0%	2.3%	

****P value was considered significant if ≤ 0.05.***

Discussion:

The skin is a distinctively protective barrier that keeps the internal environment of the body separate from external world, and plays a critical role in maintaining overall health [10]. The environmental threat with ultraviolet (UV) radiation from the sun is well known, and, as such, it is widely regarded as one of the major contributor and a chief carcinogen leading to the development of skin cancer [11]. Ultraviolet A and Ultraviolet B radiation have been termed carcinogenic for their existence within the

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solar radiation spectrum. Between childhood and adolescence it is known that the exposure to UV radiation is an important risk factor for the development of skin cancer in later life [12]. The main reason for side effects on the skin, eyes and immune system is increased sun exposure. Additionally, it is noted that four of five cases of skin cancer are preventable and reducing sun exposure can lessens the impact of UV radiation [13]. Immediate skin harm due to short term exposure to UV radiation include sunburn and tanning. Unlike, prolonged exposure to UV radiation causes chronic skin conditions such as hyperpigmentation (e.g. solar lentigines, freckles and melasma), skin aging (e.g. increased blood vessels and decreased elasticity of skin), disturbance in skin immune responsiveness, disruption of skin barrier functions, photodermatoses, and even skin cancer [14]. Thus, we aimed in this study to assess the level of awareness and knowledge of daytime sunscreen protection usage among adults in Saudi Arabia.

We surveyed 392 people in our study of the knowledge and awareness of daytime sunscreen protection among adults in Saudi Arabia, of which 78.3 percent understood the dangers of sun exposure. Yet there was no correlation between protective behaviours and awareness, with 60.7% reporting they applied sunscreen regularly. Previous studies, such as that of Al Robaee et al.[15] had also reported this discrepancy by pointing out that though an understanding of the relationship between sun exposure and skin cancer existed, only 8.3 % of Saudis adults used sunscreen regularly. Like AlGhamdi et al.[16] the Saudi population not engaging in regular use of sunscreen only represents 23.7% of the population while being aware of it. Finally, our findings showed that although 86.0% of the participants understood the importance of sunscreen sun protection, only 61.2% performed additional protective measures, for example, seeking shade or wearing protective clothing. It also supports the findings from a study in Brazil, which found a sunblock usage rate of 63%, showing greater intervention versus sunscreen usage[17]. Additionally, our study found that 51.5% of participants recognized the high-risk period for sun exposure to be between 10 AM and 2 PM, a finding consistent with the awareness of sun safety, as reported by,Agarwal et al.[18], who conducted a study on awareness of sun exposure time, which is an important part of effective sun protection . Yet gaps in knowledge persisted; fewer than half, 38%, of participants said they felt properly informed about which sunscreen to use. This finding concurs with the work by Hobbs et al.[19] who identified that a large proportion of students did not know SPF values with some 64.9% never having heard of SPF. In addition, our results revealed that 37.2% of respondent did not use sunscreen at recommended time before sun exposure indicating that educational interventions are necessary. Interestingly, while a good half of our participants (47.7%) gave preference to SPF 50, 59.4% believed there was a large difference between SPF 30 and SPF 50, suggesting a lack of understanding of SPF ratings. Mancuso et al.[20] also noted in the study that this confusion around sunscreen efficacy lead many participants to not reapply sunscreen, reporting 50.0% of them do not reapply at all. Findings indicate that targeted educational campaigns are needed to promote the knowledge-practice gap gap in light of 70.4 percent of participants recognizing the need for sun protection in Saudi Arabia's harsh climate. Additionally, we found several significant correlations with demographic factors, such as gender ($P = 0.0001$), age ($P = 0.017$), education ($P = 0.001$) and Fitzpatrick skin type ($P = 0.022$), similar to Tilwani et al.,[21] which emphasize the importance for tailoring of educational strategies to improve public health. Sadly, the researchers found alarmingly low knowledge of how to best protect the skin from the sun, with only 2.6% of those surveyed showing high knowledge and awareness of sunscreen use, while 50.5% of respondents exhibited little to no knowledge. This is consistent with Alberg et al., [22] who reported a lack of understanding of skin cancer and sun protection among you in Maryland, as well. Together these studies highlight the pressing need for comprehensive educational interventions aimed at enhancing knowledge and behaviour relevant to sun safety in diverse populations.

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Conclusion:
Finally, our study strongly implies that there is an inconsistency between awareness and the usage of protective behaviour in relation to daytime sunscreen application among adults in Saudi Arabia. Of course, not only was a large 78.3 per cent of people aware of the harmful effects of sun exposure, but only 60.9 per cent reported regular sunscreen use. This disconnect underlies a fundamental gap to introduce targeted educational interventions targeting an improved understanding and practice of sun protection strategies. Knowledge levels were influenced very much by gender, educational level, and age, so there is likely a better chance that tailored educational programs could be more effective. However, alarmingingly, only 2.6% of participants reported high knowledge and awareness of sunscreen protection, whilst almost half reported low understanding. Because of the high exposure to the sun in Saudi Arabia, it become very important to educate people about the risks of the skin cancer and the use of sunscreen, stressing the need to use and apply the sunscreen properly and use it again. Given that these knowledge gaps are identified, sun safety behaviors should be improved and risk for skin cancer reduced.

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Ethical approval:

After fully explaining the study and emphasizing that participation is optional, each participant gave their informed consent. The information gathered was safely stored and utilized exclusively for study.

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Conflict of interests:

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability:

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

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