

Evaluation of the knowledge of sun exposure and sun protective measures in healthcare workers

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ABSTRACT

Introduction: Solar ultraviolet (UV) radiation has a great impact on human life. The sun has always played an important role in Asian culture, so much so, that it is often prayed to as a God. Prolonged sun exposure can cause extensive and chronic harmful effects. Healthcare personnel is supposed to have good knowledge regarding sun protection as they play a key role in society disseminating knowledge to the general public. There are limited data regarding the knowledge of sun protection and sunscreen practice among health care workers.

Methods: This descriptive cross-sectional study was carried out from June to October 2020 on healthcare workers (medical staff) in Kathmandu Medical College Teaching Hospital. A questionnaire was distributed to the target study population without disturbing or hampering the healthcare worker's duty.

Results: Out of a total of 264 participants in the study, 84 (31.8%) were male and 180 (68.2%) were female. The knowledge of proper terminology for SPF (Sun Protection Factor) was noted in 196 (74.2%) and 57 (21.6%) agreed that the value of SPF was related to age. No significant difference was noted regarding knowledge about the time of sun exposure for Vitamin D synthesis. No significant differences were found in practices of sunscreen use for purposes of fairness, or prevention of tanning, wrinkle, mole, and skin cancer.

Conclusion: A higher level of education was associated with better knowledge and proper abiding practices regarding sunscreen use. As healthcare workers play a key role in distributing information in society, they should be targeted in education campaigns regarding sun exposure and sun protection measures; with these efforts focused more on nurses and medical officers.

Keywords: Health personnel, Knowledge, Sunscreen, Ultraviolet

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Introduction

Solar ultraviolet (UV) radiation has a great impact on human life. Sun has always been given importance in Asian culture to the extent that it is often considered of god, similar to the Greeks and Romans worshipping Apollo as the sun God and the god of light.¹ Even today, UV radiation via

sunlight has important public health implications in the form of both beneficial and deleterious effects. Sun exposure causes extensive intrinsic as well as extrinsic changes in the skin and has many acute and chronic harmful effects.² Nowadays, there is an increasing awareness about the benefit

of sunlight for the synthesis of vitamin D.

Results of photo aging, such as pigmentation, sagging, wrinkling, and photo-carcinogenesis are caused by an alteration to DNA; which can be prevented with regular usage of sunscreen.² During summer, the ultraviolet (UV) energy received on the earth's surface is made up of 3.5% ultraviolet B (UVB) and 96.5% ultraviolet A (UVA) radiation.⁴ UVA penetrates up to the dermis whereas UVB affects the epidermis of the skin.³ Regular sunscreen usage can prevent photo-induced and photo-aggravated dermatoses. Food and Drug Administration have approved Sunscreen for use in the prevention of sunburn, photo-induced pigmentation, aging, and carcinoma of the skin.⁴

The mechanism by which sunscreens inhibit the transmission of UV radiation into the skin is by absorbing, reflecting, or scattering such radiation.⁴ Sunscreens have been recommended as preventive and protective measures against sunlight, with the efficacy increasing with a higher sun protection factor.⁴ Health care personnel supposedly have good knowledge regarding sun protection and they play a key role in society disseminating knowledge to the general public. There are limited data regarding the knowledge of sun protection and sunscreen practice in health care workers.

Our study aimed to determine the knowledge of healthcare workers regarding the solar spectrum, sunscreen, the relation of Vitamin D with sun exposure, the practice of using sunscreen and other sun protection methods.

Methods

This descriptive cross-sectional study was carried out from October 2020 to July 2021 on healthcare workers (medical staff) in Kathmandu Medical College Teaching Hospital after taking ethical approval from IRC. Non-medical hospital staff and health workers with less than one year of experience in healthcare practice were excluded from our study. All health workers working in the hospital who voluntarily agreed to participate were included.

Participants were informed about the purpose of

the study and its methodology. The questionnaire was self-designed and pilot testing was done on 15 participants to calculate the approximate time to complete it and to determine the clarity of the questionnaire. Feedback was taken for further improvement and modification of the questionnaire. The researcher distributed the self-administered questionnaire to the target study population without disturbing or hampering the healthcare worker's duty. A researcher was available to clarify any issue and questionnaires were collected soon after responses were collected. The questionnaire consisted of three sections. The first section consisted of demographic variables including age, gender, education, and medical post. The second section consisted of knowledge regarding the sun, SPF, vitamin D, and sunscreen and the third section consisted of questions regarding the practice of sun protective measures. Data were entered and analyzed by SPSS version 20. Analytical statistics was applied using the chi-square test for testing the difference or association between two categorical variables, similarly, descriptive statistics were applied to calculate frequency and percentage.

Results

The participants in the survey aged between 24-67 years with a mean age of 34.74 ± 7.839 . Out of a total of 264 participants in the study, 84 (31.8%) were male and 180 (68.2%) were female. In our study, the healthcare workers participating were nursing staff 41(15.5%), Medical officers 81(30.7%), and consultant doctors, 142(53.8%). Among them, 89(33.7%) health workers had skin problems at some point in their lives. The number of participants who knew about the different spectra of ultraviolet radiation was 175 (66.3%). (Table 1).

Regarding the level of knowledge about sunscreen 212 (80.3%) agreed that sunscreen is expensive, (significant $p < 0.005$). Out of 264 participants, only 196 (74.2%) knew the proper terminology for SPF (Sun Protection Factor) and only 59 (21.6%) agree that the value of SPF is related to age. Similarly, 120 (45.4%) participants knew about the difference between physical and chemical sunscreen and it was not significant. (Table 2).

Table 1: Socio-Demographics data of participants

Variables		N (%)
Gender	Male	84(31.8)
	Female	180(68.2)
Education qualification	Nursing	41(15.5)
	Medical Officer	81(30.7)
	Consultant	142(53.8)
Age range	20-29	81(30.7%)
	30-39	120(45.5%)
	40-49	52(19.7%)
	50-59	5(1.9%)
	> 60	6(2.3%)
Underlying skin condition	Yes	89(33.7)
	No	172(65.2)

Table 2: Health worker level of knowledge regarding Sunscreen

Variables		Nursing N (%)	Medical officer, N (%)	Consultant N (%)	p- value
Sunscreen is expensive	Agree	36 (13.6)	74 (28)	102 (38.6)	0.002
	Disagree	3 (1.1)	5 (1.8)	14 (5.3)	
	Don't know	2 (0.7)	2 (0.7)	26 (9.8)	
Meaning of SPF	Sun protection factor	27 (10.2)	58 (21.9)	111 (42)	0.023
	Sun prevention factor	4 (1.5)	2 (0.75)	10 (3.7)	
	Sun protection formula	5 (1.8)	13 (4.9)	4 (1.5)	
	Sun Prevention formula	2 (0.73)	2 (0.75)	2 (0.75)	
	Don't know	3 (1.1)	6 (2.2)	15 (5.6)	
Value of SPF is related to age	Agree	28 (10.6)	48 (18.1)	77 (29)	0.132
	Disagree	3 (1.1)	20 (7.5)	36 (13)	
	Don't know	10 (3.7)	13 (4.9)	29 (10)	
Difference between physical and chemical sunscreen	Yes	17 (6.4)	35 (13.2)	68 (25.7)	0.681
	No	24 (9)	46 (17.4)	74 (28)	

Out of the total participants, 214 (81%) agreed that there is a relationship between sunlight and vitamin D synthesis

, and it was significant. No significant difference was noted regarding knowledge about the time of sunscreen exposure for vitamin D synthesis. Around 95 (45.5%) recommended that 20-30 minutes/week of sun exposure is required for vitamin D synthesis. Similarly, regarding vitamin D deficiency, 90(34%) agreed that regular use of sunscreen can cause vitamin D deficiency. (Table

3)

Regarding the knowledge about sunlight, only 172 (65.1%) were aware of different spectra of UV light. Similarly, 96 (36.3%) knew that skin condition gets aggravated by exposure to Ultra Violet radiation. Regarding outdoor activities among the three groups, Consultants, 52(19.6%) were more likely to spend lesser time outdoors and avoided sunlight exposure during peak hours. (Table 4)

Table 3: Health worker level of knowledge regarding vitamin D and Sunscreen

Variables		Nursing N (%)	Medical officer N(%)	Consultant N(%)	P- value
View on the relationship between sunlight and vitamin D	Agree	37 (14)	75 (28.4)	107 (40.5)	0.020
	Disagree	2 (0.75)	1 (0.3)	24 (9)	
	Don't know	2 (0.75)	5 (1.8)	11 (4.1)	
Is the area of sunlight exposure related to vitamin D synthesis	Yes	28(10.6)	60 (22.7)	98 (37.1)	0.003
	No	13 (4.9)	21 (7.5)	44 (16.6)	
The exposure time required for vitamin D synthesis	20-30min/week	17 (6.4)	21 (7.9)	57 (21.5)	<0.001
	40-60min/week	13 (4.5)	40 (15.1)	29 (10.9)	
	60-90min/week	11 (4.1)	20 (7.5)	56 (21.2)	
View on sunscreen use and vitamin D deficiency	Agree	15 (5.6)	18 (6.8)	57 (21.5)	0.001
	Disagree	23 (8.7)	47 (17.8)	49 (18.5)	
	Don't know	3 (1.1)	16 (6.06)	36 (13.6)	

Table 4: Healthcare worker level of knowledge regarding sunlight

Variables		Nursing N(%)	Medical officer N(%)	Consultant N(%)	p- value
Know about the different spectra of UV light	Yes	27 (10.2)	50 (18.9)	98 (37.1)	0.541
	No	14 (5.3)	31 (11.7)	44 (16.6)	
Do you think skin condition is aggravated by UV light	Yes	13 (4.9)	33 (12.5)	50 (18.9)	0.567
	No	28 (10.6)	48 (18.1)	92 (34.8)	
Is sun exposure bad for the skin	Agree	26 (9.8)	64 (24.2)	98 (37.1)	0.048
	Disagree	15 (5.6)	13 (4.9)	33 (12.5)	
	Don't know	0 (0)	4 (1.5)	11 (4.1)	
Hours of outdoor activity you do in a week	<15hr/week	26 (9.8)	45 (17)	87 (32.9)	0.249
	15-30hr/week	15 (5.6)	29 (10.9)	41 (15.5)	
	>30hr/week	0 (0)	7 (2.6)	14 (5.3)	
Avoid sunlight during peak hour	Always	15 (5.6)	20 (7.5)	52 (19.6)	<0.001
	Sometimes	26 (9.8)	57 (21.5)	57 (21.5)	
	Rarely	0 (0)	1 (0.37)	26 (9.8)	
	Never	0 (0)	3 (1.1)	7 (2.6)	

According to the participants, 89 (33.7%) used coin size volume of sunscreen regularly and among them, 45 (17%) were consultant doctors. Regarding the sunscreen application time, 91(34.4%) used it in the morning, while 51(19.3%) used sunscreen whenever they go out in sun. Reapplication of sunscreen was done only by 73 (27.6%) participants. Most of the participants i.e. 124 (46.5%) used SPF of 30-50 and a majority of participants (62.1%), applied sunscreen only on the face followed by face and neck by 128(48-4%)

and arm 32 (12.1%). (Table 5).

No significant differences were found in the level of practice of sunscreen for precaution of fairness, or prevention of tanning, wrinkle, mole, and skin cancer. The most common reason for sunscreen application was to prevent sunburn 132(50%) and was significant. Apart from sunscreen other sun protection methods reported were the use of an umbrella 149 (56.4%), wearing sunglass 125(47.3%), and wearing full sleeves 106(40%) which were not significant. (Table 6).

Table 5: Practice of sunscreen by healthcare workers.

Variables		Nursing N (%)	Medical Officer N (%)	Consultant N (%)	p- value
The volume of sunscreen applied	Pea size	11 (4.1)	29 (10.9)	35 (13.2)	0.118
	Coin size	16 (6.06)	28 (10)	45 (17)	
	Double coin size	0 (0)	6 (2.2)	7 (2.6)	
Time of application	Morning	16 (6.06)	22 (8.3)	53 (20)	0.001
	Afternoon	3 (1.1)	7 (2.6)	11 (4.1)	
	Going out	7 (2.6)	30 (11.3)	14 (5.3)	
	Twice a day	1 (0.3)	5 (1.8)	10 (3.7)	
Reapplication	Yes	7 (2.6)	30 (11.3)	36 (13.6)	0.044
	No	34 (12.8)	51 (19.3)	106 (40)	
Use sunscreen indoor	Yes	13 (4.9)	28 (10.6)	50 (18.9)	0.235
	No	27 (10)	53 (20)	92 (34.8)	
SPF use	15-29	5 (1.8)	20 (7.5)	15 (5.6)	0.007
	30-50	22 (8.3)	37 (14)	65 (24)	
	>50	1 (0.3)	8 (3.03)	9 (3.4)	
Area of application	Face	25 (9.4)	57 (21.5)	82 (31)	0.172
	Neck	19 (7.1)	32 (12.1)	77 (29.1)	0.091
	Arm	5 (1.8)	2 (0.75)	25 (9.4)	0.004
	Other parts	0 (0)	2 (0.75)	0 (0)	

Table 6. The practice of sun protection measures by Healthcare workers.

Variables		Nursing N (%)	Medical officer N (%)	Consultant N (%)	p- value
Reason for use of sunscreen	Fairness	11 (4.1)	25 (9.4)	7 (10.2)	0.128
	Prevent tanning	18 (6.8)	33 (12.5)	44 (16.6)	0.178
	Prevent sunburn	17 (6.4)	50 (18.9)	65 (24.6)	0.036
	Prevent wrinkle	12 (4.5)	38 (14)	54 (20.4)	0.150
	Prevent early aging	10 (3.7)	28 (10.6)	49 (18.5)	0.447
	Prevent mole	5 (1.8)	22 (8.3)	37 (14)	0.144
	Prevent skin cancer	4 (1.5)	24 (9)	30 (11.3)	<0.01
Other sun protection measure used	Umbrella	15 (5.6)	48 (18.1)	86 (32)	0.233
	Hat	13 (4.9)	33 (12.5)	50 (18.9)	0.567
	Sunglasses	18 (6.8)	47 (17)	60 (22)	0.068
	Full sleeves	17 (6.4)	41 (15.5)	48 (18.1)	0.047

Discussion

Healthcare workers are considered to be well-educated and knowledgeable. Higher education level was known to be associated with increased use of sunscreen and other sun protection measures as they are aware of sun radiation damage to the skin.⁵

In our study, there were more female participants due to nursing female healthcare workers. Among the three groups in our study, the knowledge about UV radiation, sunscreen, physical and chemical sunscreen and SPF (Sun Protection Factor) was found more in consultant doctors and was statistically significant. The subgroup among

the healthcare professions that had a lower knowledge also had a lower education level. A similar outcome was found in other studies.⁶

In our research, we assessed the relationship between vitamin D syntheses with sun exposure. It was found that 81.8% of healthcare workers agree that there is a relationship between vitamin D and sunlight, while 186 (70%) believe that sunlight exposure is related to vitamin D synthesis, which is similar to a study by Kaymalet al.⁷ The study done by Neale et al. also supported the theoretical risk of sunscreens may affect vitamin D levels.⁸ Young et al. concluded that high UVA-PF sunscreen enables significantly higher vitamin D

synthesis than a low UVA-PF sunscreen because the former, by default, transmits more UVB than the latter. Sunscreens (sun protection factor, SPF 15) applied at a sufficient thickness to inhibit sunburn during a week-long holiday with a very high UV index still allow a highly significant improvement of serum 25-hydroxyvitamin D3 concentration. An SPF 15 formulation with high UVA protection enables better vitamin D synthesis than a low UVA protection product. The former allows more UVB transmission.⁹

In this study, 87 (32.9%) participants avoided sunlight during peak hours, this may be due to indoor working hours. Similarly, Kaymak et al. found 'not going out at peak times' to be the most commonly adopted method with a figure of 45.3% and 53.0% in males and females.¹⁰ The outcome of this study shows that consultants were more likely to be familiar with the sun's detrimental effects on skin and take protective measures, including sunscreen application.

A Greek study found the use of sunglasses (83.4%) as the most common sun protection measure in Mediterranean inhabitants, followed by protective clothing (57.8%),¹¹ in contrast to our study where other sun protection measures were less adopted. This can be due to a lack of knowledge, social and cultural norms, and economical barriers. Using an umbrella was the least adopted method of sun protection in Turkey,¹¹ similar to that of our study. In Saudi Arabia, 95% of respondents reported wearing long-sleeved cloth and a head cover, clearly influenced by customs and traditional dressing practices.¹²

Surprisingly, our study found that the knowledge about the relation of sun exposure with skin cancer is very low (21.9%), as opposed to many international studies, where the knowledge about sun exposure and its relation with skin cancer as well as adapted measures of sun protection was very high. For example, 85% in Australia, 92 % in Canada and the United States, and 92.5% in Malta where as 55.5% in India reportedly were more aware.^{13,14} No significant difference was found among the three study groups (consultant, nursing, and medical officer) regarding the reason

for using sunscreen. This is similar to the result of a study by Ergin et al.¹⁵

Conclusion

A higher level of education was associated with better knowledge and behavior toward sunscreen and the solar spectrum. As healthcare workers play a key role in distributing information in society, especially nurses, medical officers should be targeted in education campaigns regarding sun exposure and protection.

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