Behavior of Sunscreen Usage Among Medical Students

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ABSTRACT

Background: Photoaging is an early skin aging process caused by sun exposure. Sunscreen is effective as a primary photo-protection to protect the skin from the dangers of ultraviolet radiation (UV) sunlight. However, sunscreen is often used in the wrong manner, so that it can reduce the effectiveness of the work of sunscreen. **Purpose:** To describe the knowledge and the practice of sunscreen usage among medical students of Universitas Airlangga and find out the relationship between the knowledge and the practice of sunscreen usage. **Methods:** This study is an analytic-observational study. Data were collected through questionnaire sheets that distributed to medical students of Universitas Airlangga class of 2016, 2017, and 2018. The results were analyzed using the Spearman test with a significance level of 1%. **Result:** Obtained total respondents that fulfilled the inclusion criteria were 159 respondents, with 88.68% were female and 11.32% were male. Based on Fitzpatrick skin type, 55.97% respondents found with skin type-IV. There were 59.12% respondents got score of knowledge in the medium category and 64.78% respondents got score of practice also in the medium category. Based on analytic statistic correlation test between knowledge and practice of sunscreen usage, known that the significance value is equal to 0,006 with coefficient correlation is equal to 0.216. **Conclusion:** The knowledge and the practice of sunscreen usage among medical students of Universitas Airlangga is already in a fairly good range. There is a parallel relationship between the knowledge and the practice of sunscreen usage among medical students of Universitas Airlangga but with a low level of correlation strength.

Keywords: photoaging, sunscreen, behavior, knowledge, practice.

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INTRODUCTION

Photoaging is a process of skin aging caused by sun exposure.[1] Basically, the body has its mechanism for filtering sunlight, that is a melanin pigment. But if the skin exposed to sunlight chronically, it can cause damage to the skin. Consistent use of things that are protective against sunlight (photoprotective) is important to prevent photoaging, including to avoid the danger of ultraviolet (UV) rays. There are various forms of physical photoprotection, including endogenous factors, avoiding sunlight, staying in the shade, using clothing that covers the skin, or by using sunscreen.[3]

This photoprotection is very important for people who often do outdoor activities, one of them is a student. Student is required to always actively participate in various activities other than lecturing activities in class, for example following social service events that require students to go directly to the field, as well as other activities that are usually carried out in the context of community service. The use of photoprotection in students is highly recommended.

Sunscreen is the products combining several ingredients which protect the skin by absorbing, blocking or scattering UV radiation.[2] Sunscreen is effective as a primary photoprotection to protect the skin from the dangers of sunlight. However, sunscreens are often used in the wrong manner or in less doses, and this allows significant deoxyribonucleic acid (DNA) damage to occur.[4] For example, when sunscreen should be used as much as 2 mg/cm^2 on skin surface, but most consumers use only 25 - 50% of the proper thickness.[5]

Table 1. Characteristics of the study sample

No.	Questions	Frequency (n = 159)	%
1.	Gender :		
	Male	18	11.32
	Female	141	88.68
2.	Skin type based on Fitzpatrick scale :		
	I	0	0
	II	0	0
	III	34	21.38
	IV	89	55.97
	V	36	22.65
	VI	0	0

Mistakes in the practice of sunscreen usage as described above will makes the aim of using sunscreen not optimal and not in accordance with the expected protection. Then in general, mistakes in practice in doing something will be based on their knowledge about it. Therefore, this study conducted with the aim to evaluating behavior, both the knowledge and the practice of sunscreen usage among medical students of Universitas Airlangga, as well as proving the relationship between knowledge and practice of sunscreen usage.

METHODS

This research is an analytic-observational study. The sample was determined using a purposive sampling method, with inclusion criteria, namely medical students of Universitas Airlangga, class of 2016, 2017 and 2018 who has been using sunscreen and who were willing to be the subject to the study by signing the informed consent sheet. Data was collected through questionnaire distributed to each class in the Faculty of Medicine, Universitas Airlangga. Then, the results were presented using descriptive statistical tables in the form of distribution tables and analyzed using a statistical correlation study.

The questionnaire is sourced from studies that have been carried out previously, conducted by Hadi et al. (2016) with the title "The Use of Sunscreen Products Among Final Year Medicine and Pharmacy Students: A Cross-sectional Study of Knowledge, Attitude, Practice, and Perception".[20] These questions have been selected to fit the research variables that have been determined in this study and also has been tested for the validity of the items using the Pearson function in Microsoft Excel software version 15.26.

Spearman correlation tests have been conducted to analyze the correlation of knowledge variables and practice variables using IBM SPSS Statistics software version 23 for macOS.

RESULTS

A total 159 respondents met inclusion criteria and gave consent to participate in this study. Most of the samples were female 88.67% with the most skin type was skin type IV (55.97%) as shown in Table 1. The skin type was self-chosen by the respondents, according to the description of Fitzpatrick's classification in the questionnaire, associated with examples for each skin type.

In table 2 and table 3, the answers with letter "a" apostrophe ([a]) are the correct answer according to the journal reference.

Table 2 shows that there are 50.31% of respondents who know that sunscreen must be used even when they are indoors. Most respondents, 83.02%, knew that broad spectrums sunscreens were better used in daily activities. As many as 73.59% of respondents know that sunblock must be used at least 15 minutes before being exposed to sunlight. Unsatisfactory results were obtained on the question of the number of sunscreens that must be used on the whole body of an adult (face, neck, back, chest, stomach, both hands, and legs), which is only 21.38% who answered correctly. As many as 60.38% of respondents know that the application needs to be repeated and at least once every 2 hours when outdoors activities. More than half of the respondents, 69.19%, knew that sunscreens with greater sun protection factor (SPF) would be more effective at protecting skin from ultraviolet-B (UVB) radiation, but only 33.33% of respondents understood that the SPF level could not be used to measure the effectiveness of sunscreen protection against ultraviolet-A (UVA) radiation.

Table 3 shows that there were 66.04% respondents using sunscreen every day. All respondents (100%) have used broad spectrum sunscreens. As many as 60.38% of respondents had applied sunscreen at least 15 minutes before being exposed to sunlight, but only 25.16% of respondents used the right amount of sunscreen, namely 1 teaspoon or more for the face only. Disappointing results were also obtained on the question of reapplying sunscreen, which is only 10.69% of respondents who reapply once every 2 hours during outdoors activities. As many as 70.44% of respondents have used a sunscreen with 30 SPF or more.

Table 4 shows that there were 59.12% and 64.78% of respondents who got score in the medium category about the knowledge and practice of using sunscreen (in sequence).

From table 5 to 7, it can be seen that as many as 64.78% of respondents know the knowledge about the use of sunscreen from other options, namely from the internet and instructions for use listed on the sunscreen label, 59.12% choose the SPF size as a matter of consideration when choosing sunscreen products, and 33.96% chose other options, namely because of their self-awareness from reading magazines, the internet, and social media, also based on suggestions from family members to use sunscreen. In table 8 shows the results of the Spearman correlation statistical test, obtained significance value or Sig. (2-tailed) of 0.006, because the value of Sig. (2-tailed) 0.006 is smaller than 0.05 or 0.01, it means that there is a significant relationship between the variables of knowledge and practice of using sunscreen. A correlation coefficient of 0.216 means that the level of strength of the relationship is in a very weak range. Correlation

coefficient value is positive, which means the relationship is a direct relationship.

DISCUSSION

This study consisted of 141 female respondents and 18 male respondents. This may be due to the fact that women are more concerned about the use of sunscreen, as shown in the results of study conducted by Al Robaee (2010) that women tend to be more aware of sun exposure danger than men and take more protective measures including the use of sunscreen.[6] The same thing was also found in study conducted by Paul et al. (2003), that women use sunscreen more often than men.[7]

Table 2. Knowledge of sunscreen usage

No.	Questions	Frequency (n=159)	%
1.	Frequency of sunscreen usage :		
	How often someone should be use sunscreen?		
	Always, even when in indoors[a]	80	50.31
	Every time will do outdoor activities	79	49.69
	No need to use sunscreen	0	0
2.	Type of sunscreen :		
	What type of sunscreen is better for daily use?		
	Broad spectrum[a]	132	83.02
	Non-broad spectrum	27	16.98
3.	Time of application :		
	When should someone apply sunscreen?		
	Immediately before sun exposure	17	10.69
	5 minutes before sun exposure	25	15.72
	≥15 minutes before sun exposure[a]	117	73.59
4.	Amount of sunscreen usage :		
	How much sunscreen is needed to cover the entire average adults' body?		
	3 teaspoons	13	8.18
	6 teaspoons[a]	34	21.38
	12 teaspoons	18	11.32
	I apply what I think is enough	94	59.12
5.	Reapplication of sunscreen usage :		
	Does the application of sunscreen need to be reapplied during do outdoor activities?		
	Yes, every 2 hours[a]	96	60.38
	Yes, every less than 2 hours	46	28.93
	No need to be reapplied	17	10.69
6.	Knowledge of SPF :		
	Product A has an SPF of 30. Product B has an SPF of 15. Which product is more effective at protecting against UVB radiation?		
	Product A[a]	110	69.19
	Product B	10	6.29
	Not enough info to make determination	49	30.82
7.	Knowledge of SPF :		
	Product A has an SPF of 30. Product B has an SPF of 15. Which product is more effective at protecting against UVB radiation?		
	Product A	85	53.46
	Product B	21	13.21
	Not enough info to make determination [a]	53	33.33

Note :
[a] = correct response
SPF= Sun Protection Factor
UVB= Ultraviolet-B

Table 3. Practice of sunscreen usage

No.	Questions	Frequency (n=159)	%
1.	Frequency of sunscreen usage :		
	How often do you use sunscreen?		
	Every day[a]	105	66.04
	Sometimes	54	33.96
	Never	0	0
2.	Type of sunscreen that be used :		
	Broad spectrum[a]	159	100
	Non-broad spectrum	0	0
3.	Time of application :		
	When do you use sunscreen?		
	Less than 15 minutes before sun exposure	63	39.62
	More or precisely 15 minutes before sun exposure[a]	96	60.38
4.	Amount of sunscreen :		
	How much sunscreen that you use to cover the face?		
	Less than 1 teaspoon	119	74.84
	Precisely 1 teaspoon or more[a]	40	25.16
5.	Reapplication of sunscreen :		
	How often you reapply sunscreen during outdoor activities?		
	Every 2 hours[a]	17	10.69
	Every more than 2 hours	61	38.37
	Never reapply	81	50.94
6.	SPF value that be used :		
	How much SPF value that you use?		
	< 15	0	0
	15 – 29	47	29.56
	≥ 30[a]	112	70.44

Note :
[a] = correct response
SPF= Sun Protection Factor

Table. 4 Knowledge and practice of sunscreen usage score

No.	Category	Score Range	Frequency (n=159)	%
1.	Knowledge of sunscreen usage			
	High	5 – 7	45	28.3
	Moderate	3 – 4	94	59.12
	Low	0 – 2	20	12.58
2.	Practice of sunscreen usage			
	High	5 – 6	31	19.5
	Moderate	3 – 4	103	64.78
	Low	0 – 2	25	15.72

Table 5. Information sources about the knowledge of sunscreen usage

Question	Frequency (n=159)	%
How did you find out about the knowledge above?		
Parent	8	5.03
Doctor	14	8.81
Friend	29	18.24
Teacher	8	5.03
Other	103	64.78

Note: respondent can choose more than 1 options

Table 6. Consideration in choosing sunscreen products

Question	Frequency (n=159)	%
What are your considerations in choosing sunscreen products?		
Type of skin	56	35.22
SPF value	94	59.12
Price	25	15.72
Brand	22	13.83

Note: respondent can choose more than 1 options
SPF= Sun Protection Factor

Table 7. Person who recommends to use sunscreen

Question	Frequency (n=159)	%
Who recommends you to use sunscreen?		
Parent	8	5.03
Doctor	14	8.81
Friend	29	18.24
Teacher	8	5.03
Other	103	64.78

Note: respondent can choose more than 1 options

Table 8. Analysis of the relationship between knowledge and practice of sunscreen usage

Correlations				
			Knowledge	Practice
Spearman's rho	Knowledge	Correlation Coefficient	1.000	.216**
		Sig. (2-tailed)	.	.006
		N	159	159
	Practice	Correlation Coefficient	.216**	1.000
		Sig. (2-tailed)	.006	.
		N	159	159

**. Correlation is significant at the 0.01 level (2-tailed).

Skin types can be classified on the Fitzpatrick scale based on the skin reactions to sun exposure and UV radiation.[8] Based on the above research data, majority of respondents, 55.97% had skin types IV. This is consistent with the data mentioned in the journal article written by Knaggs (2009), where the majority of Asian people have relatively darker skin, usually type IV and above, compared to people in western countries. In addition, there are also differences between Asian communities themselves. Asian communities can be divided into Northeast Asian communities (China, Japan, Korea), Southeast Asia (Indonesia, Malaysia, Singapore, Thailand, Cambodia, Vietnam) and South or Central Asia (India, Pakistan, Sri Lanka, Bangladesh). The skin of Northeast Asian people tends to be brighter (where

these countries have more seasons) compared to Southeast Asian people who are more exposed to sunlight because of its geographical location close to the equator.[9]

UVA rays have a longer wavelength, which is 320-400nm, compared to UVB (290-320nm) and ultraviolet-C (200-280nm, cannot reach the earth's surface). Therefore, UVA can penetrate glass, whereas UVB can be completely obstructed by glass.[10] A study conducted by Lowe et al. (1995), shows that continuous exposure to UVA even at low doses can reduce the content of elastic tissue in the skin which will then cause photodamage.[11] Thus, broad spectrum sunscreens still need to be used even though being active indoors, such as when indoors and in the car. From the research data, it was found that 50.31% of respondents had answered correctly, while the rest (49.69%) still thought that sunscreen only needed to be used when outdoors.

Because not all sunscreen products are broad spectrum, it is important to read the information contained in the sunscreen product. Sunscreen with broad spectrum provides protection from UV radiation from the sun, both UVA and UVB, by absorbing and / or reflecting UV radiation before it can damage the skin.[12] From the research data, most respondents (83.02%) already understand that the sunscreen sun broad spectrum is a type of sunscreen that is better for use in daily activities.

Sunscreen must be applied at least 15 minutes before sun exposure to get maximum benefit from sunscreen in an amount of 1 ounce or equivalent to 6 teaspoons to cover the entire body of an average adult.[12,13] According to research conducted by Poh Agin (2006), based on a monograph, a sunscreen can provide a protection interval against solar UV radiation depending on the size of the SPF and minimal erythema dose (MED) for someone who uses it.[14] Meanwhile according to the American Academy of Dermatology (2018) and US Food and Drug Administration (2019), sunscreen must be re-applied once every 2 hours when outdoor activities or immediately re-apply after swimming or sweating, according to the instructions for use on the sunscreen label, without seeing the large SPF sunscreen and MED owned by its users.[12,13] Guidelines from the American Academy of Dermatology and US The Food and Drug Administration is used in this study, to assess the behavior of sunscreen re-application. From the research data it is known that the majority of respondents (73.59%) have known that sunscreen must be used at least 15 minutes before exposure to sunlight, but only 21.38% of respondents know that the amount of sunscreen needed to cover the entire body of a person adult is as much as 6 teaspoons. More than half of the number of respondents (60.38%) know that sunscreens need to be reapplied every 2 hours during outdoor activities.

Some respondents already knew that a high SPF value would provide more protection. However, this does not indicate that the respondent understands the relationship between SPF and UVA / UVB, as illustrated from the frequency distribution of questions number 6 and 7. Most respondents (69.19%) know that the greater the SPF the greater the protection provided for UVB radiation, but only 33.33% of respondents understood that the information provided in the question was not enough to know the effectiveness of sunscreen to protect the skin from UVA radiation.

From the research data above it can be seen that the majority of respondents have used the right type of sunscreen. However, only a small proportion of respondents use the appropriate amount of sunscreen.

The sun emits harmful UV rays throughout the year. Even in cloudy weather, up to 80% of harmful UV rays can penetrate into the deep layers of the skin.[15] Therefore, sunscreen needs to be used every day.[16] From the research results it can be seen that more than half of the number of respondents (66.04%) have used sunscreen with the right frequency, i.e. every day. And only 33.96% of respondents don't use sunscreen every day. The data is parallel with the frequency distribution data of knowledge about the appropriate frequency of sunblock use.

Very remarkable results can be seen from the data on the type of sunscreen used by respondents. All respondents (100%) have used broad spectrum sunscreen. The data is not in accordance with the frequency distribution data of respondents' knowledge about the type of sunscreen that is better used, it can be seen from 16.98% of respondents who still believe that non-broad spectrum sunscreens are better used in daily activities. Thus, it can be indicated that most of the sunscreens scattered in the market have provided the benefits of protection against UVA and UVB (broad spectrum) radiation, so that respondents who have inadequate knowledge but in practice can do the right thing.

From the results of the study it can be seen that the majority of respondents (60.38%) have used sunscreen at least 15 minutes before being exposed to sunlight. The data is continuous with the level of knowledge when using sunscreen, which is as much as 73.59% of respondents know that sunscreen needs to be used at least 15 minutes before being exposed to sunlight.

Unsatisfactory results were obtained in the frequency distribution of the number and re-application

of sunscreen by respondents. Most respondents (74.84%) use inadequate sunscreen which are less than one teaspoon for the face only, which is not enough to produce maximum protection that can be achieved by sunscreen. This can be caused by the poor level of knowledge regarding the amount of sunscreens by majority respondents. This is consistent with the results of research conducted by Thomsen et al. (1993), which shows that the average amount used by respondents is 0.5mg / cm2, where the amount that should be used is 2mg / cm2.[17]

In addition, although most respondents (60.38%) knew that sunscreens need to be reapplied once every 2 hours while outdoors, but 89.31% respondents still make mistakes in reapplying sunscreens. In fact, 50.94% of respondents said they had never re-applied sunscreen. This indicates that the practice of reusing sunscreen is not only influenced by the knowledge possessed by respondents, but there are also other factors that can influence. As shown in the results of research conducted by Weig et al. (2019), namely there are several inhibiting factors for using sunscreen, including dislike of the texture of sunscreen, constraints on costs, and constraints on time.[18]

Based on research data, it can be seen that the majority of respondents (70.44%) in practice have used sunscreen with an appropriate SPF value in accordance with those recommended by the American Academy of Dermatology (2018). The practice behavior was supported by the level of knowledge of the majority of respondents about the exact size of the SPF.

The total value of knowledge about the use of sunscreen can be obtained with a range of values between 0 to 7. Overall, the majority of respondents (59.12%) get a total value in the medium category. This indicates that the knowledge of Universitas Airlangga Faculty of Medicine students about the use of sunscreen is quite good.

However, there are some aspects that still need to be corrected and socialized, namely the number of sunscreens that should be used and the correlation between the SPF and the protective effect against UVA radiation. Whereas, only 50% respondents answer correctly in both question. The total practice value using sunscreen can be obtained with a range of values between 0 to 6. Overall, the majority of respondents (64.78%) get the total value in the medium category. This indicates that the practice of using sunscreen on Universitas Airlangga Faculty of Medicine students is quite good. However, there are some behaviors that still need more attention, namely the use of sunscreen with the right amount (24.57%) and re-application of sunscreen with the proper frequency (10.28%). Where, both of these practices have a number of respondents below 50% who answer correctly.

From the results of the above study it can be seen that the internet and the usage instructions listed on the sunscreen label are the most widely used source of knowledge about the use of sunscreen by 64.78% respondents. This is different from the results of research conducted by Weinstein et al. (2001) which shows that television and magazines were the main source of their knowledge about the knowledge of sun protection.[19]

From the research data it can be seen that the amount of SPF was the most (59.12%) considered by respondents in choosing a sunscreen product. This was consistent with the data obtained in a study conducted by Hadi et al. (2016), namely the majority of respondents consisting of 28 (45.9%) pharmacy faculty students and 33 (32.7%) medical faculty students, choosing sunscreen products based on their SPF size.[20]

An attitude can't automatically be appeared in form of an action (overt behavior). To make attitude become a real action, supporting factors or a condition that allows, among others, is a facility are needed. In addition to the facility factor, other factors are needed, such as support factors from other parties, for example friends, parents, etc.[21]

From the data above, it can be seen that the majority of respondents (33.96%) used sunscreen on their awareness/desire themselves because they read magazines, the internet, and social media. This was different from the results of research conducted by Hadi et al. (2016), which shows that International Islamic University Malaysia medical faculty students had the highest influence from their friends to use sunscreen.[20]

Research by Turrisi et al. (1999), showed that there was statistically significant relationship between knowledge and the practice of using sunscreen, but the level of strength of the relationship was unknown. This was consistent with research data, which shows that there was a relationship between knowledge and practice of using sunscreen on Universitas Airlangga Faculty of Medicine Students but with a very weak level of strength. The practice of using sunscreen in daily life was not only influenced by the knowledge they had, but it can also be influenced by other factors.

Figure 1, explains that the practice of using sunscreen were influenced by respondents' attitudes towards the use of sunscreen. Where, even though the respondent had good knowledge, it was not an affirmation that respondent can accept (agree or not) with the information they had.

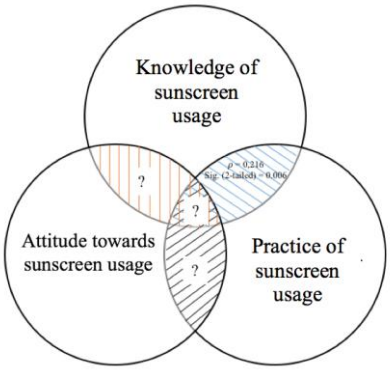

Figure 1. Diagram venn of sunscreen usage behavior.

The conclusion of this research is the knowledge and practice of using sunscreen on medical student of Universitas Airlangga is in a good range and there is a parallel relationship between the knowledge and practice of using sunscreen but with a low level of relationship strength. Suggestions from this study is that socialization needs to be done with a more enhanced frequency and do medical intervention by health services to improve the behavior of the use of sunscreen to the wider community by conducting counseling and demonstration of steps to use sunscreen. For further research, it is necessary to make a specific evaluation for why people don't use sunscreen.

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