Original Investigation
Orijinal Araştırma

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Information about sun exposure, protection, awareness and behavioural patterns of medical students in Kolar

Kolar'da tıp öğrencilerinin güneş maruziyeti, korunma, farkındalık ve davranış kalıpları hakkındaki bilgisi

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Abstract

Background and Design: The harmful ultraviolet radiation of sunlight can damage skin cells and affect the skin's normal appearance. The short term effects associated with sun exposure include acute skin damage associated changes such as sunburn, suntan and the long term effects are delayed pigmentation, impaired vitamin D synthesis, altered immunological responses of the skin, photodamage and photocarcinogenesis. The majority of these photodermatoses are preventable with the implementation of appropriate sun protection measures and behavioral changes.
Materials and Methods: Data collection was done with the help of a structured questionnaire which was distributed among 339 undergraduate medical students in their 4th, 7th, 8th and 9th term attending dermatology postings at a medical college attached to a tertiary hospital from January 2018 to July 2018.
Results: The majority of the students in this study were 4th term undergraduates representing 35.3% of the population. The mean ± standard deviation scores of knowledge, behaviour and awareness were 11.67±3.31, 12.32±5.004, 24±6.282, respectively. Only 26.8% of the above population always used sunscreen during daily activities, 32.1% sometimes, 25.6% rarely used and 15.3% never used sunscreen during daily activities. One-Way ANOVA tests depicted a statistically significant difference among the various term students with respect to variables of knowledge, behaviour and awareness score with a $p<0.001$.
Conclusion: The results of this study indicate that knowledge regarding sun exposure and its adverse effects, behaviour and awareness even among medical students to sun protection is inadequate. Sun protection should start at an early age and therefore awareness campaigns are highly recommended.
Keywords: Photodermatoses, sunscreen, photocarcinogenesis

Öz

Amaç: Güneş ışığının zararlı ultraviyole radyasyonları deri hücrelerine zarar verebilir, derinin normal görünümünü etkiler. Güneşe maruz kalmanın kısa vadeli etkileri güneş yanığı, bronzlaşma gibi akut deri hasarı ile ilişkili değişiklikleri içerir, uzun vadeli etkiler ise gecikmiş pigmentasyon, bozulmuş D vitamini sentezi, derinin değişmiş immünolojik tepkileri, fotohasar ve fotokarsinogenezdir. Bu fotodermatozların birçoğu, uygun güneş koruma önlemlerinin ve davranışsal değişikliklerin uygulanması ile önlenebilir.
Gereç ve Yöntem: Veri toplama, Ocak 2018'den Temmuz 2018'e kadar üçüncü basamak bir hastaneye bağlı bir tıp fakültesinde dermatoloji görevlerine devam eden 4., 7., 8. ve 9. dönemlerde 339 tıp fakültesi öğrencisi arasında dağıtılan yapılandırılmış bir anket yardımıyla yapıldı.
Bulgular: Bu çalışmadaki öğrencilerin çoğunluğu katılımcıların %35,3'ünü temsil eden 4. dönem mezunlarıydı. Bilgi, davranış ve farkındalık skoru için ortalama ± standart sapma değerleri sırasıyla 11,67±3,31, 12,32±5,004, 24±6,282 idi. Yukarıdaki popülasyonun sadece %26,8'i günlük aktiviteler sırasında her zaman güneş kremi kullanıyordu, %32,1'i bazen, %25,6'sı nadiren güneş kremi kullanırken, %15,3'ü günlük

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aktiviteler sırasında hiç güneş kremi kullanmıyordu. One-Way ANOVA testleri farklı dönem öğrencileri arasında bilgi, davranış ve farkındalık değişkenlerinin puanları açısından p<0,001 olan istatistiksel olarak anlamlı bir fark olduğunu ortaya koydu.
Sonuç: Bu çalışmanın sonuçları, güneşe maruz kalma ve güneşin yan etkileri, davranışlar ve farkındalığın tıp öğrencileri arasında bile güneşten korunma konusundaki bilginin yetersiz olduğunu göstermektedir. Güneşten korunma erken yaşta başlamalıdır ve bu nedenle bilinçlendirme kampanyaları şiddetle tavsiye edilir.
Anahtar Kelimeler: Fotodermatozlar, güneş kremi, fotokarsinogenez

Introduction

Ultraviolet (UV) radiation alters the proliferation, differentiation and survival of several different cell types and thereby affects skin homeostasis. The most abundant form of UV radiation that reaches the earth's surface is ultraviolet A (UVA) and only a small amount of UVB radiation reaches the earth's surface. In recent years, a rapid depletion in the ozone layer has resulted in a major quantity of UVB rays reaching the earth's surface and this has had a global impact and increased the risk of mutagenesis and photo-carcinogenesis. The extent of ozone loss in the southern hemisphere is more than the northern hemisphere with increased negative impact of UV radiation on this population[1].

The harmful effects of UV rays on the skin can be acute or chronic. The acute effects are damage to DNA, apoptosis, erythema, immunosuppression and increased risk of pigmentation due to stimulation of melanogenesis. The chronic effects include photoaging and photocarcinogenesis. The malignancies that occur are basal cell carcinoma and squamous cell carcinoma. The risk of occurrence of basal cell carcinoma to squamous cell carcinoma is 4:1. Non-melanoma skin cancers have a lower risk of mortality and morbidity but cause a profound impairment in patient's social life and daily activities. The most lethal tumor of all of these is malignant melanoma. The survival rates of these tumors have increased with the recent advances in diagnostic technology and therapeutics, however, the risk of mortality still continues to rise, emphasising the need of early detection and patient education[1].

The highest UVB radiation is found near the equator. India lies in the tropical belt and the population here is exposed to a high degree of both UVA and UVB radiation[2].

The adverse effects that occur with sun exposure can be prevented with appropriate sun protective measures. The measures for effective sun protection are avoidance of sun exposure between 10.00 a.m. and 2.00 p.m, using sunscreen, seeking shade, avoiding tanning beds minimizing sunburns, and wearing wide-brimmed hats, protective clothing, and sunglasses[3].

Sunscreens constitute the main backbone of sun protection. They act by reflecting, absorbing, or dispersing the UV radiation and reducing its transmission into the skin[3].

Sunscreens were approved by Food and Drug Administration to prevent sunburn, aging, carcinoma and sunlight induced pigmentation[2]. Patients have to be educated about sunscreen use and its benefits in skin protection[3].

The cost of sunscreens and the greasy formulations in which they are available are the major reason for discontinuation of sunscreen in individuals. The alternative formulations of sunscreens that are available including less greasy formulations like gels, sprays, and lip balms are unknown to many and even to some medical professionals[4].

Though many studies have been conducted worldwide to assess the sun protective behaviour and use of sunscreens. In India very few such studies have been done. This is the second study of its kind[3].

Although a number of international surveys regarding skin cancer, prevention and control programmes have been successful in raising public consciousness, these programmes do not assess their behavioural implementation. In daily practice, even medical students as well as the local population are unaware of proper sun protection practices[3].

This study was undertaken on medical students in India who constitute the top layer of the educational society and also who are the future of propagation of education in the country as practitioners and teachers. This is the first study of such kind in India to be conducted on this group of participants.

Materials and Methods

Study design

A cross-sectional questionnaire-based study was conducted. The Sri. Devaraj Urs Medical College Institutional Ethics Committee approval was obtained (approval number: SDUM/KLR/IEC/94.2018-19, date: 23.05.2018). Informed consent was taken and 339 undergraduates attending the dermatology postings from June to November at R.L Jalappa Hospital, Kolar were included in the study and answered the questionnaire containing questions to assess the knowledge, attitude, and behaviour questions regarding sun exposure and skin protection practices.

Data collection

The paper copies with the list of 35 questionnaire were distributed to undergraduate medical students.

Devices/tools

A questionnaire was formed based on previous studies and in accordance with the circumstances of the current sample population. A 35-question final questionnaire based on multiple choice and self-report instrument and Likert scale was developed[4-6]. The assessment was done based on three domains, the first assessment was based on the seven questions that focused on socio-demographic characteristics like age, gender, marital status, nationality and history of sunburn[6]. The second domain comprised of ten questions about sun protective behaviours, and the third set comprised of eighteen questions about the sun and its hazards, sun protective measures and sunscreen application[6]. The questionnaire took an approximate time of ten minutes per student.

Behaviour score

The behaviour was calculated as follows with "sometimes" assigned a score of two, "rarely" equivalent to a count of one and "never" allocated as zero. The behaviour score was calculated with the least score of zero and a highest score of 24. The behaviour score was obtained as per Likert scale and individuals with variable answers were not included in the study.

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Knowledge level score

The hazardous outcomes of sun exposure such as malignancy and the protective measures against the sun were assessed with 18 questions. The score of knowledge level (KLS) was calculated by giving one point to each correct answer (zero points were allotted to "False/I do not know" answers). The scores were summed together ranging from 0 (minimum score) to 18 (maximum score).

Awareness score

The total awareness score was calculated by adding the KLS and behaviour score. The total score was calculated as 42.

Statistical Analysis

The sample size for the study was calculated based on the average awareness score which was obtained from a study conducted on medical students on their knowledge, awareness and behaviour about skin cancer, the hazards of sun exposure and utilization of sunscreen[7]. The estimated average variance was found to be 49 with a 99% confidence interval (CI) with an alpha error of 1% the required sample size found to be 339. A chi-square test was performed to assess the link between the KLS, behaviour score, and demographic details.

Analysis and statistical method

Collected data was coded into excel format on quantitative measures and presented by mean standard deviation and CI on categorical data by proportions. One-Way ANOVA was used to compare the mean scores in different groups. Multiple linear regression was used and chi-square test was done to compare the different proportions. Any p-value less than 0.5 was considered statistically significant.

Results

The study was conducted to assess the knowledge, behaviour and awareness of undergraduate medical students towards sun exposure and sun protection practices. In our study, the maximum study participants were males 180 (53.1%) followed by females 159 (46.9%). The number of students in this study were 4th term (35.3%), 7th term (29.4%), 9th term (24.7%) and 8th term (10.3%) (Table 1).

Table 1. Demographic data and history details of the participants (n=339)

Characteristics	n	%
1. Age		
<25	339	100
2. Marital status		
Married	10	2.9
Unmarried	329	97
3. Nationality		
Indian	339	100
4. Gender		
Male	180	53.1
Female	159	46.9
5. Term		
4th	120	35.3
7th	100	29.4
8th	35	10.3
9th	84	24.7
6. "Have you ever had sunburn under the age of 15?"		
No	307	90.5
Yes	32	9.4
7. "Have you ever had a late sunburn?"		
No	289	85
Yes	50	14.7

Knowledge level

The accurate answers were in the range of 23 % to 84.9% with minimum knowledge on the question "with the proper application of SPF-30 one can stay in the sun 30 minutes longer without sustaining sun burns" (23%) to maximum knowledge on the question "periodic examination by a dermatologist helps in detection of early stages of skin cancers" (84.9%) (Table 2).

Behaviour

The behaviour related variables were assessed and it was found that 25% of study population avoided sun or preferred shade during the peek hours and 53% of the population avoided sun sometimes only. The study population comprised of 10.9% of students always practicing outdoors; 56.9% of students sometimes practicing outdoors; and 11.7% of students never practicing outdoors during the day. Further, it was observed that 48.9% of population never used tanning beds and only 7.3% of population used tanning beds indicating its uncommon practice among individuals. In the study population 32.4% used sunscreen during daily activities, and 15.3% of the subjects never used sunscreens during daily activities. Among the sunscreen users 35.1% used sunscreen of SPF-30 and above. The practice of sunscreen use while sun bathing on holidays was seen in 32.4% of study population and 31.2% of them did not use sunscreen even while sunbathing on holidays. The other protective measures such as sunglasses were used by 26.2%, followed by protective clothing in 25.6% of the individuals and hats in 16.2% of them. The rest of these individuals (31.8%) also failed to use other sun protective measures. Majority of the study population (40.7%) failed to get their skin checked by physicians for potential cancerous lesions and only few of them (12%) got their skin examined for potential cancerous lesions. Self-examination of skin for precancerous skin lesions was occasionally performed by 30.9% of these individuals and never performed by 30% of the population. The reasons for not using sun protective measures were investigated, and the most common reasons were laziness in 54.6% individuals, followed by willingness to tan in 13.9%, embarrassment in 8.5%, and the thought that these measures would not be necessary in 23%. Only 15 % of these individuals have recently suffered from sunburns. A total of 9.4% of these individuals recently suffered from sunburn before the age of fifteen (Table 3).

Knowledge and behaviour

The knowledge and behaviour score together constituted the awareness score. The mean knowledge, behaviour and awareness score and total knowledge, behaviour and awareness score have been calculated according to term and is as provided in the table. A statistically significant difference in mean awareness score was seen

Table 2. Knowledge related questionnaire and responses of the participants (n=339)		
Variables	**n**	**%**
1. "Using sunscreen protects the skin from cancer."		
True	214	63.1
False	60	17.6
No idea	65	18.2
2. "Periodic examination by a dermatologist helps in detection of early stages of skin cancers."		
True	288	84.9
False	25	7.3
No idea	26	7.6
3. "Early stages of skin cancer can be detected by self-examination of suspicious lesions."		
True	325	78.5
False	28	6.8
No idea	61	14.7
4. "Freckles are caused by excessive sun exposure."		
True	214	63.1
False	50	14.7
No idea	79	23.3
5. "Excessive sun exposure causes premature skin wrinkles."		
True	204	60.2
False	82	7.7
No idea	73	28.3
6. "Excessive sun exposure causes skin cancer."		
True	198	58.4
False	68	20
No idea	73	21.5
7. "The most harmful effect of sun exposure is seen between 10:00 a.m. to 2:00 p.m."		
True	229	67.5
False	50	14.7
No idea	60	17.6
8. "A sunscreen with an SPF (sun protection factor) of at least 30 is considered ideal."		
True	203	59.8
False	44	13
No idea	92	27.1
9. "SPF of more than 30 offers slightly greater protection with a drawback of higher cost."		
True	137	40.4
False	66	19.4
No idea	136	40.1
10. "If you want to apply for whole body a minimum of 30 mL or 2 table spoon of sunscreen is required."		
True	179	52.8
False	70	20.6
No idea	100	29.4
11. "With the proper application of SPF 30 one can stay in the sun 30 minutes longer without sustaining sun burns."		
True	78	23
False	129	38
No idea	132	39
12. "One fingertip is equal to the amount of cream/lotion that covers both sides of a hand when applied."		
True	192	56.6
False	76	22.4
No idea	71	20.9
13. "Wet clothing means more transmission of UV rays and more damage."		
True	162	47.7
False	80	23.5
No idea	97	28.6
14. "Sunscreen application should be done 15-30 minutes before exposure to the sun with re-application every 2 hours."		
True	210	61.9
False	62	18.2
No idea	67	19.8
15. "Blonde hair or red hair poses a greater risk of skin cancer."		
True	172	50.7
False	52	15.3
No idea	115	33.9
16. "The risk of skin cancer varies with skin type."		
True	218	64.3
False	38	11.2
No idea	83	24.5
17. "Chances of melanoma later in life doubles with one blistering sunburn during childhood."		
True	172	50.7
False	63	18.5
No idea	104	30.6
18. "Does a family history of skin cancer further increase the individual's risk of skin cancer?"		
True	232	68.4
False	46	13.5
No idea	61	17.9

SPF: Sun protection factor, UV: Ultraviolet

between the male and female participants of the study (p=0.0138). One-Way ANOVA test revealed statistically significant difference among individuals in different terms (p<0.001) with respect to knowledge, awareness and behaviour variables. Multiple linear regression showed that the term is a significant predictor of behavior score (β=0.371, p=0.025) with an overall model fit R^2=0.022 and a significant predictor of knowledge score (β=0.473, p=0.005) with an overall model fit R^2=0.023 (Table 4).

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Table 3. Behaviour related questionnaire and responses of the participants (n=339)	
Behaviour related variables	**n (%)**
1. "How frequently do you forego sun exposure or seek protection during the peak hours?"	
Always	25.1
Sometimes	53.3
Rarely	15.6
Never	4.7
2. "How often during the day do you practice or compete outdoors?"	
Always	10.9
Sometimes	56.9
Rarely	20.3
Never	11.7
3. "How frequently do you use tanning beds?"	
Always	7.3
Sometimes	18.5
Rarely	25
Never	48.9
4. "Use of sunscreen during daily activities"	
Always	32.4
Sometimes	20.3
Rarely	15.9
Never	31.2
5. "Do you use sunscreen while sunbathing during holidays?"	
Always	32.4
Sometimes	20.3
Rarely	15.9
Never	31.2
6. "Do you use SPF 30 or higher sunscreen"	
Always	35.1
Sometimes	20.9
Rarely	16.8
Never	24.2
7. "Use of other sun protective measures*"	
Sun glasses	26.2
Protective clothing	25.6
Hats	16.2
None of the above	31.8
8. "How often do you ask your physician to check your skin for potential cancerous lesions?"	
Always	12
Sometimes	20.9
Rarely	26.2
Never	40.7
9. "Do you examine your skin for potential cancerous lesions on your own?"	
Always	18.5
Sometimes	30.9
Rarely	20.3
Never	30
10. "If you are not using sun protective measures, what's making you stay away from utilising them?*"	
Lazy/tired/no time	54.6
Want to tan	13.9
Embarrassed	8.5
I don't need it	23

*Indicates question has been excluded from the total behaviour score calculation.

Discussion

Light is an essential component of life. Various metabolic, endocrine, and physiological processes of life are dependent on sunlight. In addition to such advantages on life, sunlight also has a vast number of adverse effects on skin. These effects are more marked in countries like India which lie in tropical zone with high amount of sunlight exposure[7]. Photodermatoses are a group of disorders which occur due to UV light induced abnormal tissue responsiveness on the sun-exposed skin. They are classified as idiopathic photodermatoses, photodermatoses secondary to exogeneous agents or endogenous chemicals, photodermatoses due to defective DNA repair or photo aggravated dermatoses[7,8]. Various causes of idiopathic photodermatoses include solar urticaria, polymorphous light eruption, hydroa vacciniforme, actinic prurigo and chronic actinic dermatitis. Some photosensitisers may cause reactions such as phototoxic reaction, photo contact allergy and systemic photo allergy. Photodermatoses secondary to DNA repair defects are xeroderma pigmentosa, Bloom's syndrome, and Rothmund Thomson syndrome. Photo-aggravated dermatoses are lupus erythematosus, pemphigus erythematosus, atopic dermatitis, seborrheic dermatitis, acne vulgaris, rosacea, pemphigus erythematosus and bullous pemphigoid[8].

The photodermatoses in India can be due to polymorphic light eruption, parthenium dermatitis with photo aggravation, phototoxic and photoallergic reactions due to various photosensitizing drugs and chemicals and nutritional deficiencies such as pellagra[7].

Photoprotective measures constitute an essential component of all therapeutic regimens. These measures include protective clothing, shade, wide brimmed hat, sun glasses and effective sunscreens. The recent advances in cosmetology and dermatosurgery procedures have further enhanced the need to use sunscreens[9].

In this study, the majority of the participants were males (53.1%), followed by females (46.9%), which is similar to another study which included male participants (51.5%) followed by female participants (48.5%)[10] (Table 1). This is in contrast to another study which had (63%) female participants followed by (37%) male participants[11]. According to the findings in this study, undergraduate medical students have good knowledge on sun exposure and adverse effects of prolonged sun exposure on the skin. These findings are in contrast to other studies conducted on medical professionals, medical students, nursing students and survey conducted by American Academy of Dermatology

Table 4. Knowledge, behaviour and awareness score by terms

Term		Knowledge	Behaviour	Awareness (n=42)
4.00	Mean	11.44	11.61	23.05
	N	120	120	120
	Standard deviation	3.183	4.646	5.784
	Minimum	3	2	9
	Maximum	20	22	35
	Median	11.00	10.00	23.50
7.00	Mean	11.93	11.38	23.31
	N	100	100	100
	Standard deviation	3.322	5.206	5.724
	Minimum	4	0	13
	Maximum	18	22	35
	Median	12.00	12.00	24.00
8.00	Mean	10.34	15.17	25.51
	N	35	35	35
	Standard deviation	3.307	5.020	7.147
	Minimum	3	7	13
	Maximum	18	26	39
	Median	10.00	15.00	25.00
9.00	Mean	12.23	13.25	25.54
	N	84	84	84
	Standard deviation	3.359	4.718	6.891
	Minimum	3	4	7
	Maximum	19	24	40
	Median	12.50	14.00	27.00
Total	Mean	11.67	12.32	24.00
	N	339	339	339
	Standard deviation	3.312	5.004	6.282
	Minimum	3	0	7
	Maximum	20	26	40
	Median	11.00	12.00	24.00

to assess the sun exposure risk and its harmful effects on the skin[12-15]. These findings are similar to a study conducted on medical students who had a good knowledge on this aspect[16]. Another study conducted on non-dermatologist physicians concluded that they had a correct knowledge on UV induced risk on skin and the appropriate protective measures to be used[17].

In the study 63.1% of the participants strongly believed that use of sunscreens protects against skin cancer which was in accordance to another study where 44% of the participants strongly agreed that sunscreen use protects against skin cancer[2]. The study participants also had knowledge about need of frequent examination of skin

Table 5. Knowledge, behaviour and awareness score by gender

Gender		Knowledge	Behaviour	Awareness (n=42)
F	Mean	11.89	12.97	24.89
	N	159	159	159
	Standard deviation	3.184	4.997	6.206
	Minimum	3	3	7
	Maximum	20	24	40
	Median	12.00	13.00	25.00
M	Mean	11.47	11.74	23.21
	N	180	180	180
	Standard deviation	3.418	4.953	6.260
	Minimum	3	0	9
	Maximum	19	26	39
	Median	11.00	11.00	23.50
Total	Mean	11.67	12.32	24.00
	N	339	339	339
	Standard deviation	3.312	5.004	6.282
	Minimum	3	0	7
	Maximum	20	26	40
	Median	11.00	12.00	24.00

F: Female, M: Male

by dermatologist (84.9%) and one's own self (78.5%) to look for precancerous lesions which are in accordance to another study where 82.6% and 78.5% of individuals believed in doing the same[6]. The adverse effects of sun exposure including freckles and wrinkles was known in 63.1% and 60.1% of study participants which are similar to another study where the risk of freckles and wrinkles were known in 63.8% and 64% study participants[6]. The risk of skin cancer with sun exposure was quoted to be 58.4% according to the participants which is in contrast to another study where only 16.7% of general population were aware of this risk[12]. The sun being most harmful between 10 a.m. and 2 p.m. was known in 67.5% of study participants which was similar to another study where 76.8% of population knew the same. The majority of students in the study also had knowledge regarding the properties, quantity and frequency of application of sunscreen which was seen in 59.8%, 52.8% and 61.9% of population respectively which is similar to another study, in which these factors were known in 49.3%, 18.1% and 31.4% of the individuals of that study. Only 23% of the study participants knew about the meaning of SPF-30 that means an individual can stay additionally in the sun without burning, and 40.4% knew that SPF-30 offers minimal additional protection with larger cost disadvantage. These findings are similar to another study where only 22% of individuals were aware about this[6]. The risk of sunburn in childhood causing increased chances of skin cancer was known in 50.7% of these individuals which is slightly higher than another study where this risk was known in 31.4% of individuals only, and in contrast to another study where 97% of individuals knew about this[12,13]. The family history of skin cancer to increase the risk was known in 68.4% of study participants which were in accordance to other

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Table 6. Comparison of knowledge, behaviour and awareness of the participants between and within the groups

ANOVA						
		Sum of squares	df	Mean square	F	Sig.
Knowledge	Between groups	100,644	3	33,548	3,116	0.026
	Within groups	3,606,690	335	10,766	-	-
	Total	3,707,333	338	-	-	-
Behaviour	Between groups	506,354	3	168,785	7,106	0.000
	Within groups	7,956,873	335	23,752	-	-
	Total	8,463,227	338	-	-	-
Awareness (n=45)	Between groups	434,271	3	144,757	3,758	0.011
	Within groups	12,902,726	335	38,516	-	-
	Total	13,336,997	338	-	-	-

Statistical significance: p value, F: Female, df: Degree of freedom for a two group ANOVA

Table 7. Multiple linear regression model summary for the knowledge, awareness and behaviour variables with term as predictor

		Regression: Model summary							
Dependent variable	Predictor	Model	R	R square	Adjusted R square	Standard error of the estimate	Change statistics		
							R square change	F change	df1
Knowledge	Term	1	0.057[a]	0.003	0.000	3.311	0.003	1,095	1
Behaviour	Term	1	0.150[a]	0.022	0.020	4.955	0.022	7,734	1
Awareness	Term	1	0.152[a]	0.023	0.020	6.218	0.023	7,991	1

df1: Degree of freedom for a two group ANOVA is 1

Table 8. Comparison of knowledge, awareness and behaviour variables between the participants with term as predictor

	Coefficients						
Sl. no	Dependent variable	Predictors	Unstandardized coefficients		Standardized coefficients	t	Sig.
			B	Standard error	Beta		
1.	Knowledge	Term	11,056	0.610	-	18,120	0.000
			0.093	0.089	0.057	1,047	0.296
2.	Behaviour	Term	9,889	0.913	-	10,832	0.000
			0.371	0.133	0.150	2,781	0.006
3.	Awareness	Term	20,902	1.146	-	18,244	0.000
			0.473	0.167	0.152	2,827	0.005

t test: test used to compare the mean between two groups, Statistical significance: p value

study where 63% of individuals knew about it[17] (Table 2). Though these individuals had a good knowledge about sun protective measures, the behavioural aspects of these were relatively poor. Only 32% of the population compulsorily used sunscreen during daily activities and sunbathing which is in contrast to other studies on medical students where 70.7% and 77.9% of subjects used sunscreens[13,16]. Among these study participants, only 25% of them always seek shade which is relatively lower as compared to another study in which 61.5% seek shade[13]. Only 7.3% of the study population used tanning beds which is similar to another study where 10.8% used it[13]. In this study, only 35% of the population always used sunscreen with SPF-30 or more which is in contrast to other studies where 73% of population used sunscreen of SPF-30 and more. The other sun protective measures used included sunglasses (26.2%), protective clothing (25.1%) hats (16.2%). However in another study, sunglasses was the most commonly used sun-protection measure (83.4%), followed by protective clothes (57.8%) and then sunscreens (77.1%)[18]. This difference in percentage further highlights the lack of adequate behaviours in the study population. Majority of these individuals were lazy to use sun protective measures (54.6%), wanted to tan (13.9%), embarrassed (8.5%) and were not in need of it (23%). These findings are similar to another study where 47.2% individuals found it bothersome/lazy to use sunscreens, 36.6% individuals wanted to tan, 9.5 % of these individuals were embarrassed to use sun protective measures and 26.2% of individuals did not feel the need to use any sun protective measures[18] (Table 3). This study highlights that the sun protective behaviour was not parallel to the

knowledge possessed by these individuals. The mean behaviour score of the study population was 12.32±5.004 with a maximum score of 26 (Table 4). These findings are similar to other studies in which individuals of study population had a low behaviour score[14,19]. Statistically significant differences was seen in the mean awareness scores with p-value of 0.0138 with a higher mean awareness score of 24.89 in females as compared to males in whom a mean score of 23.21 (Table 5) was seen which is in contrast to other studies in which gender did not have an influence on the awareness score[20,21]. Statistically significant differences in knowledge behaviour and awareness scores were seen in this study among the students of the terms and between the terms which were not seen in other studies where semesters/terms failed to have an impact on these scores (Table 6,8)[20,21].

Study Limitations

Limited time frame of study, limiting population size.

Conclusion

Photoprotection protects individuals from cumulative and hazardous effects of the sun. Though sunscreens constitute the most important component of photoprotection, this can also be accomplished by protective clothing, seeking shade and other behavioural changes. The reinforcement of sunscreen application by the physician can improve the patient's compliance and its outcome[22]. In addition, lifestyle changes and behavioral changes can be achieved through these studies[23].

Ethics

Ethics Committee Approval: The Sri. Devaraj Urs Medical College Institutional Ethics Committee approval was obtained (approval number: SDUM/KLR/IEC/94.2018-19, date: 23.05.2018).

Informed Consent: Written informed consent was obtained from all participating patients.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: S.M.G., R.T.S., S.K.K., P.P., Concept: S.M.G., R.T.S., S.K.K., P.P., Design: S.M.G., R.T.S., S.K.K., P.P., Data Collection or Processing: S.M.G., R.T.S., S.K.K., P.P., Analysis or Interpretation: S.M.G., R.T.S., S.K.K., P.P., Literature Search: S.M.G., R.T.S., S.K.K., P.P., Writing: S.M.G., R.T.S., S.K.K., P.P.

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