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## The perception of sun exposure as predictor for skin cancer among health-related students in Umm Al-Qura University: A cross-sectional study

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**ABSTRACT**

**Background:** The significant increase in the incidence of skin cancer emphasizes the need to learn how to prevent it. Throughout this study, we polled health-related students at Umm Al-Qura University on their perception of sun exposure as a risk factor for skin cancer. **Objective:** The aim of this study was to determine the perception of sun exposure as a predictor for skin cancer among health-related medical students. **Methodology:** From January to February 2022, an analytic cross-sectional study was conducted at Umm Al-Qura University in Makkah, Saudi Arabia. **Results:** The current study involved 354 health-related students as participants. The average age of participants was  $21.97 \pm 1.75$  years. Males made up 72.8 percent of all responses, while females made up 27.2 percent. The vast majority of students were sixth-year medical students, accounting for 25.2 percent of total participation. In addition, the medical faculty was the most responsive of all the health colleges. The percentage of students with a high degree of knowledge in our study was the smallest. Sunscreen should be applied during sun exposure was answered correctly by 80% of respondents, while 20% wrongly responded that you do not need to apply sunscreen on cloudy days. **Conclusion:** Skin cancer is a serious disease requiring early detection and treatment. Excessive sun exposure causes most skin malignancies, which are preventable. These results indicate that there should be more campaigns in the future that emphasize the importance of sunscreen products and the correct way to apply them.

**Keywords:** Skin cancer, risk factors, triggers, awareness, prevalence

**1. INTRODUCTION**

The incidence of skin cancer is significantly rising in many countries, it represents the most commonly diagnosed cancer in the United States, with 5.4

million non-melanoma skin cancer cases treated annually (Nahar et al., 2018; Rogers et al., 2015) while, Melanoma is one of the most serious forms of skin cancer, can metastasize and become life-threatening (Nahar et al., 2018; Isvy et al., 2013). In United States, 87,110 new instances of melanoma were predicated to be diagnosed in 2017, with 9730 people expected to die as a result from this disease (Nahar et al., 2018). However, It is considered common malignancy cancer in Saudi Arabia as it accounts for 3.2% of all cancer newly diagnosed in 2010 (Alzahrani et al., 2018). They are basically classified into many types, but squamous cell carcinoma, basal cell carcinoma, and melanoma are the three most prevalent cancer of the skin (Alzahrani et al., 2018; Magnus et al., 1991).

Furthermore, the most common modified risk factor is exposure to ultraviolet (UV) radiation in reducing the hazard of the significant cancers of the skin (Alzahrani et al., 2018; Coups et al., 1996; Armstrong, 2004), therefore, practicing protective measures such as avoiding direct sun exposure during peak hours, wearing sunglasses, and application of sunscreens can help in decreasing the hazard of developing skin malignancies (Alzahrani et al., 2018; Coups et al., 1996; Armstrong, 2004; Nahar et al., 2013). Healthcare workers and health-related students play a major role in educating patients about the risk of sun exposure and the protective measures that can reduce the hazard of skin cancer developing.

Many studies in Saudi Arabia suggested different levels of awareness among non-medical students in other regions (Alsenaid et al., 2020; Samarkandy et al., 2020; Alamri et al., 2015; Almuqati et al., 2019; Al-Dawsari & Amra, 2016). Nevertheless, there is an insufficient study investigating awareness and knowledge of skin cancer among health-related students in Makkah city. A demand is that these studies need addition investigation at health-related students in Umm Al-Qura University at Makkah city.

## 2. METHODS

This analytic study was conducted at Umm Al-Qura University in Makkah, Saudi Arabia, from January to February 2022. The participants in the study were undergraduate students of medical colleges including: (College of Medicine, College of applied medical sciences, College of Dentistry, College of Pharmacy, and College of nursing) from the 2nd to the internship year. There are approximately 4100 students, and the sample size was calculated by epi info software VER 2.1. Considering confidence interval as 95% and level of significance (p-value) as 5%, we found the minimal sample size is 354.

Data was obtained from an online self-administrated questionnaire survey designed by the Google platform. Our survey was driven from previous published study (Patel et al., 2010). We distribute the questionnaire via social media among the undergraduate health care specialist students for one week, from 22th January to 28th January 2022. The questionnaire form was divided into two different parts. The first part contained demographic information like gender, age, college, academic year. The second part included a group of questions that assessed the perception of sunlight exposure as a predictor for skin cancer.

The Institutional Research Board approved this study at Umm Al-Qura University (Approval No. HAPO-02-K-012-2022-02-986). All of the participants in the study were provided information on the study's objectives and assured that their responses would be kept confidential and not be released. The obtained data were statistically analyzed using SPSS version 22. Frequently was determined for categorical variables and mean  $\pm$  standard deviation for the continuous variables. We used the chi-square test to differentiate the categorical variables. A P-value of  $\leq 0.05$  was considered statistically significant.

## 3. RESULTS

Overall, 354 health-related students among different health-related departments were surveyed. The average age of participants was 21.97 years (SD= 1.75); the (22-24) age groups were mainly represented (195, 54.6%), while the (25-26) age groups were the lowest responding (19, 5.3%). The majority of respondents were males (n 260) representing 72.8%, while females (n 97) represented 27.2% (Table 1). Senior health students (6th year) were predominately representing (90, 25.2%), followed by joiners health students (n. 80), representing 22.4%. In addition, the college of medicine was the most responsive among all health colleges, representing (259, 72.5%) (Table 1).

**Table 1** Demographic data

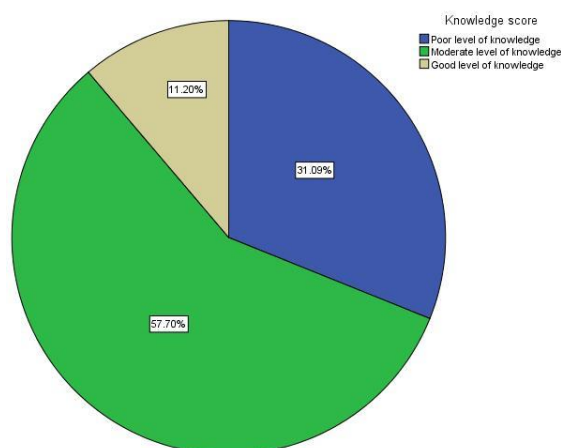
Variable	Category	N	(%)
Age ( <i>mean</i> ( <i>SD</i> ))	(21.97 (1.75) )		
	19-21	143	40.1
	22-24	195	54.6
	25-26	19	5.3
Gender	Male	260	72.8
	Female	97	27.2

Academic year	2 <sup>nd</sup> year	80	22.4
	3 <sup>rd</sup> year	56	15.7
	4 <sup>th</sup> year	30	8.4
	5 <sup>th</sup> year	73	20.4
	6 <sup>th</sup> year	90	25.2
	intern	28	7.8
Collage	College of medicine	259	72.5
	College of dentistry	24	6.7
	College of pharmacy	30	8.4
	College of nursing	13	3.6
	College of applied medical sciences	31	8.7

9-subgroups questions were aimed to assess students' knowledge about sunlight exposure as a risk factor for skin cancer (Table 2). Conversely, according to modified Bloom's criteria to calculate knowledge score. Most students have shown a moderate level of knowledge, representing 57.70%, while 31.09% have a poor level of knowledge (Figure 1). Furthermore, students acquainted with a good level of knowledge were the least, representing 11.20%.

**Table 2** Percentage of the correct responds

Questions	Correct answer %
Sunscreen should be applied during sun exposure	80.1
Sunscreen only needs to be applied while at the beach or pool	77.3
You do not need to wear sunscreen on cloudy days	34.5
Sunscreen should be reapplied every time after going in the water	35.3
Eye protection from the sun (sunglasses) is important	73.4
If you apply sunscreen, you only need to apply it once a day	42.9
If you wear a hat, you do not need to applied sunscreen	67.5
You should limit exposure to the sunlight during the hours of 10 AM to 4 PM	57.4
Long-sleeved clothing protects you from the sun	58.3



**Figure 1** Frequency of level of knowledge scores among health-related students

The college of medicine corresponded significantly with subgroup questions of "Sunscreen should be worn during sun exposure" and "Sunscreen should be reapplied every time after going in the water "(P value, 0.024, 0.006, respectively). Simultaneously, no significant relationship was found between health-collages and other subgroup questions (Table 3). The associations between the level of students' knowledge and students' demography were labeled in (Table 4); male students correspond significantly with the level of knowledge (p-value, 0.000) compared with female students. In addition, the association between the level of knowledge and students' age groups, collages, and academic years was not significant (p-value, 0.754, 0.840, 0.902, respectively) (Table 4).

**Table 3** The relation of students' collages and subgroups questions

Category	Answers (%)	Collages					p-value
		College of medicine	College of dentistry	College of pharmacy	College of nursing	College of applied medical sciences	
Sunscreen should be applied during sun exposure	Correct answers (%)	75.2%	5.2%	8.0%	3.5%	8.0%	0.024*
Sunscreen only needs to be applied while at the beach or pool	Correct answers (%)	72.5%	5.8%	8.3%	4.3%	9.1%	0.846
You do not need to wear sunscreen on cloudy days	Correct answers (%)	67.5%	8.1%	12.2%	4.1%	8.1%	0.519
Sunscreen should be reapplied every time after going in the water	Correct answers (%)	62.7%	11.9%	13.5%	2.4%	9.5%	0.006*
Eye protection from the sun (sunglasses) is important	Correct answers (%)	73.7%	6.5%	9.2%	3.8%	6.9%	0.501
If you apply sunscreen, you only need to apply it once a day	Correct answers (%)	67.3%	7.8%	11.8%	3.9%	9.2%	0.264
If you wear a hat, you do not need to applied sunscreen	Correct answers (%)	71.4%	7.1%	9.1%	4.1%	8.3%	0.481
You should limit exposure to the sunlight during the hours of 10 AM to 4 PM	Correct answers (%)	72.7%	7.8%	6.8%	4.9%	7.8%	0.174
Long-sleeved clothing protects you from the sun	Correct answers (%)	75.0%	6.3%	7.7%	2.4%	8.7%	0.640

**Table 4** The associations between students' demography and level of knowledge

Variable	Level of knowledge			P-value
	Good (%)	Moderate (%)	Poor (%)	
Age				
19-21	11.9%	60.1%	28.0%	0.754
22-24	10.8%	56.9%	32.3%	
25-26	10.5%	47.4%	42.1%	

Gender				
Male	5.8%	55.0%	39.2%	0.000*
Female	25.8%	64.9%	9.3%	
Colleges				
College of medicine	10.0%	58.3%	31.7%	0.840
College of dentistry	16.7%	50.0%	33.3%	
College of pharmacy	13.3%	63.3%	23.3%	
College of nursing	7.7%	69.2%	23.1%	
College of applied medical sciences	16.1%	48.4%	35.5%	
Academic years				
2th year	13.8%	53.8%	32.5%	0.902
3th year	8.9%	62.5%	28.6%	
4 <sup>th</sup> year	6.7%	56.7%	36.7%	
5 <sup>th</sup> year	13.7%	54.8%	31.5%	
6 <sup>th</sup> year	12.2%	57.8%	30.0%	
Intern	3.6%	67.9%	28.6%	

#### 4. DISCUSSION

In Saudi Arabia, recent reports revealed that the incidence of skin cancer has grown over the past years despite it being avoided in some cases (Alzahrani et al., 2018), and it is the most prevalent type of cancer in humans (Gordon, 2013). Moreover, according to the Saudi cancer registry, 207 (3.60%) males and 166 (2.30%) females were reported to have non-melanoma skin cancer in 2016. Individuals' knowledge and attitude toward the disease are essential variables in disease control and early identification (Alamri et al., 2015). However, medical personnel slightly perceive sunlight exposure and its risks (Alzahrani et al., 2018). Furthermore, in this study, we purposed to assess the health-related medical students' perception of sunlight exposure as a predictor for skin cancer by evaluating their level of knowledge.

According to the results of this study, males represented 72.8% of respondents, and females represented 27.2% which was different from the other three previous studies (Alzahrani et al., 2018; Alamri et al., 2015; Kelati et al., 2017). In addition, the students from the faculty of medicine were the vast majority of the respondents, and it is similar to the previous study was done at King Abdulaziz University (Alzahrani et al., 2018). Most students have shown a moderate level of knowledge, while the students with a high level were the smallest percentage. Besides that, the college of dentistry got the highest percent of increased knowledge. Otherwise, the students from the college of applied medical were the highest percentage of poor understanding. Compared to Western research, we noticed greater awareness among university students from Western areas, particularly about the association between skin cancer and sun exposure.

A study held in the United States assessed college students' knowledge and attitudes about sun exposure threats. It was revealed that most participants were well aware that sunlight exposure raised the hazard of skin cancer. Moreover, only 29% of participants accurately recognized risk-reduction practices (Almuqati et al., 2019). Different study in 2017 was conducted in four US cities with Hispanic and black respondents (aged 18–44). Although all of respondents had heard about skin cancer, their knowledge differed depending on where they lived. Respondents in Los Angeles and Miami were more knowledgeable about skin cancer symptoms, terminology, and sun protection techniques than Atlanta and Chicago. There were no discernible changes in terminology knowledge based on risk stratification or race/ethnicity (Buchanan et al., 2018).

However, regarding the questionnaire and their correct answers, "Sunscreen should be applied during sun exposure" has been answered correctly by 80.1% of the respondents, then "Sunscreen only needs to be worn while at the beach or pool," then "Eye protection from the sun (sunglasses) is important" were the highest percentage of correct answer respectively. Moreover, the minor question that has been correctly answered is "you do not need to wear sunscreen on cloudy days" by 34.5%. These results suggest

the requirement for future campaigns emphasizing the importance of sunscreen products and proper application methods, as well as increasing skin cancer awareness.

The limitation of our study is that the sample cannot be representative of the overall population. In addition, the high sample size is required in future studies. These results indicate that there should be more campaigns in the future that emphasize the importance of sunscreen products and the correct way to apply them.

## 5. CONCLUSION

Skin cancer is a serious disease that necessitates early detection and treatment. Excessive sun exposure causes most skin malignancies, which are preventable. Our study's strength is that it was low-cost, rapid, and practical, as participants only had to be evaluated once. In addition, there was no requirement for a follow-up study, and recruiting volunteers was more accessible.

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### Author's contribution

Salah Bakry: Manuscript editing and review – literature search – Result writing \_ Concept\_ Statistical analysis

Abdullah Meshal Alharthi: Manuscript editing and review – literature search – design

Amer Abdulaziz Eisa: Manuscript editing and review – literature search – discussion writing

Ammar Adel Bakhsh: Manuscript editing and review – literature search – Abstract and Conclusion writing

Ammar Khalid Mandili: Manuscript editing and review – literature search – discussion writing

Omar Abdulaziz Althobity: Manuscript editing and review – literature search – Methods writing

Mohammed Mohammed Alomairi: Manuscript editing and review – literature search – Methods writing

Mokhtar Mahfouz Shatla: Manuscript editing and review – literature search – General Supervision

### Ethical approval

The study was approved by the Ethics and Research Review Committee of Umm Al-Qura University, Faculty of Medicine (Approval number: HAPO-02-K-012-2022-02-986), Data of approval was 28/02/2022.

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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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