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Sun Safety Educational Awareness Guidelines For Prevention of Skin Cancer Among College Students

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Abstract: ***Background*****: Too much unprotected exposure to the sun's ultraviolet (UV) rays can cause skin damage and skin cancer. Even people in their twenties can develop skin cancer, so, effective education on the issue of sun safety is essential. The aim of this study was to examine sun safety educational awareness guidelines for prevention of skin cancer among college students. Design: A quasi-experimental research design was used. Setting: This study was carried out at 7 faculties in Helwan University, Egypt. Sample: A convenience sample of 550 students was selected. Tools: (I)A structured designed interviewing questionnaire which includes sociodemographic characteristics and student knowledge questionnaire. (II)Self–Report Practice Likert Scale toward Sun Protection Measures. (III) Self–Report attitude Likert Scale toward Protect from Sun Exposure. Results: The study sample had poor knowledge (61.5%), negative attitude (78.2%) as well as inadequate practice (71.3%) before conducting sun safety educational awareness guidelines. A highly statistically significant improvement was detected after educational guidelines in their total good knowledge (71.4%), positive attitude (89.5%), as well as their total adequate practices (91.6%). There was an increase in mean total scores of knowledge, attitude and practice regarding sun safety and skin cancer prevention at post educational guidelines than pre guidelines as (p<0.001). Conclusion: Overall improvement in the awareness of College students regarding skin cancer prevention after implementation of sun safety educational guidelines. Recommendation: Health promotion and young adult age education intervention focusing on sun-smart strategies are required.**

Keywords: **Sun safety, College students, Skin cancer, Educational guidelines.**

1. INTRODUCTION

Skin is an essential organ serving many necessary functions, and as such we must work to protect it. Sunburns are defined as damage to superficial and deep layers of skin cells from ultraviolet (UV) radiation, and the prime risk factor for developing skin cancer **(1).**

Skin cancer is a group of heterogeneous malignancies and uncontrolled proliferation of abnormal skin cells generally classified into non-melanoma skin cancer (NMSC) which includes basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) arising from epidermal keratinocytes and melanoma skin cancer (MSC) arises from epidermal melanocytes **(2,3)**. Melanoma is the least common but deadliest form of skin cancer and tends to metastasize rapidly. Approximately 90% of skin cancers are caused by ultraviolet radiation **(4).**

Skin cancer is the most preventable form of cancer, so a critical need has emerged to focus on better ways to disseminate information about skin cancer prevention methods. Because 80% of lifetime sun exposure occurs before the age of 19 years so education is essential and if detected early is highly curable **(5).**

The young adult population is especially at risk due to the increased sun exposure, intentional sun exposure, decreased sun protection behaviors and benefits of sunbathing during this developmental period. Intentional sun exposure behaviors are more commonly observed in adolescence and young adult than any other developmental period **(6, 7).**

Many skin diseases are caused by excessive and unprotected sun exposure. High cumulative levels of ultraviolet (UV) radiation can damage skin cells, affect the skin's normal growth and appearance and cause acute skin damage, including tanning and burning. Furthermore, more complicated chronic skin problems can occur with long-term exposure, such as pigmentary changes (e.g., melasma, lentigines), skin aging and skin cancer **(8, 9).**

Skin cancer has increased progressively during the past four decades **(10).** The individual hazard of skin cancer has a robust relationship with skin type, with the superior risk among skin type which burns easily. Although skin cancers are less common in dark-skinned people, the prognosis is worse because the cancers tend to be diagnosed late **(11).**

The most common warning sign and symptoms of skin cancer include changes in the size, color or shape of a mole, oozing or bleeding from a mole, a mole that feels itchy, hard, lumpy or swollen and a growth or a sore that will not heal (**12).**

Primary prevention of skin cancer is concerned with a reduction of the risk factors for skin cancer. The risk factors include family history of skin cancer, personal history of skin cancer, exposure to the sun (ultraviolet radiation) through work and play, history of sunburns, especially early in life, skin that burns, freckles, reddens easily, or becomes painful in the sun, certain types of moles, exposure to certain chemicals, Smoking, human papilloma virus (HPV) infection and reduced immunity (**13).**

Sun safety is the practice of taking simple steps to reduce overexposure to UV rays at the outdoors. Everyone can practice sun safety. The consequences of chronic UV radiation exposure are likely avoidable if suitable types of sun-protection behaviors used such as avoiding sun exposure between 10:00 a.m. and 4:00 p.m., seeking shade, using sunscreen, minimizing sunburns, avoiding tanning beds, wearing wide-brimmed hats, protective clothing and sunglasses are the main recommendations for efficient sun protection **(14,15).**Sunscreens reduce the transmission of UV radiation into the skin by reflecting, absorbing, or dispersing such emission. Thus, sunscreen is a form of safeguard against sunlight. Educational guidelines are important to increase understanding of the detrimental effects of excessive sun exposure and the advantages of sunscreen use **(16, 17).**

Early detection of skin cancer is vital importance in addressing the public health threat about skin cancer. Recognizing risk factors and identifying high-risk groups are the first steps towards early detection, so increase education and change behavior and attitudes related to sun-safe behaviors by educating youths was important **(12).**

Nurses are considered to be one of the most trusted professionals and are therefore in a unique position to educate the persons about the dangers and prevention of skin cancer. Also, community and adult health nurse can contribute to promoting healthier lifestyles to prevent, and ensure early detection of skin cancer through Promoting preventive behaviors and identifying measures to help prevent skin cancer as protection from ultraviolet (UV) radiation is the primary evidence-based approach for minimizing this risk **(18).**

Nurses should encourage the person to perform periodic skin self-examinations. When performing a skin exam, the person should identify moles, skin blemishes, and birthmarks. The person should be advised to pay close attention to any moles that change color or shape or feel different to the touch **(1).**

Significance of the study

Skin is the largest organ in the body and serves as a protective barrier to internal tissues from exposure to radiation, temperature extremes, toxins and bacteria, while providing sensory perception and thermoregulation. Person with skin cancer have a profound effect on physical comfort, quality of personal, social life and experiencing embarrassment, anxiety, a lack of confidence, and depression **(19).**

Young adult age (college students) is critical periods during which sun exposure is likely to contribute to skin cancer later in life. Cumulative sun exposure has been linked to about 95 percent of all skin cancers. Because education is known to be a primary means of health, it is estimated that more than 75% of all skin cancers could be prevented by practicing sun protection in young adult age**(13).**

Skin cancer is the most common cancer in the United States, each year over one million people will be diagnosed and it is estimated that one in five adults will develop skin cancer in their lifetime. Currently, melanoma stands alone as the most commonly diagnosed malignancy among those aged 18Y -29 years **(20).**There has been a dramatic increase in the prevalence of skin cancer worldwide, and it accounts for 1 in 9 cancer cases worldwide. This increase is recorded mainly in countries such as Australia, New Zealand, North America and North Europe **(10).**

In Egypt, Skin cancer represented 5% of the malignant tumors of the entire body. Basal cell carcinomas (BCC) (77%) was the most common skin cancer followed by squamous cell carcinomas (SCC) (15%) and melanomas (8%) **(21).**

2. AIM OF THE STUDY

The current study aimed to examine sun safety educational awareness guidelines for prevention of skin cancer among college students.

Research Hypotheses:

H1: Sun safety educational awareness guidelines will improve college student's knowledge about prevention of skin cancer and sun safety in post-test than pretest.

H2: Sun safety educational awareness guidelines will improve college student's attitude about prevention of skin cancer and sun safety in post-test than pretest.

H3: Sun safety educational awareness guidelines will improve college student's practices about prevention of skin cancer and sun safety in post-test than pretest.

H4: There will be a significant correlation between knowledge, attitudes, and practices of college students regarding sun safety and prevention of skin cancer in post-test than pretest.

3. SUBJECTS AND METHOD

Design: A quasi-experimental research design was used to achieve the desired aim of the study.

Setting: This study was carried out at 7 faculties in Helwan University included: - Faculty of Education, Social Service, Literature, Law, Computer, Commerce, and Nursing.

Sampling: A convenience sample of students was selected. It included 550 students from Helwan University at Egypt. The sample size can be calculated using the following formula: $n = [(Z_{\alpha/2} + Z_{\beta})^2 \times \{2(SD)^2\}]/ (\text{mean difference})^2$, Considering the level of significance of 5%, and power of study of 80%. Hence, total sample size required from the seven colleges is 550.

Inclusion criteria include:-

- Students age 18 to 22 years,
- From first to fourth academic year
- Students who are willing to participate.

Tools for Data Collection:

Tool I: A structured designed interviewing questionnaire

It was developed by the researcher, based on reviewing the related literature. It was written in simple Arabic language and it includes the following:

A. *Sociodemographic characteristics* such as age, sex, academic years, marital status, type of college, personal and family past history of skin cancer.

B. *Student knowledge questionnaire:* it involved 20 items that assess students' knowledge regarding skin cancer and sun exposure questionnaire (4 open questions and 16 closed questions), which includes (meaning of skin cancer, signs and symptoms, precautions and treatment of skin cancer, also involved how to protect yourself from sunshine – the best time

to sun exposure at the day, if sun exposure causes aging and change of skin color, precaution for used sunscreen .....etc. It was adopted from ***(22).***

Scoring system for knowledge: The questions were scored as follows: for open questions, wrong don't know they were scored one; incomplete answer scored two and scored three for the complete answer. For closed questions was scored by one for a «don't know » answer, two for an «incorrect» answer and three for «correct» answer. The total knowledge scores ranged from 20-60 points, they were evaluated as follows:

1- Poor knowledge (< 50%) (With scores ranged from 20-29).

2- Fair knowledge (50-75%) (With scores ranged from 30-45).

3- Good knowledge (>75%) (With scores ranged from 46-60).

Tool II. Self–Reported Practice Likert Scale toward Sun Protective Measures: It was adopted from (***23***). It was a 3-point Likert scale as follows: Never - Sometimes - Always. Consist of 10 questions such as (How often do you use sunscreen when you outdoor- How often do you wear a hat and How often do you wear sunglasses…..etc.)

The total score ranges were as follows (3 to 1): Always (3), Sometimes (2), and Never (1) and total scores of these questions ranged from (10-30) and were categorized as follows:

1- Inadequate practice (<60%) (With scores ranged from 10-17).

2- Adequate practice (≥60%) (With scores ranged from 18-30).

Tool III. Self-Report Attitude Likert Scale toward Protect from sun exposure.

It was adopted from **(24)** and modified by the researcher. Consist of 7 questions. It was 3-point scale as follows: agree, neutral and disagrees

The total score ranges were as follows (3 to 1): agree (3), neutral (2) and disagree (1) and total scores of these questions ranged from (7-21) and were categorized as follows:

1- Negative attitude (<60%) (With scores ranged from 7-12).

2- Positive attitude (≥60%) (With scores ranged from 13-21).

Data Collection Procedure:

- Data were collected during a period of 6 months starting from beginning of September 2017 to the end of February 2018.

- **Approval:** The present study was carried out after taking a written official letter was obtained from the Dean Faculty of Nursing, Helwan University and delivered to the Dean of each faculty, in order to obtain their approval for conduction of the research after explaining its purpose.

- Reviewing the available literature related to skin cancer and sun protection factors to cover various aspects of the research problem using books, articles, magazines, and internet to develop the study tools for data collection.

Ethical considerations: Each student was informed about the purpose and benefits of the study then oral consent was obtained before starting the data collection. Stringent confidentiality was ensured throughout the study. The students were assured that all data was used only for research purpose and each student was informed of the rights to refuse or withdraw at any time without giving any reason.

Tools Developments:-

-Validity: Tools were reviewed and tested for validity by 5 experts in Community Health Nursing and Medical-Surgical Nursing. According to the opinion of the expertise, minor modifications were applied in the form of rephrasing, or comprehension and changing of some questions were performed.

- Reliability: Reliability was applied by the researchers for testing the internal consistency of the tools, by administration of the same tools to the same subjects under similar condition twice with an interval of 2 weeks. Answers from reported

testing were compared (test-retest reliability). The reliability of the study tools was tested using Cronbach Alpha. It amounted to be 0.92 for tool one, while its accounts for 0.87 for tool two and 0.85 for tool three. Thus indicating the good reliability of the tools.

- Pilot study: A pilot study was carried out on 10% from the total number of sample students to assess the tools clarity, objectivity and feasibility. As well to estimate the time needed for data collection. Those students in the pilot study were excluded from the main study sample. Data obtained from the pilot study were analyzed and the necessary modifications and rearrangement on the study tool were done.

Construction of Sun safety educational awareness guidelines:

The study was achieved through four phases namely assessment, planning, implementation and evaluation.

Assessment phase:

The aim of this phase was to collect college students' data regarding skin cancer and sun safety precaution as well as to identifying individualized learning needs in order to design the suitable sun safety educational awareness guidelines. Each college student recruited in the study sample was interviewed using socio-demographic data and past history of sun exposure, knowledge assessment tool about sun safety and skin cancer, self-reported practice toward sun protection measures, then Self –Report Attitude Likert Scale toward Protect from sun exposure.

Planning phase:

College students' guidelines were developed based on the finding of the assessment and in the light of related literature. The guidelines were designed to improve awareness of college students regarding skin cancer through sun safety educational guidelines. The guideline was designed based on a review of relevant literature and custom-tailored to the college students' needs identified in the pre-test. The knowledge regarding skin cancer and sun safety precaution measures included the following items: meaning of skin cancer, signs, and symptoms, methods of prevention from skin cancer, treatment of skin cancer, effect of sun exposure on skin, sun protection factors and finally general advice and precaution to a decrease danger of sun exposure.

Implementation phase: During this phase, the researcher implemented the educational guidelines followed by the immediate post-test. The total number of college students was 550 students and divided into 22 groups; each group consisted of 25 students. Each group attends 5 sessions, two sessions per week each session lasted 30-40 minutes. The researchers were contacted by a team leader who was contacted by telephone to make sure students were not busy with their lectures and to prepare a place to receive education guidelines which contain the following:

- ***Session 1*:** This session was concerned with the open discussion for identification, integration of group, clarification of the aim and time table allowed for the education guidelines. The researchers apply brainstorming about skin cancer, after that provided general introduction about skin cancer.
- ***Session 2:*** This session was concerned with a lecture about the meaning of skin cancer, signs, symptoms, precaution should be taken to prevent skin cancer and treatment of skin cancer.
- ***Session3:*** The researchers' revision about the previous session, then stressed about effects of excessive sun exposure on skin.
- ***Session4:*** At the beginning this session the researchers review the knowledge provided at the previous session, then explain the following: importance of using sunscreen, proper sun exposure time and precaution for sun safety.
- ***Session 5:*** This session was concerned with adequate practice toward sun protection measures.

These sessions were achieved through several teaching methods as brainstorming, lecture, discussion and an illustrated guidelines booklet offered to every student as a reference. Use of illustrative media, e.g., computer, video, and pictures. At the end of each session summary and conclusion, let a time for asking questions and feedback.

Evaluation phase: Evaluation of the educational guidelines was done immediately after its implementation by contrasting the change in college student level of knowledge, attitudes, and practices through applying the similar tool of pre-test as a post-test.

IV. Statistical design:

The collected data were organized, tabulated and statistically analyzed using the Statistical Package for Social Sciences (SPSS) for windows version 22.0. Data were tested for normality of distribution prior to any calculations. All continuous data were normally distributed and were expressed in mean ± standard deviation (SD). Categorical data were expressed in number and percentage. The comparisons were determined using Student's t-test for variables with continuous data and chi-square test for variables with categorical data. Statistical significance was set at $p<0.05$.

4. RESULTS

Table (1) shows that 54.5% of the studied college students had 20-< 22 years with mean ±SD was 19.6 ±1.1. Regarding gender, 54.7% were female. Concerning academic year, 32.7% were in the fourth year, While 91.8% were single. In relation to the personal history of melanoma97.3% had a negative history of melanoma while minority 2.7% had abnormal moles.

Table (2) presents that 54.5% of the studied college students were sometimes burned and usually tan when exposed to the sun without sunscreen, while 55.5% had sunburned in the past about 1-5 times. In relation to check the body for skin changes or skin cancer, there was 50.9% check skin annually. Regarding reasons for not use sunscreen, 61.8% does not use due to high costs of sunscreen.

Tables (3A, B, C) Demonstrates that highly statistically significant difference between studied college students at pre and post-sun safety educational awareness guidelines in all knowledge items.

Table (4) Indications highly statistically significant improvement among studied college students in total knowledge scores after the implementation of sun safety educational awareness guidelines as $P<0.001$.

Tables (5) Clarifies that highly statistically significant difference among studied college students at pre/post-sun safety educational awareness guidelines in practice items is reported.

Table (6) Reveals highly statistically significant improvement among studied college students in total practice score after educational guidelines implementation

Table (7) Indicates that highly statistically significant difference among studied college students at pre/post educational guidelines in attitude items is reported.

Table (8) Displays highly statistically significant improvement among studied college students in total attitude score after implementation of educational guidelines.

Figure (1) Shows an increase in mean total scores of knowledge, attitude and practice regarding sun safety/skin cancer prevention at post educational guidelines than pre guidelines among college students.

Figure(2) Shows positive statistically significant correlations between total knowledge scores and total attitude scores regarding sun safety/skin cancer prevention at post educational guidelines among college students as($p<0.001$) and r = 870

Figure (3) Specifies positive statistically significant correlations between total knowledge scores and total practices scores regarding sun safety/skin cancer prevention at post educational guidelines among college students as ($p<0.001$) and r = **873**

Figure (4) Instructs positive statistically significant correlations between total attitude scores and total practices scores regarding sun safety/skin cancer prevention at post educational guidelines among college students as ($p<0.001$) and r = 884

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Table 1. Distribution of the studied college students according to their demographic data(N = 550)

Demographic data	**No.**	**%**
Age (years)		
18 -	250	45.5
20-<22	300	54.5
Range	18 - 21	
Mean ±SD	19.6 ±1.1	
Sex (gender)		
Female	301	54.7
Male	249	45.3
Faculty		
Education	80	14.5
Social Service	60	10.9
Literature (Adab)	80	14.5
Law	60	10.9
Computer	85	15.5
Commerce	80	14.5
Nursing	105	19.1
Academic year		
First	90	16.4
Second	115	20.9
Third	165	30
Fourth	180	32.7
Marital status		
Single	505	91.8
Married	45	8.2
Personal history		
-ve	535	97.3
Abnormal moles	15	2.7
Family history		
-ve	520	94.6
Melanoma	10	1.8
Abnormal moles	20	3.6

Table 2. Skin cancer risk assessment for studied college students (N = 550)

Variables	**No.**	**%**
When your skin is exposed to the sun without sunscreen		
Usually, burn, sometimes tan	5	0.9
Sometimes burn, usually tan	300	54.5
Never burn, always tan or darken	245	44.5
How many times have you sunburned in the past		
Never	245	44.5
About 1-5 times	305	55.5
Did you have past sunburn with crusts or bubbles		
No	541	98.4

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Yes	9	1.6
Do you spend more than 2hours a day in the sun because of your outdoor activities or work during the summer?		
No	380	69.1
Yes	170	30.9
How often do you check your body for skin changes or cancers		
Annually	280	50.9
Several times a year	20	3.6
Never	250	45.5
Have a new inflammation or abnormal growth on the skin more than a month		
No	543	100
Yes	7	1.3
Do you currently have a mole or freckle that has changed in color, size or shape	550	100
No		
Reasons for not use sunscreen		
Sunscreen has high costs	340	61.8
There is a lot of trouble to apply it correctly	10	1.8
Contains many oils that affect the skin.	65	11.8
I do not need it because I am not exposed to sunburn	15	2.7
I forget her status	55	10
I do not like the smell and inhalation	40	7.3
I only use it in the summer when the weather is very hot	25	4.5

Table 3a. Distribution of Knowledge of studied college students about sun safety/skin cancer prevention at pre and post educational guidelines(N = 550)

Items of Knowledge	Pre guidelines		Post guidelines		Chi-square test	
	No.	%	No.	%	$\chi 2$	p
1. Meaning of skin cancer						
wrong/ don't know	227	41.3	44	8.0		
Incomplete	204	37.1	202	36.7		
Complete	119	21.6	304	55.3	204.496	<0.001
2. Signs and symptoms of skin cancer						
wrong/ don't know	302	54.9	36	6.5		
Incomplete	137	24.9	193	35.1		
Complete	111	20.2	321	58.4	320.924	<0.001
3. Precautions should be taken to Prevent skin cancer						
wrong/ don't know	305	55.5	43	7.8		
Incomplete	134	24.4	211	38.4		
Complete	111	20.2	296	53.8	298.529	<0.001
4. Treatment of skin cancer						
wrong/ don't know	324	58.9	48	8.7		

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Incomplete	120	21.8	206	37.5		
Complete	106	19.3	296	53.8	317.262	<0.001
5. UV rays from the sun cause skin darkening and sunburn						
don't know	227	41.3	36	6.5		
Incorrect answer	218	39.6	217	39.5		
correct answer	105	19.1	297	54.0	230.415	<0.001
6. Too much sun exposure can cause freckles, increase aging and wrinkles						
don't know	185	33.6	30	5.5		
Incorrect answer	199	36.2	213	38.7		
correct answer	166	30.2	307	55.8	154.252	<0.001

Table 3b. Knowledge about the effect of sun exposure on the skin for the prevention of cancer pre and post educational guidelines among studied college students (continue)

The effect of sun exposure on the skin	Pre guidelines		Post guidelines		Chi-square test	
	No.	%	No.	%	$\chi 2$	p
1. Change the color of the skin (pigment) is evidence of damage to the skin						
don't know	163	29.6	36	6.5		
Incorrect answer	265	48.2	206	37.5		
correct answer	122	22.2	308	56.0	168.897	<0.001
2. Sunburn can occur on a cloudy day						
don't know	184	33.5	22	4.0		
Incorrect answer	190	34.5	235	42.7		
correct answer	176	32.0	293	53.3	161.350	<0.001
3. Too much sun exposure can cause skin cancer						
don't know	164	29.8	27	4.9		
Incorrect answer	223	40.5	211	38.4		
correct answer	163	29.6	312	56.7	145.338	<0.001
4. The sun is more harmful to the dark skin than normal skin						
don't know	236	42.9	29	5.3		
Incorrect answer	182	33.1	217	39.5		
correct answer	132	24.0	304	55.3	232.618	<0.001
5. Sun harmful to your skin only when you get sunburn						
don't know	220	40.0	32	5.8		
Incorrect answer	180	32.7	223	40.5		
correct answer	150	27.3	295	53.6	192.089	<0.001
6. Sun is the strongest and most harmful between the hours from 10 am and 4.00 pm						
don't know	190	34.5	22	4.0		
Incorrect answer	235	42.7	221	40.2		
correct answer	125	22.7	307	55.8	210.238	<0.001

Table 3c. Knowledge about Proper sun exposure time& protection measure at pre and post educational guidelines for studied college students(continue)

Proper sun exposure time& protection measure	Pre guidelines		Post guidelines		Chi square test	
	No.	%	No.	%	$\chi 2$	p
1. It is necessary to use sunscreen to avoid the harmful effects of exposure to the sun						
don't know	211	38.4	28	5.1		
Incorrect answer	185	33.6	243	44.2		
correct answer	154	28.0	279	50.7	184.067	<0.001
2. The best time for sun exposure at sunrise time7 – 9 am at sunset 5 – 6 pm						
don't know	209	38.0	32	5.8		
Incorrect answer	208	37.8	195	35.5		
correct answer	133	24.2	323	58.7	209.582	<0.001
3. Many sunburns in childhood increase the chance of getting skin cancer later						
don't know	249	45.3	29	5.3		
Incorrect answer	173	31.5	203	36.9		

correct answer	128	23.3	318	57.8	257.436	<0.001
4. Using sunscreen provides adequate protection against sunlight for up to 4hours						
don't know	182	33.1	35	6.4		
Incorrect answer	222	40.4	236	42.9		
correct answer	146	26.5	279	50.7	141.630	<0.001
5. Sunscreen should be used 30 minutes before going to the sun						
don't know	180	32.7	32	5.8		
Incorrect answer	210	38.2	193	35.1		
correct answer	160	29.1	325	59.1	160.172	<0.001
6. People with normal skin are more prone to skin cancer than dark-skinned people						
don't know	188	34.2	28	5.1		
Incorrect answer	210	38.2	214	38.9		
correct answer	152	27.6	308	56.0	171.461	<0.001
7. Light color clothes are considered better protection from the sun than dark-colored clothing						
don't know	184	33.5	19	3.5		
Incorrect answer	211	38.4	199	36.2		
correct answer	155	28.2	332	60.4	198.795	<0.001
8. Loose clothing is better protection against the sun than tight clothes						
don't know	198	36.0	29	5.3		
Incorrect answer	191	34.7	199	36.2		
correct answer	161	29.3	322	58.5	179.650	<0.001

Table (4): Total knowledge scores about sun safety/skin cancer prevention at pre and post education guidelines among college students(N=550).

Total knowledge	**Pre guidelines**		**Post guidelines**		χ^2	**P**
	No	**%**	**No**	**%**		
Total knowledge scores: Poor (<50%) Fair (50-75%) Good (>75%)	 338 125 87	 61.5 22.7 15.8	 12 145 393	 2.2 26.4 71.4	500.202	<0.001
Total knowledge scores: Range Mean±SD	 20 – 55 37.2 ±10.0		 24 – 58 50.0 ±4.6			
t value P	27.183 <0.001					
Change of total knowledge scores post than pre intervention: Range Mean±SD	 1 – 23 12.8 ±7.4					
Z value P	40.571 <0.001					

Table 5. Self-reported practice toward sun protection measures at pre and post educational guidelines among college students (N=550).

Items	**Pre guidelines**		**Post guidelines**		**Chi-square test**	
	No.	%	**No.**	%	$\chi 2$	p
1. How often do you use sunscreen when you outdoor?						
Never	178	32.4	50	9.1		
Sometimes	180	32.7	231	42.0		
Always	192	34.9	269	48.9	91.049	<0.001
2. How often do you reapply your sunscreen every 4 hours?						
Never	177	32.2	52	9.5		
Sometimes	190	34.5	233	42.4		

Always	183	33.3	265	48.2	87.612	<0.001
3. How often has sunscreen been used before getting out 30 minutes?						
Never	203	36.9	45	8.2		
Sometimes	182	33.1	235	42.7		
Always	165	30.0	270	49.1	132.742	<0.001
4. How often do you wear a hat?						
Never	188	34.2	50	9.1		
Sometimes	173	31.5	238	43.3		
Always	189	34.4	262	47.6	102.113	<0.001
5. How often do you wear sunglasses						
Never	156	28.4	52	9.5		
Sometimes	192	34.9	251	45.6		
Always	202	36.7	247	44.9	64.368	<0.001
6. How often do you use an umbrella						
Never	213	38.7	57	10.4		
Sometimes	159	28.9	235	42.7		
Always	178	32.4	258	46.9	119.472	<0.001
7. How often do you limit the time outdoors between 10 a.m. and 4 p.m						
Never	192	34.9	40	7.3		
Sometimes	174	31.6	231	42.0		
Always	184	33.5	279	50.7	127.101	<0.001
8. How often do you wear clothing covering most of your body with long-sleeved clothing						
Never	189	34.4	48	8.7		
Sometimes	175	31.8	236	42.9		
Always	186	33.8	266	48.4	107.099	<0.001
9. How often have been exposed to the sun deliberately						
Never	178	32.4	41	7.5		
Sometimes	205	37.3	251	45.6		
Always	167	30.4	258	46.9	109.828	<0.001
10. How often wearing light colors cloths						
Never	202	36.7	48	8.7		
Sometimes	193	35.1	229	41.6		
Always	155	28.2	273	49.6	130.468	<0.001

Table (6): Total practice scores toward sun protection measures at pre and post education guidelines among college students (n=550).

Total practice	**Pre guidelines**		**Post guidelines**		χ^2	**P**
	No	**%**	**No**	**%**		
Total practice scores: Inadequate (<60%) Adequate (≥ 60%)	 392 158	 71.3 28.7	 46 504	 8.4 91.6	454.164	<0.001
Total practice scores: Mean ±SD	19.9 ±2.9		23.9 ±2.4			
t value P	25.269 <0.001					
Change of total practice scores post than pre intervention: Range Mean±SD	 1 – 6 4.1 ±0.9					
Z value P	97.515 <0.001					

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Table 7. Self-reported attitude toward sun protection measures at pre and post educational guidelines among college students (N=550).

Items	Pre guidelines		Post guidelines		Chi-square test	
	No.	%	No.	%	$\chi 2$	p
1. The use of sunscreen will help to protect me from getting melanoma						
Disagree	188	34.2	61	11.1		
Neutral	162	29.5	197	35.8		
Agree	200	36.4	292	53.1	85.391	<0.001
2. People with light skin are more affected by the sun than black skin						
Disagree	176	32.0	66	12.0		
Neutral	196	35.6	199	36.2		
Agree	178	32.4	285	51.8	74.751	<0.001
3. Examinations by a dermatologist help to detect the early stages of melanoma						
Disagree	189	34.4	75	13.6		
Neutral	184	33.5	189	34.4		
Agree	177	32.2	286	52.0	74.955	<0.001
4. Self-checks for melanoma help to detect the early signs of melanoma						
Disagree	187	34.0	74	13.5		
Neutral	180	32.7	204	37.1		
Agree	183	33.3	272	49.5	67.832	<0.001
5. Public awareness about melanoma is important to reduce risk						
Disagree	184	33.5	79	14.4		
Neutral	183	33.3	213	38.7		
Agree	183	33.3	258	46.9	56.948	<0.001
6. **All people should take precautions against the damaging effects of the sun**						
Disagree	187	34.0	75	13.6		
Neutral	179	32.5	193	35.1		
Agree	184	33.5	282	51.3	69.014	<0.001
7. I believe I should practice sun-safe behaviors						
Disagree	206	37.5	68	12.4		
Neutral	164	29.8	221	40.2		
Agree	180	32.7	261	47.5	92.820	<0.001

Table (8): Total attitude scores among college students toward sun protection measures at pre and post educational guidelines (N=550).

Total attitude	**Pre guidelines**		**Post guidelines**		χ^2	**P**
	No.	**%**	**No.**	**%**		
Total attitude scores: Negative (<60%) Positive (≥ 60%)	 430 120	 78.2 21.8	 58 492	 10.5 89.5	509.691	<0.001
Total attitude scores: Range Mean ±SD	 8 – 19 13.9 ±2.2		 9 – 21 16.6 ±2.0			
t value P	29.8 <0.001					
Change of total attitude scores post than pre intervention: Range Mean±SD	 1 – 5 2.7 ±0.9					
Z value P	68.997 <0.001					

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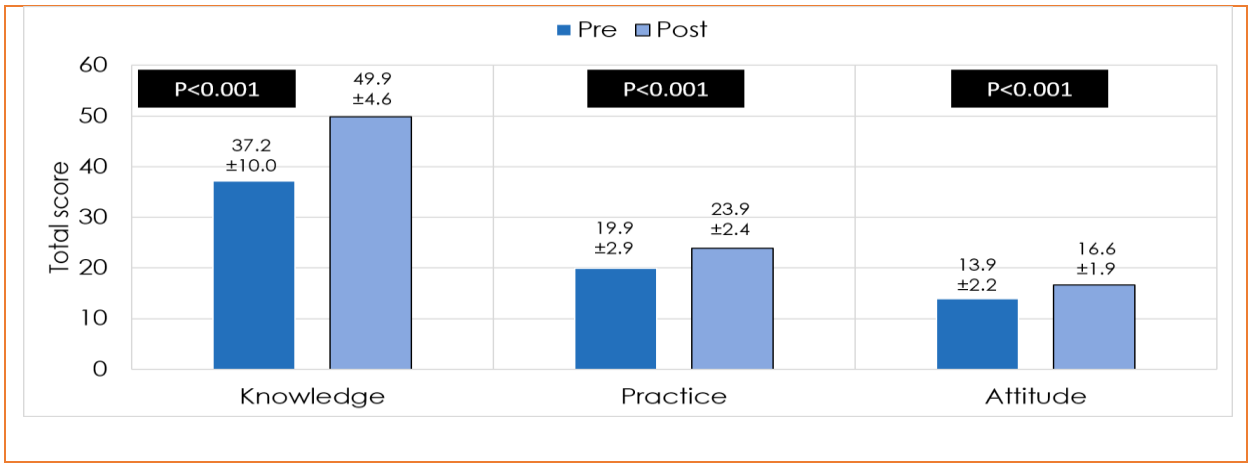
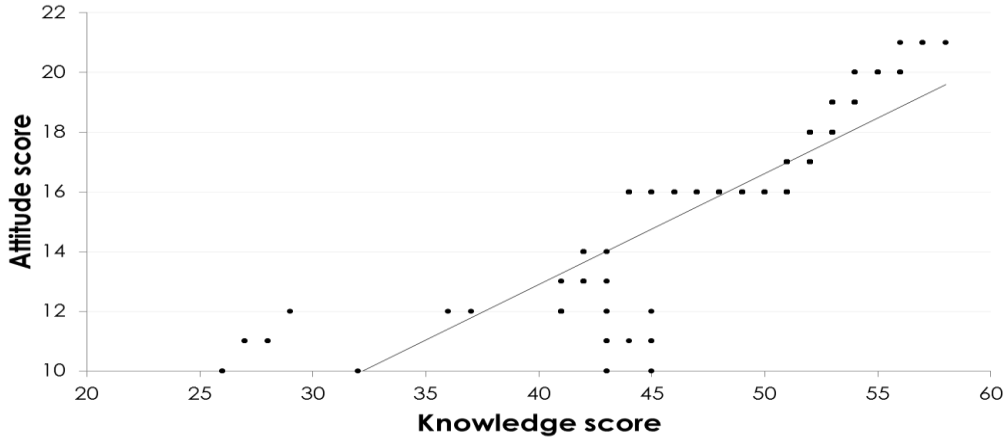
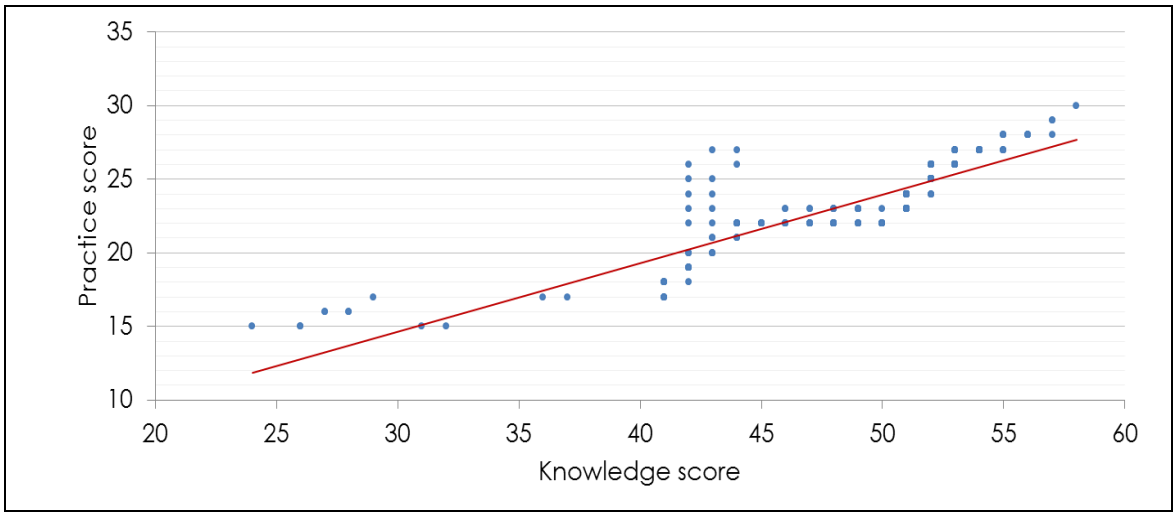


Figure (1).Comparison between the mean total scores of knowledge, attitude and practice regarding sun safety /skin cancer prevention at pre and post educational guidelines among college students (n=550).



(r=870, p<0.001)

Figure (2) Correlation between total knowledge score and total attitude score regarding sun safety /skin cancer prevention at post educational guidelines among college students (n=550).



(r=873, p<0.001)

Figure (3). Correlation between total knowledge score and total practice score regarding sun safety/skin cancer prevention at post educational guidelines among college students (n=550).

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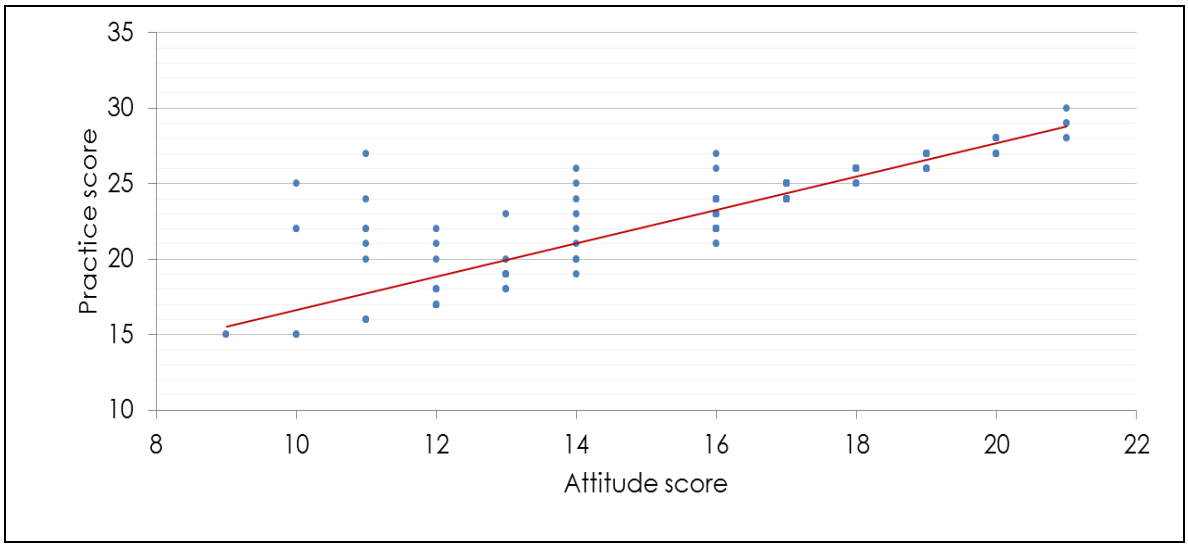

(r=884, p<0.001)

Figure (4) Correlation between total attitude score and total practice score at post educational guidelines among college students (n=550).

5. DISCUSSION

Skin cancer is the uncontrolled growth of abnormal skin cells. It occurs when unrepaired DNA damage to skin cells (most often caused by ultraviolet radiation from sunshine or tanning beds) triggers mutations, or genetic defects, that lead the skin cells to multiply rapidly and form malignant tumors (***25).***The sun's ultraviolet rays are responsible for more than 90 percent of all skin cancers and the implementation of general education programs that lead to life-long, sun-safe behaviors is greatly encouraged**(*22*)**.The aim of this study was to examine sun safety educational awareness guidelines for prevention of skin cancer among college students.

Considering the skin cancer risk assessment, the result of the present study revealed that about half of study sample were sometimes burn and usually tan when exposed to the sun without sunscreen also had sunburned in the past about 1: 5 times and check for skin changes annually and about three fifths not use sunscreen due to high costs. This study was similar to ***(26)***in Saudi Arabia who studied "Awareness of sun exposure and use of sunscreen by the general population". They revealed that the rate of regular sunscreen use in the Saudi population is 23.7%, they added that 41.4% of the study respondents reported that they have never used sunscreen, and 21% of them had not at all heard about sunscreen, also mention that only a small fraction of our population uses sunscreen during outdoor activities on a regular basis. This may be attributed to lack of information and practices of the college student about how to discover the skin cancer and also not used the sunscreen due to the vast majority of the Egyptian people are of average salary, therefor the college student unable to use the sunscreen continuously.

Regarding college student's knowledge about sun safety and skin cancer prevention, the present study showed a significant improvement in all items of knowledge after the implementation of educational guidelines. Also, this study showed statistically significant improvement among college students regarding total knowledge scores. This result agrees with (***27)*** *in* Nevada who studied "Assessing the Impact of the Sunwise Program on Youth Sun Safety Knowledge, Attitudes, and Behaviors in Clark County, Nevada". That found a statistically significant change in knowledge was observed for all participants in the intervention group. This result was in the same line with that of a study done by ***(12)***in Maryland who studied" Knowledge, attitudes, and behaviors towards skin cancer and sun safety program in Maryland youths", who stated that program had its impact on improving the level of knowledge among youths regarding skin cancer awareness and sun safety. This present finding means that the implementation of sun safety educational guidelines has a positive effect on increasing college student`s knowledge score regarding skin cancer and sun safety. Also, may be due to many reasons such as the relevance of the items, content, clarity of the guidelines material and easy language.

Regarding the self-reported practice toward sun protection measure, this result revealed highly statistically significant differences between all items of self-reported practice at pre/post educational guidelines. Also, this study showed statistically significant improvement among college students regarding total practice scores. This result is congruent with (**27)** in Australia, who studied" School education on protective behavior and practice against over-exposure to sun". Who found statistically significant improvement in practice about skin cancer prevention after the intervention. While this result disagrees with ***(28)***in Nevada, he detected that no significant difference in rates of participants in the intervention group wearing hats, sunglasses and covered clothing following participation in the Sun Wise Program. This may be due to change in college student's knowledge which reflected on practice toward sun protection measure and effectiveness of the educational guidelines lead to improve their practice.

Regarding the self-reported attitude of college students toward protect from sun exposure, the present study revealed highly statistically significant differences among college students at pre/post educational guidelines. This finding was similar to ***(28)*** in Nevada and revealed that the intervention group's results showed significant improvements in attitude by indicating that the implementation of sun safety tips is easy. But this study contradicted with ***(29)*** in America, who study "Annual Report, Boys and Girls Club of America". They stated that questions related to attitudes of sun-safe behaviors did not change significantly. Those discrepancy may be attributed to a large percentage of participants were already reporting positive attitudes in the pretest.

The result of the present study revealed that less than half agreed that self-checks for melanoma help to detect the early signs of melanoma, should practice sun-safe behavior and public awareness about melanoma is important to reduce risk. This finding was similar to (**30***)* in Japan, who studied" Importance of melanoma prevention, early detection". Revealed that Melanoma is most treatable when detected early, so the AAD recommends performing regular skin self-exams to look for new or suspicious spots, and seeing a board-certified dermatologist to evaluate anything changing. This may be attributed to the positive effect of educational guidelines among college students in enhancement of their attitudes regarding skin cancer and sun safety.

As regard to the comparison between the mean total scores of knowledge, attitude, and practice, this study show highly statistically differences at pre and post educational guidelines regarding sun safety /skin cancer prevention among college students regarding three issues, the most improvement was found in the knowledge, then the practices and then the attitude. This result disagrees with ***(31) in*** Malaysia, who studied "Cancer Awareness of a Sample of Malaysian Undergraduate Students". They revealed that majority of the students had low awareness (94.4%) and knowledge (64.9%) scores but have high attitude scores (76.9%). Awareness, knowledge and attitude scores were significantly higher among female students and science faculty students. Only knowledge score was significantly higher among students from Chinese ethnicity. This discrepancy between the results may be attributed to the education guidelines considering the most convenient way to raise awareness about sun safety and skin cancer prevention. Also due to the positive effect of educational guidelines, which prove the improvement of studied students' knowledge, attitude, and practices after education guidelines.

Hence, the research hypothesis ($\mathbf{H_{1,\ 2\&3}}$) which stated that education guidelines will improve studied college students knowledge, attitude and practices about sun safety and skin cancer prevention was justified.

Regarding the correlation between total knowledge score and total attitude score, this study shows a positive statistically significant correlation between total knowledge score and total attitude score among college students at post guidelines. This result agreed with **(32),** who studied "Knowledge and attitudes to sun exposure among adolescents in Korinthos, Greece". They reported that increase in knowledge and improved attitude toward sun safety occurred after implementation of the program and positive correlation present between total knowledge score and total attitude score. This finding indicated that information plays a large and effective role in changing attitude.

The results of the current study indicated that there were positive statistically significant correlations between total knowledge scores and total practices scores regarding sun safety /skin cancer prevention among college students at post guidelines. This result was in the same line with the study done by **(33)** in United state. who studied "Changing knowledge and practices about skin cancer risk factors in adolescents". They reported that increase in knowledge leads to enhancement in practices. This may be due to the knowledge plays an important role to promote practices.

The present study revealed that positive statistically significant correlations between total attitude scores and total practices scores regarding sun safety /skin cancer prevention at post education guidelines. This result is in accordance with that of the study conducted by **(34)** who studied "Evaluation of a health promotion intervention for skin cancer prevention in Spain". They reported that differences were observed for pre and post-intervention scores between attitude and practices and present positive correlations between total attitude scores and total practices scores.

Finally, the above-mentioned results proved the research hypothesis (H_4), which revealed that there will be a significant correlation between knowledge, attitude, and practices of studied students regarding sun safety and prevention of skin cancer.

Conclusion:

Sun safety educational awareness guidelines had improved college student's knowledge, attitudes, and practices about skin cancer prevention.

Recommendations

1. The need for the mass media to be used to increase the adoption of sun protection behaviors such as wearing protective clothing and routinely using sunscreen.
2. Health promotion and young adult age education intervention focusing on sun-smart strategies are required.
3. Spread campaigns among university students to focus on informing them about strategies they use to protect against sunburn.

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