

Knowledge and attitude of Princess Nourah University Students Towards Sun Protection

Faten Albukhari ¹, Nouf Alzahrani ¹ Raghad M. Alamri ², Wejdan T. Abokhesheim ², Munira S. Alqahtani ², Abeer A. Alasiry ², Renad Zaini ³, Raghad E. Alsubki ³

(1) Clinical Sciences Department, Faculty of Medicine, Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia

(2) Medical Intern, College of Medicine, Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia

(3) Medical Student, College of Medicine, Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia

Corresponding author:

Dr.Faten Albukhari

Assistant Professor, Dermatology

Faculty of Medicine, Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia

Email: Faalbukhari@pnu.edu.sa

Received: November 2022 Accepted: December 2022; Published: December 30, 2022.

Citation: Faten A. Albukhari et al. Knowledge and attitude of Princess Nourah University Students Towards Sun Protection. World Family Medicine. December 2022 - January 2023 Part 2; 21(1):289-298 DOI: 10.5742/MEWFM.2023.95251596

Abstract

Background: Hyperpigmentation, early skin wrinkling, skin cancer, and many other serious skin problems are caused by the sun's harmful UV rays. Yet, there are many preventive ways that allow us to enjoy the sun and even take benefits from it without causing any harm to the skin. One very effective and useful way is through applying sunscreen with adequate Sun Protection Factor (SPF) and good coverage. However, the Saudi community lacks education on the importance of applying sunscreen or how to effectively use sunscreens and what could be prevented with its usage.

Objectives: This study aims to estimate PNU student's awareness and knowledge of sun safety, to compare between healthy and non-healthy students in regards to knowledge and practice, to assess the protective behaviors toward sun exposure among PNU students, and to provide the public with information regarding safe sun protection.

Methods: This cross-sectional study was conducted among 900 PNU students using convenient sampling. The study was conducted between November 2019 and March 2020. Data was collected by a paper-based questionnaire of 46 questions and all statistical analysis was done by SPSS software.

Results: A notable difference was observed among students of health colleges, vs students from non-health colleges. 71.7 % of poor knowledge was correlated with non-health students and 28.3% was associated with health students. However, both groups showed no significant differences when it came to sunscreen use and practice.

Conclusion: Sunscreen usage and utilization were substantially low among PNU students. Despite the high knowledge level that health students represented, this did not affect their sunblock application. Awareness of the importance of sun protection was low among PNU students.

Keywords: Awareness; Knowledge; Sun safety; Attitudes; Practices; Sunscreen; Sunblock.

Introduction

Ultraviolet radiation has both negative and positive effects on one's health. Under the influence of sun rays, vitamin D is synthesized in the skin, therefore adequate but protected exposure is needed. Most of the benefits are related to vitamin D and how it is involved in many metabolic activities (1). Additionally, regular sun exposure has anticancer effects by contributing to the prevention of breast, colon, prostate cancers, melanoma and non-Hodgkin lymphoma which is related to vitamin D(1). Moreover, it is involved in treating some skin diseases like psoriasis and non-psoriasis conditions, and sclerosing conditions(2). Likewise, sunbathing or tanning has good advantages such as reducing pain in fibromyalgia(2). Regular exposure promotes the production of serotonin, which is involved in the sensation of happiness, well-being and mood enhancement(2). However, acute and chronic skin damage can arise from unprotected exposure to (UV) radiation as well as infrared radiation. UV Radiation can harm skin cells and cause acute damage such as erythema, episodes of sunburn and tanning. Furthermore, it can cause chronic skin issues with long term UV exposure such as hyperpigmentation (e.g. Melasma), and premature wrinkles(3). Long-standing unprotected exposure to UV rays can increase the risk of developing melanoma and this risk increases two-fold after sunburns (4). On the contrary, chronic non-burning protected exposure reduces that risk (4). Melanoma is accountable for 75% of skin cancer deaths worldwide (5). People with fair skin tones are at higher risk of developing melanoma but individuals with darker skin tones are not safe, they still have the risk of developing late-stage skin cancer (6). Sun protection behaviors are considered an essential step that prevents skin damage induced by chronic sun exposure(6). Avoiding sun exposure between 10 a.m. - 2 p.m., seeking shade, wearing wide-brim hats, sunglasses and protective clothing and the use of sunscreen products are the main methods for efficient sun protection (6). Throughout various countries, several sun protection campaigns have been initiated to increase the public's awareness of sun exposure risk and the encouragement of using different sun protection measures, thus; a significant improvement of the population's awareness has been observed (6). Nonetheless, compliance with sun protection remains inadequate (6). Dermatology clinics have found plenty of misconceptions and improper attitudes towards sun protection in a substantial number of patients (7). There have been few studies in Saudi Arabia regarding this matter. Not much is known about the Saudi population's understanding of the use of sun protection measures (6). For effective interventions, information from this study may be helpful. This study aims to investigate the awareness, attitudes, and behaviors among Princess Nourah University students in Riyadh, Saudi Arabia regarding sun exposure and safety. Students were chosen because they were in the age range where sun exposure habits were known to reduce skin aging and cancer (6).

Objectives

1. To estimate PNU student's awareness and knowledge of sun safety.
2. To compare between health and non-health students in regards to knowledge and practice.
3. To assess the protective behaviors toward sun exposure among PNU students.
4. To provide the public with information regarding safe sun protection.

Materials and Methods

This cross-sectional study was conducted among 900 PNU students using convenient sampling. The study was made between November 2019 and March 2020. Previous literature showed that the prevalence of regular use of sunscreens among the Saudi population was 35% with an expected difference of 10% when the level of confidence is 95% ($\alpha=0.05$), and power of study of 80% ($\beta=20\%$). The minimal sample size needed for our study was 511 using G-power software. Data was collected by a paper-based questionnaire of 46 questions. We included 6 questions regarding sociodemographic data, one question about skin conditions, 3 questions about tanning behaviors, and 9 questions to evaluate participants' usage of sunscreen and mode of selection. Also, we wanted to know why some participants refrain from using sunscreen. Finally, we included a scale of 25 statements to estimate the knowledge of participants about the effect of the sun and sunblock. The answers were (yes, no, and I don't know). We coded yes as 1 and no or I don't know as 0, and chose a cut-off point of 13/25 or above as good knowledge and poor knowledge participants were those who scored 12/25 or less. All statistical analysis was conducted using SPSS software in terms of means, standard deviations, median and interquartile ranges which were used to describe criteria of the studied sample. Analysis of the quantitative data was made by t-test while the association of qualitative variables was by the chi-square test. A P-value of less than 0.05 was considered as statistically significant. Multivariate analysis was adopted according to results from univariate analysis.

Results

A total of 900 students at Princess Nourah university were located and agreed to participate in the study (response rate, 99%). The participants were not diverse in terms of age; the mean age of participants was 20.35 years (age range, 17-32 years, SD, 2.01). 33.9% of the participants were from health colleges, and 66.1% were from non-health colleges. The vast majority of the participants were single (92.6%). The socio-demographic records of the study population are represented in Table 1.

Table I. Group Demographics

Characteristics	N=900(%)
Age, Mean±SD:	20.35 ± 2.01
College:	
Health	305(33.9)
Non-health	595(66.1)
Marital Status:	
Single	833(92.6)
Married	67(7.4)
Socioeconomic status:	
High status	419(46.6)
Good status	401(44.6)
Low status	61(6.8)
Poor status	19(2.1)
Skin Color:	
Fair	255(28.3)
Medium	596(66.2)
Dark	49(5.4)
Skin Conditions:	
Lichen Planus	9(1.0)
Eczema	73(8.1)
Acne	261(29.0)
Rosacea	15(1.7)
Cutaneous Lupus	2(0.2)
Melasma	30(3.3)
Urticaria	7(0.8)
# Other	20(2.2)
None	483(53.7)

Psoriasis

Knowledge of PNU Students on Sunscreen.

Table 2: Comparison Between Knowledge Level And Group Demographics.

Group Demographics	Bad Knowledge	Good Knowledge	P-value
Age (Mean, SD)	20.4±2.1	20.4±1.9	0.97
College Health Non-health	170(28.3) 430(71.7)	135(45.0) 165(55.0)	<0.01
Marital status Single Married	557(92.8) 43(7.2)	276(92.0) 24(8.0)	0.65
Socioeconomic status High status Good status Low status Poor status	272(45.3) 273(45.5) 41(6.8) 14(2.3)	147(49.0) 128(42.7) 20(6.7) 5(1.7)	0.72
Skin color Fair Medium Dark	159(26.5) 408(68.0) 33(5.5)	96(32.0) 188(62.7) 16(5.3)	0.22
Skin conditions Lichen planus Eczema Acne Rosacea Cutaneous lupus Melasma Urticaria Other No	5(0.8) 50(8.3) 179(29.8) 10(1.7) 2(0.3) 16(2.7) 4(0.7) 13(2.2) 321(53.5)	4(1.3) 23(7.7) 82(27.3) 5(1.7) 0(0.0) 14(4.7) 3(1.0) 7(2.3) 162(54.0)	0.78

Respondents' demographics were compared to their knowledge level in Table 2. The survey showed no significant difference between the two groups regarding knowledge in terms of age. 71.7% of poor knowledge was from non-health colleges while only 28.3% were from the health colleges, therefore the difference was significant ($p < 0.01$) between the two groups. However, respondents' socioeconomic status, skin color, and conditions did not show any significant difference in regard to the knowledge.

Table 3: Statements representing knowledge level

Knowledge statements	Percentage of the correct response.
There are physical and chemical sunscreens.	23.3%
Best sunscreen products are the ones with 100% SPF.	31.7%
Sunblock only protects against skin cancer.	42.1%
When tanning under the sun, no need to apply sunblock.	25.1%
Applying sunblocks prevent you from getting tanned.	41.2%
Sunblock protects against sunburns.	69.7%
Sunscreens only block UV radiation, they don't filter it.	18.9%
Sunburns increase the risk of getting skin cancer.	52.9%
Using sunscreen may decrease your skin production of vitamin D.	35.2%
Sunscreens can be harmful.	25.3%
Sunblocks protect against ultraviolet rays only.	25.1%

Table 3 illustrates the correct response to statements testing knowledge among the study group. It shows that most participants had a poor knowledge level.

Practice and attitude regarding sunscreens and sun exposure.

Table 4: Comparison Between Health And Non-Health College Students' practice and attitude regarding sunscreens and sun exposure.

Questions:	Health colleges	Non-health colleges	P-value
Question 1: How much time do you spend under the sun in a day? < one hour (<7h/w) 1-2 hours (7-14h/w) > 2 hours (>14h/w)	190(62.3) 90(29.5) 25(8.2)	374(62.9) 140(23.5) 81(13.6)	0.02
Question 2: Which of the following sun protective methods do you often use during summer? Topical creams Long-sleeved clothes Face cover	182(59.7) 76(24.9) 56(18.4)	322(54.1) 115(19.3) 108(18.2)	0.12 0.52 0.94
Question 3: Do you use sunscreen? Yes No	183(60.0) 122(40.0)	341(57.3) 254(42.7)	0.44
Question 4: How did you choose your sunblock? By prescription Over the counter Social media Friends I do not use	50(16.4) 90(29.5) 13(4.3) 50(16.4) 102(33.4)	112(18.8) 161(27.1) 29(4.9) 74(12.4) 219(36.8)	0.39
Question 5: Do you read labels before buying sunscreen? Yes No Sometimes I do not use	97(31.8) 51(16.7) 72(23.6) 85(27.9)	181(30.4) 89(15.0) 150(25.2) 175(29.4)	0.83
Question 6: How often do you use sunscreen? Daily Often Rarely I do not use	101(33.1) 75(24.6) 38(12.5) 91(29.8)	188(31.6) 136(22.9) 71(11.9) 200(33.6)	0.72
Question 7: How many times a day do you apply sunscreen? Once Twice Before going out I do not use	116(38.0) 16(5.2) 65(21.3) 108(35.4)	221(37.1) 31(5.2) 118(19.8) 225(37.8)	0.91

Table 4: Comparison Between Health And Non-Health College Students' practice and attitude regarding sunscreens and sun exposure. (continued)

Question 8: Where do you typically apply sunscreen?			
Face	193(63.3)	334(57.8)	0.12
Hands	78(25.6)	128(21.5)	0.17
All exposed areas	35(11.5)	70(11.8)	0.90
I do not use sunscreen	95(31.1)	200(33.6)	0.46
Question 9: In your opinion, what causes the disuse of sunscreens?			
It causes pimples			
It is sticky	104(34.1)	157(26.4)	0.02
It is expensive	161(52.8)	241(40.5)	<0.01
	143(46.9)	259(43.5)	0.34
Question 10: How often do you tan?			0.44
Once a week	8(2.6)	25(4.2)	
Once a month	11(3.6)	17(2.9)	
Only on holidays	57(18.7)	95(16.0)	
I do not tan	229(75.1)	458(77.0)	
Question 11: At what time do you tan?			0.47
In the morning	45(14.8)	89(15.0)	
At noon	24(7.9)	31(5.2)	
After 3 o'clock	8(2.6)	16(2.7)	
I do not tan	228(74.8)	459(77.1)	
Question 12: How many times have you had sunburn in your lifetime?			0.89
Once	45(14.8)	90(15.1)	
2-3 times	19(6.2)	45(7.6)	
More than 3	10(3.3)	18(3.0)	
I never had a sunburn	231(75.7)	442(74.3)	

62% of the participants spend less than 7 hours per week under the sun. The practice of health college students of sun protective methods was higher by 5.6% than non-health students regarding the usage of topical creams and long-sleeved clothes. Unfortunately, nearly 40% of both groups show a negative attitude regarding sunscreen application. Students favor to choose sunblocks on their own rather than following a prescription. More than 55% of the participants in both groups have a positive attitude in regards to reading sunscreen labels before purchasing. The majority show a positive practice regarding how often they apply sunscreen. Participants tend to apply sunscreens once a day as well as prior to sun exposure. Yet, only 5.2% of sunscreen users apply it two times a day. We asked the participants about their opinion on why people would deter from using sunscreen, the answers were; due to its sticky texture (52.8%,40.5%), it is overpriced (46.9%,43.5%), it provokes acne (34.1%,26.4%). A significant difference is seen by the two groups regarding sticky texture. Positively, the survey shows that three-quarters of the participants in both groups do not practice tanning. Fortunately, about three quarters of the participants in both groups have never had sunburn in their lifetime. While only about 3% of them have experienced a sunburn more than three times. In regards to the practice, Table 4 has not illustrated any remarkable difference between the two groups.

Table 5: Comparison Between participants application of sunscreens

Characteristics	Using Sunscreen	Not using Sunscreen	P-value
Socioeconomic status			0.26
High status	250(47.7)	169(44.9)	
Good status	231(44.1)	170(45.2)	
Low status	36(6.9)	25(6.6)	
Poor status	7(1.3)	12(3.2)	
Skin color			0.30
Fair	145(27.7)	110(29.3)	
Medium	355(67.7)	241(64.1)	
Dark	24(4.6)	25(6.6)	
Skin conditions			0.22
Lichen planus	4(0.8)	5(1.3)	
Eczema	43(8.2)	30(8.0)	
Acne	157(30.0)	104(27.7)	
Rosacea	11(2.1)	4(1.1)	
Cutaneous lupus	1(0.2)	1(0.3)	
Melasma	22(4.2)	8(2.1)	
Urticaria	6(1.1)	1(0.3)	
Other	14(2.7)	6(1.6)	
No conditions	266(50.8)	217(57.7)	
Question: How much time do you spend under the sun in a day?			0.65
< one hour (<7h/w)	328(62.6)	236(62.8)	
1-2 hours (7-14h/w)	138(26.3)	92(24.5)	
> 2 hours (>14h/w)	58(11.1)	48(12.8)	
Question: Do you tan?			0.75
Tanning	126(24.0)	87(23.1)	
Not tanning	398(76.0)	289(76.9)	
Question: Have you had a sunburn in your lifetime?			0.09
Sunburned before	143(27.3)	84(22.3)	
Never sunburned	381(72.7)	292(77.7)	

The sunscreen usage behavior was compared between the demographics, time of sun exposure, tanning and having previous sunburns. Despite using and deterring from sunscreen, socioeconomic status does not affect sunscreen utilization. Surprisingly, skin color and skin conditions had no noticeable impact concerning the use of sunscreen. Nevertheless, the table displays that the number of individuals with a skin condition who use sunscreen is higher than those who have a condition but they do not use sunscreen. For example, most of the affected participants with rosacea, melasma, and urticaria use sunscreen compared to those who do not use it. 11 of 15 of rosacea patients, 22 of 30 of melasma patients, and 6 out of 7 urticaria patients use sunscreens. Yet, the variance is not considerable. More than half of the participants get less than 7 hours of sunscreen exposure a week, and only 328 of them use sunscreens compared to 236 who do not use it. Time spent under the sun, tanning and previously sunburned individuals had no significant difference regarding the application of sunscreen.

Discussion

Knowledge of PNU students on sunscreen use.

Several studies have been conducted in Saudi Arabia to assess the knowledge and attitude of the general population on sunscreen. However, this study is the first to be conducted exclusively on students of Princess Nora University. The knowledge and awareness of the students varied according to their majors; the study shows that health students are more aware of the importance of sunscreen than non-health students are. Almost seventy-six percent of students both health and non-health combined are not aware that there are different types of sunscreen like physical and chemical. Physical sunscreens work by reflecting the rays before penetrating the skin(8). However, chemical sunscreens work by absorbing UV rays, converting them into heat then releasing them before they induce skin damage (8). That could be due to the lack of interest and poor sources of information about sun protection in Saudi Arabia. In fact, we did not know about this valuable information until we started working on this research, which proves that more public education on this matter is needed. The study indicates that 68% of participants believe that 100 SPF is the most effective type of sunscreen which could be considered wrong as the difference is very unremarkable once the SPF gets past fifteen(9). It appears that 57% of respondents think that sunblocks only protect from cancer, which is very wrong. The Food and Drug Administration has approved Sunscreens for use in the prevention of sunburn, photo-induced pigmentation, aging, and carcinoma (10). With this in mind, a large number of students believe that there is no need to apply sunblock when tanning. Having said that, 58% of the respondents believe that sunblock prevents tanning which is considered low compared to the results found in a study in India where almost 80% agree on that(11). Furthermore, sixty-four percent of participants think using sunscreen may decrease the skin's production of vitamin D which was surprisingly high when compared to a study done in King Abdulaziz University where only 30% agreed with that(6). Nonetheless, ultraviolet B rays are shortwaves from the sun that generate vitamin D in the skin; they are blocked by sunscreen usage(12). However, because most users apply lower than the recommended amount of sunscreen they are not deficient in vitamin D (12). In addition, almost 71.1% of respondents agree that sunblocks can be harmful while only 26.2% do not agree. Sunscreens are safe, however, the FDA issued a proposed rule that asks manufacturers to provide more data about the ingredients they use in their sunscreens for further inspection (10). More importantly, 52.9% of students believe that getting sunburned increases the risk of getting skin cancer. This is considered similar to a previously conducted study in 2010 with almost 55%(13).

Practice of sunscreen use in PNU students.

Based on the results of our survey 60% of health students and 57.% of non-health students are using sunscreen, which is considered substantial only in comparison to the rates of the previous studies done in Saudi Arabia. For instance, a study conducted on female students of King

Abdulaziz University in Jeddah concluded that only 23% of their respondents were using sunscreen(6). Furthermore, a cross-sectional survey done in Al-Qassim demonstrated a shockingly low rate of 8.3%(13). We speculate that this low rate might be a result of the incorporation of both genders in the Al-Qassim study, as prior research substantiates the belief that the female gender is associated positively with the practice of using sunscreens(14). 62% of our health and non-health participants have been estimated to spend 7 hours or less under the sun weekly. On the other hand, the study done in Al-Qassim estimated an average sun exposure of 19 hours a week (13). This seems to be the same case as the rate of sunscreen use, being attributed to genders and the difference in their behavior. One explanation for the low rate of sun exposure in our results could be the indoor lifestyle that is highly predominant in Saudi Arabia, which could be a result of the hot climate. Health authorities globally have recommended the re-application of sunscreen to increase its effectiveness in preventing sun damage. It has been proved that the combination of two applications of sunscreen gave on average 2 times more protection from Ultraviolet Rays than a single sunscreen application per day (15). With that in mind, only 5.2% of our respondents stated they used a double application of their sunscreen. However, this result appeared to be consistent with other study results, which stated that 3.7% of their respondents were applying their sunscreen twice(6). Upon gathering information from the participants on what discourages people from applying sunscreen, the sticky texture of the sunscreen and the overpricing were mostly chosen. A similar pattern of results was obtained in a prior study that showed sticky texture and overpricing were the most chosen reasons (46%,35%)(11). One finding we found was that most of the students with conditions like melasma, rosacea, and urticaria were using sunscreen. Only 30% of both colleges admitted to reading labels before purchasing sunscreen, which might explain the little knowledge the respondents had on SPF. According to the Skin Cancer Organization, it is recommended to apply sunscreen on all parts exposed to the sun(16). However, only 11% of both colleges were adhering to that recommendation. After analyzing the practice of health and non-health students, it came to us as a surprise that the rate of sunscreen application between the two colleges was awfully similar in spite of the health students scoring a higher knowledge level.

Recommendations

According to WHO, the global incidence of melanoma occurrence has reached 130,000 cases yearly(17). This rate is expected to increase to 4,500 more cases with the further depletion of the ozone levels and the decreased filtration of UVR by the atmosphere. The skin cancer organization has found that sunscreen decreases the risk of squamous cell carcinoma by 40% and melanoma by 50% (16). Based on the results of our research and prior studies in Saudi Arabia, the knowledge of the Saudi population on sunscreen use and benefits is markedly low. To improve this knowledge, we need to implement nationwide sun safety strategies. The first objective of such

strategies should focus on the awareness and compliance of parents in particular. Parents and caregivers are the primary role models of the next generation and have the biggest influence on their behavior and attitudes. Secondly, public facilities and schools principally should ensure the availability of shade, particularly during outdoor activities. Educational facilities are also required to plan flexible timing of outdoor activities reducing the time spent in the sun between 10 AM and 2 PM. The third objective should promote the use of sun-protective clothing such as hats and long sleeves. Lastly, there should be large-scale sunscreen awareness campaigns focusing on schools, shopping malls, and social influencers.

Conclusion

This cross-sectional study reported that the knowledge and awareness of sunscreen practices among PNU students are higher in health students than non-health students. However, the use of sunscreens and other methods of protection was low with no significant difference between the two groups, which emphasizes the need to raise awareness of the public.

Limitations And Strengths

Conducting this study in PNU campus has led to a few limitations including; the study being done in a convenient sample, the representation of health students was lower than non-health students, males are not represented because the study was conducted in a female-only university, and due to conducting the study among students, the age group was narrow. However, the results provide valuable information on the awareness of Saudi female university students about sun protection.

References

1. van der Rhee HJ, de Vries E, Coebergh JW. Regular sun exposure benefits health. *Med Hypotheses*. 2016;
2. islam MT. Beneficial Aspects of Ultraviolet Rays in Protective and Sound Health. *EC Pharmacol Toxicol*. 2018;6(2):57–65.
3. Rittié L, Fisher GJ. Natural and sun-induced aging of human skin. *Cold Spring Harb Perspect Med*. 2015;5:1–14.
4. Hoel DG, Berwick M, de Gruijl FR, Holick MF. The risks and benefits of sun exposure 2016. *Dermatoendocrinol*. 2016;8(1):e1248325.
5. Parker G, Williams B, Driggers P. Sun Exposure Knowledge and Practices Survey of Maintenance Squadrons at Travis AFB. *Mil Med*. 2015;180:26–31.
6. Almuqati RR, Alamri AS, Almuqati NR. Knowledge, attitude, and practices toward sun exposure and use of sun protection among non-medical, female, university students in Saudi Arabia: A cross-sectional study. *Int J Women's Dermatology*. 2019;
7. AlGhamdi KM, AlAklabi AS, AlQahtani AZ. Knowledge, attitudes and practices of the general public toward sun exposure and protection: A national survey in Saudi Arabia. *Saudi Pharm J [Internet]*. 2016;24(6):652–7. Available from: <http://dx.doi.org/10.1016/j.jsps.2015.04.002>
8. Wilson BD, Moon S, Armstrong F. Comprehensive Review of Ultraviolet Radiation and the Current Status on Sunscreens. 2012;5(9):18–23.
9. Gabros S, Patrick Z. Sunscreens And Photoprotection - StatPearls - NCBI Bookshelf [Internet]. 2019 [cited 2020 Apr 5]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK537164/>
10. FDA. Sunscreen: How to Help Protect Your Skin from the Sun. 2018 [cited 2020 Apr 5];1–8. Available from: <https://www.fda.gov/drugs/understanding-over-counter-medicines/sunscreen-how-help-protect-your-skin-sun>
11. Agarwal SB, Godse K, Patil S, Nadkarni N. Knowledge and attitude of general population toward effects of sun exposure and use of sunscreens. *Indian J Dermatol [Internet]*. 2018;63(2):125–30. Available from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85045467996&doi=10.4103%2Fijd.IJD_585_17&partnerID=40&md5=24ac1ecf391acb36c5e83a65633c1c90
12. Harvard Women's Health Watch. The science of sunscreen. *Sci Am [Internet]*. 2018 [cited 2020 Apr 7];319(5):54–5. Available from: <https://www.health.harvard.edu/staying-healthy/the-science-of-sunscreen>
13. Al Robaee AA. Awareness to sun exposure and use of sunscreen by the general population. *Bosn J Basic Med Sci*. 2010;10(4):314–8.
14. Boggild AK, From L. Barriers to Sun Safety in a Canadian Outpatient Population. *J Cutan Med Surg*. 2003;7(4):292–9.
15. Heerfordt IM, Torsnes LR, Philipsen PA, Wulf HC. Sunscreen use optimized by two consecutive applications. *PLoS One*. 2018;13(3):1–11.
16. Richard E. Sunburn - The Skin Cancer Foundation [Internet]. The Skin Cancer Foundation. 2019 [cited 2020 Apr 5]. Available from: <https://www.skincancer.org/skin-cancer-prevention/sun-protection/sunscreen/>
17. World Health Organisation. WHO | Skin cancers. Who [Internet]. 2017 [cited 2020 Apr 5];9(6):607–22. Available from: <https://www.who.int/uv/faq/skincancer/en/index1.html>