

Knowledge, attitudes, and behaviors of high school adolescents regarding sun protection, effects of the sun, and skin cancer

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Received date: 15 March 2022; **Accepted date:** 04 April 2022; **Published date:** 13 April 2022

Citation: Cano E, Zekja I, M Fida, Abazaj E, Villani A (2022) Knowledge, attitudes, and behaviors of high school adolescents regarding sun protection, effects of the sun, and skin cancer. J Comm Med and Pub Health Rep 3(02): <https://doi.org/10.38207/JCMPHR/2022/FEB03020529>

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Abstract

Background: Sun exposure during adolescence may lead to serious health problems, especially when adolescents are exposing themselves to the harmful effects of the sun for longer times. For that reason, we conducted this study with the aim to determine the attitudes, knowledge, behaviors, and effect of sun's exposure among adolescents in four districts in Albania.

Methods: This is a cross-sectional survey in which adolescents from different high schools (public/private) in four districts of Albania are selected. The districts were Tirana, Durrës, Berat-Skrapar and Sarandë. We recruited adolescents of age 14 to 20 years irrespective of their gender. A standardized questionnaire regarding recent and previous sunburn history, knowledge about, attitudes towards and use of sunscreen, and protective measures, as well as socio-demographic factors, was answered by each participant. Data were analyzed using SPSS (version 20.0). Pearson's Chi-square tests were used for categorical variables and a multivariate regression analysis was conducted to assess predictors of sun protection knowledge, attitude, behaviors, and sociodemographic factors. *P-values* less than 0.05 were taken as significant

Results: In this study, we enrolled 600 adolescents from four districts with 150 participants from each district. The mean age was 17.26 ±0.69 years, with a minimum age of 14 years and a maximum of 20 years 48 % were female and 52 % were male. Females presented predominance. Berat/Skrapar and Durrës district, males in Sarandë and Tirana district. Male adolescents presented with more improper sun-protecting behaviors versus females concerning the use of sunscreen (*P* < 0.001). Almost 38.5 % of adolescents knew what melanoma is but 57 % believed that sunlight is harmful to the skin only when they have a sunburn in summer. We found significant differences regarding knowledge, attitude, and protective measures between male and female adolescents. In all these questions the *p-value was* < 0.05.

Conclusion: In this study, adolescents presented some knowledge regarding sun effect and especially for sun protection behavior, while attitudes and general knowledge about sun protection were significantly different among male and female adolescents. But this was a self-reported study so we could not verifier the reason for these differences. We did not record the frequency of sunscreen use per day by the adolescents so we recommend that this may be explored in future studies.

Keywords: adolescents, sun protection measures, knowledge, and attitude, skin cancer

Introduction

The incidence of skin cancer has increased dramatically in Europe and worldwide over the past decades [1-4]. Skin cancer greatly affects the quality of life of more people, and it can be disfiguring or even deadly [5,6]. Skin cancer and malignant melanoma are among the most severe health effects, but a series of other health effects have been identified [7].

The most common environmental cause of the vast majority of skin disorders and skin cancer is ultraviolet radiation (UVR). Epidemiological studies have disclosed a strong association between solar UVR and all major types of skin cancer [8], but on the other hand, many factors such as advanced age, skin types, and male gender have been associated with an increased risk of developing

skin cancer [9]. Melanoma is the most serious form of skin cancer and is now one of the most common cancers among adolescents and young adults ages 15-29. While melanoma accounts for about three percent of skin cancer cases, it causes more than 75 percent of skin cancer deaths [10].

Extended sun exposure may lead to serious health problems [11] especially for adolescents Also, ta a lot of epidemiological literature reports that sun exposure and especially sunburns from the UVR during an early age [12-16]. More adolescents do have no good knowledge about carcinogens, and factors that influence their development and consequences making them an ideal study population when we can determine their knowledge of individual

sun exposure habits and photoprotection behavior or impact on the frequency of sunburn [17].

In Albania, there are data about the knowledge and attitudes related to sun exposure habits and sun protection behaviors in the population and particularly in adolescents as the most risk group. Center for Disease Control and Prevention mention in their report in 2019 that skin cancer prevention policies in schools are an important setting for addressing skin cancer prevention among youth.

Methods

Subject

During the period January to December 2019, a standardized questionnaire regarding knowledge, attitude, and behaviors on skin protection from sun exposure, among adolescents was distributed in four different districts in Albania. Albania is a southeastern Europe country, situated in the western part of the Balkan. Albania has mountainous geography and about three-fourths of its territory consists of mountains and hills; the remainder consists of coastal and alluvial lowlands. This country is bounded by the Adriatic and Ionian seas to the west and southwest, respectively. The climate of Albania like other Mediterranean countries, has characteristically warm, dry summers and mild, wet winters. Local climatic variation can occur, however, from one region to another. The western part of the country, which is under the influence of warm maritime air from the Adriatic and Ionian seas, has more-moderate temperatures than the rest of Albania. We have focused to involve a considerate number of adolescents that live in Tirana, Durrës, Berat (also in Skrapar), and Saranda. In total, we have interviewed 600 adolescents separately equal to four districts. The participants of this study were selected randomly.

Tirana: Tirana is the capital city, and largest city of Albania and is located in the center of the country. Due to its location at the Plain of Tirana and the close proximity to the Mediterranean Sea, the city is particularly influenced by a Mediterranean seasonal climate. It is among the wettest and sunniest cities in Europe, with 2,544 hours of sun per year. Tirana has a humid subtropical climate. Temperatures vary throughout the year from an average of 6.7°C in January to 24°C in July. Spring is very warm to hot often reaching over 20°C. During autumn and winter, from November to March, the average temperature drops and is not lower than 6.7°C but during the months of June to September, the temperature ranges from 35-43°C. **Durrës:** Durrës is the second most populous city in Albania. It is located on a flat plain along the Adriatic Sea Coast. Durrës climate is profoundly influenced by a seasonal Mediterranean climate. The summers are predominantly hot and dry, the winters relatively mild,

Data Analysis

Data were analyzed using SPSS (version 20.0) tool. The participants were divided into four groups (based two the respective districts) for comparison. Descriptive statistics were used to show the distribution

Adolescents and students are typically at school during midday hours when UV radiation from the sun is strongest. Recess and other outdoor activities during the midday can put students at risk if they are not protected [18]. For that reason, we conduct this study with the aim to determine the attitudes, knowledge, behaviors, and effect of sun exposure as a cause of skin cancer among adolescents in four districts in Albania.

and falls and springs mainly stable, in terms of precipitation and temperatures. The mean monthly temperature ranges between 7.5°C in winter to 23.8 °C in summer. The highest temperature arrived until to 39°C.

Berat-Skrapar: Berat is the ninth most populous city of the Republic of Albania. This city is located in the south of the country and is surrounded by mountains and hills. Berat has a Mediterranean climate, and the summers are characterized as hot and dry with a maximum average of 28.2°C but during the months of June until September the temperature range from 42-44°C. The municipality of Skrapar is part of the Berat district. It is located in the north-eastern part of the southern region of the country and occupies 43% of the surface of the whole district of Berat. This municipality has a position at an average 788m altitude above sea level and its relief is quite varied throughout the district. The highest temperature arrived until to 33°C.

Saranda: Saranda is a city in the Republic of Albania and the seat of Sarandë Municipality. Geographically, the city is located on an open sea gulf of the Ionian Sea within the Mediterranean Sea. Stretching along the Albanian Ionian Sea Coast, Saranda typically has a Mediterranean climate with over 300 sunny days a year. Sarandë is known for its blue deep waters of the Mediterranean. The highest temperature arrived until to 35°C.

The standardized questionnaire has five sections. The first section gave data regarding demographic information. It included questions on gender, age, education level and employment status of parents, high school level of students interviewed, city/district, and living areas. The second part includes questions on skin type, eye color, and the presence of moles in their body. The third and the fourth part of the questionnaire is about the knowledge of adolescents that were included in our study regarding the effects of the sun on the skin and knowledge of skin cancer. We asked in the fifth part of a questionnaire about recent and previous sunburn history, the use and efficiency of sunscreen, and protective measures (like hat, protective clothes, glasses, etc) used during sunbathing.

of the outcome and independent variables. The groups of the participants were compared using Pearson's Chi-square tests for categorical variables and analysis of variance (ANOVA) for continuous variables. General linear model multivariate regression

analysis was conducted to assess predictors of sun protection knowledge, attitude, behaviors, and sociodemographic factors. *P*-

values less than 0.05 were considered significant.



Figure 1: Maps of four districts in Albania
a) Tirana; b) Durrës; c) Berat-Skrapar; d) Sarandë

Results

In this study, female and male interviews presented a difference in percentage, 48 % (288 participants) were female and 52 % (312 participants) were male (**figure 1**). Females presented a predominance versus males for the district of Berat/Skrapar and for the Durrës district. For Berat/Skrapar district 65.3 % (98/150) of adolescents were female and 34.7 % (52/150) were male, and for Durrës district 71.3 % (107/150) were female and 28.7 % (43/150)

were male. On the other hand, we have another situation regarding the gender of the Saranda and Tirana districts. In Saranda district female adolescents resulted in 39.3 % (59/150) and males 60.7 % (91/150) and in Tirana district, we have the lowest number of females 16 % (24/150) and the highest number of male adolescents 84 % (126/150). Based on analyses of data, Chi-square 23.2 *p*-value resulted in 0,001.

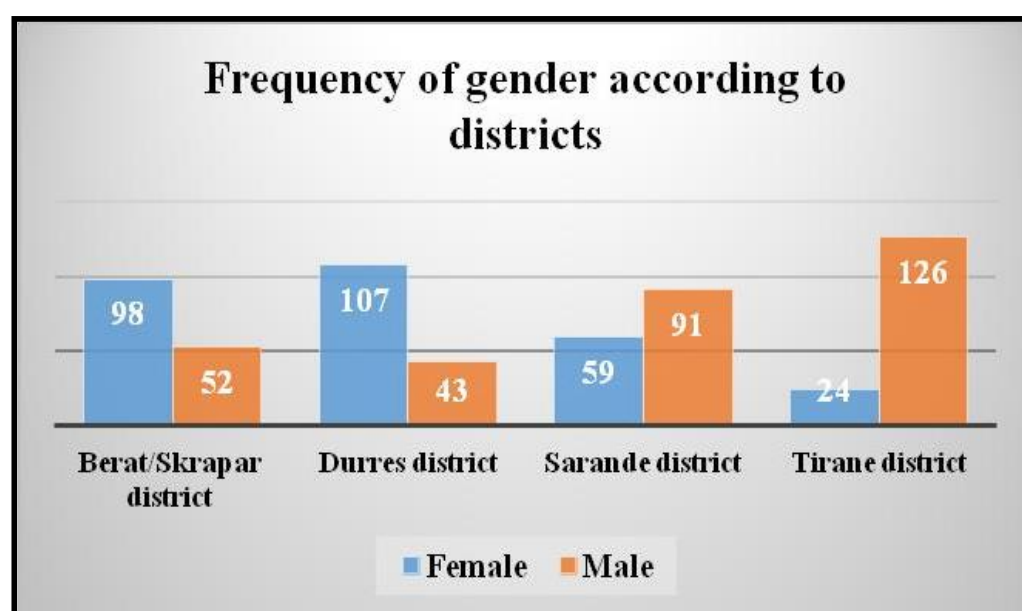


Figure 1: Frequency distribution of gender according to districts

Table 1 presents the socio-demographic characteristics among our adolescents. For comparison, all 600 participants are divided into four groups (based on the respective district). Each district has the same number of adolescents (150 participants). The mean age for adolescents resulted in 17.26 ± 0.69 Std, with a minimum age of 14 years and a maximum of 20 years old. Related to the age, we have used two age groups of our adolescents, in the first we have included all adolescents from 14 to 16 years old, and the second group is included adolescents from 17 to 20 years old. Participants of the age

groups 17-20 years old presented the higher number 67.2 % (403/600) compared to age groups 14-16 years old 32.8 % (196/600). A strong significant association was found for the age based on different district analyses of 0,0001. Regarding residence, only 28.2 % of adolescents referred that living in a rural area and 71.8 % referred that living in urban areas. Adolescents from the Berat-Skrapar district presented the highest number according to their residence in rural areas compared to other districts. 0,001.

Table 1: Socio-demographic characteristics of participant' adolescents

Variables	Total number	Berat-Skrapar` adolescents	Durrës` adolescents	Saranda` adolescents	Tirana` adolescents	P value
Gender	600	150	150	150	150	0,001
Female	288	98	107	59	24	
Male	312	52	43	91	126	
Age	mean	16.71±0.82	17.01±0.95	16.42±0.79	17.18±1.19	0,0001
14-16 years old	197	69	48	56	24	
17-19 years old	403	81	102	94	126	
Living area						
Rural area	169	58	23	21	19	0,001
Urban area	431	92	127	129	131	
Grade of the class						0,051
Ten (10 class)	100	37	20	23	20	
Eleven (11 class)	220	80	85	34	21	
Twelve (12 class)	241	26	45	93	77	
Thirteen (13 class)	32	0	0	0	32	
Education level (Father)						0,03
≤ 12 years of study	341	99	89	78	74	
> 12 years of study	259	51	61	72	76	
Employment of (Father)						0,069
Yes	451	130	94	121	106	
NO	149	20	56	29	44	
Education level (Mother)						0,57
≤ 12 years of study	401	135	72	112	82	
> 12 years of study	199	15	78	38	68	
Employment of (Mother)						0,89
Yes	138	15	48	16	59	
No	462	135	102	134	91	

In section two we have included questions about skin type, hair and eyes color, presence of the mole in their body, and family history of skin cancer. As seen in table 2 we have presented the information data regarding the type of skin among our participants. 11.2 % (67/600) have light skin, 71 % (426/600) have fair skin, 12.5 % have brown skin and 5.3 % have dark brown skin. Related to the question; Do you have sunburn during childhood? About 32.2 % of adolescents referred that have not sunburn during their childhood and 67.8 % have at least 1 more burn during childhood. Adolescents from Berat-Skrapar and Tirana districts presented the highest

number of cases without sunburn during childhood 36.6 % (55/150) and 50 % (75/150) respectively. For the question, “Does your skin burn when you go to the beach for sunbathing?”. We have classified them based on the type of skin. So, type 1 resulted in 8.3% of participants, type 2 resulted in 47 %, type 3 resulted in 27.5 %, and type 4 resulted in 9 % of participants. Also, 8.8 % of participants have not specified if their skin burn when they went to the beach for sunbathing. For the presence of a mole in their body, only a few of them referred that haven't any mole (11.7 %) in their bodies, and the others have at least one mole in their body (88.3 %).

Table 2: Information data regarding type of skin and presence of mole

Type of skin	Berat-Skrapar` adolescents	Durrës` adolescents	Saranda` adolescents	Tirana` adolescents
What color is your skin				
Light	25	19	11	12
Fair	88	112	117	109
Brown	37	10	20	8
Dark brown	0	9	2	21
Do you have sunburn during the childhood				
No	55	37	26	75
1 time	19	30	34	12
2 times	39	19	24	8
More than 2 times	37	64	62	55
*Does your skin burn when you go to the beach for sunbathing?				
Type I	14	20	4	12
Type II	60	76	95	51
Type III	49	27	30	58
Type IV	14	15	6	19
Not specified	13	15	15	10
Do you have mole in your body?				
No	16	15	22	17
Yes	134	135	128	133
Did you have controlled your mole?				
Yes	0	10	2	11
No	150	140	148	139

***Tipi 1:** Always get sunburn without getting suntans; **Tipi 2:** Firstly, get a sunburn before having tan; **Tipi 3:** Tan, but sometimes sunburn; **Tipi 4:** Get suntans without sunburn. Not specified.

In the other table (3) we describe sun exposure as a risk factor problem causing skin cancer. We also describe the opinions of adolescents regarding the relationship between exposure to ultraviolet (UV) radiation and health for four districts. So, related to the information collected in this study, most adolescents had knowledge about sun exposure, skin cancer, and its impact on

health. Also, the knowledge about sunscreen provides protection from UV rays was good. Regarding melanoma information, only 38.5 % of adolescents have knowledge. Also, regarding questions about a family history of skin cancer, no more than 1.5 % (9/600) of adolescents referred that have.

Table 3: Knowledge level of adolescents regarding sun effect in health

Questions	Total number	Berat-Skrapar	Durrës	Saranda	Tirana
Sun exposure causes skin cancer					
Yes	451	105	113	125	108
No	139	45	37	25	32
The sunlight is more harmful to dark skin than to light skin					
Yes	112	37	19	22	34
No	488	113	131	128	116
The sunlight is harmful to your skin only when you have sunburn in summer					
Yes	342	96	87	78	81

No	258	54	63	72	69
Suntan is a sign of being healthy					
Yes	296	93	68	69	66
No	304	57	82	81	84
Sunlight is stronger and harmful from 11:00 to 16:00					
Yes	532	132	130	140	130
No	68	18	20	10	20
Sunscreens provide protection from UV rays					
Yes	495	143	122	128	102
No	105	7	28	22	48
Sunscreens with a factor 15 or less cannot protect you					
Yes	337	100	54	101	82
No	263	50	96	49	68
One application of sunscreen protects you for at least 4 hours					
Yes	401	103	83	104	111
No	199	47	67	46	39
Do you know what melanoma is?					
Yes	231	82	49	58	42
No	369	68	101	92	108
Where did you get the information about melanoma?					
TV and radio	52	15	9	17	11
newspapers and magazines	30	9	5	9	7
Internet	83	29	14	21	19
Doctors	16	5	8	1	2
School	16	7	3	5	1
Others	34	17	10	5	2
Family history of skin cancer					
Yes	9	4	2	1	2
No	591	146	148	149	148

In accordance with the knowledge level, attitudes, and behaviors we have continued with additional questions among participants of this study. Most adolescents 69.5 % (417/600) think that nothing can prevent skin cancer. Almost half of the adolescents 52.3 % (314/600) think that melanoma is the most dangerous skin cancer type that can cause death. Related to the question; Frequent sunburns in childhood increase the risk of skin cancer in older age most adolescents are answered Yes 56.3 % (338/600). For the question, The number of moles in an individual is related to the risk

of developing melanoma, 46.8 % know that and 53.2 % do not. According to other questions, the adolescents are answered Yes in 49 % of participants for the question My skin will age faster if I stay longer in the sun; 64.8 % for the question I am aware that sun / UV exposure can cause skin cancer; 51 % for question A suntan makes me look more beautiful; 50.3% for question A suntan makes me feel healthier and 38.2 % for question Solariums are a safe way to get skin tan.

Table 4: Knowledge level, attitudes and behaviors additional questions of adolescents regarding sun effect in health

Questions on attitude	Berat-Skrapar	Durrës	Saranda	Tirana
There is nothing that can prevent skin cancer				
Yes	56	47	41	39
No	94	103	109	111
Melanoma is the most dangerous type of skin cancer that can cause death				
Yes	87	60	97	70

No	63	90	53	80
Frequent sunburns in childhood increase the risk of skin cancer in older age?				
Yes	102	81	77	78
No	48	69	73	72
The number of moles in an individual is related to the risk of developing melanoma				
Yes	69	62	66	84
No	81	88	84	66
My skin will age faster if I stay longer in the sun				
Yes	73	52	88	81
No	77	98	62	69
I am aware that sun / UV exposure can cause skin cancer				
Yes	88	111	99	91
No	62	39	41	59
A suntan makes me look more beautiful				
Yes	79	100	45	82
No	71	50	105	68
A suntan makes me feel healthier				
Yes	90	82	59	71
No	60	68	91	79
Solariums are a safe way to get skin tan				
Yes	68	58	49	54
No	82	92	101	96

Tables 5 and 6 are part of five sections and describe the current evidence data on preventing skin cancer. This part of questionnaire describes the skin cancer prevention and highlights ting areas of research where more work is needed. The protection measures those adolescents use to protect their self from the sun and skin cancer are presented below.

Adolescents from the Berat-Skrapar district 63.3 % (95/150) wear sunglasses as protective measures from the sun, 80.6 % (121/150)

stay inside, etc. In adolescents of Durrës district 79.3 % (119/150) wear sunglasses as protective measures from the sun, 58 % (87/150) stay inside, etc. In adolescents of Saranda district, 88 % (132/150) wear sunglasses as protective measures from the sun, 45.3 % (68/150) stay inside, etc. In adolescents of Tirana district, 78.7 % (118/150) wear sunglasses as protective measures from the sun, 36 % (54/150) stay inside, etc.

Table 5: Strategies and protected measures regarding exposed to the sun amongst adolescents

Strategies	Berat-Skrapar` adolescents	Durrës` adolescents	Saranda` adolescents	Tirana` adolescents
Wear sunglasses	95	119	132	118
Stay inside	121	87	68	54
Stay under shade/ Stay mainly in the shade	100	91	95	96
Cover up with clothes/ Wear clothing covering most of your body	97	85	79	67
Keep out of the sun between 11 a.m. and 3 p.m	126	95	84	74
Wear a hat outside	118	92	73	108

Related to sunscreen application attitude and practices among adolescents, most adolescents 28.3 % use sunscreen with a protective factor always, and almost always 21.2 % of them. Regarding the reapply of sunscreen, 8.5 % never reapply the

sunscreen, 25.5 % reapply every 4 hours, 30.7 % reapply every 2 hours and 35.3 % reapply every hour. For the question Do you frequent UV lamps, sunbeds (solarium), 7.3 % frequent the UV lamps or sunbeds 3-4 times a year, 5.5 % frequent 1-2 times a month

1 % frequent 1 time per week. According to the time that adolescents had stayed on the beach during last holidays, 43.8 % had referred that stayed less than 15 days. Regarding the sunbathing attitude, 23.3 % did not use sunbathing because they think that is dangerous 23.7 % referred that while they are at the beach they stay in the shade or swim 26.2 % like sunbathing sometimes, and 26.8 % really like sunbathing and tanning all the time. We ask all adolescents what they think about skin tanning, 32.5 % think that the tanning makes them look better/prettiest, 29.2 % think that their

body skin looks healthier when they tan, and 27.8 % think that most of their friends want to be suntanned. Regarding the attitude towards sun protection 31.8 % declared that they were ashamed of applying sunscreen in front of their friends, 39.2 % declared that if they are wearing a blouse on the beach does not make them look good, and 29 % declared that their parents did not protect themselves from the sun, so they do not think that is necessary to protect their self from the sun.

Table 6. Attitude and practices regarding sunscreen application among adolescents

Attitudes and Practices	Total number	Berat-Skrapar` adolescents	Durrës` adolescents	Saranda` adolescents	Tirana` adolescents
How often do you use sunscreens with protective factor?					
Always	170	44	47	47	32
Almost always	127	28	35	35	29
Sometimes	77	25	8	8	36
Rarely	97	19	31	31	16
Never	124	29	29	29	37
Do you use sunscreen or sun oil with spf?					
I do not use	234	74	63	63	34
Only during the summer at the beach time	277	69	59	53	96
Continuously in daily life	89	7	28	34	20
Do you reapply sunscreen					
Never	51	23	6	6	16
Every 4 hours	153	39	22	76	16
Every 2 hours	184	48	46	22	68
Every hour	212	40	76	46	50
Do you frequent UV lamps, sunbeds (solarium)?					
3- 4 times a year	44	10	16	11	7
1-2 times a month	33	4	11	16	2
1 time per week	6	0	1	2	3
Never	516	136	122	120	138
How long do your beach holidays last?					
Less than 15 days	263	76	71	56	60
15-30 days	206	34	52	71	49
more than 30 days	131	40	27	23	41
What is attitude about sunbathing?					
I do not sunbathe because they are dangerous	140	10	40	60	30
While I am at the beach I stay in the shade or swim	142	48	60	28	6
I like sunbathing sometimes	157	42	28	22	65
I really like sunbathing and tanning	161	50	22	40	49
What do you think about skin tanning					
I think the tanning makes me look better/ prettiest	195	72	48	64	11
The bodyskin looks healthier when I tan	175	33	64	38	40
Most of my friends want to be suntanned	167	45	38	48	36
Attitude towards sun protection					
I am ashamed to apply sunscreen in front of my friends	191	42	36	93	20

Wearing a blouse on the beach does not make you look good.	235	39	93	28	75
My parents do not protect themselves from the sun, so I do not think it is necessary to protect myself from the sun.	174	69	21	29	55

In a multivariate regression analysis, we have evaluated the association between adolescent self-report knowledge, behavior, and attitudes towards sun protection. In table 7 we have presented all the questions that show a strong significant association.

Table 7: Association between adolescent knowledge, behavior, attitude and sun protection

Questions	p value
Do you use sunscreen or sun oil with spf?	p=0.02
Do you reapply sunscreen	p < 0.0001
There is nothing that can prevent skin cancer	p < 0.0001
Do you know what melanoma is?	p = 0.04
Sunscreens with a factor 15 or less cannot protect you	p = 0.035
One application of sunscreen protects you for at least 4 hours	P = 0.007
How long do your beach holidays last?	p < 0.0001
What is attitude about sunbathing?	p = 0.0096
What do you think about skin tanning	p < 0.0001
Melanoma is the most dangerous type of skin cancer that can cause death	p = 0.049
Where did you get the information about melanoma?	p < 0.0001
Family history of skin cancer	p = 0.017
Frequent sunburns in childhood increase the risk of skin cancer in older age?	p = 0.018
I am aware that sun / UV exposure can cause skin cancer	p = 0.0027
Does your skin burn when you go to the beach for sunbathing?	p = 0.0007
The sunlight is more harmful to dark skin than to light skin	p < 0.0001
The sunlight is harmful to your skin only when you have sunburn in summer	p = 0.0032
How often do you use sunscreens with protective factor?	p < 0.0001
A suntan makes me feel healthier	p = 0.0007
Did you have controlled your mole?	p < 0.0001
Sunlight is stronger and harmful from 11:00 to 16:00	p = 0.027
Sunscreen provide protection from UV rays	p = 0.016
Solariums are a safe way to get skin tan	p < 0.0001
Do you reapply sunscreen	p < 0.0001

Discussion

Human exposure to solar ultraviolet radiation has important public health implications. Evidence of harm associated with overexposure to UV has been demonstrated in many studies [11,12,19]. Skin cancer and malignant melanoma are among the most commonly diagnosed cancer in the United States and affects the quality of life, and they can be disfiguring or even deadly most cases are preventable [3,6,7,20]. Unprotected UVR exposure has been reported as the single most important environmental risk factor. This study was carried out to evaluate the high school adolescent's knowledge, attitude, behaviors, and sun protection measures regarding the sun protection. This cross-sectional study in four districts shows a relative level of knowledge among our adolescents regarding the harmful of UV and the problems that cause in the skin. We selected four different districts based on some characteristics.

Tirana is the capital city of Albania and almost 1 million people live here. Tirana capital city of Albania is among the wettest and sunniest cities in Europe, with 2,544 hours of sun per year. Durrës is the second city regarding the socioeconomic level and several populations. Also, this city is located on a flat plain along the [Adriatic Sea Coast](#). Saranda is located on the [Ionian Sea](#) coast and has a typically [Mediterranean climate](#) with over 300 sunny days a year. Berat and Skrapar districts are located in the south of the country and are surrounded by mountains and hills. We have recruited an equal number of adolescents (150) for each district selected for this study. Based on the analyses of the self-reported questionnaires, males presented a predominance compared to females 52 % and 48 % respectively. On the other hand, females presented a good knowledge and attitude about protection from the sun versus males. We find a strong significance between them

$p=0.001$. This finding is similar to another study carried out by Janjani et al, which showed a significant correlation between sex and the students' knowledge and protection behavior [21]. Owen et al, found that the level of knowledge in males in the age group 16-25 was lower than in other age groups [22] but, Terzi et al, found a good level of knowledge in patients in the 16-24 and 25-44 age groups and those pieces of knowledge were statistically significantly higher than in the 45-64 age group and those older than 65 years. Their finding was explained by the fact that patients in the 16-24 age group who took part in our study had a higher level of education [23]. In our study, adolescents 17-20 years old presented a higher number of participants (67.2 %) compared to the age groups 14-16 years old (32.8 %). Also, in this age, we investigate good knowledge, attitudes, and behaviors related to protection from the sun. Related to the district analyses we find a strong association for the age groups' p -value of 0.0001. Most of the adolescents referred that living in urban areas 71.8 % and the higher number of adolescents were shown for grades school 11-12 without an association p -value of 0.051.

Regarding the type of skin and their personal information, 71 % of adolescents presented fair skin, and 67.8 % have at least 1 more burn during childhood. We found a correlation between the history of previous sunburn during childhood or skin type and knowledge level. We found varying levels of knowledge regarding the melanoma and effects of sunbathing or the number of moles in an individual is related to the risk of developing melanoma. Percentage regarding the knowledge and attitude of our adolescents were high compared to a study carried out on Greek adolescents. The results of this study show that the sun exposure knowledge of the Greek adolescents studied was insufficient and they reported risky behaviors in the summer months [11]. But the finding in our study was less compared to another study conducted by Benvenuto-Andrade et al in Brazil. They have administered a questionnaire to 724 students about ultraviolet radiation effects, opinions about tanning, total time of sun exposure per day, photoprotection, and activities in the sun and about 90 % were aware of the association between sun exposure and skin cancer, and mass media was the main source of information [24]. The knowledge level of the participants regarding sun exposure as a risk factor problem for causing skin cancer. We found that most adolescents had good knowledge about sun exposure as a cause of skin cancer and its impact on health. But we found a contrast regarding the knowledge of melanoma, so, most of them 61.5 % did not know what is. Our adolescents know the effect sun exposure may affect their health, but they do not know what melanoma is.

Kaptanoğlu et al, found in their study that 44.5 % of the participants stated that their sources of information on the ways of sun protection were television, magazines, and newspapers [25]. In our study, most of the adolescents have taken the information about melanoma from

the internet 35.9 % and TV and radio 22.5 %. Only 1.5 % of adolescents have a family history of skin cancer.

Many studies present that people with white complexion show more protective behaviors against sunlight because they are more susceptible to sunlight [21,26]. In contrast to that, some studies suggest that the youth find tanned skin tones more attractive than pale skin. In the US, the incidence of skin tanning was higher among women, younger people, and those with brightly colored skin and it seems tanning is still prevalent despite the well-publicized risks [27,28].

However, in our study, the great majority of adolescents believed that tanning improved their appearance and that it was worth taking the risk. So, 51 % of adolescents think that a suntan makes them look more beautiful; 50.3 % think that suntan makes them feel healthier and 38.2 % think that solariums are a safe way to get skin tan. Avoiding the sun at midday was found as the most frequently used sun protection method in these adolescents. Because avoiding the sun at midday and staying in the shade as their sun avoidance behaviors rather than wearing more covering clothes for protection from the sun, wearing hats, and wearing sunglasses. This can be explained by the fact that physical methods such as wearing hats and sunglasses and using SPPs are more difficult to implement in practice. Similarly finding were found and in some other studies were the sun protection method most widely used by those who cared about protection from the sun was not going out in the sun between 10:00 and 16:00 hours [29,30].

Related to sunscreen application attitude and practices among adolescents, most adolescents use always (28.3 %) and almost always (21.2 %) sunscreen with a protective factor. 39 % of adolescents do not use sunscreen or sun oil with SPF, 46.2 % use sunscreen only during the summer at the beach time and 14.8 % use sunscreen continuously in daily life. In our study, the use of SPPs was found to be significantly higher in those who had parents with a higher level of education, and in those with higher economic levels, those living in cities, and those with a higher level of knowledge of the harmful effects of sunlight and the ways of protection. Some reports about the rate of using SPPs show significant increases in those populations that have higher levels of education and high monthly income, especially women [31,32] Those facts are similar to our findings. According to the reapply of sunscreen, 8.5 % never reapply the sunscreen, 25.5 % reapply every 4 hours, 30.7 % reapply every 2 hours and 35.3 % reapply every hour. Regarding the sunbathing attitude, 23.3 % did not use sunbathing because they think that is dangerous 23.7 % referred that while they are at the beach they stay in the shade or swim 26.2 % like sunbathing sometimes, and 26.8 % like sunbathing and tanning all the time. Regarding the attitude towards sun protection 31.8 % declared that they were ashamed of applying sunscreen in front of their friends,

39.2 % declared that if they are wearing a blouse on the beach does not make them look good, and 29 % declared that their parents did

not protect themselves from the sun, so they do not think that is necessary to protect their self from the sun.

In this study, adolescents referred to good knowledge and attitude regarding the effect of sun exposure on health. But the protective effects of sunscreen, with an overall poor to intermediate understanding among our participants. The participants were aware of the ability of a sunscreen to prevent skin cancer and aging [33- 36]. Furthermore, female students were significantly more aware of the protection offered by sunscreen against sunburn and skin aging and were compelled to utilize sunscreen due to their knowledge more than their male colleagues. A possible explanation for this could be the more image-conscious and appearance-focused nature

Conclusion

In this study, the adolescents presented relative knowledge regarding the sun effect and especially for the sun protection behavior. Meantime the attitudes and general knowledge about sun protection were significantly different among male and female adolescents. These results emphasize the need for the promotion of protective habits in our adolescents and the importance of engaging all responsible government especially staff involved in the school curricula in developing campaigns directed at this issue to achieve

Limitations

Questionnaires in this study are the instruments usually used to investigate health-related behaviors; they can be used in population studies and to assess the impact of interventions that have been implemented in the target population (adolescents). Related to our study, we have evaluated some limitations. Knowledge and attitude regarding sunscreen use were self-reported by the adolescents for a

References

1. Ponce S, Jódar A, Borrego L, Saavedra P (2019) Comportamientos, actitudes y conocimientos relacionados con la exposición solar en estudiantes de medicina de la Universidad de Las Palmas de Gran Canaria. *Actas Dermosifiliogr.* 110(5): 372–384.
2. Sacchetto L, Zanetti R, Comber H, Bouchardy C, Brewster DH, et al. (2018) Trends in incidence of thick, thin and in situ melanoma in Europe. *Eur J Cancer.* 92: 108-118.
3. Lomas A, Leonardi-Bee J, Bath-Hextall F (2012) A systematic review of worldwide incidence of nonmelanoma skin cancer. *Br J Dermatol.* 166 (5): 1069-1080.
4. Trakatelli M, Ulrich C, del Marmol V, Euvrard S, Stockfleth E, et al. (2007) Epidemiology of nonmelanoma skin cancer (NMSC) in Europe: Accurate and comparable data are needed for effective public health monitoring and interventions. *Br J Dermatol.* 156(Suppl 3): 1-7.

of women compared with men [36]. Also, based on a multivariate regression analysis, we have evaluated the association between adolescent self-report knowledge, behavior, and attitudes towards sun protection. Most of our questions show a strong significance. So, we found an association between the use of sunscreen or sun oil with SPF $p=0.02$; reapply of sunscreen $p < 0.0001$; nothing that can prevent skin cancer $p < 0.0001$; One application of sunscreen protects you for at least 4 hours $p = 0.007$; Melanoma is the most dangerous type of skin cancer that can cause death $p = 0.049$, etc. All our finding regarding the association of the questions is given in table 7.

effective long-lasting results. Adolescents are aware of the effects of ultraviolet radiation on the skin, but campaigns have not successfully changed their sun exposure habits. Given the lack of awareness regarding the protective effects of sunscreen against skin cancer and aging, adolescents should be educated with the help of awareness campaigns and initiatives. Adolescents constitute an important audience for protection programs. Furthermore, the sun exposure and sun protection habits acquired during adolescence may have a significant impact on skin cancer incidence in the future.

consequence we could not verify their refer. Almost half of the questionnaires were filled during the hot months of April to September which may not reflect sunscreen use attitudes and practices throughout the year, especially for the district that are not near the beach. Also, we do not arrive at recorded the frequency of sunscreen use per day by the adolescents so we think that this may be explored in future studies.

5. Burdon-Jones D, Thomas P, Baker R (2010) Quality of life issues in nonmetastatic skin cancer. *Br J Dermatol.* 162(1): 147– 151.
6. Pollack LA, Li J, Berkowitz Z, Weir HK, Wu XC, et al. (2011) Melanoma survival in the United States, 1992 to 2005. *J Am Acad Dermatol.* 65(5 Suppl 1): S78-86.
7. US Department of Health and Human Services. (2014) The Surgeon General's Call to Action to Prevent Skin Cancer. Washington (DC): Office of the Surgeon General (US). Skin Cancer as a Major Public Health Problem.
8. Grosse Y, Baan R, Straif K, Secretan B, El Ghissassi F, et al. (2009) A review of human carcinogens Part A: pharmaceuticals. *Lancet Oncol.* 10(1): 13-4.
9. Warren DB, Riahi RR, Hobbs JB, Wagner Jr RF (2013) Sunscreen use on the dorsal hands at the beach. *J Skin Cancer.* 2013: 269583.
10. <https://www.epa.gov/sunsafety/health-effects-uv-radiation>

11. Saridi M, Pappa V, Kyriazis I, Toska A, Giolis A, et al. (2009) Knowledge and attitudes to sun exposure among adolescents in Korinthos, Greece Rural and Remote Health. 9(4): 1162.
12. Şenel E, Süslü I (2015) Knowledge, attitudes, and behaviors regarding sun protection, effects of the sun, and skin cancer among Turkish high school students and teachers. *Dermatologica Sinica*. 33(4): 87-190.
13. Eakin P, Maddock J, Techur-Pedro A, Kaliko R, Derauf DC (2004) Sun protection policy in elementary schools in Hawaii. *Prevent Chronic Dis*. 1(3): A05.
14. Davis KJ, Cokkinides VE, Weinstock MA, O'Connell MC, Wingo PA (2002) Summer sunburn and sun exposure among US youths ages 11 to 18: national prevalence and associated factors. *Pediatrics*. 110(1 Pt 1): 27-35.
15. Gandini S, Sera F, Cattaruzza MS, Pasquini P, Abeni D, et al. (2005) Meta-analysis of risk factors for cutaneous melanoma: I. Common and atypical naevi. *Eur J Cancer*. 41(1): 28e44.
16. Dulon M, Weichenthal M, Blettner M, Breitbart M, Hetzer M, et al. (2002) Sun exposure and number of nevi in 5- to 6-year-old European children. *J Clin Epidemiol*. 55(11): 1075-81.
17. Littlewood Z, Greenfield S (2018) Parents' knowledge, attitudes and beliefs regarding sun protection in children: a qualitative study. *BMC Public Health*. 18(1): 207.
18. Center for Disease Control and Prevention Department of Health and Human Services. U S. Skin Cancer Prevention Progress Report. 2019.
19. <https://www.who.int/uv/health/solaruvrad.pdf>
20. Rogers HW, Weinstock MA, Harris AR, Hinckley MR, Feldman SR, et al. (2010) Incidence estimate of nonmelanoma skin cancer in the United States, 2006. *Arch Dermatol*. 146(3): 283–287.
21. Janjani H, Nedjat S, Yunesian M, Nasseri S, Doost FH, et al. (2019) Sun exposure and health safety practices of high school students in an urban population of Iran. *BMC Public Health*. 19: 1736.
22. Owen T, Fitzpatrick D, Dolan O, Gavin A (2004) Knowledge, attitudes and behaviour in the sun: the barriers to behavioural change in Northern Ireland. *Ulster Med J*. 73(2): 96-104.
23. Sevim T, Pınar YB, İjlal E (2017) Evaluation of knowledge, attitude, and behavior about harmful effects of the sun and sun protection among patients attending an outpatient clinic. *Turkderm-Turk Arch Dermatol Venereology*. 51: 2-7.
24. Benvenuto-Andrade C, Zen B, Fonseca G, De Villa D, Cestari T (2005) Sun exposure and sun protection habits among high-school adolescents in Porto Alegre, Brazil. *Photochem Photobiol*. 81(3): 630-5.
25. Kaptanoğlu AF, Dalkan C, Hıncal E (2012) Kuzey Kıbrıs Türk Toplumunda Güneşten Korunma: İlkokul Çağı Çocukları ve Ailelerinin Güneşten Korunma ile İlgili Bilgi, Tutum ve Davranışları. *Türkderm*. 46(3): 121-129.
26. Fajuyigbe D, Young AR (2016) The impact of skin colour on human photobiological responses. *Pigment Cell Melanoma Res*. 29(6): 607-18.
27. Buller DB, Cokkinides V, Hall HI, Hartman AM, Saraiya M, et al. (2011) Prevalence of sunburn, sun protection, and indoor tanning behaviors among Americans: review from national surveys and case studies of 3 states. *J Am Acad Dermatol*. 65(5): S114-23.
28. Heckman CJ, Coups EJ, Manne SL (2008) Prevalence and correlates of indoor tanning among US adults. *J Am Acad Dermatol*. 58(5): 769–80.
29. Kaymak Y, Tekbaş ÖF, Şimşek I (2007) Üniversite öğrencilerinin güneşten korunma ile ilgili bilgi tutum ve davranışları. *Türkderm*. 41(3): 81-85.
30. Köktürk A, Baz K, Buğdaycı R, ve ark: Dermatoloji polikliniğine başvuran hastalarda güneşten korunma bilinci ve alışkanlıkları. *Türkderm* 2002; 12: 198- 203
31. Lee A, Garbutcheon-Singh KB, Dixit S, Brown P, Smith SD (2015) The influence of age and gender in knowledge, behaviors and attitudes towards sun protection: a cross-sectional survey of Australian outpatient clinic attendees. *Am J Clin Dermatol*. 16(1): 47-54.
32. Pengpid S, Peltzer K (2015) Sun protection use behaviour among university students from 25 low, middle income and emerging economy countries. *Asian Pac J Cancer Prev*. 16(4): 1385-9.
33. Abda N, Rhazi KE, Obtel M, Bendahhou K, Zidouh A, et al. (2012) Determinants of self-reported sun protection practices among Moroccan population. *Prev Med*. 54(6): 422–424.
34. Miller KA, Huh J, Unger JB, Richardson JL, Allen MW, et al. (2015) Patterns of sun protective behaviors among Hispanic children in a skin cancer prevention intervention. *Prev Med*. 81: 303–8.
35. Alberg AJ, Herbst RM, Genkinger JM, Duszynski KR (2002) Knowledge, attitudes, and behaviors toward skin cancer in Maryland youths. *J Adolesc Health*. 31(4): 372–7.
36. Memon MM, Manzoor M, Ashrafi MM, Kumar S, Ul Haq Z, et al. (2019) Prevalence and Predictors of the Use of Sunscreen Amongst Medical Students: A Multi-center Cross-sectional Study. *Cureus*. 11(6): e4926.

Supplements

Knowledge, attitude and behavior of adolescents towards protection from solar radiation and their perception for melanoma

District _____

Code _____

School _____

Grade of the class _____

Part 1. Sociodemographic data

Name Surname _____ /		Age _____	
Gender:	a) male	b) female	Ethnicity _____
Place of birth _____		/Residence _____	
Father's education:			
a) Primary level		b) Elementary	
c) High school		d) University	
e) Postgraduation			
Father employment:			
a) Employed		b) Unemployed	
b) Invalid		d) Retiree	
Mother's education:			
a) Primary level		b) Elementary	
c) High school		d) University	
e) Postgraduation			
Mother employment:			
a) Employed		b) Unemployed	
b) Invalid		d) Retiree	

Part 2. Questions about skin type

a) What color is your skin?

b) Light

c) Fair

d) Brown

e) Dark brown

b) What color is your hair?

a) Red

b) Blond

c) Brown

d) Dark

c) What color are your eyes?

a) Blu

b) Green

c) Brown

d) Dark

d) Do you have sunburn during the childhood?

a) NO

b) 1 time

c) 2 times

d) More than 2 times

e) Does your skin burn when you go to the beach for

sunbathing? Self-reporting regarding the skin type

a) Type 1

b) Type 2

c) Type 3

d) Type 4

e) Not specified

f) Do you have mole in your body?

a) No

b) I have only 10- 50 moles (few)

c) I have 50-100 moles (more)

d) I have more than 100 moles

g) Did you have controlled your mole?

a) Yes

b) No

Part 3. Knowledge of the effects of the sun on the skin. Do you agree with the following statements?

- | | | |
|--|-----|----|
| a) Ultraviolet rays cause suntan | Yes | No |
| b) Ultraviolet rays cause sunburn | Yes | No |
| c) Prolonged exposure to the sun causes freckles | Yes | No |
| d) Prolonged exposure to the sun causes | Yes | No |
| e) Sun exposure causes skin cancer | Yes | No |
| f) The sunlight is more harmful to dark skin than to light skin | Yes | No |
| g) The sunlight is harmful to your skin only when you have sunburn in summer | Yes | No |
| h) Suntan is a sign of being healthy | Yes | No |
| i) Sunlight is stronger and harmful from 11:00 to 16:00 | Yes | No |
| j) Sunscreen provide protection from UV rays | Yes | No |
| k) Sunscreens with a factor 15 or less cannot protect you | Yes | No |
| l) One application of sunscreen protects you for at least 4 hours | Yes | No |

Part 4. Knowledge about skin cancer

1. Do you know what melanoma is?

- a) yes
- b) no

2. If you answered yes to question 18, where did you get the information about melanoma?

- a) TV
- b) radio
- c) newspapers
- d) magazines
- e) partner
- f) internet
- g) leaflets
- h) doctor
- i) friends
- j) school
- k) other

3. Do you have a family member diagnosed with melanoma?

- a) yes

- b) no

4. If you answered yes to question 18, can you name at least 3 of its causes?

- genetic predisposition
- b) ultraviolet sunlight
- c) solarium
- d) damage to moles
- e) stress
- f) non-use of photoprotectors
- g) sunburn during childhood
- h) lack of care about the health
- i) skin color
- j) number of moles
- k) dysplastic moles
- l) use of alcohol
- m) smoking
- n) lack of vitamins
- o) pregnancy

Part 5. Questions on attitude

- | | | |
|---|----|----|
| a) There is nothing that can prevent skin cancer. | Po | Jo |
| b) Melanoma is the most dangerous type of skin cancer that can cause death | Po | Jo |
| c) frequent sunburns in childhood increase the risk of skin cancer in older age? | Po | Jo |
| d) The number of moles in an individual is related to the risk of developing melanoma | Po | Jo |
| e) My skin will age faster if I stay longer in the sun. | Po | Jo |
| f) I am aware that sun / UV exposure can cause skin cancer | Po | Jo |
| g) A suntan makes me look more beautiful | Po | Jo |
| h) A suntan makes me feel healthier. | Po | Jo |
| i) Solariums are a safe way to get skin tan | Po | Jo |

Jo

Part 6. Practical Questions

1. What protection measures do you use to protect yourself from the sun and skin cancer if you are exposed to the sun?

- a) glasses
- b) hats
- c) umbrella
- d) I do not stay in the sun during dangerous hours 10:00-16:00
- e) stay in the shade
- f) use of protective clothing
- g) use sunscreens with protective factor
- h) nothing

2. How often do you stay in the shade or under an umbrella

- a) Always
- b) Almost always
- c) Sometimes
- d) Rarely
- e) Never

3. How often do you use hats

- a) Always
- b) Almost always
- c) Sometimes
- d) Rarely
- e) Never

4. How often do you use sunglasses

- f) Always
- g) Almost always
- h) Sometimes
- i) Rarely
- a) Never

5. How often do you use protective clothes that covers most of the body

- j) Always
- k) Almost always
- l) Sometimes
- m) Rarely
- a) Never

6. How often do you use sunscreens with protective factor?

- n) Always
- o) Almost always
- p) Sometimes
- q) Rarely
- a) Never

7. Do you use sunscreen or sun oil with spf?

- a) I do not use
- b) Only during the summer at the beach time
- c) continuously in daily life

8. If you answered yes to question 9, What is spf of your sunscreen/sun oil?

- a) I do not use **sunscreen/sun oil**
- b) less than 10
- c) SPfactor 10-20
- d) SPfactor 21-30
- e) SPfactor 31- 50
- f) I do not know

9. Do you reapply sunscreen

- a) Never
- b) Every 4 hours
- c) Every 2 hours
- d) Every hour

10. Do you frequent UV lamps, sunbeds (solarium)?

- c) 3- 4 times a year
- d) 1-2 times a month
- e) 1 time per week
- f) Never

11. Do you go on summer vacation to the beach? a) yes

b) no

12. If you answered yes to question 5, how long do your beach holidays last?

- a) less than 15 days
- b) 15-30 days
- c) more than 30 days

13. What is attitude about sunbathing?

- a) I do not sunbathe because they are dangerous
- b) while I am at the beach I stay in the shade or swim
- c) I like sunbathing sometimes
- d) I really like sunbathing and tanning

14. What do you think about skin tanning

- a) I think the tanning makes me look better/ prettiest
- b) The bodyskin looks healthier when I tan
- c) Most of my friends want to be suntanned

15. Attitude towards sun protection

- a) I am ashamed to apply sunscreen in front of my friends
- b) Wearing a blouse on the beach does not make you look good.
- c) My parents do not protect themselves from the sun, so I do not think it is necessary to protect myself from the sun.