Journal of Pakistan Association of Dermatologists. 2023;**33(3)**:972-979.

Original Article

Prevalence and factors of sunscreen use in medical and paramedical students: A cross-sectional study in Punjab, Pakistan

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Abstract

Background Exposure to environmental ultraviolet radiation (UVR) has many adverse biological effects on the human body which comprise of cutaneous aging and cutaneous carcinogenesis. These can be minimized by regular use of photoprotective measures especially when started at a young age. This study was conducted to assess the knowledge, outlook and perceptions about sunscreens and photoprotective measures in medical and allied health science students.

Methods The data was collected using an online questionnaire distributed among medical and paramedical students of various government institutes of Punjab via WhatsApp groups over a four months.

Results A total of 437 students responded which consisted of 63% females and 37% males with a prevalence of use in 48%. Most of the participants were aged between 20-30 years (66%) and lived in urban area (72%). About half did not use sunscreens and only 17% used sunscreens on a daily basis. The main purpose of using sunscreens was prevention of skin darkening (65%). About two-thirds had experienced side effects with sunscreen use. About half knew about the time and sites of application but more than two-thirds did not have any idea of re-application timings.

Conclusion Prevalence of sunscreen use in medical and paramedical students of Punjab was 48% with a large ratio not having sufficient knowledge of sunscreen use and practice.

Key words
Prevalence; Sunscreen; Photoaging.

Introduction

Exposure to environmental ultraviolet radiation (UVR) has many biological effects on the human body. These include acute adverse effects such as erythema, tanning and immunosuppression, and chronic adverse effects which include photoaging and photocarcinogenesis.[1] The main advantage of cutaneous UV exposure is synthesis of Vitamin D which in turn has many health benefits such as protection against cardiovascular diseases and reduced risk of breast and colorectal malignancies.[2,3]

The main source of environmental UVR is the sun. The pigmentation of the skin, and the extent and duration of sun exposure determine the damage caused by the solar radiation, therefore, sun protection-related knowledge and behavior are important aspects in prevention of solar damage.[4] Regular use of photoprotective

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measures since childhood, avoiding UVR by physical measures and use of sunscreens retard photoaging and photocarcinogenesis.[1,5,6] Although Asians have a much lower incidence of cutaneous malignancies as compared to fair-skinned individuals but, as in other skin of colour populations, the morbidity and mortality associated with skin cancers is disproportionately higher.[7] The regular use of sunscreens and other photoprotective measures is, therefore, clinically relevant in our population too.

The recommended photoprotective measures for Asian skin are similar to those for other populations and include use of a sunscreen with a minimal sunprotection factor (SPF) of 30 on a daily basis, reapplication of sunscreen every two hours, use of protective clothing and seeking shade in environmental conditions with high ambient UV exposure.[8] The SPF of a sunscreen is determined by calculating the ratio of the smallest UVR dose causing erythema (minimal erythema dose or MED) of sunscreen covered skin compared to the MED on uncovered skin.[9]

Experience from daily dermatologic practice in our population reveals that many patients having photodermatoses and even normal individuals use sunscreens to prevent tanning and improve complexion, rather than for prevention of sunburn or skin cancer owing to lack of knowledge about sunscreen. Moreover, even when sunscreens is used there are many factors which alter its efficacy in preventing against photodamage such as SPF, water resistance, timing and frequency of application, etc. of which most of individuals are unaware.[10]

Our study has highlighted a gap in the sunscreen knowledge and behavior in both medical and paramedical students of Pakistan as they are future health care professionals to advise sun protective measures to their patients. To the extent of our knowledge only one study has been conducted in Pakistan related to the sunscreen use by medical students.[11] Another study by Nadia Sultan relates to the preventive effects of sunscreen on melasma but does not cover other advantages of sunscreen use and relevant practices.[12] No study has been performed that encompasses awareness regarding knowledge of photoprotection and sunprotective behavior to establish the prevalence of sunscreen use especially in second big city of Pakistan i.e. Lahore having majority of medical colleges for both the medical and paramedical students.

Methods

The sampling frame consisted of 1600 eligible students. Sample size of 440 was calculated assuming 69.5% prevalence of sunscreen use and practice with 5% margin of error and 95% confidence level. Convenience sampling was utilized to administer a structured online questionnaire for collecting data and reach the sample size of 465. This online questionnaire which was distributed among medical and paramedical students in various teaching hospitals of Lahore via WhatsApp groups after approval from the ethical review committee of Lahore General Hospital, Lahore (although it was an online questionnaire based study). The students who were unwilling to respond or could not comprehend English were excluded. The data collection was performed from April 2021 to July 2021.

After informed consent the participants filled out a predesigned, structured form in English language which included questions about their demographic details, and their knowledge, attitude and perceptions about UVR effects, sunscreen and other photoprotective behaviors. A total of 465 questionnaires were collected over four months out of which 28 questionnaires were rejected due to incomplete responses.

Data was analyzed using IBM SPSS version 21 and the effects of different variables like gender, residential area, etc. on the knowledge, perceptions and practice of photoprotective measures was measured.

Results

A total of 465 respondents were included. The demographic features of the respondents are shown in **Table 1**.

Most of the students were aware of the role of skin in Vitamin D synthesis, the adverse effects of solar radiation and the role of sunlight in skin aging (**Table 2**).

Table 1 Demographic features of the study population.

Feature	*N (%)*
Age	
Less than 20 years	144 (33)
20-30 years	289 (66)
More than 30 years	4 (1)
Gender	
Male	161 (37)
Female	276 (63)
Residential area	
Urban	314 (72)
Rural	123 (28)
Degree/Course	
MBBS	284 (65)
Pharm D	14 (3)
Physiotherapy	32 (7)
Nursing	30 (7)
BDS	4 (1)
Allied Health Sciences	61 (14)
Miscellaneous	12 (3)

MBBS: Bachelor of Medicine, Bachelor of Surgery; Pharm D: Doctor of Pharmacy; BDS: Bachelor of Dental Surgery

Table 2 Knowledge about Sunlight and UV radiation.

Feature	*N (%)*
Benefits of Sunlight	
Synthesis of Vitamin A	16 (4)
Synthesis of Vitamin D3	415 (95)
Treatment of certain skin diseases	6 (1)
Side effects on skin	
Yes	300 (69)
No	73 (17)
Maybe	64 (14)
Skin aging	
Yes	243 (56)
No	111 (25)
Maybe	83 (19)

Nearly half the participants identified digital media as their main source of information about skin care and sunblock use while discussion with a physician or a friend/ family member, each accounted for 18%. Other less frequent information sources were saloon visits and print media like magazines or newspapers.

The most regular photoprotection behavior reported by 41% respondents was avoidance of outdoor activities during peak sun hours and only 17% used sunscreens on a daily basis for sunprotection. The most frequent purpose behind using sunscreen was prevention of skin darkening indicated by 65%, followed by prevention of sunburn in 22%. Only 13% were using sunscreens to prevent skin aging or cancer.

It was observed that 52% did not use sunscreens at all (**Figure 1)**. About one third of these cited forgetting to apply as the main reason and 18% said that they did not have time to apply in their morning routine. 28% were not convinced about the need for sunscreens and 16% had stopped due to side effects of oiliness or sweating. Only 10% said that they did not use sunscreens due to the cost.

The most frequent side effects experienced while using sunscreens were sweating and acne which was reported by 45% participants. Other less common unpleasant effects included skin discomfort and burning. About 37% individuals said that they did not experience any side effects with sunscreens.

Table 3 depicts the knowledge of participants about sunscreen use. Most of the students did not know about the effect of sunscreens on Vitamin D synthesis. 11% thought that sunscreens inhibit production of Vitamin D

Table 3: Knowledge about Sunscreen Use

Feature	*N (%)*
Safety	
Safe	343 (79)
Harmful	11 (2)
No idea	83 (19)
Concept of SPF, UV index, Fitzpatrick skin types	
Yes	71 (16)
Somewhat	136 (31)
No	230 (53)
Asian skin needs Sunscreens	
Yes	276 (63)
No	32 (7)
No idea	129 (30)
Sunscreen prescription in children	
Yes	104 (24)
No	115 (26)
No idea	218 (50)
Frequency	
Daily	75 (17)
Occasionally	115 (26)
Seldom	88 (20)
Never	159 (37)
Site of application	
Face	178 (41)
Hands and Neck	32 (7)
Arms	14 (3)
All exposed areas	178 (41)
No idea	35 (8)
Time of application	
Immediately after going in sun	57 (13)
Half hour before going in sun	216 (49)
One hour before going in sun	13 (3)
No idea	151 (35)
Frequency of re-application	
2 hourly	51 (12)
4 hourly	36 (8)
6 hourly	51 (12)
No idea	299 (68)
Amount used for face	
Half teaspoon	94 (22)
1 teaspoon	62 (14)
2 teaspoon	15 (3)
No idea	266 (61)

while 29% thought that it did not. **Figure 1** shows various reasons for not using the sunscreen.

In terms of prescribing practice in future, about half of the participants said that they would recommend a sunscreen to their family members and patients. However, upto 42% were unsure and 6% said they would not recommend a sunscreen.

Discussion

Sunscreens are an important aspect of photoprotection that help reduce photocarcinogenesis and photoaging when used regularly and appropriately. Physicians have an essential role in preventive practices and the general population are more likely to follow the recommendations of medical staff about skin care practices. Medical students need to have a thorough understanding of the advantages and proper use of sunscreens so they can adequately counsel their patients in the future.

The present study aimed to identify the concepts of medical and paramedical students about the cutaneous effects of solar radiation, photoprotection and sunscreens. The participating students comprised of 63% females and 37% males mostly in their twenties. Most of the students were aware of the synthetic role of skin (95%), the adverse effects of solar radiation (83%) and skin photoaging (75%). Alssageer *et al.* also observed that 88% of their students were aware of cutaneous Vitamin D synthesis on sun exposure.[13] Similarly, a study by Al Battat and colleagues on medical students reported a very good knowledge (96%) about solar radiation effects.[14]

Digital media was the main source of information regarding sunscreen use in about half the respondents, and discussion with a physician or a friend/ family member, each accounted for 18% respondents. This aligns with the overall increasing use of social media among the students and youngsters for skincare information.[15] Novitasari *et al.* also elicited a predominant role of internet for sunscreen information in medical students while only 9% students reported physicians as a source of

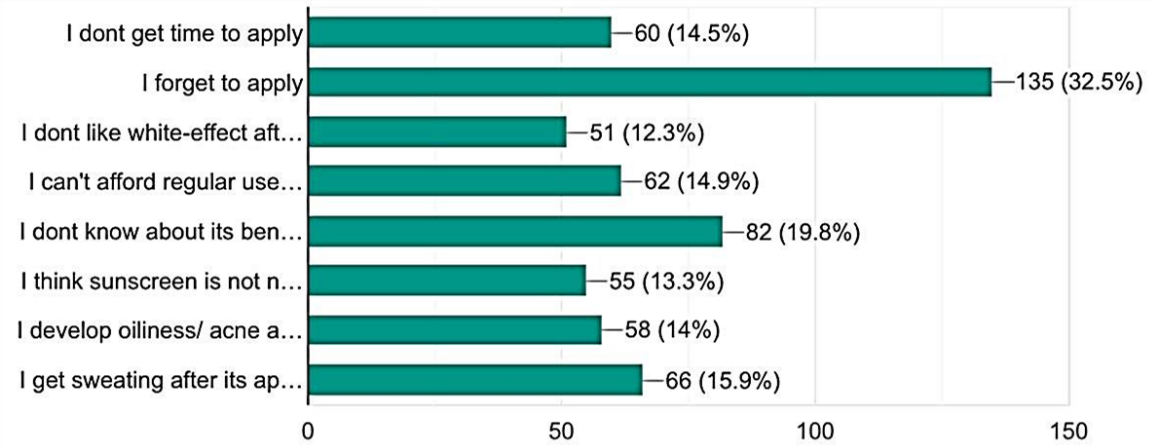

Figure 1 Reasons in sunscreen non-users.

sunscreen information.[16] Similarly, Bhardwaj and co-researchers observed that advertisements were the main source of information affecting use of cosmetic and skincare products including sunscreens in 68% of college students while family advice influenced 25% students in their choices.[17]

The major sunprotection modes selected by the participants were staying indoors during peak hours (41%) and sunscreen usage (48%). A study by Memon and colleagues reported an even higher rate of sunscreen use (69%) by Pakistani medical students for photoprotection.[11] Al Battat from Iraq observed that atleast 47% of their medical students used several sunprotection methods including wearing protective clothing and avoiding excess sun exposure.[14] However, Seetan and colleagues found that only 20% medical students in Jordan avoided sun during peak hours.[18] There is a possibility that the variation in the reported means of sunprotection from different countries is due to differences in their climatic conditions

The results of the present research revealed that 52% students did not use sunscreens giving reasons such as forgetting to apply (29%), lack of time to apply (18%) or various side effects (16%). However, cost of sunscreens was not a very significant factor in this research as only 10% indicated expense as a reason for non-compliance. Memon *et al.* reported a very high ratio of medical students (50%) who did not use sunscreens due to side effects especially oily skin texture, while other causes were forgetting to apply (35%) and time wastage (23%).[11] Weig and his fellow researchers from Iowa, also identified poor aesthetic appearance and texture as the causative factor in 34% and lack of time in 15% of individuals not using sunscreens. In addition, 16% of their subjects reported costly preparations leading to noncompliance.[19]

Overall about half of the medical students (48%) used sunscreens although regular daily use was quite low (17%). Different researchers have observed differing ratios of regular sunscreen use by medical students which range from 7% observed by Upadhyay *et al.* from India, 32% in a study by Battat *et al.* on Iraqi medical students and upto 38% documented by Gambetta in Peruvian medical students.[20,14,21] This wide range probably depicts the variable use of sunscreens in the general population of these areas as well as a wide variation in the curricular level stress on sunprotection awareness in the medical institutes.

It was observed that 57% female students used sunscreens compared to only 34% male students. This female predominance was also observed by

several other researchers such as Al Battat (93% females versus 25% males) and Alssageer (43% females versus 0% males).[13,14] Since females tend to use more cosmetic and skincare products and facial skincare has traditionally been a considered a feminine characteristic, this gender ratio observed in several studies is expected.

There was no significant difference in sunscreen use by students from rural and urban backgrounds in the present study. This is similar to the findings of Bhardwaj *et al.* from India who observed no effect of rural or urban residence on sunscreen usage.[17]

The most frequent purpose behind using sunscreen was prevention of skin darkening indicated by 65%, followed by prevention of sunburn in 22%. Only 13% were using sunscreens to prevent skin aging or cancer. Another study conducted in Pakistan also illustrated the same reasons of sunscreen usage which included prevention of skin tanning (38%) and sunburn (28%).[11] These results reflect the use of sunscreens by our population as a cosmetic aid rather than as a preventive tool against skin aging and skin cancers.

The most frequent side effects experienced while using sunscreens were sweating and acne which were reported by 45% participants. Other less common unpleasant effects included skin discomfort (9%) and burning (3%) while about 37% individuals did not experience any side effects. On the other hand, Al Battat and fellow scientists from Iraq recorded no side effects in 71% of their students, greasy skin texture in 11%, acne eruption in 7% and feeling of skin burning in 3%.[14] This variation may be due to different weather conditions of the study areas as well as differences in the sunscreen formulations used by the students.

The present research displayed a wide variation in the knowledge of medical students about sunscreen use technique. 41% knew that sunblocks should be applied on all exposed parts and 49% correctly reported the time of application of sunscreens which is 15-30 minutes before going in the sun. However, only 12% knew about the two hour re-application interval when outdoors. Similarly, only 17% participants advised use of one or two teaspoon amount on the face area which is the preferred amount.[6] Many surveys in the general population and in students have documented a similar lack of knowledge about the recommended sunscreen usage method. Al Battat *et al.* observed that only 12% of their medical students applied sunscreens on all skin areas exposed to the solar radiation.[14] Memon and co-workers from Pakistan elicited that only 32% students applied sunscreens 30 minutes before going in the sun and only 5% reapplied at regular intervals when outdoors.[11] Al Jasser *et al.* from Saudi Arabia documented that 52% university students did not apply sunscreens before sun exposure and 62% did not re-apply. Additionally, more than 90% of their participants did not utilise an appropriate quantity of sunblock.[22] Indonesian researchers Novitasari and colleagues observed a better knowledge about time of sunscreen application (74%) and two-hourly reapplication (60%) but the knowledge about effective quantity was still deficient (21%) in their students, while in our study only 12% were aware that it should be reapplied after 2 hours. It is very important to be aware of the site, amount and reapplication of sunscreen to get its full benefit which was lacking in our students.[16]

A recent review article by Neale established that in vivo use of sunscreens does not cause Vitamin D deficiency.[23] However, 71% respondents in the present research had a poor concept of the effect of sunscreens on Vitamin D synthesis and only 29% thought that sunscreens

did not inhibit Vitamin D synthesis.

In terms of future prescribing practice, about half of the participants said that they would recommend a sunscreen to their family members and patients. However, 42% were unsure and 6% said they would not recommend a sunscreen. Iraqi researchers also documented that two-thirds medical students would advise sunprotection including sunscreen use to the general population.[14] If they are resistant to sunscreen use, other sun protective measures such as wearing full clothes, using umbrellas, seeking shad especially during peak hours of sunlight should be emphasized. Recently, mobile apps to monitor the UVs index and alerting for sunscreen application have been launched.

Limitations

Authors acknowledge the limitations of study.

Our data was collected through self- report measuring which might bias the results.

The main drawback of our study is the use of online questionnaire, as there is a possibility that mostly those participants responded that had some pre-existing knowledge of sunscreens or were already using them. Furthermore, the data was collected during peak summer months, when students are inclined towards photoprotection and may not show results of year round practices. Further studies collecting year round data by in-person questionnaires from a larger student population can help overcome these potential flaws.

Conclusion

Prevalence of sunscreen use among medical and paramedical students was 48% in Punjab which was lower than studies conducted in other provinces of Pakistan. Several knowledge and practice gaps exist in these students regarding sunscreen use and its benefits.

Recommendations

Awareness campaigns as well as increased emphasis on photoprotection within the premedical curricula can bridge these deficiencies. These students can then exert a positive influence on sun protective behaviors of their patients through their professional scope in the future. This can help increase sunscreen use by the general population and in the long term reduce the burden of premature skin ageing and malignancies.

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