



KNOWLEDGE, ATTITUDE AND PRACTICE ABOUT SUN PROTECTION AND USAGE OF SUNSCREEN AMONG UNDERGRADUATE STUDENTS

Dermatology

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ABSTRACT

Introduction And Objective: We in our daily lives are mostly exposed to sunlight. There are various manifestations that can caused due to increased photo exposure like sagging, wrinkling and photo carcinogenesis, which takes place due to the damage to cell and the DNA, which can be prevented with the usage of sunscreens. Many of the skin diseases are directly or indirectly provoked by the sunlight which can lead to acute reactions like sunburn. Hence we in our study aimed to assess the knowledge and attitudes regarding sun exposure and factors that influences the participants knowledge and perception in receiving physician counselling, by identifying the gaps for appropriate use of sunscreens **Materials And Methods :** This cross-sectional, questionnaire-based study, contained 30 questions on knowledge, attitude and practice adapted or available. All questions were Yes or No, or options based. **Results:** 800 medical students filled the form. 68.5% were females. 88% of students used sunscreens. 70.8% applied sunscreen once a day. 75.7% choose sunscreens based on its SPF value. 76% used it to protect from tanning. 38% said few drops are sufficient to cover the face. 73.5% said that they preferred lotions. Sunscreen was commonly used to prevent sunburns and tanning. **Conclusion :** Although majority of our study participants used sunscreen products, adequate knowledge about the exposure and its harmful effects, protective measures is still required. Educational campaigns through posters, directed videos on social media, and in-campus seminars and lectures can help accomplish this task.

KEYWORDS

Sunscreen, Sun Protection, Knowledge, Attitude, Practice

INTRODUCTION

We the humans in our daily lives are mostly exposed to sunlight¹. Even though sunlight has a very good health benefits, its exposure can cause severe extrinsic and intrinsic changes in skin². Excessive exposure and unprotected skin can sometimes be associated with skin cancer¹. There are various manifestations that can cause due to photoaging are sagging, wrinkling and photo carcinogenesis, which takes place due to the damage to cell and the DNA, which can be prevented with the usage of sunscreens³.

Many of the skin diseases are directly or indirectly provoked by the sunlight which can lead to acute reactions like sunburn. These acute reactions are caused by the excessive UV radiation particularly of UV-B type which can affect anyone. High doses of UV can also damage the skin leading to skin cancer by UV-B. Abnormal reactions to UV are triggered by UV-A type and these do not affect all. These diseases are known to be the true photo dermatoses. This is divided as primary and secondary type induced by photosensitization and systemic diseases respectively⁴.

Epidemiological study results implicate the ultraviolet rays [UV] exposure due to sun as the main environmental cause for the skin cancer and premature ageing⁵. The UV energy has two types, UVA and UVB, where UVA penetrates up to dermis and UVB affects epidermis. In India, most of our population is exposed to UVA and UVB rays of higher degree. The UVB rays get filtered through glass, while the UVA rays will pass through it⁶. Sunburns are always caused by the ultraviolet B rays between 280-320nm and is related to the risk of melanoma⁷.

According to national cancer institute of US reports from 2020, it has been reported that the newer cases of melanoma has been tripled since 1970's⁸. Though the exact cause for melanoma is not yet determined, it is been said that the risk factors can be family history of skin cancers, moles, freckles, fair skin and UV radiation⁸. It is said that around 80% of the cases can be prevented with sun protections. Use of sunscreens either as creams, oils or gels can play an important role in preventing the skin cancer, as it acts as a barrier and protects from DNA damage⁹.

The routine use of sunscreen helps to prevent the formation of actinic keratosis and thereby reduce the risk of skin cancer. The active ingredient in the sunscreens protects from UV light and halts the

penetration¹⁰ and also increase the tolerability of UV light reaching by absorption, reflection and scattering⁷. The use of broad spectrum sunscreens is the only method in skin cancer prevention. Hence we in our study aimed to assess the knowledge and attitudes regarding sun exposure and factors that influences the participants knowledge and perception in receiving physician counselling, by identifying the gaps for appropriate use of sunscreens

MATERIALS AND METHODS

This is a cross-sectional, questionnaire-based study, conducted after obtaining ethical committee approval. We conducted the study among several medical colleges in Bangalore for a period of one and half month. A specially designed questionnaire containing 30 questions were distributed via google forms to the students.

The questionnaire contained questions on knowledge, attitude and practice like type of sunscreens, its proper usage, frequency of application, quantity of sunscreen to be applied, different formulations used, about SPF, other photo protective measures available or adapted. Questions were also asked on the knowledge about the deleterious effects of excessive sun exposure such as sun allergy, tanning, sun burn, aging and skin cancers. The influence to use sunscreen and the major constraints against usage of sunscreen, their knowledge about oral sunscreen and the harmful effects of visible light were also noted. All the questions were closed ended, either as Yes or No, or options based. The data was collected and transported to the Microsoft excel sheet. The analysis was done using descriptive statistics.

RESULTS

The google form was filled by 800 medical undergraduate students across Bangalore. On analysis of sociodemographic data, we found that that the students were between the age group of 18 – 25 years of age. The majority of the students 68.5% [548] who responded were females.

We then analysed the questionnaire for knowledge, attitude and practice. With respect to the **use of sunscreens** we noted that 88% [706] of students used sunscreens. 57.7% [462] students used it routinely, while 35% [281] used only during sunny days and 8% [64] used it only when they were at beach. Few others students i.e., 68% [551] said that they used prior to swimming, 48% [385] used on cloudy day, 37% [297] used even when they were indoors and 32% [258]

when using laptops [Graph 1][Table 1]

With regards to the **application of sunscreen**, we noted that, 70.8% [567] of students applied sunscreen once a day, and 2% [17] of them applied every 2 hours. The **application process** of sunscreen, 15 to 20 mins before the exposure was followed by 62.5% [500] students. 51.5% [412] of the students used sunscreens only on face, while 24% [192] used both on face and hand and 25% used on the exposed area [Table 2]

With respect the **selections of sunscreens**, 75.7% [606] of the students choose the sunscreens based on its SPF value, 43.4% [348] choose based on their skin type, 47% [379] students used based on the brand of the product and 17% choose based on the price of the product. When questions were asked related to SPF, 86% [688] students knew the abbreviation of SPF. 41% [333] of students used SPF 50, while 35% [280] students used SPF 30. We then asked question about the different types of sunscreens that are available in the market. About half of the population 49% [394] students were not aware about the different type of sunscreens that were available, while 34.6% [277] used broad spectrum sunscreen. 46% [374] students used sunscreen only as a protection against sunlight. [Table 2]

When we analysed about the **reason for the use of sunscreens**, we found that 76% [610] students used it to protect from tanning. This was the most common reason for the use of sunscreens. 57% [461] used sunscreen to prevent from sunburns, 41.75% [334] used to prevent themselves from the risk of skin cancer and 30% [242] used sunscreens to control premature aging. We also asked them about the activities that can cause the maximum tanning. Maximum number of students, 74% [593] choose the option as exposure in the desert area, while 49% said that sports activity causes tanning and 11% [91] said choose as snow. [Table 1]

We also analysed the **reason for not using sunscreens** and found that oiliness was the major concern, which was answered by 54% [436] of the students, while the remaining 37% [299] said that whitish hues and cost factor 24% [194] was the reason. [Table 1]

When we checked the **influence for the usage of sunscreens**, 37% [296] and 29% [235] said that they used it seeing their family and friends respectively, 47% [38] as per the advised of health care professional and 31% [253] were influenced by media. 80% [640] used sunscreens to protect themselves from the hazardous effect of sunlight and not as a skin lightening agent. [Table 1]

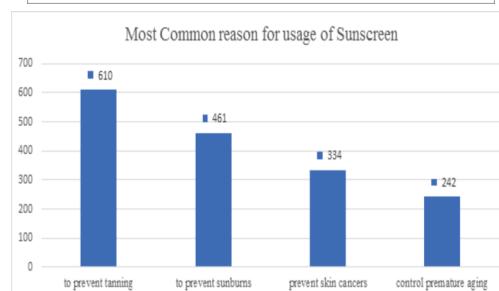
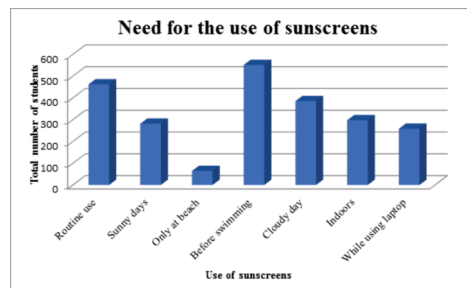
We then asked them about their **knowledge on different types of UV rays**, its effects leading to skin cancer and which if the type can cause cancer. We found that 42% [338] were not at all aware about the type of UV rays, while 34% [273] said UVA and 20% [164] said UVB. 58.8% [465] agreed that prolonged exposure to sun can cause cancers and 33% [271] volunteers felt most common cause was UVB rays. 37% [295] preferred using sunscreens with SPF prior to application of makeup products. 53% [428] agreed that sunscreens are not the reason for vit D deficiency. [Table 2]

With regards to the **usage of sunscreens among age group** of patients, 58% [467] said that sunscreens are used only for adults while 30% [242] said that it can be used for babies more than 6 months. [Table 1]. We also asked them regarding the **quantity of sunscreen that is required to apply** on the face. 38% [309] said that few drops are sufficient to cover the face, while 29% [238] said that they need half a spoon, 25% [204] said they need one full teaspoon and 9% [72] students mentioned that they require more than one teaspoon to cover the face. [Table 2]

We had questions listed about their **experience on allergic reaction** caused due to sun exposure and use of sun screens. 33.5% [268] said that they are prone to allergies on exposure to sun. With regards to allergies caused due to use of sunscreens, 86.6% [693] did not have any allergic reactions on using sun screens, while only 16.3% [131] experienced allergies on usage of sunscreen. [Table 1]

We asked them to select on their **preferred formulation** of sunscreens. 73.5% [588] said that they preferred lotions while 25% [203] students preferred gel formulations [Table 2]. We analysed about the **awareness on the signs of ageing**, which was caused by the visible sunlight from computer screens, mobiles and the need for its

reapplication with increased screen time. 50.2% [402] opted the choice as yes, and said that they were aware of the visible light that leads to pigmentation.



Graph 1: Need For The Use Of Sunscreens

Table 1 : Opinions of students about usage of sunscreen

Sl.no	Particulars	Number of students [%]
1	Use of sunscreen • Routine use • Sunny days • Only at beach • Before swimming • Cloudy day • Indoors • While using laptop	462 [57.7%] 281 [35%] 64 [08%] 551 [68%] 385 [48%] 297 [37 %] 258 [32%]
2	Reason for the use of sunscreen • Protect from tanning • Prevent from sun burns • Risk of skin cancer • Premature aging	610 [76%] 461 [57%] 334 [41.7%] 242 [30%]
3	Reason for not using sunscreen • Oiliness • Whitish hues • Cost	436 [54%] 299 [37%] 194 [24%]
4	Influence for the usage of sunscreen • Family • Friends • Advised by healthcare Professional • Media	296 [37%] 235 [29%] 38 [47%] 253 [31%]
5	Sunscreen among age groups • Only adults • Babies more than 6 months	467 [58%] 242 [30%]
6	Allergic reactions • No allergy on using sunscreen • Had allergies on usage of sunscreen	693 [86.6 %] 131 [16.3%]

Table 2 : Opinions of students about Sun protection

Sl.no	Particulars	Number of students [%]
1	Application of sunscreen • Once a day • Every 2 hrs	567 [70.8%] 17 [2%]
2	Selection of sunscreen • Based on SPF values • Based on their skin type • Based on brand	606 [75.7%] 348 [43.4%] 379 [47%]
3	Different types of UV rays • SPF 50 • SPF 30	333 [41%] 280 [35%]
4	Preferred formulations • Lotions • Gels	588 [73.5 %] 203 [25%]

5	Quantity of sunscreens required for application	
	• Few drops	309 [38%]
	• Half a spoon	238 [29%]
	• One full spoon	204 [25%]
	• More than one tea spoon	72 [9%]

DISCUSSION

Though sun exposure has beneficial effects like, Vit D absorption to the body, harmful effects on the skin varying from skin burns to skin cancer can be alarming and matter of concern. Luckily, to overcome these negative effects, protective measures like use of sunscreens, avoiding the activity at peak sunlight, usage of hats, sunglasses, long sleeves can be routinely followed¹¹. Application of sunscreen is an important method of sun protection. Effectiveness of sunscreen depends on its SPF and right use of the product. Both of this are important and influences significantly, the knowledge and the awareness of the public towards its use^{12,13}.

We have assessed the opinion of students on usage of sunscreen, their knowledge attitude and practices among large group of population. Our study results had maximum number of females, which was similar to many other studies done by Shanshal et al¹¹, and Rashmi sarkar et al¹⁴. While few studies done by Md.I Aljasser et al¹⁵, and Khalid M et al¹⁶, showed that they had maximum number of males using sunscreens. Reason for such variation could be the leading to many skin related issues. To protect from future consequences related to skin, both the genders in such region use precautionary measures.

When use of sunscreen was analysed we saw that majority of students in our study used it while going out as routine use, before swimming and on cloudy and sunny days. Similar Indian study done by Agarwal and his colleagues³ showed that routine use of sunscreens was common among their study participants. The most common reason in our study for the use of sunscreen was tanning. This results from our study was similar to most of the studies done by the researchers across the globe^{3,14-16}.

Many of our participants did not use sunscreens for reason being oiliness, white hues or due to reason of cost. This study results were similar to study conducted by Shwetha and her colleagues¹⁷. In a country like India, most of the women were not financially independent and especially when it comes to students, they depend on pocket money. As sunscreens are considered cosmetics and also expensive, their use was limited¹⁷. White hues on applying sunscreen was mentioned as a disagreeable effect in a study conducted by Mosavi et al¹⁸. Other reasons for non-usage of sunscreen from other studies was burning sensation and stinging in eyes smell of the product, high cost and forgetfulness¹⁹. Only few percent of our study participants had allergic reactions to sunscreens similar to study done by Agarwal et.al.,³.

We also assessed the opinions of students on various questions related to sun protection and their practice for use of sunscreens. Duration of sunscreen applied was considered maximum as once daily application in our study. In comparison to the study results by Suja Xavier et al²⁰ their study participants also admitted that they did not reapply sunscreens at every 2 hours. Majority in our study used the sunscreens SPF value of 50-30, which was in contrast to Xavier et al²⁰. The 1/3rd protection for skin from sunlight is because of the SPF value of the sunscreen. Therefore, to attain 10-15 fold protection, it is perfect to use the sunscreen of SPF30- SPF50^{14,19}.

UV rays from sun reach earth are UVA and UVB. Both can be harmful to skin on longterm exposure⁵. Right sunscreen always has broad-spectrum shield effect against both UVA and UVB. This explanation is in acceptance with the existing recommendations for the use of sunscreen with an SPF of at minimum 30²¹. Testing in standard methods of SPF in sunscreens is done by thickness of 2mg/cm². Many studies have summarized that people who apply inadequate quantities of sunscreen in real life as compared to the amount recommended for SPF testing¹⁵. Therefore, high SPF would recompense for this suboptimal application.

Few others in our study selected the sunscreens based on the brand or their skin types, while few of them used sunscreens as per suggestions from friends or family or by the media, without proper knowledge on the usage, its types or the purpose for its use. Similar study results were seen in the study conducted by Mrinal Gupta¹⁹, Dey²¹ and by

Reema et al²² in 2019. Less than half of the population in our study started using sunscreens as per health care professional's advice, which was similar to study results by Reema et.al.²².

With respect to the formulations of the sunscreen, water resistant sunscreens which are water in oil formulations are known to provide better protections. Most of our study participants preferred cream-based formulations when compared to gel based. This study results were in acceptance with the study conducted by Harsh Arora et al²³.

More than 50 % of the sunscreen users in our study applied it less than 10 minutes before going out, while it is recommended that sunscreens should be applied 15–30 minutes before sun exposure^{24,25}. Sunscreens are applied mainly to face and hands among our study participants. With respect to the quantity required, approximately 30 mL of lotion/cream which is equal to 2-3 tablespoons is required to efficiently cover the whole body. The amount of sunscreen that is considered sufficient to cover the face and neck is approximately 1-2 teaspoons but, in our study, majority applied ≤ 0.5 teaspoon. Reapplication of sunscreen is essential every two hours or after swimming or excessive sweating^{26,27}. Most students in our study do not routinely reapply sunscreen.

The use of other sun protection methods is important. It has significant lower risk of sunburns. Fortunately, our study participants did use some or the other alternative method of sun protection. These findings indicate that there is a need to educate students about skin cancer risks and the preventive measures, its-related knowledge, attitudes and practices among medical students.

CONCLUSION

Although majority of our study participants used sunscreen products, adequate knowledge about the exposure and its harmful effects, protective measures is still required. Sunscreen was commonly used to prevent sunburns and tanning. The male response was very poor and usage among them was not seen. This low level of knowledge among males about an important aspect of general health is required to be considered to reduce the risk of skin cancer. Educational campaigns through posters, directed videos on social media, and in-campus seminars and lectures can help accomplish this task.

Limitations Of Our Study

The few limitations in our study is that, we conducted in a particular area and group of population. Comparison between urban and rural population was not made, which could have yielded a better result for understanding. Administering the online questionnaire can be considered as a limitation as it eliminates one on one contact between the participant and the researcher. However, such online surveys help to reach wider and faster response.

Annexure 1: E Questionnaire

Name *
Age group *
• 18-25
• >25
Gender *
• Female
• Male
Profession *
• Medical Student/Graduate
• Non Medical student/Graduate
1. Do you use Sunscreen?*
• Yes
• No
2. When do you use sunscreen?*
• Routinely
• At the beach
• During exercise
• On a sunny day
3. When do you apply sunscreen?*
• Immediately before exposure to sunlight
• 15-30 mins before
• 1 hour before
• 2 hours before

5. Where do you apply the sunscreen?*

- Face only
- Face and hands
- All sun exposed parts
- Whole body

6. Do people around you use sunscreen ?

- Yes
- No
- Don't know

7. You would choose sunscreen based on:*

- Type of skin
- SPF value
- Price
- Brand

8. What does SPF stand for?*

- Standard protection factor
- Sun protection factor
- Sun proof factor
- Sun protection field

9. What SPF do you use?*

- 15
- 30
- 50
- >50

10. Which type of sunscreen do you use *

- Broad spectrum
- Physical/chemical
- Tinted sunscreen
- Don't know

11. How do you protect your skin from sunlight?*

- Sunscreen and scarf/hats
- Sunscreen is enough
- No protection
- Use a moisturiser

12. Why is sunscreen necessary?*

- To prevent tanning
- Sun burns
- Skin cancers
- Aging

13. What makes you not want to use sunscreen?*

- Oily
- Acne
- Costly
- Whitish hue

14. Does sunscreen make you fair?*

- Yes
- No

15. What rays are maximum in our surrounding?*

- UVA
- UVB
- UVC
- Do not know

16. Can increased sun exposure cause cancers?*

- Yes
- No
- Maybe

17. Which of this cause cancer?*

- UVA
- UVB
- Visible light
- Don't know

18. Does sunscreen cause vitamin D deficiency?*

- Yes
- No
- Don't know

19. Do you need sunscreen in the below situations:*

- Cloudy day
- Indoors
- Swimming
- While using Laptop

20. Influence to use sunscreen?*

- Family
- Friends
- Media
- Health care professionals

21. Age for usage of sunscreen?*

- <6 months old babies
- >6months old babies
- Adults only
- School children

22. Quantity of sunscreen required?*

- Few dots
- Upto 1 teaspoon
- 1/2 teaspoon

23. Which activity causes maximum tanning?*

- Water sports
- Activities in the snow
- At the dessert
- High altitudes

24. Do you know about oral sunscreens?*

- Yes
- No

25. Have you ever experienced an allergic reaction to sun exposure?*

- Yes
- No

26. Have you experienced any allergy after using sun screen?*

- Yes
- No

27. Which formula of sunscreen do you prefer?*

- Lotion
- Gel
- Oral
- Powder

28. Visible light from computer screens, mobiles cause pigmentation?*

- Yes
- No
- Don't know

29. Reapplication of sunscreen with increased screen time is necessary? *

- Yes
- No

30. Do you get enough sun protection with usage of makeup products labelled with SPF?*

- yes, it is enough
- do not know
- No, use a sunscreen prior

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