

# Knowledge, attitude, practice and perception on sunscreen and skin cancer among doctors and pharmacists

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## ABSTRACT

**Introduction:** Excessive ultraviolet light (UV) can cause premature skin aging and potentially skin cancer. Currently there is a lack of awareness among health care professionals and the public on sun protection. The objectives of this study were to determine knowledge on sunscreen and skin cancer among health care professionals, to evaluate the knowledge, attitude, practice and perception of doctors and pharmacists toward the usage of sunscreen as protection against UV radiation.

**Materials And Methods:** This is a cross-sectional study conducted among doctors and pharmacists in Hospital Sultanah Nora Ismail, Batu Pahat, Johor, Malaysia. Questionnaires were used in this study.

**Results:** A total of 384 participants completed the questionnaires. The participants consisted of 323 doctors (84.1%) and 61 pharmacists (15.9%). The age group of the participants ranged between 25 till 55 years old. Ninety doctors (27.9%) and thirty-one pharmacists (51.0%) reported used sunscreen daily ( $p < 0.001$ ). This finding showed that there was a deficit in the practice of sun protection. Pharmacists scored a higher knowledge score of median 12 (IQR=3.0) while the doctors scored 11 (IQR=2.0). This study showed a significant association between ethnicity and skin cancer knowledge ( $p < 0.05$ ).

**Conclusion:** This study demonstrated a lack of knowledge of sunscreen and skin cancer prevention among health care practitioners. This finding supports better medical education program on this topic.

## KEYWORDS:

*Sunscreen, skin cancer, knowledge, practice, perception*

## INTRODUCTION

Exposure to sunlight is required for vitamin D synthesis. Ultraviolet (UV) radiation (290 to 400 nm) is responsible for sunburn, photoaging and skin malignancy. Ultraviolet B (UVB) radiation (280-320nm) represent five percent of UV radiation reaching the surface of the earth which causes sun burn, pigmentation, inflammation and can induce melanoma and skin cancer. Ninety five percent of UV radiation arriving at the earth surface is ultraviolet A (UVA) (320 to 400 nm).<sup>1,2</sup> UVA consists of UVA1 (340 to 400 nm) and UVA2 (320 to 340 nm). UVA1 is less potent than UVA2 in

inducing erythema.<sup>3</sup> Ultraviolet A is responsible for skin pigmentation and photoaging.<sup>3,4</sup> Measures such as avoiding peak hours of sun, sun protective clothing and sunscreen applications are crucial to reduce the potential harm due to UV exposure.<sup>5</sup>

Sunscreen lotions are topical preparations which contain filters that reflect or absorb radiation in the UV wavelength. They can be categorized into organic or inorganic filters.<sup>2</sup> Organic filters such as cinnamates and salicylates are aromatic compounds that absorb UV radiation and convert it to a negligible amount of heat.<sup>2</sup> Inorganic filters such as zinc oxide and titanium dioxide reflect and scatter UV light over a wide range of wavelengths.<sup>2,6</sup> A broad-spectrum sunscreen combines filters of different ultraviolet absorption spectra and is able to absorb both UVA and UVB radiation. The sun protection factor (SPF) is a measurement used to measure a sunscreen ability to protect one from sunburn which is primarily caused by UVB.<sup>7,8</sup>

Geographically, Malaysia is located on the equatorial and experiences hot and humid weather throughout the year. Malaysians are exposed to sunlight daily and it is imperative for health care professionals to be competent and comfortable to advice their patients correctly about sun protection. There is limited published data of knowledge of sun protection among health care professionals locally. Ammar Ihsan Awadh et al. reported that final year pharmacists displayed better sunscreen knowledge and perception on sunscreen usage than final year medical students from the International Islamic University Malaysia.<sup>9</sup> Internationally, there are reported population-based study on sunscreen use and perception.<sup>12</sup>

The objectives of this study were to explore knowledge on sunscreen and skin cancer, attitude, practice and perception among health care professionals on sunscreen and skin cancer.

## MATERIALS AND METHODS

### *Study Design and Setting*

This is a cross sectional questionnaire-based study among doctors and pharmacists conducted by a team of doctors from the internal medicine department of Hospital Sultanah Nora Ismail, Batu Pahat, Johor, Malaysia between 1st July to 31st November 2019. Exclusion criteria included doctors and pharmacists who were unable or refused to provide consent.

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A content and face validity method were conducted by the investigators.

The questionnaire was developed according to earlier studies and approved by our Clinical Research Committee of Hospital Sultanah Nora Ismail, Batu Pahat, Johor, Malaysia.<sup>9</sup> The content of the questionnaire was reviewed and approved by our expert dermatologist. The design of the questionnaire contained practices of sunscreen use, attitude and knowledge on sunscreen and skin cancer. The first section of the questionnaire consisted of demographic profile of the doctors and pharmacists. As the medical education of both medicine and pharmacy undergraduate programs are conducted in the English language in Malaysia, the English version of the questionnaire was distributed without the need for translation. The study protocol was approved by the Ministry of Health Research Ethics Committee (MREC) and the National Medical Research Registry with the registration number NMRR-19-1470- 48459.

### **Sample and Setting**

The prevalence of any response (items from KAP) may be low, moderate or high. The sample size calculation was based on a formula to determine prevalence in a targeted population where prevalence of 50.0% will always yield the largest sample size based on fixed margin of error. Therefore, the sample size calculation is based on to determine a prevalence of 50.0% with margin of error of 5.0% for any response of the KAP items. Thus, the minimum required sample size for 95% confidence interval is 384 respondents. Sample size was calculated using epiinfo software version 7.2.0.1. Doctors and pharmacists were recruited from each of the department. The participants filled up the questionnaires individually after receiving the written instructions.

Content validity was conducted among two senior medical doctors and one dermatologist to ensure all the questions are valid and relevant to the patients. No amendments were made at this stage. Next, face validity was conducted among ten respondents consisting of pharmacists and medical doctors. No amendment was made also at this stage. No pilot study was conducted since the earlier researchers concluded the questionnaire is appropriate, reliable and valid since previously the study using the same questionnaire was published elsewhere.<sup>9</sup> Basis of validity was determined based on content and face validity only.

### **Data Collection and analysis**

The questionnaires were distributed to the participants. A brief description of the study and an invitation to participate was provided in writing. After completing the questionnaires, the participants were asked to return the questionnaire. Participants were asked to convey any problems they face to the investigator so that immediate changes can be made to facilitate data collection. Responses to the questionnaire items and questions were entered into IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. for analysis of descriptive statistics.

## **RESULTS**

Out of the total of 473 doctors and 80 pharmacists, 323 (68.3%) doctors and 61 (76.3%) pharmacists returned the

completed questionnaires. Five questionnaires were rejected because they were incomplete. Thus, a total of 384 completed questionnaires were collected. This study sample consisted of 175 male and 209 female participants. The age of our participants ranged from 20 to 60 years old. Table I and II describe the demographic data of participants. Table III summarizes the attitude, practice and perception of participants among doctors and pharmacists towards sunscreen use. Table IV and V describe the knowledge on sunscreen questionnaires.

The total number of returned questionnaires were from 323 (68.3%) doctors and 61 (76.0%) pharmacists. Among the 323 doctors who completed the questionnaires, 142 (44.0%) were house officers, 149 (46.1%) were medical officers and 32 (9.9%) were specialists. Sixty-one pharmacists which consists of 20 (33.0%) provisionally registered pharmacists and 41 (67.0%) fully registered pharmacists returned the completed questionnaires. The majority of the doctors and pharmacists were of the female gender and were from the 20 to 30 years age group. Two hundred and eighteen (67.5%) doctors and 44 (72%) pharmacists had Fitzpatrick skin type IV and V.

We interviewed all our participants about their practice of daily sunscreen use. Seventy-eight doctors (74.0%) and 23 (38.0%) pharmacists do not have the practice of daily sunscreen usage. Twenty-six (68.0%) male and 75.0 (59.0%) female participants did not have the practice of daily sunscreen usage. Majority of doctors (70.0, 66.0%) and pharmacists (37.0, 61.0%) answered correctly about the timing of sunscreen application before sunlight exposure. In the doctor's cohort, media (33.0, 32.0%) was the top influencer for daily sunscreen use while in the pharmacist's cohort, family (18.0, 30.0%) was the top influencer. Mass media exposure with sun-protection information positively influenced the perception and sunscreen use among the doctor's cohort.

## **DISCUSSION**

Our findings showed that 51.0% pharmacists and 28.0% doctors reported to have the practice of daily use of sunscreen. Ammar Ihsan Awadh et al. reported a similar finding where final year pharmacy students (47.5%) use more sunscreen than final year medical students (36.6%).<sup>9</sup> This was possibly related to the fact that pharmacists are more familiar with sunscreen products. The majority of pharmacist respondents were females (92.0%) and they were generally more aware of the importance of sun protection. In our cohort, the practice of sunscreen use showed no significant differences between both genders as the majority of male (67.5%) and females (57.9%) do not have the practice of daily sunscreen use.

The assessment of knowledge about the use of sunscreen showed that female respondents scored a higher percentage of correct answer than the male respondents with a statistically significant association ( $p=0.011$ ). This is possibly due to the fact that females are more concerned on sun protection and sunscreen use. There is a famous Asian belief that 'a fair skin can hide three facial flaws'.<sup>10</sup> Asian females have long considered being fair as a desirable trait.<sup>10</sup> Therefore, they are more compliant to sun protection

**Table I: Socio-demographic background of participants (N=384)**

	<b>Doctors (n=323)</b>	<b>Pharmacists (n=61)</b>
<b>Position– no. (%)</b>	House officers 142 (44.0) Medical officers 149 (46.1) Specialist: 32 (9.9)	†PRP: 20 (33.0) ‡FRP: 41 (67.0)
<b>Age– no. (%)</b>		
20 till 30 years old	206 (63.8)	44 (72.0)
31 till 40 years old	109 (33.7)	15 (25.0)
41 till 50 years old	7 (2.2)	2 (3.0)
51 till 60 years old	1 (0.3)	0 (0)
<b>Gender – no. (%)</b>		
Male	170 (52.6)	5 (8.0)
Female	153 (47.4)	56 (92.0)
<b>Ethnicity – no. (%)</b>		
Malay	172 (53.3)	24 (39.0)
Chinese	131 (40.5)	34 (56.0)
Indian	16 (5.0)	3 (5.0)
Biracial/Others	4 (1.2)	0 (0)
<b>Status – no. (%)</b>		
Single	127 (39.3)	50 (82.0)
Married	138 (42.7)	11 (18.0)
In a relationship	58 (18.0)	0 (0)
<b>Fitzpatrick Type – no. (%)</b>		
Type II & III	105 (32.5)	17 (28.0)
Type IV & V	218 (67.5)	44 (72.0)

Data are presented as number (%) of participants.  
 †PRP = Provisionally registered pharmacists; ‡FRP = Fully registered pharmacists.

**Table II: Socio-demographic background of participants who completed the questionnaire (N=384)**

<b>Occupation – no. (%)</b>	
Doctor	323 (84.1)
Pharmacist	61 (15.9)
<b>Doctors – no. (%)</b>	
House officers	142 (44.0)
Medical Officers	149 (46.1)
Specialist	32 (9.9)
<b>Pharmacist – no. (%)</b>	
†PRP	20 (32.8)
‡FRP	41 (67.2)
<b>Age – no. (%)</b>	
20 till 30 years old	250 (65.1)
31 till 40 years old	124 (32.3)
41 till 50 years old	9 (2.3)
51 till 60 years old	1 (0.3)
<b>Gender – no. (%)</b>	
Male	175 (45.6)
Female	209 (54.4)
<b>Ethnicity – no. (%)</b>	
Malay	196 (51.0)
Chinese	165 (43.0)
Indian	19 (4.9)
Others	4 (1.1)
<b>Status – no. (%)</b>	
Single	177 (46.0)
Married	149 (38.9)
In a relationship	58 (15.1)
<b>Fitzpatrick Type – no. (%)</b>	
Type II & III	122 (31.8)
Type IV & V	262 (68.2)

Data are presented as number (%) of participants.  
 †PRP = Provisionally registered pharmacists; ‡FRP = Fully registered pharmacists.

**Table III: Practice of sunscreen usage among doctors and pharmacists (N=384)**

Questionnaires	Doctors (n=323)	Pharmacists (n=61)	p values
<b>Do you use sunscreen? – no. (%)</b>			
Yes	90 (27.9)	31 (51.0)	<0.001
No	209 (64.7)	23 (38.0)	
Occasionally	24 (7.4)	7 (11.0)	
<b>How frequently do you apply your sunscreen? – no. (%)</b>			
Occasionally	103 (31.9)	20 (33.0)	<0.001
Every morning or evening	33 (10.2)	10 (16.0)	
Once a day	122 (37.8)	25 (41.0)	
Every 4 hours	65 (20.1)	6 (10.0)	
<b>When do you apply your sunscreen before sunlight exposure? – no. (%)</b>			
Immediately before	55 (17.0)	14 (23.0)	<0.001
30 minutes before	210 (65.0)	37 (61.0)	
60 minutes before	58 (18.0)	10 (16.0)	
<b>Influence to use sunscreen– no. (%)</b>			
Media	128 (39.6)	16 (26.0)	<0.001
Family	50 (15.5)	18 (30.0)	
Friends	87 (27.0)	6 (10.0)	
Health care professionals	41 (12.7)	12 (20.0)	
Others	17 (5.2)	9 (14.0)	
<b>Will you recommend the usage of sunscreen to others? – no. (%)</b>			
Yes	209 (64.7)	42 (69.0)	<0.001
No	76 (23.5)	4 (7.0)	
Unsure	38 (11.8)	15 (24.0)	

Data are presented as number (%) of participants.  
p values are calculated based on Pearson Chi-square test.

**Table IV: Attitude of sunscreen use among doctors and pharmacists (N=384)**

Questionnaire	Doctors (n=323)	Pharmacists (n=61)	p values
<b>Will you encourage parents to apply sunscreen to their &lt; 6 months old baby? – no. (%)</b>			
Yes	131 (40.6)	6 (10.0)	<0.001
No	173 (53.5)	55 (90.0)	
Unsure	19 (5.9)	0 (0)	
<b>Sunscreen is effective at preventing sunburn. – no. (%)</b>			
Agree	256 (79.3)	58 (95.0)	0.012
Disagree	56 (17.3)	3 (5.0)	
Unsure	11 (3.4)	0 (0)	
<b>Sunscreen is effective in preventing skin cancer. – no. (%)</b>			
Agree	302 (93.5)	58 (95.0)	0.008
Disagree	7 (2.2)	3 (5.0)	
Unsure	14 (4.3)	0 (0)	
<b>Sunscreen is effective at preventing skin aging. – no. (%)</b>			
Agree	302 (93.5)	54 (89.0)	0.126
Disagree	7 (2.2)	7 (11.0)	
Unsure	14 (4.3)	0 (0)	
<b>Sunscreen is required on a cloudy or rainy day. – no. (%)</b>			
Agree	227 (70.3)	44 (72.0)	0.035
Disagree	67 (20.7)	17 (28.0)	
Unsure	29 (9.0)	0 (0)	
<b>Sunscreen should be applied when going for outdoor activities during a cloudy day. – no. (%)</b>			
Agree	287 (88.9)	49 (80.0)	<0.001
Disagree	19 (5.8)	12 (20.0)	
Unsure	17 (5.3)	0 (0)	
<b>Sunscreen should be applied when going for outdoor activities during a sunny day. – no. (%)</b>			
Agree	318 (98.5)	61 (100.0)	0.620
Disagree	1 (0.3)	0 (0)	
Unsure	4 (1.2)	0 (0)	

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<b>Sunscreen should be applied when going swimming at the pool, beach or waterfall. – no. (%)</b>			
Agree	315 (97.5)	61 (100.0)	0.462
Disagree	1 (0.3)	0 (0)	
Unsure	7 (2.2)	0 (0)	
<b>Sunscreen should be applied when attending lectures, working in hospital or any indoor activities. – no. (%)</b>			
Agree	230 (71.2)	45 (74.0)	0.003
Disagree	62 (19.2)	16 (26.0)	
Unsure	31 (9.6)	0 (0)	
<b>Sunscreen should be applied when attending any occasions at night. – no. (%)</b>			
Agree	114 (35.3)	21 (34.0)	0.142
Disagree	178 (55.1)	40 (66.0)	
Unsure	31 (9.6)	0 (0)	
<b>What does SPF stand for? – no. (%)</b>			
Correct	217 (67.2)	40 (66.0)	0.806
Incorrect	106 (32.8)	21 (34.0)	
<b>Which of the following has higher risk of skin cancer? – no. (%)</b>			
UVA	182 (56.3)	35 (57.0)	0.018
UVB	106 (32.8)	26 (43.0)	
Unsure	35 (10.9)	0 (0)	
<b>If one is working in-door (e.g. Office job), one does not need to wear sunscreen. – no. (%)</b>			
Agree	167 (51.7)	45 (74.0)	<0.001
Disagree	128 (39.6)	16 (26.0)	
Unsure	28 (8.7)	0 (0)	
<b>Melanoma is a form of skin cancer. – no. (%)</b>			
Agree	315 (97.5)	58 (95.0)	0.294
Disagree	8 (2.5)	3 (5.0)	
Unsure	0 (0)	0 (0)	
<b>Wearing sunscreen can cause vitamin D deficiency– no. (%)</b>			
Agree	26 (8.1)	8 (13.0)	0.019
Disagree	264 (81.7)	53 (87.0)	
Unsure	33 (10.2)	0 (0)	

p values are calculated based on Pearson Chi-square test.

**Table V: Sunscreen and skin cancer knowledge scores among different sub-group**

Scores	Sunscreen knowledge scores Median (IQR)	P values
Occupation– no. (%)		
Doctors	11.0 (2.0)	0.008
Pharmacists	12.0 (3.0)	
Gender– no. (%)		
Male	11.0 (2.0)	0.011
Female	12.0 (3.0)	
Age– no. (%)		
20 till 30 years old	11.0 (3.0)	0.993
31 till 40 years old	11.0 (2.0)	
41 till 50 years old	12.0 (3.0)	
51 till 60 years old	13.0 §	
Ethnicity– no. (%)		
Malay	11.0 (3.0)	<0.001
Chinese	11.0 (3.0)	
Indian	9.0 (3.0)	
Others	7.5 (4.0)	
Status– no. (%)		
Single	12.0 (3.0)	0.668
Married	11.0 (2.0)	
In a relationship	11.0 (3.0)	
Fitzpatrick Type– no. (%)		
Type II & III	11.5 (4.0)	0.007
Type IV & V	11.0 (2.0)	

p values are calculated based on Pearson Chi-square test.

We applied non parametric test since normality assumptions is not assumed.

§There is only one respondent in the 51 till 60 years old category.

measures and sunscreen use. This finding was also reported by Ammar Ihsan Awadh et. al where females in their cohort are more concerned about the usage of sunscreen use and tend to use it more regularly than male respondents.<sup>9</sup> On the other hand, pharmacists reported a higher percentage of correct answer than doctors although this did not reach statistical significance ( $p=0.008$ ).

Majority of the doctors (65.0%) and pharmacists (61.0%) were aware of the correct timing to apply sunscreen before sunlight exposure and the need to apply sunscreen even when working indoors. The correct time required to apply sunscreen before going out is 30 minutes. The majority of the respondents in our cohort were well aware with the fact that sunscreen is effective in preventing sunburn, skin cancer and skin aging. The benefits of sunscreen usage include prevention of sunburn, skin cancer, wrinkling, ageing, pigmentary disorder and photo-dermatoses.<sup>6,11</sup>

Majority of the respondents (56.3% doctors and 57.0% pharmacists) were unaware of that UVB is responsible for more skin cancers than UVA. SQ Wang, et al. reported that majority of the participants in New Jersey did not understand the subtle but crucial differences between UVA claim for a product and the sun protection factor (SPF) value listed on the product.<sup>13</sup> Compared to UVA, UVB have a shorter wavelength but higher energy which could damage the outermost skin layers and directly lead to skin cancer.<sup>14</sup> Sun protection factor (SPF) is a measure of effectiveness of sunscreen in preventing UVB in reaching the skin. The majority of respondents (67.2% doctors and 66.0% pharmacists) were aware of the meaning of SPF and choose a sunscreen based on its SPF value.

The majority of doctors (81.7%) and pharmacists (87%) were well aware that wearing sunscreen does not cause vitamin D deficiency. R. E. Neale et al. in the effect of sunscreen on vitamin D: a review reported that there is little evidence that sunscreen decreases 25(OH)D concentration and suggested that skin cancer prevention advice should not be neglected.<sup>15</sup>

#### STUDY LIMITATION

This is a single centre among doctors and pharmacists who had participated voluntarily. This data does not reflect the entire cohort of doctors and pharmacists working in this centre. Thus, results are not representative of all the hospital in Johor or in Malaysia as a whole.

#### CONCLUSION

This study demonstrated that there is a lack of knowledge on sunscreen and skin cancer among health care providers in this study. We propose a more structured continuous education programme to improve the sunscreen and skin cancer knowledge among health care providers. With adequate sun protection and skin cancer knowledge, we can disseminate the information to patients and together reduce the detrimental effects of sunlight on human skin.

#### ETHICAL APPROVAL

This study was approved by the Ministry of Health Research Ethics Committee (MREC) and the National Medical Research Registry with the registration number of NMRR-19-1470-

48459. All respondents gave their informed consent prior to their participation in this study.

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#### CONFLICT OF INTEREST

The authors hereby certify that the work which was reported herein had not received any financial support from any pharmaceutical company or other commercial source and neither the authors nor any first degree relatives have any special financial interest in the subject matter discussed in our manuscript.

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