

## Knowledge level of school students and its related factors about the methods of protecting their body against sunlight exposure

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**Abstract:** Long term exposure to the sun causes variant damages and malignant melanoma of the skin but severe intermittent contact with sunlight is more important in causing melanoma. Regarding this issue that exposure to sunlight is in a high degree among the people of province of Mazandaran especially in adolescents, and there are not sufficient educational and news-feeding tools for them, we decided to investigate the knowledge level of school pupils and its related factors about the methods of protecting their body against sunlight exposure in In middle and high schools in the city of Sari in year 2012.

**Materials and Methods:** This study was a cross-sectional study among middle and high school students of Sari city in 1391 and knowledge of students about the methods of protection against solar radiation was measured. The sample size was 2,000. A two-part questionnaire was used for data acquisition. The first part consisted of demographic information and the second part was about the knowledge of students about sun-block and other methods for protection against the sun radiation.

**Results:** The study population consisted of 1273 patients (63.65%) were male and 727 patients (36.35%) were female. The mean age of the study was 15.0725 with a minimum age of 12 years and maximum age of 17 years. 256 of female samples (35.21%) wore sunglasses, while 122 of boys (9.58%) were using sun glasses. Among girls, 278 cases (38.32%), and use among boys, 122 cases (14.61%) were using a sun block. Among the male students, 42 (29.3%) had low knowledge, 742 cases (58.28%) have moderate levels of knowledge, 471 cases (36.99%) had good knowledge and 18 (1.41%) had a higher level of consciousness and knowledge. Among female students, 16 (20.2%) had low knowledge, 236 cases (32.46%) had medium level of knowledge, 411 cases (56.53%) had good knowledge and 64 (8.80%) had a higher level of consciousness and knowledge.

**Conclusion:** Based on the results obtained in our study and other researchers, techniques of prevention of the damaging effects of the sunlight, are helpful ways to prevent skin damages. But since that most people are not aware of the harmful effects of the sun radiations, the use of prevention methods and tools are not appropriate. Hence, the use of appropriate advertising and other communication tools to convey information to the public is advised.

**Keywords:** *sunlight, exposure, knowledge*

### 1. Introduction

Exposure to the sunlight has beneficial effects, such as the synthesis of vitamin D, repairment and strengthening if the bones, reducing infections, antibacterial and disinfecting properties et. In contrast, constant and prolonged exposure to the sunlight causes early aging, freckle, solar lentigo, pseudoporphyria, delayed tanning, sunburn, actinic keratosis, malignant melanoma and non-melanoma skin cancers, but severe and intermittent exposure to

sunlight is more important in causing melanoma. It should be noted that more than 90% of skin cancers are on sun-exposed sites of the body. The prevalence of non-melanoma skin cancer in the United States was 81,700 cases (100,000 / 94.4) in 2006. This figure was estimated about 10,400 cases of malignant melanoma (100,000 / 14.7). In Iran, in a study conducted in 1383, 13 percent of all cancers in

women and 17% of all skin cancers in men were skin cancers (1-7).

There are several ways to protect our skin from the sunlight including: eye protection by using appropriate sunglasses that block UV rays, protecting the skin with sun-blocks which should be done three times a day (early in the day, mid-day and afternoon). Particularly at time interval of approximately 11 to 15 when the sun shines almost vertically (especially in summer) and the intensity of UV radiation is more. And finally, protecting the body and the head by using proper clothes and hats. Clothes must be thick and from cotton and sleeves should be long. We should not be under sun exposure in any way during the day, especially in the middle of the day, dressed in short sleeves, shorts, without hat or protective clothing. Exposure to ultraviolet ray (UV) in childhood and adolescence is as a critical factor for causing skin cancer later in life. However, by minimizing the amount of received UV, the risk of skin cancers such as melanoma, basal cell carcinoma (BBC) and squamous cell carcinoma (SCC) can be reduced. Many studies have shown that protecting the skin against the sun exposure in the adolescent stage of life between 15 and 17 years are at the lowest level compared to life. However, in another study conducted in the United States it was noted that children (under 16 under old) are at a higher risk of prolonged exposure to sunlight and UV ray, due to their lack of knowledge about bad effects of long-time sunlight exposure and due to their thought that see the sunburn as an effect which needs just some days to be cured. They noted that the level of knowledge about adolescent teenagers about the effects of excessive exposure to sunlight is not low, but for other reasons related to their age, they neglect this fact (5-10).

Due to the fact that sun exposure among the people in the northern provinces is high because of the sightseeing in the beaches and sea and the sunburn, especially in the teenagers, and sufficient information means are not available, and according to this fact that a similar study has not been conducted in the area, we decided to evaluate the knowledge of school students about the ways of protecting the body from sunlight exposure in middle and high schools in the city of Sari, 2012 .

## Methods

The study was a cross-sectional study among middle and high school students of Sari city in 2012 and the knowledge of the students about the methods of protection against solar radiation was evaluated. In this study, male and female students were the target group and the total number of samples based on

random sampling and the formula

$$n = \frac{(1/96)^2 * P(1 - P)}{d^2}$$

was 2000 persons. After obtaining the necessary permits, the list of middle schools and high schools in both two educational regions of Sari was taken. Also the number of non-profit and public schools in each region was obtained based on being a boys school or girls school. The number of samples in terms of population abundance in every educational region was calculated and quotas for each region were determined. Samples of each educational region were divided based on the population of each sex. According to numbers of nonprofit and public schools, the number of students in each sex and each school was determined. In schools, using random numbers, one class was selected from various levels and this selection was repeated in different schools. A two-part questionnaire was used for data acquisition. The first part included demographic data (age, sex, education level, hair color, skin color, educational region) and the second one with the remaining 20 questions about their knowledge of sun-blocks, frequency of use, amount of SPE in sun-blocks and other sun protection methods and etc. (The questionnaire is attached). In the second part of the questionnaire, if questions 7 to 26 were answered correctly, the lowest score was considered 4 and the maximum score 20 points. To assess the knowledge of the methods of protection against sunlight, scores of 5-1 were considered poor, 10-6 average, 15-11 good and 20-16 was considered as excellent scores.

Questionnaires were distributed among the students in collaboration with the classroom teacher. After completing the forms, the information was collected and evaluated by statistical analysis software SPSS version 18. P values less than 0.05 were considered significant. For evaluating the questionnaire validity, three dermatologists were asked to judge the questionnaire. For evaluating Reliability, retesting with a correlation coefficient 7/0: R was used and was approved.

Ethical considerations: The study was performed without any intervention .Getting information was done after obtaining written consent from participants. Participants did not pay any fee.

## Results:

This study was a cross sectional study to assess the knowledge of the students about the methods of protection against the solar radiations. The study population was of middle and high school students in the city of Sari in 1391 including 2000 persons. The number of samples was calculated based on the population abundance in every educational region and quota for each region was determined. Then the

sample population was divided by the educational regions. According to the numbers of nonprofit and public schools, the number of students in each sex and each school was determined. By using random numbers, one class was selected from various levels and this selection was repeated in different schools. The mean age of the study was 15.0725 with a minimum age of 12 years and maximum age of 17 years.

The study population consisted of 1273 patients (63.65%) were male and 727 patients (36.35%) were female. Divisions of the samples in terms of education level showed that 834 of the boys (65.51%) were studying in the high school and 439 students (34.48%) were studying in the middle school. On the other hand, 418 girls (57.49%) were studying in the high school and 309 students (42.50%) were educated in middle schools. Classification of patients according to age shows that the boys in middle schools 99 patients (77.7%) had 12 years, 162 (12.72%) 13 years, 178 cases (13.98%) 14 years old and in the high school 184 students (14.45%) 15 years, 387 cases (30.40%) and the 263 (20.65%) had 17 years had. In the group of girls in middle school 66 students (9.07%) had 12 years, 87 patients (11.96%) 13 years, 156 cases (21.45%) 14 years and in the high school 38 students (5.22%) had 15 years, 211 students (29.2%), 16 and finally 169 cases (23.24%) had 17 years old. By investigating the students based on their hair colors, 1015 boys (79.73%) had black hair, 242 boys (19.1%) had dark brown hair and 16 other boys (1.25%) had light brown hair color. Among girls, 486 girls (66.85%) had black hair, 207 girls (28.47%) had dark brown hair, 26 girls (3.57%) had light brown hair, 8 other girls (10.1%) had blonde hair color. By investigating them on the basis of skin color, 592 boys (46.50%) had white color, 653 boys (51.29%) had a light brown color and 28 other boys (2.19%) had dark brown color skin. Among girls, 483 girls (66.43%) had white color, 235 girls (32.32%) had a light brown color and 9 other girls (23.1%) had a dark brown color skin.

With the data obtained from the questionnaires, these results were obtained:

Among the studied samples, 1,647 of them had a history of sunburn, 463 girls (63.68%) and 1184 of the boys (93%). 8 females (1.1%) had a history of tanning while none of the boys had such a history. Skin aging and skin cancer was not detected in any of them. Darkening of the skin was observed in 36 girls (4.95%) and 124 boys (9.74%). On the other hand, 19 girls (2.61%) and 43 boys (3.37%) had a history of allergies.

These data were also gathered about the ways by which these students obtained their information:

Among the girls, 57 students (7.8%) noted that journals were their main source of information about the harmful effects of UV rays and effective methods of prevention, 183 students (25.17%) mentioned to television as their source of information about the harmful effects of UV ray and the methods of prevention. Other girls (n = 487) (66.98%) considered all items (doctors, schools, magazines, radio, television) as part of their information resources.

As we know, there are different ways to protect our skin from solar radiations. The most important ones include: Protecting the eyes by proper sunglasses that blocks UV rays and protecting the skin by sun-blocks (three times a day: early in the day, mid-day and afternoon). Through assessing the questionnaires, useful information was obtained about the usage of these methods by the students. Among the girls, 256 students (35.21%) were using sunglasses while among the boys, 122 students (9.58%) were using sunglasses. Among the girls, 278 students (38.32%) were using sun-block gels, while among the boys 122 students (14.61%) were using these sun-blocks. SPF stands for (Sun Protection Factor). This number represents the strength of these products for protection against sunlight and also it is used as a comparison factor between different products. As much as the number is bigger, the products are more efficient and provide greater protection.

By examining the SPF factors in sunblocks used by a group of the subjects, the following information was obtained:

Among the 278 girls who used sunblocks, knowledge of 30 cases (10.79%) was about the sunblocks which had a SPF factor less than 30. While 248 (89.20%) girls, had a knowledge about the sunblocks with a SPF factor more than 30. On the other hand, Among the 176 boys who used sunblocks, knowledge of 34 cases (18.27%) was about the sunblocks which had a SPF factor less than 30. While 152 (81.72%) boys, had knowledge about the sunblocks with a SPF factor more than 30. To assess the knowledge of students about the methods of protection against sunlight, the scores of 5-1 poor, 10-6 medium, 15-11 good and 20-16 was considered excellent and following results were obtained:

Among the boys, 42 students (29.3%) had poor knowledge about the methods of protection against the sunlight, 742 boys (58.28%) had medium level of knowledge, 471 students (36.99%) had a good knowledge and 18 boys (1.41%) had an excellent level of knowledge. On the other hand, among the girls, 16 students (20.2%) had poor knowledge about the methods of protection against the sunlight. 236 of them (32.46%) had medium level of knowledge, 411

students (56.53%) had a good knowledge and 64 (8.80%) had an excellent level of knowledge.

Among the male students of middle schools, 27 students (6.15%) had poor knowledge about the methods of protection against the sunlight, 355 boys (80.86%) had medium level of knowledge, 50 students (12.3%) had a good knowledge and 3 boys (0.68%) had an excellent level of knowledge.

Among the male students of high schools, 15 students (1.79%) had poor knowledge about the methods of protection against the sunlight, 387 boys (46.40%) had medium level of knowledge, 417 students (50%) had a good knowledge and 15 boys (1.79%) had an excellent level of knowledge.

On the other hand, among the female students of middle schools, 15 students (4.85%) had poor knowledge about the methods of protection against the sunlight, 182 boys (58.89%) had medium level of knowledge, 106 students (34.30%) had a good knowledge and 6 students (1.94%) had an excellent level of knowledge.

Among the female students of high schools, 1 student (0.23%) had poor knowledge about the methods of protection against the sunlight, 54 students (12.91%) had medium level of knowledge, 305 students (72.96%) had a good knowledge and 58 students (13.87%) had an excellent level of knowledge.

### Discussion:

In a study conducted by Ermer tekan et al in 2005 on 1018 (403 males and 615 females) students and staff of Selal Bayar University of Turkey due to an increased incidence of pre-neoplastic neoplastic melanoma and non-melanoma disorders of skin, and without determination of prevalence of usage of sunblock products and other methods of protection against sunlight, they were investigated by a questionnaire including 45 items about sun protection methods, such as lack of exposure to sunlight during the hours of maximum radiation, the amount of SPF in sunblock products, usage of proper clothing or sunglasses etc. Using +15 SPF sunblocks was the second method used by males (19/14%) and the third used by women (2/39%). The findings of this study showed that the risk of exposure to the sun in the study area is extensively unknown and the obtained information in these areas is not enough and we require a better education condition for effective use of methods of sunlight protection and prevention of skin cancer risk. The findings of this study showed that the risk of exposure to the sun in the study area is largely unknown. Information obtained in these areas is not enough, while in our study the first method of protection of the skin used by the boys the was sunblocks (14.61%) and the second method was sunglasses (9.58%). On the other hand, the first

method of protection of the skin used by the girls was sunblocks (38.32%) and the second method was sunglasses (35.21%). By assessing and comparing of usage of skin protection methods among the boys and the girls in our study, we can suggest that usage of both two methods is respectively higher among the girls.

In a study conducted by M. Maleki et al (12) in 2010 in order to verify sun protection factor (SPF) for some sunblock products, which was done as an interventional trial in dermatology clinic of Imam Reza hospital between the years 1385-86, among healthy participants with skin types 1 to 3, at first 25 persons were included in the study for two sunblock X and Y. The tests and the evaluations were done during 3 days by phototherapy device 800K UV with lamps of UVB, UV-skin test, UV-meter made in Walmann company of Germany. At first, the least dose of erythrogenicity with the sunscreen cover, was obtained by the formula of

$SPF = MED_p / MED_{up}$ . The participants were under this dose ( $MED_p$ ) and also 85% of this dose and then, 24 hours later, these two areas of skin were examined in terms of skin erythema. If at least in 90% of volunteers, evaluating the accuracy of the SPF showed standard results, the overall result of the test for that sunblock was considered "correct". Verifying the accuracy of the test was performed according to the standard protocols SPF test. All participants were male and their average age was  $51/8 + 5/33$ . Average MED was  $73/0 \pm 15/6$  /  $cm^2$ . The final results of both products were reported as "correct". The result of standard lotion in all the participants was "correct". They concluded that regarding the results of their study, we can assure the public and the physicians about the reliability of SPF written on at least some of Iranian products.

In the year 2012, Benerd (13) conducted a study entitled the impact of adequate protection against UVA and UVB rays and argued that skin damages, including sunburn, pigmentation and aging of the skin are caused by repeated exposure to the sunlight. For selecting an appropriate sunblock for protection against sun exposure, at first it is necessary to recognize the biological phenomena that occur after UV irradiation. In that study, the models reconstructed from human skin, including keratinocytes, fibroblasts and melanocytes, were studied. This study showed that UV rays cause burning of skin cells, damage to DNA, pigmentation and early aging of the skin, while the reconstructed of skin covered with sunblocks against UV radiation were not damaged. This study properly shows the effect of appropriate sunblocks.

In 2012, a study was conducted by Katalinic A (2) in Germany entitled "Does skin cancer screening is



effective in prolonging the life?" 360 persons aged over 20 years were studied in the center of Schleswig Holstein, and mortality rates caused by melanoma and were compared with other centers which did not apply melanoma screening. At the beginning of the study in Schleswig Holstein, melanoma mortality rates was 109 per 100,000 in men and 104 per 100,000 and 104 in women which was similar to that of other centers. But at the end of the study, after screening at the center, the mortality rate with 47% reduction was 1 per 100,000 men and 0.7 per 100,000 women while in other centers in which the screening had not been done, the mortality rate was equal to the beginning. The results show that detection and prevention of skin cancer in all people, especially those over 20 years should be done.

In the year 2012, Moyal D, in a study entitled need for a good sunblock to protect the skin against UV rays, stated that the exposure to the sunlight can have many harmful effects. Both UVA and UVB radiation can have harmful effects on the skin. Therefore, those sunblocks should be used which can protect the skin against both rays. Based on this study, a sunblock with an SPF / UVAPF ratio  $<3$  has the highest level of protection against pigmentation and damage to DNA. The level of knowledge about choosing a good sunblock to protect the skin is effective in preventing skin cancer.

Based on the results of our study and other researchers, preventing the harmful effects of the sunlight by methods such as sunblocks and sunglasses are useful ways to prevent skin damage. But even though most people are aware of the harmful effects of the sunlight, they don't use appropriate methods and tools to prevent such effects. Hence, usage of appropriate advertising and other communication tools to convey information to the public is advised.

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