Print ISSN : 0972-8813
e-ISSN : 2582-2780

[Vol. 20(1), January-April, 2022]

Pantnagar Journal of Research

(Formerly International Journal of Basic and Applied Agricultural Research ISSN : 2349-8765)

G.B. Pant University of Agriculture & Technology, Pantnagar

PANTNAGAR JOURNAL OF RESEARCH

Vol. 20(1) January-April, 2022

CONTENTS

Awareness of the aspects of sun protection among college going girls

BEENU SINGH and MANISHA GAHLOT

Department of Clothing and Textiles, College of Home Science, G. B. Pant University of Agriculture and Technology, Pantnagar, (U.S. Nagar, Uttarakhand)

ABSTRACT: An increase in outdoor activities and habits of humans frequently result in more exposure to solar radiation which consist of different electromagnetic radiations namely ultraviolet radiation (UVR), visible light and infrared radiation. UV radiation is a known carcinogen, It can pierce deep into the layer of skin which causes immediate tanning and premature aging of skin and certain type of skin cancers. Most of the people are ignorant about the different concepts related to the harmful effects of ultra violet rays. Therefore, the current study was designed to explore the knowledge and awareness of college going girls pertaining to the different aspects of the sun protection. An exploratory study was conducted through survey using questionnaire to collect data for assessing the awareness regarding different aspects of sun protection among female students of GBPUAT, Pantnagar, Uttarakhand. The data revealed that most of the respondents were not aware of different aspects of sun protection like range of UV radiations, UPF, characteristics of sun protective measures and health effects due to exposure to sunlight.

Key words: Awareness, tanning, UV radiation, UV protection

Sunlight is an electromagnetic energy, which is disseminated by electromagnetic waves. The most important parts in electromagnetic spectrum of sun are ultraviolet radiation (UV) which is invisible to the eye, visible light by which life is able to see and the major source of heat i.e., infrared radiation, which is also invisible (Black *et al*., 2001). Frequent and prolonged exposure to ultraviolet (UV) rays over many years is the leading cause of skin cancer (Scerri *et al*., 2002; Yilmaz *et al*., 2014; Grandahl *et al*., 2018). The increased incidence of skin cancer over the past decade is strongly related to the growing attraction to outdoor activities and recreational sun exposure. Increased exposure to sunlight is also the leading cause of detrimental effects on the skin, eye and immune system. Solar UV undergoes significant absorption by the atmosphere, but due to the depletion of ozone layer in atmosphere, the phototoxic effects of sunlight are of great concern for humans all over the world.

Tanning occurs when one goes out into the sun. People have become aware of the need for sun protection for avoiding the incidences of sun induced skin damages. It is therefore necessary to protect skin from direct sun. That can be done either with the application of sunscreen lotions or by covering the exposed parts of body with some fabric cover. Clothing provides more reliable protection than sunscreen lotions and is easier to use. Therefore, the demand for sun protective textiles is rapidly increasing worldwide (Black *et al*., 2001; Shafie Pour *et al*., 2015).

Knowledge of sun safety is related to the amount of awareness of different concepts and facts about sun protection. Hence, the present study was undertaken with the objective of assessing the knowledge and awareness of college going girls regarding sun exposure and related issues. Teenage and young females are more conscious of their appearance than other age groups as they are influenced by fashion and media portrayals of attractiveness. Therefore female students pursuing the undergraduate, M.Sc. and Ph.D. degree programmes in the university were selected as respondents for the present study.

MATERIALS AND METHODS

Research Design

The research conducted in present study was exploratory in nature. The method used for conducting study was survey. Questionnaire was used as instrument for obtaining the relevant information from selected respondents on

different aspects pertaining to UV protection.

Formulation of questionnaire

Questionnaire comprised of two parts. Part-I of questionnaire dealt with the general information of the respondents like age, education level, discipline of study. The Part-II of questionnaire sought information regarding the awareness of respondents about different aspects of sun protection.

Collection of data

Total 90 respondents were selected randomly from seven girl's hostel. A chit method of simple random sampling was used for the selection of respondents. The questionnaires were distributed among the respondents for collecting information regarding their awareness on different issues of sun protection.

Statistical Analysis of Data

The statistical measures used for the analysis were frequency and percentage.

Levels of awareness

Total score for each statement included in the questionnaire was calculated by assigning the weight (value) 2 to the responses as Yes and weight 1 to the responses as No. Thus, when the statements got all the responses as no, the minimum score (value) was calculated as 1 x 90= 90 for a statement. Similarly, maximum score (2 x 90= 180) was calculated when all the responses got yes for a statement. Then difference between the minimum and maximum scores (180-90=90) were divided into 3 equal parts resulting in three levels as low (scores between 90-120), medium (scores between 121-150) and high when the scores were between 151-180 (Kothari, 2007).

RESULTS AND DISCUSSION

Personal information of respondents

Respondents were taken from different girls' hostels of the University which included female students from Undergraduate, M.Sc. and Ph.D. degree programmes. There were 57.77 % respondents who belonged to undergraduate level, 28.88 % respondents were from M.Sc. programme and only 13.33 % were from Ph.D. programme. Personal information of the respondents including their age, education level and subject of studies has been presented in Table 1. It is clear from the data that more than half of the respondents (53.33 %) were between the age group of 18-22 years and 46.66 % respondents were between the age group of 23-28 years. It can be envisaged from the data that 26.57 % respondents were from the subject of Agriculture followed by 16.66 %, 24.44 %, 20 %, 4.44 % and 6.66 % respondents who were from Home Science, Technology, Veterinary Science & Animal Husbandry, Fisheries and Basic Science and

Table 1: Distribution of respondents according to personal information (n= 90)

Sl. No.	Parameters	Variables	Frequency	Per cent
1	**Age**	18-22 years	48	53.33
		23-28 years	42	46.66
2	**Education level**	Undergraduate	52	57.77
		M.Sc.	26	28.88
		Ph.D.	12	13.33
3	**Subject of studies**	Agriculture	25	26.57
		Home Science	15	16.66
		Technology	22	24.44
		Veterinary Science and Animal Husbandry	18	20
		Fisheries	4	4.44
		Basic Science and Humanities	6	6.66

Humanities, respectively.

Awareness of the respondents regarding sun protection

The awareness of the female students was assessed by collecting the responses as either YES or NO for different sets of statements related to different aspects of sun protection. The responses of the respondents were tabulated to calculate the frequencies and percentages. The frequency and percentage of the responses for different statements are shown in Tables 2 to 6.

The data given in Table 2 illustrates that majority of the respondents were aware of the fact that sunlight is a portion of electromagnetic radiation (88.88 %) and comprises of different types of radiations (95.55 %). Majority of the respondents (75.55 %) were also aware of different forms of UV radiations but only 51.11 % of respondents were aware of the range of UV radiations i.e., 400-100 nm. This shows that respondents were aware of general aspects of sunlight but lacking in knowledge of specific aspects.

Table 3 reveals that majority of the respondents were unaware about the terms photosensitivity (65.55 %) and photoageing (56.66 %). Most of the respondents (90 %) were aware of the fact that sunburn is an inflammation of the skin caused by over exposure of the sun followed by 77.77 % respondents who were aware about the term tanning and 72.22 % respondents who were aware about the skin cancer due to sun exposure. Besides this, 66.66 % of respondents had awareness that Sun Protection Factor (SPF) is a measure of how well a sunscreen will protect skin from UV A and UV B rays. Very less percentage of respondents (16.66 %) were aware of the fact that the UPF (Ultraviolet Protection Factor) is a numerical rating given to clothing to indicate how effectively the fabric blocks ultraviolet (UV) radiations. It can be inferred from the results that there was more awareness of terms related to sunburn, tanning and occurrence of skin cancer due to sun exposure. This may be attributed to increased reporting of such issues resulting from global

Table 2: Awareness of respondents regarding aspects of sunlight (n= 90)

Sl. No.	Statements	Yes		No	
		F	%	F	%
1.	Sunlight is a portion of the electromagnetic radiation given off by the sun.	80	88.88	10	11.11
2.	Sunlight comprises of different types of radiations namely infrared, visible and ultraviolet light.	86	95.55	4	4.44
3.	UVA, UVB and UVC are different forms of UV radiations.	68	75.55	22	24.44
4.	Range of UV radiations is from 400 – 100 nm.	46	51.11	44	48.88

F – Frequency, % - Percentage

Table 3: Awareness of respondents regarding terminology related to sun protection (n= 90)

Sl. No.	Statements	Yes		No	
		F	%	F	%
1.	Photosensitivity is often referred to as sun allergy.	31	34.45	59	65.55
2.	Photoageing is a term used for the characteristic changes to skin induced by chronic UVA and UVB exposure.	39	43.34	51	56.66
3.	Sunburn is an inflammation of the skin caused by over exposure of the sun.	81	90	9	10
4.	Tanning refers to delayed pigmentation of the skin (melanin pigmentation) which becomes noticeable in one to two days after exposure to the sun.	70	77.77	20	22.22
5.	Skin cancer is the abnormal growth of skin cells most often develops on skin exposed to the sun.	65	72.22	25	27.77
6.	Sun Protection Factor (SPF) is a measure of how well a sunscreen will protect skin from UV A and UV B rays.	60	66.66	30	33.33
7.	The UPF (Ultraviolet Protection Factor) is a numerical rating given to clothing to indicate how effectively the fabric blocks ultraviolet (UV) radiations.	15	16.66	75	83.33

F – Frequency, % - Percentage

Table 4: Awareness of respondents regarding health effects due to exposure to sunlight (n= 90)

Sl. No.	Statements	Yes		No	
		F	%	F	%
1	UV B helps in synthesis of vitamin D.	32	35.55	58	64.44
2	Ultraviolet radiations enhances mood by increasing hormone (serotonin) level in the body.	21	23.33	69	76.66
3	UV radiations are used in the treatment of skin conditions such as psoriasis (condition where the skin sheds its cells too quickly and develops itchy, scaly patches).	10	11.11	80	88.88
4	UV radiations increase the melanin production as a means of protection which leads to a long lasting tan.	53	58.88	49	32.03
5	UV A radiations contribute to premature ageing and wrinkling of the skin.	40	44.44	50	55.55
6	UV B radiation causes sunburn and is the major cause of skin cancer.	55	61.11	35	38.88
7	Skin tone from very fair to light burns easily and tans slowly.	25	27.77	65	72.22
8	Medium to dark colour skin tones tan easily and burn minimally.	22	24.44	68	75.55
9	Over-exposure to UV radiation has a harmful suppressing effect on the immune system.	28	31.11	62	68.88
10	Prolonged exposure to UV or high intensities of UV damages the tissues of eyes and can cause a burning of the eye surface.	25	27.77	65	72.22

F – Frequency, % - Percentage

Table 5: Awareness of respondents regarding characteristics of sun protective measures in relation to UV protection (n= 90)

Sl. No.	Statements	Yes		No	
		F	%	F	%
1	Sun creams are classified into two types sunscreens and sunblocks.	28	31.11	62	68.88
2	Sunscreen refers to product that filters and reduces UV radiations.	47	52.22	43	47.77
3	Sunblock works by preventing the sun rays from reaching the skin either by reflecting them away or absorbing them.	36	40	54	60
4	Sunscreen should be applied 30 minutes before sun exposure to allow the ingredients to fully bound to the skin.	40	44.44	50	55.55
5	Sunscreen should be reapplied at least every two hours or every hour if the person is sweating a lot.	60	66.66	30	33.33
6	SPF 15 sunscreen blocks 93 percent of UV B radiation.	35	38.88	55	61.11
7	SPF 30 sunscreen blocks 97 percent of UV B radiations.	35	38.88	55	61.11
8	Densely woven fabric and thick fabric have high UPF.	13	14.44	77	85.55
9	A porous fabric has lower UPF value.	13	14.44	77	85.55
10	The UPF rating of the fabric decreases if it is stretched during wear due to its thinning at point of stretch.	10	11.11	80	88.88
11	The UPF is affected by the moisture content of a fabric i.e., a wet fabric has reduced UPF value than same fabric in dry condition.	8	8.88	82	91.11
12	Fabrics with darker colours absorb more UV absorption i.e., has higher UPF values.	9	10	81	90.00
13	A fabric with UPF in range of 15-24 gives good protection from ultraviolet radiations.	5	5.55	85	94.44
14	A fabric with UPF in range of 25-39 gives very good protection from ultraviolet radiations.	5	5.55	85	94.44
15	A fabric with UPF in range of 40-50 gives excellent protection from ultraviolet radiations.	5	5.55	85	94.44

F – Frequency, % - Percentage

warming and ozone depletion. Large no. of respondents were aware of the term SPF, this may be due to the increased use of sunscreens and in this case some credit also goes to advertising. As UPF is a specific term related to clothing which is not mentioned on labels and not seen in advertisements also, hence less no. of people were aware about this term.

Table 4 shows that large majority of the respondents were not aware of the facts that UV B helps in synthesis of vitamin D (64.44 %), ultraviolet

Table 6: Awareness of respondents regarding environmental factors affecting UV absorption (n= 90)

Sl. No.	Statements	Yes		No	
		F	%	F	%
1	Thick clouds reflect and absorb more UV than thin cloud cover i.e., incident UV radiations are less on cloudy day.	30	33.33	60	66.66
2	Latitude affects incident UV radiations which is higher at the equator and decline towards the poles.	30	33.33	60	66.66
3	Ozone layer encircling earth's atmosphere reduces UV radiations that reach at ground level.	25	27.77	65	72.22
4	Thin ozone layer in the atmosphere leads to higher penetration of UV radiations.	52	57.77	38	42.22
5	UV radiations peaks at midday and are lower in the early morning and late afternoon.	35	38.88	55	61.11
6	Seasons affect UV radiations which peaks in spring and summer (April to August), declines in winter.	30	33.33	60	66.66
7	More UV radiations reach the mountain top than at lower elevations.	83	92.22	7	7.77

F – Frequency, % - Percentage

radiations enhances mood by increasing hormone level (76.66 %) and UV radiations are used in the treatment of skin conditions (88.88 %). More than half of the respondents were aware that UV radiations increase the melanin production (58.88 %) and UVB causes sunburn (61.11 %). A large section of the respondents were not aware that UVA radiation contribute to premature ageing (55.55 %), light skin tones burn easily and tan slowly (72.22 %), medium to dark colour skin tones tan easily and burn minimally (75.55 %), over-exposure to UV radiation has a harmful suppressing effect on the immune system (68.88 %) and prolonged exposure to UV or high intensities of UV damages the tissues of eyes and can cause a burning of the eye surface (72.22 %).

The data in Table 5 depicts that very less respondents (31.11%) were aware that sun creams are classified into two types, sunscreens and sunblocks while 52.22 % of respondents were aware that sunscreen refers to a product that filters and reduces UV radiations. Most of the respondents were not aware that sunblock works by preventing the sun rays from reaching the skin either by reflecting them away or absorbing them (60 %) and sunscreen should be applied 30 minutes before sun exposure to allow the ingredients to fully bound to the skin (55.55 %). It can be envisioned from the data that 66.66 % of the respondents had awareness about the fact that sunscreen should be reapplied at least every two hours or every hour if the person is sweating a lot. Besides this 61.11 % respondents were unaware of the fact that an SPF 15 sunscreen blocks 93 % of UV B radiation and an SPF 30 sunscreen blocks 97 % of UV B radiations. The data describes that large majority of the respondents (ranging from 85 to 90 %) were not aware about the fabric characteristics which affect UPF. More than 90 % of the respondents were not aware of about the different UPF range of fabrics which gives protection from ultraviolet radiations. Less awareness of respondents about protection provided by sunscreens of different SPF and fabrics of different UPF may be attributed to the fact that products available in the market do not give technical information about these features.

Table 6 reveals that most of the respondents (66.66 % for each) were not aware of the fact that thick clouds reflect and absorb more UV than thin cloud cover, latitude affects incident UV radiations which is higher at the equator and decline towards the poles and seasons affect UV radiations which peak in spring and summer (April to August), declines in winter. Majority of the respondents (72.22 %) were not aware of the fact that the ozone layer encircling earth's atmosphere reduces UV radiations that reach at ground level. More than half of the respondents (57.77 %) had awareness that thin ozone layer leads to higher penetration of UV radiations in the atmosphere. Very less no. of respondents (38.88 %) were aware of the fact that the UV radiations peaks at midday and are lower in the early morning and late afternoon. Majority of respondents (92.22 %) were aware about the fact that more UV radiations

reach the mountain top than at lower elevation.

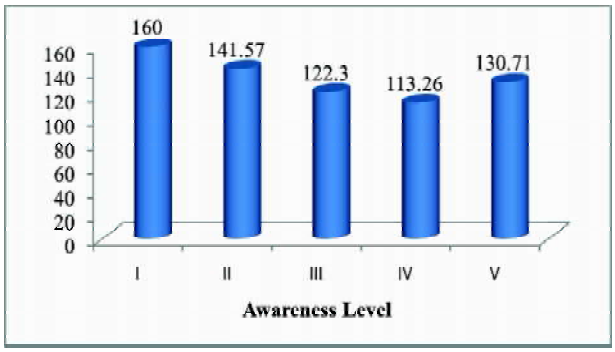

Fig. 1: Comparison between awareness levels on different aspects of sun protection

The Fig. 1 describes the awareness level of respondents regarding sun protection. The total score was taken into three levels of awareness i.e., High (score 151-180), medium (score 121-150) and low (score 90-120). It can be inferred from the data that awareness regarding aspects of sunlight was high (160) and awareness regarding terminology related to sun protection, health effects due to exposure to sunlight and environmental factors affecting UV absorption was found medium with score 141.57, 122.3 and130.71 respectively. Low level of awareness (113.26) was found regarding characteristics of sun protective measures in relation to UV protection.

CONCLUSION

The study showed that the college going girls had high awareness regarding different aspects of sunlight, medium awareness regarding terminology related to sun protection, health effects due to exposure to sunlight and environmental factors affecting UV absorption and low awareness regarding characteristic of sun protective measures in relation to UV protection. The area of the study is need of the hour owing to increased exposure of humans to solar radiations. Therefore to increase the awareness about different aspects of sun protection, an efficient method for the effective use of sun protection measures must be developed to increase the level of sun protection. Public awareness pamphlets, campaigns can also be initiated to aware people that it is worthwhile to protect themselves from the sun. These initiatives can create a more sun-conscious population, which may stop the growing incidence of skin related issues.

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Received: April 20, 2022
Accepted: April 22, 2022