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Original article

Evaluation of Medical Students' Knowledge and Their Adherence to Safety Measures Regarding Solar Ultraviolet Exposure

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ABSTRACT

Ultraviolet radiation, a type of electromagnetic radiation, can be released by both artificial and natural sources, including the sun. It is imperative to adopt the appropriate safety measures when close to an ultraviolet radiation source, as unprotected UV radiation exposure has been associated with a higher risk of developing various illnesses, such as skin tumors. This study aims to evaluate undergraduate medical students' knowledge of potential hazards from UV radiation exposure and their practice of safety measures. A cross-sectional study was conducted at Omar Al-Mukhtar University, Al-Beyda City, Libya. One hundred and nine medical students were involved in this study. The questionnaire examined participants' knowledge of and behavior toward potential risks associated with ultraviolet (UV) radiation exposure. Notably, 77.1% of them were female, and 22.9% were male. The majority of the respondents were more than 22 years old. Above half, 59.6% showed moderate knowledge about UV exposure consequences; most of the students, 91%, knew the side effects of UV on health, followed by 86%, who indicated that UV can cause premature aging and cancer. In contrast, less than a third knew that UV has a negative impact on the immune system, and about two-thirds (73.9%) didn't realize that sunburn can occur even on a cloudy day. Although medical students showed a moderate level of knowledge regarding UV radiation, there was a lack of active sun safety measures.

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INTRODUCTION

UV radiation is one type of electromagnetic radiation that is produced artificially, such as in tanning beds and welding lamps. It can be categorized into three groups: UVA, UVB, and UVC, based on energy levels (1). UVA has the lowest energy of the three forms of UV light, whereas UVC has the most energy. Exposure to high levels of UV radiation from the sun is a result of the thinning of the stratospheric ozone layer (2).

Exposure to the sun without protection has been associated with various health issues. Immediate consequences include sunburn and tanning, whereas prolonged and cumulative exposure can result in weakened immune system function, premature aging of the skin, and skin cancer (especially in individuals with fair skin) (3, 4).

It's quite astonishing to learn that each year, there are approximately 2–3 million cases of non-melanoma skin cancer and around 132,000 cases of malignant melanoma reported worldwide, according to the World Health Organization. In the United States, it is estimated that about 1 in 5 individuals will develop skin cancer at some point in their lives. These numbers highlight the importance of being aware of the risks and taking measures to safeguard our skin.

A study conducted in the UK indicated that 86% of melanomas can be attributed to exposure to UV radiation (5). Despite this knowledge, the incidence of skin cancer continues to rise. Remarkably, up to 80% of skin cancer cases can be prevented by implementing effective sun protection measures. It is estimated that UV radiation causes a loss of approximately 1.5 million days of life annually for people worldwide (6).
Since knowing and treating these issues is crucial, this study was done to assess the knowledge level of undergraduate medical students regarding the dangers of UV radiation exposure and what precautions they were taking to reduce it.

METHODS

Study design

A cross-sectional study was done among the medical students of Omer Al-Mukhtar University in Al-Beyda, Libya, in 2024. One hundred and nine medical students were selected randomly.

Data collection

A survey of fifteen questions was randomly distributed in January 2024 by social media networks such as WhatsApp and Telegram to determine the level of knowledge among medical students regarding the hazards of ultraviolet. The questionnaire was modified from a previous study (7). There were two primary sections: demographic factors, the impact of UV exposure, and the measures they used to protect their skin from the hazards of UV.

Data analysis

The questionnaire data was fed into SPSS version 20 and then analyzed by using descriptive statistics and the Chi-Square Test (χ^2)

RESULTS

One hundred nine medical students participated in this study; the majority were female (77.1%), while the men were 22.9%. The respondents mostly belonged to the age group more than 22 years (Table 1).

Table 1. Response rate of demographic

Age		Gender		Undergraduate year	
≤ 22	> 22	Male	Female	Basic year (First, second, third years)	Clinical years (Fourth. fifth, internship)
38(34.9%)	71(65.1%)	25(22.9%)	84.9(77.1%)	53(48.6%)	56(51.4%)

Section 2 includes eleven items designed to assess medical students' knowledge regarding UV radiation exposure. The majority of participants (91.7%) stated that prolonged exposure to the sun is harmful to their health. Regarding item 2, 29.4% of respondents were unaware that there are other sources of UV radiation besides the sun. For item 3, the majority of students stated that sunlight triggers the production of vitamin D. For item 4, nearly half of the students (58.7%) were aware that prolonged sun exposure can be dangerous, even with high SPF. 81.7% of participants demonstrated a high level of knowledge regarding item 5—that sunscreen can protect against UV radiation—while just 24.8% of respondents were unaware of the necessity of using it (Table 2).

Table 2. Percentage assessment of t knowledge items

Quires	Yes n(%)	No n(%)	I don't know n(%)
Health can be negatively affected by excessive exposure to the sun.	100(91.7%)	7(6.4%)	2(1.8%)
Apart from the sun, there are other sources of ultraviolet radiation.	69(63.3%)	8(7.3%	32(29.4%)
Sunlight triggers the production of Vitamin D in the skin.	101(92.7%)	8(7.3%)	0(0%)
Even with the use of high SPF products, prolonged sun exposure can still be hazardous.	64(58.7%)	11(10.1%)	34(31.2%)
To safeguard against the detrimental effects of the sun, it is important to apply sunscreen.	89(81.7%)	1(0.9%)	19(17.4%)
It is recommended to reapply sunscreen every 2 hours.	63(57.8%)	19(17.4%)	27(24.8%)
Sunburn can occur even without feeling heat on the skin from sunlight.	80(73.4%)	10(9.2%)	19(17.4%)

Exposure to the sun can lead to skin aging, wrinkling, discoloration and Skin tumors.	94(86.2%)	6(5.5%)	9(8.3%)
Sunburn can still occur on cloudy days.	29(26.6%)	43(39.4%)	37(33.9%)
Sunlight can have an impact on suppressing the immune system.	33(30.3%)	19(17.4%)	57(52.3%)
When it comes to sun protection, light-colored clothing tends to offer better coverage than dark colored clothing.	82(73.4%)	9(8.3%)	20(18.3%)

Table 3 used the chi-square test to describe the correlation between the knowledge item and demographic characteristics. The P value is considered significant if it is less than 0.005. The link between gender and knowledge level about the necessary use of sunscreen every two hours was shown to be significant (p-value = 0.003). However, the other statements indicated there is no significant association between knowledge items, information, and demographic factors since the p-value is $\geqslant$0.005.

Table 3. Chi-square test of association between age, sex, and undergraduate year versus the factors

Variable	Age p- value	Sex p- value	Undergraduate year p- value
Health can be negatively affected by excessive exposure to the sun.	0.530	0.330	0.951
Apart from the sun, there are other sources of ultraviolet radiation.	0.644	0.319	0.159
Sunlight triggers the production of Vitamin D in the skin.	0.871	0.466	0.939
Even with the use of high SPF products, prolonged sun exposure can still be hazardous.	0.083	0.890	0.178
To safeguard against the detrimental effects of the sun, it is important to apply sunscreen	0.512	0.182	0.612
It is recommended to reapply sunscreen every 2 hours.	0.703	0.003	0.989
Sunburn can occur even without feeling heat on the skin from sunlight	0.201	0.369	0.014
Exposure to the sun can lead to skin aging, wrinkling, and discoloration.	0.183	0.616	0.109
Sunburn can still occur on cloudy days	0.666	0.600	0.182
Sunlight can have an impact on suppressing the immune system	0.102	0.150	0.006
When it comes to sun protection, light-colored clothing tends to offer better coverage than dark-colored clothing	0.581	0.247	0.558

Our study evaluated knowledge levels by assessing knowledge scores as shown in Table 4. The data indicated the level of knowledge of our study is moderate, and females show more awareness of UV exposure consequences than males.

Table 4. Knowledge score

Level of knowledge	Male	Female	Total (Percentage)
Low ≤4 items	2	8	10(9.1%)
Moderate 5-8	16	49	65(59.6%)
High 9-11	7	27	34(31.1%)

The last question in the survey evaluated medical students' use of sun protection procedures, as shown in Figure 1. The results showed that females were more aware of using safety precautions against UV radiation since about 65% of them used sunscreen, nearly 20% used umbrellas and hats, compared to 18% of males who used sunscreen, and only 4%.3% used hats and umbrellas. However, 13.7 % of medical students were not taking any precautions against UV radiation.

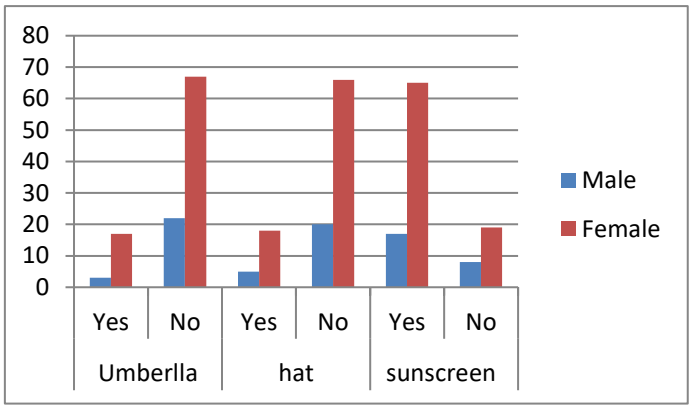

Figure 1: Percentage of using measures of UV protection

DISCUSSION

Human exposure to solar ultraviolet radiation has a significant negative influence, UV is the most important modifiable risk factor for skin cancer, pigmentation, and premature aging (3). This study was done to investigate the knowledge level of medical students regarding UV radiation exposure and what they used as precautionary measures to protect themselves.

Our study indicated that 86.2% of medical students have good knowledge about UV as the risk of skin cancer, premature aging, and discoloration compared to the study conducted in Poland since 27.93% knew the UV risk of skin aging while 28.83% and 76.58% knew the UV could be a risk of skin burns and skin cancer, respectively (8). Another study conducted in Turkey indicated that university students have low knowledge of UV as a risk of skin cancer (9). However, there were studies that indicated almost our results in question regarding UV risk factors for aging discoloration; one of them conducted in Pakistan revealed that 91.5% of participants responded correctly to the same question (7). Another one was done in Northeast China. The majority of participants were aware of how UVR can cause sunburn (92.2%) and skin cancer (95.6%) (10).

Previous studies have shown that women are typically more aware than men of the risks associated with UV radiation (9, 11), which was consisting with our results. Additionally, research indicates that students knew that the structure of vitamin D depends on UV exposure (6, 8), which also reported in our study that 92.7% of respondents chose the correct answer; however, 73.4% of our participants revealed good knowledge of the statement that says that when it comes to sun protection, light-colored clothing tends to offer better coverage than dark-colored clothing.

In a study conducted by medical students in Pakistan, 83.5% chose the correct answer to the same questions (7). However, there were two items related to UV that were poorly recognized among our students: 26.6% knew that sunburn can still occur on cloudy days, while 23.3% revealed that UV exposure can inhibit the immune system. Our results almost match the study (7).

As regards the association between the demographic factors and knowledge items based on Chi-square, our study indicates significant variation between gender and knowledge item 5 in the questionnaire. As regards other factors, there was no correlation between the knowledge information answers and age, which indicated in (7) precaution of sunlight protection that females showed more practice against UV exposure compared to males, where sunscreen was the pioneer method, with 65% used by female medical students, followed by umbrellas and hats with almost the same percentage. In contrast, only 18% of the males used sunscreen, and less than 5% of them used other methods.

CONCLUSION

Students in the current study had a moderate level of knowledge about UV radiation (UVA) as a risk factor for skin aging wrinkles and skin cancer, but their behavior was not appropriate to their level of knowledge especially among male medical students.

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Conflicts of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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تقييم معارف طلاب الطب ومدى التزامهم بإجراءات السلامة فيما يتعلق بالتعرض للأشعة فوق البنفسجية الشمسية

هناء حفالش

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المستخلص

الأشعة فوق البنفسجية ، وهي نوع من الإشعاع الكهرومغناطيسي ، من قبل كل من المصادر الاصطناعية والطبيعية ، بما في ذلك الشمس. من الضروري اعتماد تدابير السلامة المناسبة عندما تكون على مقربة من مصدر الأشعة فوق البنفسجية ، حيث ارتبط التعرض للأشعة فوق البنفسجية غير المحمية بزيادة خطر الإصابة بأمراض مختلفة ، مثل أورام الجلد. تهدف هذه الدراسة إلى تقييم معرفة طلاب الطب الجامعيين بالمخاطر المحتملة من التعرض للأشعة فوق البنفسجية وممارستهم لتدابير السلامة. أجريت دراسة في جامعة عمر المختار ، مدينة البيضاء ، ليبيا. شارك مائة وتسعة من طلاب الطب في هذه الدراسة فحص الاستبيان معرفة المشاركين وسلوكهم تجاه المخاطر المحتملة المرتبطة بالتعرض للأشعة فوق البنفسجية. النتائج.77.1 ٪ منهم من الإناث و 22.9 ٪ من الذكور. كانت غالبية المستجيبين أكثر من 22 سنة. فوق النصف 59.6 ٪ أظهروا معرفة معتدلة حول عواقب التعرض للأشعة فوق البنفسجية ، ومعظم الطلاب 91 ٪ يعرفون الآثار الجانبية للأشعة فوق البنفسجية على الصحة تليها 86 ٪ أشاروا إلى أن الأشعة فوق البنفسجية يمكن أن تسبب الشيخوخة المبكرة والسرطان. على النقيض من ذلك ، عرف أقل من الثلث أن الأشعة فوق البنفسجية لها تأثير سلبي على جهاز المناعة ، وحوالي الثلثين 73.9 ٪ لم يدركوا أن حروق الشمس يمكن أن تحدث حتى في م يوم غائم. على الرغم من أن طلاب الطب أظهروا مستوى معتدلا من المعرفة فيما يتعلق بالأشعة فوق البنفسجية، إلا أنه كان هناك نقص في استخدام تدابير السلامة النشطة من أشعة الشمس.

الكلمات الدالة. المعرفة، UVA، الطلاب.