Abstract

Background: Sun exposure causes extensive intrinsic as well as extrinsic changes in the skin. Pathogenic effects of sun exposure such as tanning, melasma, skin cancer, and aggravation of various photodermatoses such as systemic lupus erythematosus (SLE) may be prevented by the use of sunscreens. We conducted the present study to assess the knowledge and attitudes regarding sun exposure and use of sunscreens. Methods: Two thousand and thirty-seven volunteers answered the questionnaire over a period of 2 years. All adults aged 18 years and above who voluntarily agreed to participate in the study after written informed consent were included. Results: Out of 2037 volunteers, 1242 volunteers had no knowledge of sunscreens. Sixty-eight percent of the volunteers from the upper class of society knew about sunscreens, and 86% of the volunteers from the lower middle class did not know about sunscreens. Eight-one percent of the volunteers did not suffer from sunburns. Eight-four percent of the volunteers were aware that sun exposure caused darkening, but awareness about other effects of sun exposure such as wrinkling, melasma, allergy, and photo-induced cancers was less. Most of the volunteers agreed that sunscreens protected against sun damage and tanning. Fifty-eight percent of the volunteers applied sunscreen before venturing out, and 78% of the volunteers applied sunscreen only on the face. Prevention of tanning was the most common reason for the usage of sunscreens. Cosmetic appeal and irritant potential were the prominent deciding factors in choosing sunscreens. Conclusion: Awareness about protective spectrum of sunscreens, their correct method of application, and misconceptions need to be focused on. Better product development keeping in mind the Indian conditions would help in increasing the usage of sunscreens.

Key Words: Melasma, SPF, sunscreens, tanning

Introduction

Sun exposure causes extensive intrinsic as well as extrinsic changes in the skin. Various manifestations of photoaging such as sagging, wrinkling, and photocarcinogenesis which are caused by damage to cells, and DNA may be prevented with regular sunscreen usage.[1] On a single day in the summer season, the ultraviolet (UV) energy received is 3.5% UVB and 96.5% UVA. UVB affects the epidermis whereas UVA penetrates up to the dermis. Highest UVB intensities are found near the equator. In India, the population is exposed to higher degree of both UVA and UVB. UVB is filtered by glass, but UVA can pass through it.[2]

The regular use of sunscreens prevents the formation of actinic keratosis and thus the reduction of skin cancer. Photo-induced and photo-aggravated dermatoses can be avoided with regular sunscreen usage. Sunscreens have been approved by Food and Drug Administration for use in the prevention of sunburn, photo-induced pigmentation, aging, and carcinoma. The only contraindication to sunscreen usage is sensitivity to the ingredients and in infants <6 months of age. Nearly 93.3% of UV rays (UVR) is prevented from penetrating the epidermis by a sunscreen SPF 15.[3]
Sunscreens increase the tolerability of skin to UV rays reaching by reflection, absorption, and scattering.\(^4\)

Several studies have been done worldwide, especially in Australia and the USA regarding knowledge and usage of sunscreen. Australia has one of the highest rates of cutaneous malignancies in the world, out of which melanoma is the fourth most common malignancy.\(^5\) Till date, in India, only one study has been done regarding the knowledge and usage of sunscreen.\(^6\) The sun has always been given importance in the Indian culture to the extent that it is considered as God. A tanned body is considered healthy and working under the sun is considered as the sign of a hardworking person. Nowadays, there has also been an increasing awareness about the requirement of sunlight for the synthesis of vitamin D. Hence, compliance of an Indian patient in using a sunscreen or physical barriers for sun protection is poor. Second, there are other factors, such as cost and greasiness of the product which prevent the optimum use of sunscreen. Sunscreens are available in less greasy formulations such as gels, sprays, and lip balms, but the patients are not aware of this.

So, we conducted the present study to evaluate the knowledge of a subset of Indian population regarding sun exposure, to study the knowledge of effects of sun exposure on the skin, and to study the sun protective attitudes and practices of a subset of the Indian population.

**Materials and Methods**

**Study design**

It was a cross-sectional questionnaire-based study. The Institutional Ethics Committee approval was taken. Written informed consent was obtained from each volunteer. Two thousand and thirty-seven volunteers attending the outpatient department of a tertiary care hospital answered the questionnaire containing 57 questions to assess their knowledge, attitude, and practices regarding sunscreen and sun exposure over a period of 2 years.

**Inclusion criteria**

All adults aged 18 year and above who voluntarily agreed to participate in the study after written informed consent were included.

**Exclusion criteria**

Those not willing to give consent for the study were excluded.

**Questionnaire**

Demographic data which included age, gender, and socioeconomic status were noted. The questionnaire also included information regarding daily sun exposure, their knowledge about sun-induced skin changes, and protection provided by sunscreens. Those volunteers not using sunscreens were asked about reasons for doing so, to judge their attitude towards sunscreen. Practices regarding sunscreen usage were also asked. These were related to site and frequency of application, SPF of the sunscreen, and priorities while choosing a sunscreen.

**Statistical methods**

We calculated the means and standard deviations (SDs) for continuous variables and proportions for categorical variables. The proportions were compared using Chi-square test or Fisher’s exact test for low expected cell counts. We also calculated Chi-square for trend. \(P<0.05\) was considered statistically significant. Data were analyzed using Stata Version 13.1 (‘StataCorp, College Station, Texas, USA).

**Results**

The study comprised of 2037 volunteers. The mean age was 32.94 (SD 12.01) year. One thousand two hundred and forty-two (61%) of the volunteers did not know about sunscreens. Percentage was the same for male and female volunteers. Sixty-eight percent of the volunteers from the upper middle class knew about sunscreens compared to the lower middle class (8%). At least 50% of the younger age group (18–29 years) knew about sunscreens whereas the older generation was mostly unaware about sunscreens [Table 1].

About half of the volunteers (52%) had sun exposure of 2–5 h weekly. Only 9% of the volunteers had a sun exposure between 11 am and 3 pm. Eighty one percent had no history of sunburn.

**Pigmentary complaints**

Nearly 50% of the volunteers did not have problems of uneven skin color, pigmentation on acne sites, periorbital pigmentation, tanning, or generalized pigmentation on the face. Eight-four percent did not have complaints of melasma.

**Knowledge about effects of sun exposure**

Six hundred and sixty-two volunteers were aware that sun exposure causes darkening of the skin. About 50% of the volunteers were aware that sun exposure caused wrinkles (48%), melasma (38%), photoallergy (50%), and cancer (43%) [Table 2].

**Knowledge about protective effect of sunscreen**

A higher percentage of volunteers strongly agreed about short-term benefits of sunscreen-like protection against UV rays (84%), sun damage (85%), skin tanning (79%), and sunburn (77%).

We found that individuals who were graduates (44%) or professionals (43%) were more likely to know about the protective effects for cancer compared with those
who were high schools/intermediate school (20%) or illiterate/primary school (8%) (P<0.001). Similarly, the former were also more aware about the protective effects in sunburn compared with the latter (P<0.001).

Awareness about long-term benefits such as prevention of premature aging (42%), improvement in skin color (34%), and prevention of photo-induced cancers (38%) was intermediate [Table 2].

**Nonacceptance of sunscreens**

Among the 352 volunteers, who knew about sunscreens but did not use them, 138 had no specific reason for not using sunscreens, 87 volunteers did not use sunscreen as they found it sticky, and 63 found sunscreens expensive [Table 2].

Out of the 385 volunteers who were currently using sunscreens, 237 volunteers (62%) used sunscreens every day.

Five hundred and forty-one volunteers responded regarding morning use of sunscreen, out of which 357 (66%) always applied in the morning.

Four hundred and ninety-seven volunteers responded regarding the use of sunscreen when they went out, of which 287 (58%) always applied when they went out.

Four hundred and seventy-six volunteers used sunscreens always applied on the face.

Most of the sunscreens used by the volunteers were of SPF in the range of 15–50 [Table 3].

### Indication for sunscreen use

Out of 488 volunteers, 386 (79%) volunteers always used sunscreens to prevent tanning and 312 (65%) used sunscreens to prevent sunburn [Table 3].

### Opinion about the side effects of sunscreen

Knowledge about side effects of sunscreens was low (23%–31%) [Table 2].

### Preferable properties of sunscreen

Most volunteers preferred a sunscreen which was less sticky (73%) or less irritant (70%), caused fewer allergies (62%), and did not aggravate acne (65%) [Table 3].

### Gender differences

The knowledge of effectiveness of sunscreen in protection against UVR (male – 85%, female – 83%), sun damage (male – 82%, female – 86%), skin tanning (male – 80%, female – 79%), and prevention of sunburn (male – 76%, female – 77%) was nearly equal in both males and females. Males had higher awareness level regarding control of premature aging (male–48%, female–38%), improvement in skin color (male–45%, female–26%, P<0.001), and prevention of skin cancer (male–44%, female–34%, P=0.02) [Table 4].

### Discussion

Indians are chronically exposed to sunlight due to the country being situated in the tropics and by the virtue of India being a predominantly farming country till a few years back. Since Indians are dark skinned, hyperpigmentary disorders are not a concern, especially in the rural areas and in the lower socioeconomic strata. Sun exposure, tanning, and photoaging are considered as a part and parcel of life. Sixty-one percent of the volunteers in our study did not know about sunscreen. In the lower socioeconomic group, 91% of the respondents did not know about sunscreens. This was probably because of the lower literacy rate[7] and education levels and financial constraints[8,9] in this group. It was in this group that we found it difficult to convince the patients to use sunscreens in photo-aggravated conditions such as xeroderma pigmentosum and systemic lupus erythematosus. Higher education levels were known to be associated with increased use of sunscreen.[10] Fifty-four percent of the volunteers in the age group of 20–29 had knowledge about sunscreens whereas 93% of the volunteers of more than 60 years of age did not know about sunscreens which was consistent with a study done in China,[11] whereas in previous studies, it was the older generation which used sunscreen frequently compared to the younger generation,[12-14] due to higher risk of cancers in the fifth-sixth decades[6,12,13] indicating the effects of urbanization and high level of social media exposure in the younger generation. In our study,
the awareness about sunscreen increased with increased education level. The male and female volunteers were equally unaware of sunscreens (61% in each group) in contrast to other studies where females were found to have more awareness about sunscreens and used them more often. The finding could be present due to lesser incidence of melanoma and sun-induced pigmentation in Indians due to which discussions on sunscreen and its use were not encouraged as found in a study done in Tehran. In India, most females were not financially independent and sunscreens being considered as cosmetics and very expensive, use was limited. More than 80% of the male and female volunteers agreed that sunscreens gave protection against UVR, sun damage, and tanning of the skin. Only 26% of women believed that sunscreens make the skin fair as compared to 45% of men (P<0.001). About 44% of the male volunteers agreed that sunscreens played a role in the prevention of skin cancers as compared to 34% of females (P=0.02). When asked about the reasons for the use of sunscreens, only 27% of females and 36% of males used it to become fair (P=0.001). Maximum volunteers used it to prevent tanning (males–73%, females–82%). The use of sunscreen to become fair, prevention of wrinkles, early aging, mole, and cancer was below 40% for both men and women, indicating that awareness of the range of effects of UVR and the protection offered by sunscreens was limited as found in a study by Saleeqath et al. Almost 52% of the volunteers had a weekly sun exposure of 2–5 h. Forty-one percent were rarely in the sun between 11 am and 3 pm. Eight-one percent did not have a single episode of sunburn in their lifetime. These data showed that although the use and knowledge about sunscreens was less, the volunteers avoided going in the direct sun, might be due to the heat. Just about 4%–5% of the volunteers considered their pigmentary complaints to be serious, and more than 40% of the volunteers did not express any concern about their pigmentary problems. Most of the volunteers (84%) strongly agreed that sun exposure caused tanning, but knowledge about sun exposure causing wrinkles, melasma, allergies, and cancer was low (≤50%) as compared to other studies where knowledge about UVR causing skin cancer was high. A high percentage of volunteers strongly agreed that sunscreens gave protection against UVR (84%), sun damage (85%), tanning (79%), and sunburn (77%).

### Table 2: Opinion of respondents about sun exposure and sunscreen

| Statements about sun exposure | Strongly agree/agree, n (%) | Neither agree nor disagree, n (%) | Disagree/strongly disagree, n (%) | Don’t know, n (%) |
|------------------------------|-----------------------------|----------------------------------|----------------------------------|------------------|
| It causes darkening          | 662 (84)                    | 41 (5)                           | 39 (5)                           | 43 (5)           |
| It causes wrinkles           | 370 (48)                    | 154 (20)                         | 162 (21)                         | 92 (12)          |
| It causes melasma            | 289 (38)                    | 153 (20)                         | 116 (15)                         | 204 (27)         |
| It causes allergies          | 389 (50)                    | 126 (16)                         | 128 (17)                         | 128 (17)         |
| It causes cancer             | 335 (43)                    | 119 (15)                         | 141 (18)                         | 179 (23)         |

### Opinion about sunscreen

| It gives protection against UVR | 660 (84) | 45 (6) | 13 (2) | 67 (9) |
| It protects against sun damage | 658 (85) | 52 (7) | 15 (2) | 52 (7) |
| It prevents skin tanning       | 615 (79) | 71 (9) | 26 (3) | 64 (8) |
| It prevents sunburns           | 585 (77) | 88 (12) | 21 (3) | 70 (9) |
| It controls premature aging    | 323 (42) | 179 (23) | 89 (12) | 173 (23) |
| It will make the skin fair     | 259 (34) | 139 (18) | 235 (30) | 139 (18) |
| It will prevent skin cancer    | 290 (38) | 154 (20) | 102 (13) | 214 (28) |

### Reasons for not using sunscreen

| It is expensive               | 63 (35) | 48 (26) | 17 (9) | 54 (30) |
| It has many side effects      | 33 (18) | 58 (32) | 21 (11) | 71 (39) |
| It is very sticky             | 87 (46) | 33 (18) | 11 (6) | 57 (30) |
| It is very difficult to use   | 31 (17) | 59 (32) | 31 (17) | 62 (34) |
| Never really thought about it | 138 (71) | 18 (9) | 6 (3) | 33 (17) |

### Opinion about side effects of sunscreen

| It causes acne                | 178 (31) | 167 (29) | 121 (21) | 111 (19) |
| It causes skin allergies      | 134 (23) | 147 (26) | 119 (21) | 174 (30) |
| It causes irritation          | 168 (29) | 125 (22) | 123 (21) | 160 (28) |
| It causes whitening           | 143 (25) | 167 (29) | 156 (27) | 109 (19) |

UVR: Ultraviolet rays
Nearly 70% of those who knew about sunscreens had used them at some point in their lives, and 60% were currently using sunscreen. The frequency of using sunscreen daily was 63%, application in the morning was done by 66%, and 78% applied sunscreen only on the face. Sunscreens having a SPF in the range of 31–50 were mostly (68%) used. Common reasons for not using sunscreens were that sunscreens were expensive (35%) and very sticky (46%) being similar to other studies. 

In a study by Abroms et al., both men and women responded that sunscreens took too much time and effort to apply and it was cumbersome to carry the sunscreen bottle around for reapplication. Saleeqath et al. also reported stickiness, cost, and white residue after the application of sunscreen as reasons for not using sunscreen. White residue on application of high SPF of sunscreen was cited as an undesirable effect in the study done by Mosavi et al. Some of the other reasons for not using sunscreen as reported in previous studies were burning and stinging sensation in eyes, smell and association with cosmetic use, high cost, and white residue on application of high SPF of sunscreen.

### Table 3: The opinion of respondents to various factors related to sunscreen

| Variable                              | Response            | n (%)     |
|---------------------------------------|---------------------|-----------|
| Currently use sunscreen               | Yes                 | 385 (60)  |
|                                       | No                  | 255 (40)  |
| Frequency of sunscreen                | Every day           | 237 (63)  |
|                                       | Not every day but at least 2-3 times a week | 73 (20) |
|                                       | Every week but <2–3 times | 33 (9)   |
|                                       | Less frequent than once a week | 30 (8) |

### Factors related to sunscreen use

| Variable                              | Response            | n (%)     |
|---------------------------------------|---------------------|-----------|
| In the morning                         | Always/often        | 357 (66)  |
|                                       | Sometimes           | 88 (16)   |
|                                       | Rarely/never        | 100 (18)  |
| In the afternoon                       | Always/often        | 239 (46)  |
|                                       | Sometimes           | 111 (22)  |
|                                       | Rarely/never        | 165 (32)  |
| Whenever I go out                      | Always/often        | 287 (58)  |
|                                       | Sometimes           | 95 (19)   |
|                                       | Rarely/never        | 115 (23)  |
| On the face                            | Always/often        | 426 (78)  |
|                                       | Sometimes           | 60 (11)   |
|                                       | Rarely/never        | 61 (11)   |
| On the arms                            | Always/often        | 236 (45)  |
|                                       | Sometimes           | 106 (20)  |
|                                       | Rarely/never        | 184 (35)  |
| On other parts of the body             | Always/often        | 29 (10)   |
|                                       | Sometimes           | 23 (8)    |
|                                       | Rarely/never        | 246 (83)  |
| Always/often use of sunscreens with the SPF* | <15                | 28 (29)   |
|                                       | 15-20               | 68 (55)   |
|                                       | 21-30               | 71 (56)   |
|                                       | 31-50               | 103 (68)  |
|                                       | >50                 | 38 (40)   |

### Reasons for using the sunscreen

| Variable                              | Response            | n (%)     |
|---------------------------------------|---------------------|-----------|
| To become fair                        | Always/often        | 132 (30)  |
|                                       | Sometimes           | 43 (10)   |
|                                       | Rarely/never        | 269 (61)  |
| To prevent skin tanning               | Always/often        | 386 (79)  |
|                                       | Sometimes           | 50 (10)   |
|                                       | Rarely/never        | 52 (11)   |
| To prevent sunburn                    | Always/often        | 312 (65)  |
|                                       | Sometimes           | 65 (14)   |
|                                       | Rarely/never        | 100 (21)  |
| To prevent wrinkle                    | Always/often        | 162 (35)  |
|                                       | Sometimes           | 60 (13)   |
|                                       | Rarely/never        | 247 (53)  |
| To prevent early aging                | Always/often        | 160 (34)  |
|                                       | Sometimes           | 50 (11)   |
|                                       | Rarely/never        | 260 (55)  |

### Priorities about sunscreen use

| Variable                              | Response            | n (%)     |
|---------------------------------------|---------------------|-----------|
| To prevent uneven skin tone           | Always/often        | 222 (48)  |
|                                       | Sometimes           | 62 (13)   |
|                                       | Rarely/never        | 180 (39)  |
| To prevent moles                      | Always/often        | 100 (22)  |
|                                       | Sometimes           | 46 (10)   |
|                                       | Rarely/never        | 317 (68)  |
| To prevent skin cancer                | Always/often        | 135 (29)  |
|                                       | Sometimes           | 39 (9)    |
|                                       | Rarely/never        | 285 (62)  |

### Table 3: Contd...

| Variable                              | Response            | n (%)     |
|---------------------------------------|---------------------|-----------|
| To prevent uneven skin tone           | Always/often        | 222 (48)  |
|                                       | Sometimes           | 62 (13)   |
|                                       | Rarely/never        | 180 (39)  |
| To prevent moles                      | Always/often        | 100 (22)  |
|                                       | Sometimes           | 46 (10)   |
|                                       | Rarely/never        | 317 (68)  |
| To prevent skin cancer                | Always/often        | 135 (29)  |
|                                       | Sometimes           | 39 (9)    |
|                                       | Rarely/never        | 285 (62)  |

### Priorities about sunscreen use

| Variable                              | Response            | n (%)     |
|---------------------------------------|---------------------|-----------|
| Cost                                  | Essential/high priority | 250 (49) |
|                                       | Medium priority     | 142 (23)  |
|                                       | Low priority/not a priority | 120 (28) |
| Less sticky                           | Essential/high priority | 407 (73) |
|                                       | Medium priority     | 77 (14)   |
|                                       | Low priority/not a priority | 74 (13) |
| Fewer allergy                         | Essential/high priority | 340 (62) |
|                                       | Medium priority     | 95 (17)   |
|                                       | Low priority/not a priority | 114 (21) |
| Fewer acne                            | Essential/high priority | 358 (65) |
|                                       | Medium priority     | 81 (15)   |
|                                       | Low priority/not a priority | 113 (20) |
| Less irritant                         | Essential/high priority | 381 (70) |
|                                       | Medium priority     | 60 (11)   |
|                                       | Low priority/not a priority | 104 (19) |

**SPF**: Sun protection factor
and forgetfulness. A study in Portugal also found sunscreen properties, cost of sunscreen, and forgetfulness as the main barriers to use of sunscreen. Sunscreen causing vitamin D deficiency was also cited as a reason for not using it. Seniors not encouraging the use of sunscreen at the workplace was one of the barriers to sunscreen use in a study of Latino workers. About 71% of the volunteers did not have a specific reason for not using sunscreen in our study. Those who did use sunscreen were using it to prevent tanning (79%) and sunburn (65%). The side effects of sunscreen observed were acne (31%), skin allergies (23%), irritation (29%), and whitening (25%). While choosing a sunscreen, the volunteers gave priority to the stickiness (73%) and potential to cause side effects. The cost of the sunscreen was given a priority by 49%.

**Strength and limitation**

This is the first study with a large population in India to assess the knowledge, attitude, and practices regarding sun exposure and use of sunscreen. It would be useful in developing sunscreens which would be acceptable to majority of the population.

There were certain limitations. The study was conducted in a particular area of India with a large migrant population with large variability in age, education level and socioeconomic status, and skin types. Since the study was conducted in an urban area, comparison between urban and rural population could not be made. We had not included method of application of sunscreen in our questionnaire.

**Conclusion**

Our study showed that the consciousness about sunscreen was low among the study population. There was no gender difference in this aspect. Those who used were largely complaining of stickiness and high cost. Taking care of these factors might increase the use of sunscreen.

**Financial support and sponsorship**

Funding by IADVL-L’oreal grant.

**Conflicts of interest**

There are no conflicts of interest.

**What is new?**

The knowledge about sunscreen and its benefit, other than prevention of tanning, is low. The awareness about benefits of sunscreen is limited. Stickiness and high cost are some of the reasons for not using sunscreen.

**References**

1. Latha MS, Martis J, Naveen Kumar BR. Sunscreening agents – A review. J Clin Aesthet Dermatol 2013;6:16-26.
2. Bernerd F, Moyal D, Pai SB, Srinivas C. Ultraviolet induced skin damage and its prevention with sunscreen. In: Srinivas C, Verschoore M, editors. Modern Cosmetology Dermatology. 1st ed., Ch. 7. Mumbai: Jaypee Brothers Medical Publishers; 2015. p. 91-113.
3. Australian Institute of Health and Welfare. Australian Cancer Incidence and Mortality: Melanoma of the Skin. Canberra: Australian Institute of Health and Welfare; 2010. Available from: http://www.Aihw.Gov.Au/Acim-Books/. [Last accessed on 2017 Dec 23].
4. Wolverton SE. Sunscreens. Comprehensive Dermatologic Drug Therapy. 3rd ed., Ch. 46. Amsterdam: Elsevier Health Sciences; 2013. p. 551-61.
5. Thieden E, Philipsen PA, Sandby-Møller J, Wulf HC. Sunscreen use related to UV exposure, age, sex, and occupation based on personal dosimeter readings and sun-exposure behavior diaries. Arch Dermatol 2005;141:967-73.
6. Saleeqath V, Shetty NJ, Shetty VH, Rao GS, Pai MR, Shetty S,

---

**Table 4: The knowledge about sunscreen according to gender**

|                       | Male, n (%) | Female, n (%) | P  |
|-----------------------|-------------|---------------|----|
| All                   | 319 (100)   | 476 (100)     |    |
| It gives protection against UVR |             |               |    |
| Strongly agree/agree  | 271 (85)    | 389 (83)      | 0.43|
| Neither agree nor disagree | 13 (4)      | 32 (7)        |    |
| Disagree/strongly disagree | 6 (2)       | 7 (2)         |    |
| Don’t know            | 27 (9)      | 40 (9)        |    |
| It protects against sun damage |         |               |    |
| Strongly agree/agree  | 258 (82)    | 400 (86)      | 0.45|
| Neither agree nor disagree | 24 (8)      | 28 (6)        |    |
| Disagree/strongly disagree | 7 (2)       | 8 (2)         |    |
| Don’t know            | 25 (8)      | 27 (6)        |    |
| It prevents skin tanning |            |               |    |
| Strongly agree/agree  | 253 (80)    | 362 (79)      | 0.92|
| Neither agree nor disagree | 29 (9)      | 42 (9)        |    |
| Disagree/strongly disagree | 9 (3)       | 17 (4)        |    |
| Don’t know            | 25 (8)      | 39 (8)        |    |
| It prevents sunburns  |            |               |    |
| Strongly agree/agree  | 234 (76)    | 351 (77)      | 0.75|
| Neither agree nor disagree | 37 (12)     | 51 (11)       |    |
| Disagree/strongly disagree | 10 (3)      | 11 (2)        |    |
| Don’t know            | 25 (8)      | 45 (10)       |    |
| It controls premature aging |          |               |    |
| Strongly agree/agree  | 149 (48)    | 174 (38)      | 0.05|
| Neither agree nor disagree | 61 (20)     | 118 (26)      |    |
| Disagree/strongly disagree | 36 (12)     | 53 (12)       |    |
| Don’t know            | 65 (21)     | 108 (24)      |    |
| It will make the skin fair |          |               |    |
| Strongly agree/agree  | 142 (45)    | 117 (26)      | <0.001|
| Neither agree nor disagree | 51 (16)     | 88 (19)       |    |
| Disagree/strongly disagree | 75 (24)     | 160 (35)      |    |
| Don’t know            | 48 (15)     | 91 (20)       |    |
| It will prevent skin cancer |          |               |    |
| Strongly agree/agree  | 135 (44)    | 155 (34)      | 0.02|
| Neither agree nor disagree | 64 (21)     | 90 (20)       |    |
| Disagree/strongly disagree | 39 (13)     | 63 (14)       |    |
| Don’t know            | 71 (23)     | 143 (32)      |    |

UVR: Ultraviolet rays
et al. Sunscreens – A luxury or inevitability: An awareness study. J Evol Med Dent Sci 2013;2:8608-14.
7. Mosavi F, Golestan B, Vaseie M, Vaseie L, Khajeh-Kazemi R. Knowledge, attitude and practice of adults to the protective actions against sun in Northwest Tehran, Iran. Arch Iran Med 2011;14:126-31.
8. Koh HK, Bak SM, Geller AC, Mangione TW, Hingson RW, Levenston SM, et al. Sunbathing habits and sunscreen use among white adults: Results of a national survey. Am J Public Health 1997;87:1214-7.
9. Hall HI, May DS, Lew RA, Koh HK, Nadel M. Sun protection behaviors of the U.S. White population. Prev Med 1997;26:401-7.
10. Parker G, Williams B, Driggers P. Sun exposure knowledge and practices survey of maintenance squadrons at Travis AFB. Mil Med 2015;180:26-31.
11. Yan S, Xu F, Yang C, Li F, Fan J, Wang L, et al. Demographic differences in sun protection beliefs and behavior: A community-based study in Shanghai, China. Int J Environ Res Public Health 2015;12:3232-45.
12. Lee A, Singh G, Benjamin K, Shrey D, Pam B, Saxon SD. The influence of age and gender in knowledge, behaviour and attitudes towards sun protection: A cross-sectional survey of Australian outpatient clinic attendees. J Cancer Educ 2015;1:4-11.
13. Sharma K, Mohanti BK, Rath GK. Malignant melanoma: A retrospective series from a regional cancer center in India. J Cancer Res Ther 2009;5:173-80.
14. Kyle RG, Macmillan I, Forbat L, Neal RD, O’Carroll RE, Haw S, et al. Scottish adolescents’ sun-related behaviours, tanning attitudes and associations with skin cancer awareness: A cross-sectional study. BMJ Open 2014;4:e005137.
15. Janssen E, van Kann D, de Vries H, Lechner L, van Osch L. Sun protection during snow sports: An analysis of behavior and psychosocial determinants. Health Educ Res 2015;30:380-7.
16. Eadie D, Macaskill S. Results from a exploratory study of sun protection practise. Implication for the design of health promotion messages. Health Educ 2007;107:250-60.
17. Heckman CJ, Coups EJ. Correlates of sunscreen use among high school students: A cross-sectional survey. BMC Public Health 2011;11:679.
18. Cottrell R, Mcclamroch L, Bernard AL. Melanoma knowledge and sun protection attitudes and behaviors among college students by gender and skin type. Am J Health Educ 2005;36:274-8.
19. Cercato MC, Ramazzotti V, Sperduti I, Asensio-Pascual A, Ribes I, Guillén C, et al. Sun protection among Spanish beachgoers: Knowledge, attitude and behaviors. J Cancer Educ 2015;30:4-11.
20. Wickenheiser M, Kate BM, Gaber G, Hanz B, Robinson June K. Sun protection preferences and behaviors among young adult males during maximum ultraviolet radiation exposure activities. Am J Clin Dermatol 2015;16:47-54.
21. Abrons L, Jorgensen CM, Southwell BG, Geller AC, Emmons KM. Gender differences in young adults’ beliefs about sunscreen use. Health Educ Behav 2003;30:29-43.
22. Marissa B, Nadine E, Thomas C. Assessing behaviour, knowledge and attitudes about melanoma: An educational intervention for female college athletes. J Nurs Pract 2016;12:12-8.
23. Araujo-Soares V, Rodrigues A, Presseau J, Sniehotta FF. Adolescent sunscreen use in springtime: A prospective predictive study informed by a belief elicitation investigation. J Behav Med 2013;36:109-23.
24. Boyas JF, Nahar VK, Brodell RT. Skin protection behaviors among young male latino day laborers: An exploratory study using a social cognitive approach. Dermatol Res Pract 2016;1479637:1-10.