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Awareness of sun exposure effect and sun protection measures among university students in Saudi Arabia

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ABSTRACT

Background: Unprotected prolonged sun exposure is a major risk factor for a variety of skin conditions. Unprotected long term UV exposure can cause chronic skin conditions like hyperpigmentation, skin ageing and skin cancer. The main preventive measure to avoid skin damage brought on by exposure to the sun is sun protection throughout the daytime by using sunscreen. Due to a lack of studies, few Saudi Arabians are aware of the need to utilize sun protection. *Methodology:* Hence a descriptive cross-sectional community-based survey was conducted from June to August 2022 to find out how people feel about the sun and how often they use sun protection. 303 (20.2%) students from the Central region, 611 (40.7%) students from the Northern region, Western region: 255 (17%), Eastern region: 170 (11.3%) and Southern region: 162 (10.8%) and 1501 students overall completed the survey questionnaire. 804 (53.6%) of the total student body of 1071 were medical college students. *Result:* Overall, 975 students (65%) had strong understanding of sun exposure and sunscreen, while 526 students (35%) had inadequate knowledge. However, 61.9% of respondents rejected the idea that face covering (hijab, niqab or mask) is sufficient to replace sun protection products and 68.6% rejected the idea that sunscreen is bad for the skin. *Conclusion:* In order to educate the public about the link between sun exposure and skin ageing and skin cancer, this study intends to evaluate the knowledge, attitude and behavior of university students in Saudi Arabia toward sun exposure and the usage of sun protection.

Keywords: Sun exposure, sunscreen, awareness of sun protection.

1. INTRODUCTION

Excessive exposure to the sun can cause many skin diseases (Almuqati et al., 2019). Ultraviolet (UV) radiation could result in acute damage to skin such as sun burn and tanning (Younget al., 2006). Additionally, the long-term unprotected exposure to UV could lead to chronic skin disease such as

hyperpigmentation, skin cancer and skin aging (Almuqati et al., 2019). Skin functions as a barrier, preventing dehydration, thermoregulation, sensation and immunization. Age affects these functions, but chronic exposure to harmful environments (e.g., UV radiation from the sun) alters the compartments of the epidermis and dermis earlier than aging (Rittié & Fisher, 2015). Unprotected exposure to the sun is a major risk factor for many skin diseases. The skin cancer is the 9th most common malignancy reported in Saudi Arabia (Almuqati et al., 2019). Since the mid-20th century, the incidence rate is increased (Parker et al., 2021), but the rate in darker skin groups is low. People with darker skin tend to have less chance of getting skin cancer due to an increase in epidermal melanin. Furthermore, these groups do not have a full immunity against skin cancer (Almuqati et al., 2019). Sun protection with sunscreen during the daytime is the primary preventive strategy to prevent sun damage caused by sun exposure. Additionally, wearing hat and protective clothes use umbrella, wearing sunglasses and seeking shade during peak hours. Due to few studies the awareness of population in Saudi Arabia about use of sun protections is low so from this study the information could be helpful to find solutions. Due to the high UV index scores in the Saudi Arabia, people should be protected against UV radiation due to its hot, dry summers and short winters with occasional rain. In the Saudi Arabia, the climate is characterized by long, hot, dry summers and short winters with occasional rain (Sultana, 2020). Our objective is to assess Saudi Arabian university students' behaviors, knowledge and attitudes related to sun exposure and sun protection in order to raise awareness.

2. METHODOLOGY

Study design and study sample

A descriptive cross-sectional study was conducted from June to August 2022 among Saudi Arabian university students regarding sun exposure and sun protection knowledge and practices.

Data collection

A Self administered close-ended questionnaire was design. The questionnaire was translated into Arabic and approved by 1 dermatologist, there after, tested for both readability and comprehension by 20 subjects who were not included in the study. It consists of 29 questions which were guided by study objectives.

The questionnaire includes four parts: The first part of questionnaire focused on 5 questions of demographic data includes gender, age, place of residency, specialization, academic year. The second part contains 16 questions focused on sun exposure and sunscreen knowledge of participants. The third part contains 8 questions focused on attitudes and practices of participants toward sun protection measures. And for the last part it's include 1 question about reasons that prevent the participant from using measures of sun protection. The questionnaires were prepared in Arabic language. These questionnaires sent to university students in Saudi Arabia. The objectives of the study of the study were explained and a verbal consent obtained from each participant.

Data analysis

A review of the data was conducted and then the data were loaded into Statistical Package for Social Sciences version 21 for analysis (SPSS: An IBM Company). All statistical methods used were two tailed with alpha level of 0.05 considering significance if P value less than or equal to 0.05. Overall knowledge level regarding middle ear infection was assessed through summing up discrete scores for different correct knowledge items. The overall knowledge score was categorized to poor level if students score was less than 60% of the overall score and good level of knowledge was considered if the participants score was 60% or more of the overall score. The study variables, including student's personal data, college and academic year, were analyzed descriptively by prescribing frequency distributions and percentages. Also, knowledge regarding sun protection and sun screen, practice and attitude were tabulated while and overall knowledge was graphed. Cross tabulation for showing Factors associated with university student's knowledge of sun exposure and sunscreen was carried out with Pearson chi-square test for significance and exact probability test if there were small frequency distributions.

3. RESULTS

A total of 1501 students completed the study questionnaire, 611 (40.7%) from Northern region, 303 (20.2%) from Central region, 255 (17%) from Western region, 170 (11.3%) from Eastern region and 162 (10.8%) from Southern region. The mean age of the students ranged from 18 to 30 years is 21.1 2.5 years old. A total of 1071 (71.4%) students were females and 804 (53.6%) were at medical college. As for academic year, 362 (24.1%) were at their first year, 280 (18.7%) were at their 3rd year, 64 (4.3%) were at 6th year and 134 (8.9%) were interns (Table 1).

Table 1 Personal data of sampled university students in Saudi Arabia

Personal data	No	%
Region		
Central region	303	20.2%
Northern region	611	40.7%
Eastern region	170	11.3%
Western region	255	17.0%
Southern region	162	10.8%
Age in years		
18-19	412	27.4%
20-22	734	48.9%
23+	355	23.7%
Gender		
Male	430	28.6%
Female	1071	71.4%
Faculty		
Non-medical	697	46.4%
Medical	804	53.6%
Academic year		
1	362	24.1%
2	279	18.6%
3	280	18.7%
4	232	15.5%
5	150	10.0%
6	64	4.3%
7	134	8.9%

Table 2 Sun exposure and sunscreen knowledge among university students, Saudi Arabia. As for sun exposure, 93.7% of the students know that sun exposure causes sun burn, 92.9% know that Sun exposure cause hyper-pigmentation, 82.1% know that Sun exposure cause skin aging and 77.3% know that Sun exposure cause skin cancer. All the students reported that dangerous period for sun exposure is from 10 am to 2 pm regarding sunscreen, 90.7% of the students aware that men should protect themselves from the sun's rays, 84.7% told that sun protection products protect from the sun's rays, 63.9% agreed that sun protection products are necessary on a cloudy day. On the other hand, 68.6% refused that Sun protection products are harmful to the skin and 61.9% refused that Face covering (hijab/niqab/mask) is sufficient to replace sun protection products.

Table 2 Sun exposure and sunscreen knowledge among university students, Saudi Arabia

Domain	Knowledge items	No	%
Sun exposure	Sun exposure causes sun burn		
	Yes	1406	93.7%
	No	95	6.3%
	Sun exposure cause skin cancer		
	Yes	1161	77.3%
	No	340	22.7%
	Sun exposure cause skin aging		
	Yes	1233	82.1%
	No	268	17.9%
	Sun exposure cause hyper-pigmentation		
	Yes	1395	92.9%
	No	106	7.1%

	Dangerous period for sun exposure		
	10 am to 2 pm	252	100.0%
	2 pm to 6 pm	143	56.7%
	8 am to 10 am	115	45.6%
Sunscreen	Men should protect themselves from the sun's rays		
	Yes	1361	90.7%
	No	140	9.3%
	Sun protection products protect from the sun's rays		
	Yes	1272	84.7%
	No	229	15.3%
	Sun protection products are harmful to the skin		
	Yes	472	31.4%
	No	1029	68.6%
	Sun protection products are necessary on a cloudy day		
	Yes	959	63.9%
	No	542	36.1%
	Face covering (hijab / niqab / mask) is sufficient to replace sun protection products		
	Yes	572	38.1%
	No	929	61.9%
	the amount of sun protection factor and UV protection factor in sun protection products		
	Yes	809	53.9%
	No	692	46.1%

Figure 1 Sun exposure and sun screen knowledge among university students Saudi Arabia. A total of 975 (65%) students had good knowledge level for sun exposure and sunscreen and 526 (35%) had poor knowledge level.

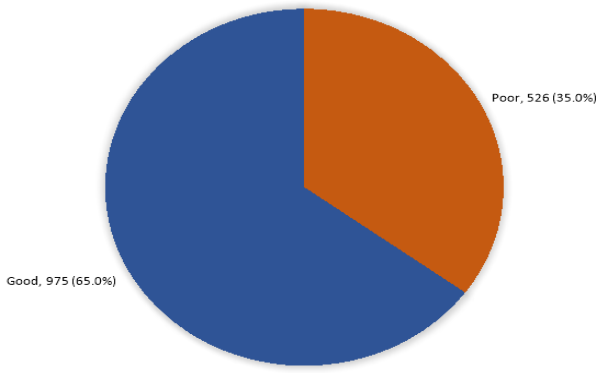

Figure 1 Overall university student's knowledge regarding sun exposure and sunscreen, Saudi Arabia

Figure 2 Reported methods by university students to protect themselves from the sun's rays. The most reported methods were Use sun protection cream (68%), followed by Walk/sit in the shade and avoid sunlight (60%), Wearing sunglasses (58%), Avoid the sun from 10 am to 2 pm (49%), Wearing long clothes (28%) and wear a hat (23%).

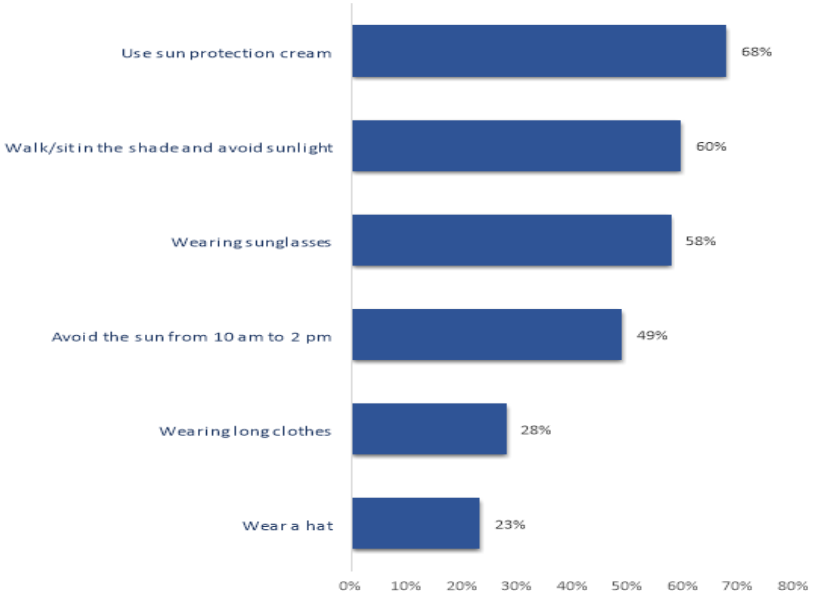

Figure 2 Sun protection methods reported by university student

Table 3 University students' attitudes and practices toward sun protection measures, Saudi Arabia. Exact of 941 (62.7%) students, 43% use sunscreen daily and 41.4% use it 3-5 times a week. A total of 748 (79.5%) students use cream, 100 (10.6%) use lotion, while 26 (2.8%) use gel. Sunscreen with SPF=50 used by 324 (34.4%) students while 178 (18.9%) used sunscreen with SPF > 50. Also, 740 (78.6%) students correctly apply the sunscreen 15-20 minutes before exposure to the sun and 218 (23.2%) reapply it every four hours while 80 (8.5%) reapply every 2 or 3 hours. A total of 593 (63%) apply sunscreen over Face, neck & hands and 233 (24.8%) apply to Face & hands while 115 (12.2%) apply to face only. Regarding method of choosing a sun protection cream product, 378 (40.2%) reported for it's according to sun protection factor and UV protection factor, 341 (36.2%) was Suggestion from a dermatologist, 315 (33.5%) told for Pharmacist advice and 296 (31.5%) affected by social media.

Table 3 Sun protection practices and attitudes among university students, Saudi Arabia

Sunscreen use practice and attitude	No	%
Use sun screen		
Yes	941	62.7%
No	560	37.3%
Frequency of using sun screen (n=941)		
Always (daily)	405	43.0%
Often (3-5 times a week)	390	41.4%
Sometimes (less than twice a week)	146	15.5%
Type of sunscreen product do you use(n=941)		
Cream	748	79.5%
Spray	67	7.1%
Gel	26	2.8%
Lotion	100	10.6%
What is the sun protection factor of the cream you are using? (n=941)		
SPF < 50	178	18.9%
SPF = 50	324	34.4%
SPF > 50	96	10.2%
I don't know	343	36.5%
How do you use sunscreen? (n=941)		

15-20 minutes before exposure to the sun	740	78.6%
Just before exposure to the sun	201	21.4%
How often do you reapply sunscreen? (n=941)		
Every four hours	218	23.2%
Every three hours	80	8.5%
Every two hours	80	8.5%
I never put it back	563	59.8%
Where do you put sun protection cream? (n=941)		
Face, neck & hands	593	63.0%
Face & hands	233	24.8%
Face only	115	12.2%
How to choose a sun protection cream product? (n=941)		
According to sun protection factor and UV protection factor	378	40.2%
Suggestion from a dermatologist	341	36.2%
Pharmacist advice	315	33.5%
Information from social networking sites	296	31.5%

Figure 3 the reasons why university students do not use sun protection methods, Saudi Arabia. The most reported reasons were High prices for sun protection products (43.6%), followed by don't feel comfortable when using it (42.9%), don't have time to put it up (35.4%), Don't care about sun protection's benefits (22.1%), Lack of awareness about sun protection creams (19.6%), unaware of the harmful effects of sun exposure (18%), and being incompatible with makeup products (7.5%).

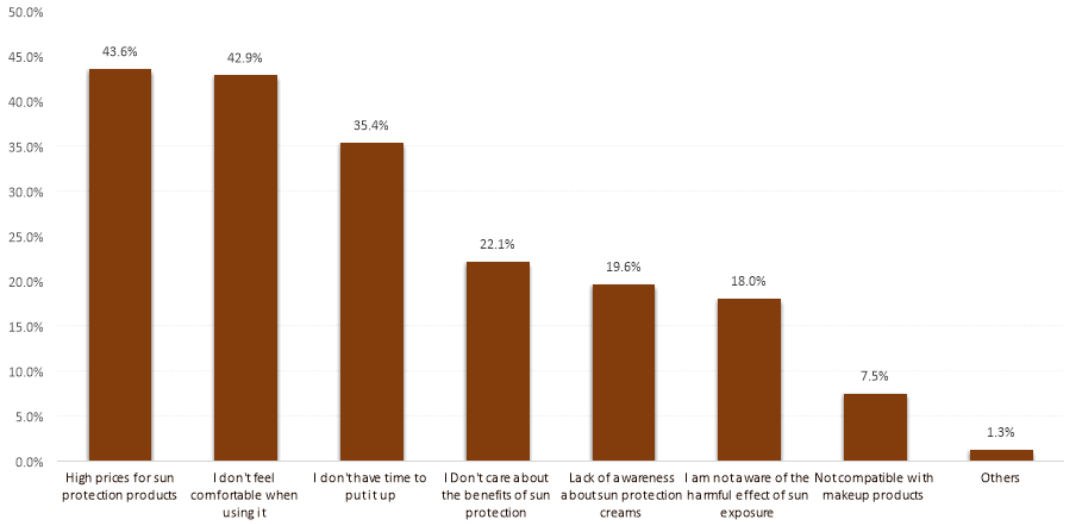

Figure 3 the reasons why university students do not use sun protection methods, Saudi Arabia

Table 4 Factors associated with university student's knowledge of sun exposure and sunscreen. A total of 70.7% of female students had good knowledge level in comparison to 50.7% of females with recorded statistical significance (P=.001). Also, 70.4% of medical students had good knowledge level regarding sun protection versus 58.7% of other non-medical students (P=.001). The highest knowledge level was reported among intern students (71.6%) versus 60.8% of 1st year students (P=.048).

Table 4 Factors associated with university student's knowledge of sun exposure and sunscreen

Factors	Sun Exposure and Sunscreen Knowledge				p-value
	Poor		Good		
	No	%	No	%	
Age in years					
18-19	138	33.5%	274	66.5%	.108
20-22	276	37.6%	458	62.4%	
23+	112	31.5%	243	68.5%	
Gender					
Male	212	49.3%	218	50.7%	.001*
Female	314	29.3%	757	70.7%	
Faculty					
Non-medical	288	41.3%	409	58.7%	.001*
Medical	238	29.6%	566	70.4%	
Academic year					
1	142	39.2%	220	60.8%	.048*$
2	95	34.1%	184	65.9%	
3	92	32.9%	188	67.1%	
4	94	40.5%	138	59.5%	
5	43	28.7%	107	71.3%	
6	22	34.4%	42	65.6%	
7	38	28.4%	96	71.6%	

*P: Pearson X^2 test $: Exact probability test * P < 0.05 (significant)*

Table 5 Factors associated with university student's use of sunscreen for sun protection. A total of 59.9% of students aged 20-22 used sunscreen versus 67.7% of others aged 18-19 years (P=.033). Also, 73.8% of female students used sunscreen in comparison to 35.1% of males (P=.001). Additionally, 70.1% of interns used sunscreen versus 67.1% of 1st year students (P=.006).

Table 5 Factors associated with university student's use of sunscreen for sun protection

Factors	Use of sunscreen				p-value
	Yes		No		
	No	%	No	%	
Age in years					
18-19	279	67.7%	133	32.3%	.033*
20-22	440	59.9%	294	40.1%	
23+	222	62.5%	133	37.5%	
Gender					
Male	151	35.1%	279	64.9%	.001*
Female	790	73.8%	281	26.2%	
Faculty					
Non-medical	432	62.0%	265	38.0%	.596
Medical	509	63.3%	295	36.7%	
Academic year					
1	243	67.1%	119	32.9%	.006*$
2	182	65.2%	97	34.8%	
3	157	56.1%	123	43.9%	
4	129	55.6%	103	44.4%	
5	98	65.3%	52	34.7%	
6	38	59.4%	26	40.6%	

7	94	70.1%	40	29.9%	

P: Pearson X^2 test $: Exact probability test * P < 0.05 (significant)

4. DISCUSSION

The most widely used sun protection technique is using sunscreen when going outside during the day. Other popular sun protection techniques include wearing protective clothes, a hat, sunglasses, and/or an umbrella, as well as avoiding UV exposure during peak hours. Our community utilizes sunscreen at a very low rate, despite having a good grasp of the risks connected with sun exposure, according to this study.

The country's hot, desert climate also encourages residents to spend more time indoors. The seasons with the highest UV indices are summer and fall, when more individuals are likely to indulge in outdoor leisure activities (Ermertcan et al., 2005). To raise public awareness about sun exposure risks and encourage sun protection measures, several sun protections programs have been launched in western countries. A noticeable increase in population awareness has occurred. However, there is still a lack of compliance with sun protection. Sun safety precautions are poorly understood by the Saudi population. This study's findings may be useful in creating therapies that work.

Considering this time frame falls after the spring seasons and the recall period for sunscreen use and sun exposure was lengthy, we chose June to August. Overall, 975 students in (65%) sun protection and sun exposure were well understood, while 526 students (35%) had inadequate knowledge. High prices for sun protection goods were the most often cited cause (43.6%). According to the findings of our study, Sunburn, hyperpigmentation, ageing and skin cancer were all recognized as negative effects of exposure to the sun. As compared to earlier Saudi Arabian studies, they were more aware. For instance, only 56% of participants in Al Robaee's first study (2010) and only 55.3% of those in the second study by Al Ghamdi et al., (2016) acknowledged knowing the connection between sunburn and skin cancer.

According to these findings, future ads need to emphasize sunscreen products' critical role as well as the right way to apply them. The media, especially social media, can be used to spread sun protection education to a broader audience. The effects of the sun and preventative methods ought to be covered in primary schools in order to instill healthy prevention practices among society's citizens. The curriculum and infrastructure needed to provide modern health education are already present in schools. It is more likely that people will change their behavior while they are young, since they can participate in learning-enhancing activities and form habits that will last a lifetime. The unpleasant sensation of the sunscreen lotion on the skin emerged as the primary issue in the analysis of factors that encourage people not to use sunscreen. Utilizing the right kinds of sunscreen will help to reduce this sensation. Other than sunscreen sticks and sprays, water-in-oil emulsions, oil-in-water emulsions, hydroalcoholic lotions and oily gels are also available (Balogh et al., 2011).

5. CONCLUSION

In general, male and female university students are aware that unprotected sun exposure can have negative effects and they are highly likely to use sunscreens. The two main strategies for protecting against the sun were seeking shade and dressing appropriately. To raise the degree of sun protection, a comprehensive policy of teaching on the proper application of sun protection techniques must be devised. Campaigns to raise awareness among the general public are another way to persuade individuals that using sun protection is desirable. Future studies are anticipated to broaden the survey's reach in terms of sample sizes and the kind of questions they ask, providing more information about people's understanding of the UV index and sun safety precautions. The findings of these studies will assist policy makers in developing practical plans to raise public awareness of the negative impacts of sun radiation.

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Authors' contribution

Each author contributed to the data analysis and interpretation and they all contributed to the final draft's critical review and approval. They are also each accountable for the manuscript's content and similarity score.

Ethical approval

This study was approved by the research ethic committee, University of Hail, Saudi Arabia (H-2022-275)

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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