

## RESEARCH ARTICLE

# Effect of Skin Cancer Training Provided to Maritime High School Students on Their Knowledge and Behaviour

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### Abstract

**Background:** This study was conducted with the purpose of evaluating the effect of skin cancer training provided to maritime high school students on their knowledge and behaviour. **Materials and Methods:** The study had a quasi-experimental design with pre-test and post-test intervention and control groups. Two maritime high schools located in the city of Antalya were included within the scope of the study between March and June 2013, covering a total of 567 students. **Results:** While the knowledge mean scores of students regarding skin cancer and sun protection did not vary in the pre-test ( $6.2 \pm 1.9$ ) and post-test ( $6.8 \pm 1.9$ ) control group, the knowledge mean scores of students in the experimental group increased from  $6.0 \pm 2.3$  to  $10.6 \pm 1.2$  after the provided training. Some 25.4% of students in the experimental group had low knowledge level and 62.2% had medium knowledge level in the pre-test; whereas no students had low knowledge level and 94.3% had high knowledge level in the post-test. It was determined that tenth grade students, those who had previous knowledge on the subject, who considered themselves to be protecting from the sun better, had higher knowledge levels and their knowledge levels increased as the risk level increased. It was found that the provided training was effective and increased positively the knowledge, attitude and behaviour levels of students in the experimental group in terms of skin cancer and sun protection. **Conclusions:** Along with the provided training which started to form a lifestyle, appropriate attitudes and behaviours concerning skin cancer and sun protection could be brought to students who will work in outdoor spaces and are members of the maritime profession within the risk group.

**Keywords:** Skin cancer - sun protection - melanoma - adolescent - school health nurses

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### Introduction

Skin cancer stands out in Turkey and in the world with its increasing incidence rate. Its development rate is reported to be one in every 39 people among men and one in every 58 people among women during their lifetimes (Jemal et al., 2009). The most important factor in the aetiology of skin cancer is ultraviolet (UV) rays (Hunter et al., 2010). In a study in which skin cancer cases of ten years were evaluated, it was reported that the rate of being exposed to sunlight for long periods of time is 90% in both men and women (Turkmen et al., 2010). Those who work in outdoor spaces are exposed to UV rays approximately eight times more than those working in indoor spaces (Stock et al., 2009).

Developing positive behaviours in terms of sun protection and reducing people's exposure to the UV radiation in sunlight constitute the most important part of decreasing the burden of skin cancer on the public health (Dobbinson et al., 2009). Due to the significant cause of exposure to sunlight in childhood in the development of skin cancer, parents should protect their children from the sun in this period and instructive programs related to

this subject should be provided at schools and non-formal education institutions (Uysal et al., 2004; Maguire-Eisen et al., 2005).

Antalya is located in the west of the Mediterranean Region where summertime is long and hot. Average temperature in summer is between 30 and 34 degrees (Municipality of Antalya, 2014). In the study conducted by Mery (2008) to investigate the distribution of the five cancer types among women in Turkey on the basis of district, it was determined that skin cancer cases were the most common in the centre of Antalya. It was also observed that skin cancer cases in Antalya were more commonly seen in coastal regions and reduced in hinterlands.

According to the result of Turkish Demographic and Health Survey (2013), 17.2% of the population under the age of 18 is composed of adolescents aged between 15 and 17. Adolescence is the period when individuals start to form behaviours and lifestyles and develop life-long protection habits. Therefore, it is important to raise awareness among students who will be a member of the maritime profession constituting the risk group concerning skin cancer. In consequence of the study where Sumen and

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Oncel (2014) examined 47 studies conducted with students on skin cancer and sun protection; they emphasised that studies conducted with students in childhood and adolescence periods have been insufficient, there is a need for further studies on skin cancer around the world and it is important to raise awareness among students and families through health education programs.

#### *Purpose and hypothesis of the study*

The purpose of this study is to determine risks and knowledge levels of the students in terms of skin cancer and reveal the effect of the training provided on the subject of skin cancer on their knowledge and behaviours. The hypothesis, "the training to be provided will increase the knowledge, attitude, and behaviour levels of students in the experimental group regarding skin cancer and sun protection" was examined within the study.

## **Materials and Methods**

#### *Type of the Study*

This is a quasi-experimental study with pre-test and post-test control group.

#### *Place and time of the study*

The study was conducted in two maritime high schools located in the city centre of Antalya and in the district of Manavgat between March 2013 and June 2013.

#### *Population and sample group of the study*

Population of the study consisted of the students of two maritime high schools in Antalya. Sampling method was not used in the study and all students registered in the aforementioned schools who were voluntary to participate in the study were included in the scope of the study. While 389 students receiving education at the maritime high school in Antalya constituted the experimental group, 178 students receiving education at the maritime high school in Manavgat constituted the control group. Experimental and control groups showed similar characteristics (Table 1).

#### *Questionnaire*

Data of the study were collected by using the questionnaire consisting of totally 59 questions, prepared by the researchers in accordance with the literature (Geller et al., 2003; LaBat et al., 2005; Reynolds et al., 2008; Wright et al., 2008; Saridi et al., 2009; Glanz et al., 2010; Hunter et al., 2010; Ergul and Ozeren, 2011; Fabris et al., 2012; Reinau et al., 2012; Suppa et al., 2012) and put into final form in line with the opinions of experts.

There were 13 questions to determine socio-demographic characteristics; which included some descriptive characteristics of students, the knowledge they gained and their opinions concerning skin cancer and sun protection. There were 13 questions regarding the factors increasing the risks of skin cancer in order to determine risk status and levels. In order to determine the risk levels of students, the responses containing risks were coded with "1" point and those not containing risks were coded with "0" points according to their answers to nine questions. At the end of the scoring, risk levels were evaluated as

"low" for those receiving 0-3 point(s), "medium" for those receiving 4-6 points and "high" for those receiving 7-9 points. There were 12 questions to determine knowledge status and levels in terms of skin cancer and sun protection. Those who answered the questions asked to determine the knowledge levels of students correctly were coded with "1" point; whereas, those who could not answer the questions correctly were coded with "0" point. At the end of the scoring, students' knowledge levels were evaluated as low (those who received 0-4 point(s)), medium (those who received 5-8 points), and high (those who received 9-12 points). In order to determine the attitudes and behaviours of students, 9 questions were asked to determine their attitudes and 10 questions were asked to determine their behaviours in terms of sun protection. Preliminary application of the prepared questionnaire was conducted on 10 students attending in another high school and finalised after revision.

#### *Collection of the study data*

Primarily, the researcher had the students who agreed to participate in the study read and sign the Informed Consent Form. Necessary statements were made separately for the students in each classroom and questionnaires were handed out them after ensuring a quiet and comfortable environment. The application consisted of three phases. In the first phase; data collection forms were distributed and pre-test was conducted among all students in the experimental and control groups. In the second phase; students in the experimental group were provided with training regarding skin cancer, simple sun protection steps and harmful effects of the sun in their classrooms. The training took approximately 35-45 minutes. Finally, researchers had the students watch a 5-minute "Dear 16-Year-Old Me" video with Turkish subtitles which was filmed by people diagnosed with skin cancer in order to emphasise the importance of skin cancer in adolescence period (The David Cornfield Melanoma Fund, 2012). At the end of the training, brochures on skin cancer and sun protection were distributed to students. Four weeks after the training, in order to remind students in the experimental group of the subject and reinforce the training, advisory posters with a size of 70x100 cm prepared by the researcher regarding skin cancer and sun protection were hanged in places visible to students within the school and in classrooms. No intervention was made for students in the control group. In the third phase; eight weeks after the training, the risk status questions related to the socio-demographic characteristics and skin cancer were excluded from the data collection form and the post-test was conducted among the students in both schools (experimental and control groups) by asking questions related to their knowledge, attitudes and behaviours once again.

Considering that it would not be ethical to provide the experimental group with training but not to provide the control group; after the post-test, students in the control group were provided with the same training related to skin cancer and sun protection which was provided to the experimental group and brochures were distributed.

**Evaluation of the study data**

The data were assessed by using number, percentage, chi-square analysis, McNemar's test, Mann Whitney U test, Kruskal Wallis test, and t test.

**Research ethics**

An institutional permission was received from Antalya Provincial Directorate of National Education and approval was received from Akdeniz University Medical Faculty Non-Invasive Clinical Trials Ethics Committee to conduct the study. The students signed Informed Consent Form.

**Results****Examination of risk statuses of students**

It was determined that majority of students in the experimental and control groups had brown/black hair (86.9%) and brown/black eye colour (72.7%), they did not have birthmarks (64.7%), speckles (86.9%) and a skin cancer history in their families (98.6%), they remained outdoors for longer than one hour per day (76.9%), their skin type was mid-tone skin (64.2%) and they had sunburn within the last one year (56.3%). No difference was found

**Table 1. Some Descriptive Characteristics of Students**

Characteristics	Experimental group		Control group		Total		x <sup>2</sup>	p
	n	%	n	%	n	%		
<b>Gender</b>								
Girl	43	11.1	14	7.9	57	10.1	1.373	0.241
Boy	346	88.9	164	92.1	510	89.9		
<b>Age</b>								
14	9	2.3	6	3.4	15	2.6	2.970	0.563
15	93	23.9	53	29.8	146	25.7		
16	127	32.6	53	29.8	180	31.7		
17	102	26.3	42	23.5	144	25.4		
18	58	14.9	24	13.5	82	14.6		
<b>Grade</b>								
9	122	31.4	62	34.8	184	32.5	6.725	0.081
10	124	31.8	53	29.8	177	31.2		
11	71	18.3	43	24.2	114	20.1		
12	72	18.5	20	11.2	92	16.2		
<b>Department</b>								
Maritime department	320	82.3	110	61.8	430	75.8	27.910	<b>0.000</b>
Shipbuilding department	69	17.7	68	38.2	137	24.2		
<b>The place of residence they resided for the longest period</b>								
Village	15	3.9	27	15.2	42	7.4	196.634	<b>0.000</b>
District	25	6.4	92	51.7	117	20.6		
Province	349	89.7	59	33.1	408	72		
<b>Status of receiving information</b>								
Receiving information	166	42.7	81	45.5	247	43.6	0.398	0.584
Not receiving information	223	57.3	97	54.5	320	56.4		
<b>Sources of information of those receiving information *</b>								
Family	72	43.4	30	37	102	41.3	1.279	0.865
Magazine/Newspaper	6	3.6	3	3.7	9	3.6		
TV/Internet	41	24.6	20	24.8	61	24.7		
Friends	24	14.5	15	18.5	39	15.8		
Medical staff	23	13.9	13	16	36	14.6		
<b>From sun ...</b>								
I think I am being protected very well.	33	8.5	24	13.5	57	10.1	3.817	0.148
I could be protected better.	242	62.2	100	56.2	342	60.3		
I am unprotected.	114	29.3	54	30.3	168	29.6		
<b>Total</b>	389	100	178	100	567	100		

\*n:166 for the experimental group, n:81 for the control group

**Table 2. Comparison of Students in the Experimental and Control Groups in Terms of their Attitudes Regarding Sun Protection**

Characteristics	Experimental group						Control group											
	Pre-test			Post-test			Pre-test			Post-test								
	Aware	Unaware	McNemar test	Aware	Unaware	McNemar test	Aware	No	McNemar test	Aware	Unaware	McNemar test						
n	%	n	%	n	%	n	%	n	%	n	%	n	%					
Light-skinned people should pay more attention to protection to abstain from sunburn.	296	76.1	93	23.9	389	100	0	0	<b>p=0.000</b>	133	74.7	45	25.3	122	68.5	56	31.5	p=0.242
UV rays cause skin cancer.	304	78.1	85	21.9	389	100	0	0	<b>p=0.000</b>	134	75.3	44	24.7	152	85.4	26	14.6	<b>p=0.034</b>
UV rays cause premature ageing on the skin.	189	48.6	200	51.4	261	67.1	128	32.9	<b>p=0.000</b>	80	44.9	98	55.1	91	51.1	87	48.9	p=0.254
Sunburn can occur even on a cloudy day.	96	24.7	293	75.3	304	78.1	85	21.9	<b>p=0.000</b>	34	19.1	144	80.9	46	25.8	132	74.2	p=0.189
Better protection is ensured with higher SPF.	227	58.4	162	41.6	345	88.7	44	11.3	<b>p=0.000</b>	107	60.1	71	39.9	114	64.0	64	36.0	p=0.505
A sun protector with SPF of 10 provides sun protection for 10 hours.	158	40.6	231	59.4	389	100	0	0	<b>p=0.000</b>	63	35.4	115	64.6	78	43.8	100	56.2	p=0.142
One can be protected from the sun using an umbrella and staying in the shade.	250	64.3	139	35.7	286	73.5	103	26.5	<b>p=0.007</b>	153	86.0	25	14.0	151	84.8	27	15.2	p=0.877
Sand, sun, and sea may pose danger for skin cancer / skin blemishes.	216	55.5	173	44.5	304	78.1	85	21.9	<b>p=0.000</b>	108	60.7	70	39.3	124	69.7	54	30.3	p=0.094
Sun creams containing SPF are recommended to light and medium-skinned people.	178	45.8	211	54.2	389	100	0	0	<b>p=0.000</b>	91	51.1	87	48.9	97	54.5	81	45.5	p=0.594
Skin melanoma is a type of skin cancer.	44	11.3	345	88.7	344	88.4	45	11.6	<b>p=0.000</b>	17	9.6	161	90.4	20	11.2	158	88.8	p=0.710
Protection from the risk of melanoma starts in childhood.	37	9.5	352	90.5	297	76.3	92	23.7	<b>p=0.000</b>	16	9.0	162	91.0	21	11.8	157	88.2	p=0.511
Sunlight should be avoided between 10:00-16:00.	322	82.8	67	17.2	389	100	0	0	<b>p=0.000</b>	163	91.6	15	8.4	169	94.9	9	5.1	p=0.263

between experimental and control groups in terms of these variables ( $p>0.05$ ). Students in the experimental and control groups stated that their sunburns observed at a rate of 81.2% were in the form of “redness on the skin, sensitive and painful to touch”.

It was found that students in the experimental (57.6%) and control groups (69.7%) had 10 and less moles and there was a difference between the groups in terms of presence of moles ( $p<0.05$ ). The number of those having 11 and more moles was higher in the experimental group compared to the control group. When we considered the distribution of moles on body; it was determined that students in both groups had moles most frequently on the head (33.0%). 46.4% of students who had moles regularly checked their moles and the students in the control group were checking their moles more often than the experimental group. Students were more frequently checking their moles in terms of deformation (28.0%), itchiness (27.2%), increase in number (23.0%), colour changes (15.2%), and bleeding/scabs (6.6%).

Mean risk score of students was  $3.99\pm 1.37$  in the experimental group and  $3.62\pm 1.39$  in the control group (min: 1 - max: 8; range 1-9). There were few high risk students and majority in both had medium risk level.

*Examination of knowledge of students on skin cancer and sun protection*

Table 2 illustrates knowledge of students in the experimental group regarding skin cancer and sun protection. Knowledge levels of students significantly increased in the post-test compared to the pre-test ( $p<0.01$ ). An increase was determined in the number of students in the control group who were aware in the post-test that UV rays could cause skin cancer and the difference between them was significant ( $p<0.05$ ). No statistical significance was determined among all other variables ( $p>0.05$ ).

While pre-test knowledge mean score of students in the experimental group was  $6.01\pm 2.33$ , their post-test knowledge mean score was  $10.65\pm 1.25$  (pre-test: min: 1 - max: 11; post-test: min: 7 - max: 12; range: 1-12). While pre-test knowledge mean score of students in the control group was  $6.21\pm 1.88$ , their post-test knowledge mean score was  $6.79\pm 1.86$  (pre-test and post-test: min: 1 - max: 11; range: 1-12) (Table 3). While no significance was determined between the groups in the pre-test ( $p>0.05$ ), the knowledge mean score of the experimental group was higher in the post-test than the control group and the difference between has been found to be significant ( $p<0.01$ ).

**Table 3. Distribution of mean scores of students regarding knowledge on skin cancer and sun protection**

Group	Mean	s.d.	t	p
<b>Pre-test</b>				
Experimental group	6.01	2.337	-0.99	0.323
Control group	6.21	1.886		
<b>Post-test</b>				
Experimental group	10.65	1.252	28.682	0.000
Control group	6.79	1.864		

**Table 4. Comparison of Students in the Experimental and Control Groups in Terms of their attitudes regarding Sun Protection**

Characteristics	Experimental group						Control group									
	Pre-test			Post-test			Pre-test			Post-test			McNemar test			
	Yes	No	%	Yes	No	%	Yes	No	%	Yes	No	%				
I don't mind having a little bit of sunburn to get a tan.	158	231	40.6	83	21.3	306	78.7	77	43.3	101	56.7	61	34.3	117	65.7	p=0.130
I prefer sun-tanned skin.	132	257	33.9	96	24.7	293	75.3	39	21.9	139	78.1	35	19.7	143	80.3	p=0.708
Being under the sun between the hours 10:00-16:00 does not disturb me.	130	259	33.4	61	15.7	328	84.3	42	23.6	136	76.4	28	15.7	150	84.3	p=0.066
Sun protection creams should be used for health protection.	292	97	75.1	343	88.2	46	11.8	142	79.8	36	20.2	144	80.9	34	19.1	p=0.894
Products with a sun protection factor higher than 20 should be used.	233	156	59.9	234	60.2	155	39.8	98	55.1	80	44.9	100	56.2	78	43.8	p=0.913
Sunglasses should be used to protect eyes.	292	97	75.1	267	68.6	122	31.4	161	90.4	17	9.6	167	93.8	11	6.2	p=0.327
Sunglasses should be used because sunlight disturbs eyes.	272	117	69.9	319	82.0	70	18.0	160	89.9	18	10.1	164	92.1	14	7.9	p=0.596
Hats should be used to be protected from the sun.	321	68	82.5	354	91.0	35	9.0	171	96.1	7	3.9	173	97.2	5	2.8	p=0.754
Hats should be used to look good.	93	296	23.9	37	9.5	352	90.5	23	12.9	155	87.1	16	9.0	162	91.0	p=0.310
Long-sleeved clothes should be used to protect our skin from the sun.	196	193	50.4	265	68.1	124	31.9	96	53.9	82	46.1	103	57.9	75	42.1	p=0.510

**Table 5. Comparison of students in the experimental and control groups in terms of their sun protection behaviours**

Characteristics	Experimental group				McNemar test	Control group				McNemar test
	Pre-test		Post-test			Pre-test		Post-test		
	n	%	n	%		n	%	n	%	
<b>Use of sun protection cream</b>										
Yes	296	76.1	335	86.1	<b>p=0.000</b>	99	55.6	108	60.7	p=0.417
No	93	23.9	54	13.9		79	44.4	70	39.3	
<b>Use of sun protection cream while going out, at the beach, etc.</b>										
Yes	161	41.4	93	23.9	<b>p=0.000</b>	96	53.9	88	49.4	p=0.466
No	228	58.6	296	76.1		82	46.1	90	50.6	
<b>Use of sun protection creams repeatedly when remaining under the sun for long periods of time</b>										
Yes	194	49.9	253	65.0	<b>p=0.000</b>	59	33.1	80	44.9	<b>p=0.036</b>
No	195	50.1	136	35.0		119	66.9	98	55.1	
<b>Protection factors of the sun cream that is used*</b>										
Sun protection factor below 20	103	45.2	54	18.2	<b>p=0.000</b>	44	53.7	46	51.1	p=0.664
Sun protection factor above 20	125	54.8	242	81.8		38	46.3	44	48.9	
<b>Preferred places in summer time as far as possible</b>										
I generally remain in the shade.	165	42.4	232	59.6	<b>p=0.000</b>	90	50.6	99	55.6	p=0.402
I generally prefer remaining under the sun. I stay in the shade when it is too hot.	224	57.6	157	40.4		88	49.4	79	44.4	
<b>Paying attention not to go out between the hours 10:00-16:00</b>										
Yes	319	82.0	351	90.2	<b>p=0.001</b>	132	74.2	140	78.7	p=0.366
No	70	18.0	38	9.8		46	25.8	38	21.3	
<b>Generally preferred type of t-shirt in summer months</b>										
Generally t-shirts that cover shoulders	197	50.6	220	56.6	p=0.106	108	60.7	113	63.5	p=0.678
Mostly t-shirts that expose shoulders (strap shirts)	192	49.4	169	43.4		70	39.3	65	36.5	
<b>Use of sunglasses while going out</b>										
Yes	259	66.6	302	77.6	<b>p=0.001</b>	100	56.2	108	60.7	p=0.461
No	130	33.4	87	22.4		78	43.8	70	39.3	
<b>Use of hats with long edges while going out</b>										
Yes	211	54.2	237	60.9	p=0.064	94	52.8	102	57.3	p=0.470
No	178	45.8	152	39.1		84	47.2	76	42.7	

\*n:228 for the experimental group, n:82 for the control group

When knowledge levels of students in the experimental and control groups in terms of skin cancer and sun protection were examined; no difference was found between knowledge levels in the pre-test ( $p>0.05$ ) and it was determined that while almost all students in the experimental group had high knowledge levels in the post-test, the knowledge level of the control group was medium and the difference between the groups was significant ( $p<0.01$ ).

#### *Comparison of Some Socio-Demographic Characteristics of Students with their Knowledge Levels*

Pre-test data of students in the experimental and control groups were combined and according to these data, some characteristics of students were compared with their knowledge levels on skin cancer and sun protection.

It was determined that most of the students with lower knowledge levels were 15 year-olds (35.6%), those who thought they were not protected from the sun (51.5%) and those who did not receive previous information (68.9%); it was also determined that the students with medium and high knowledge levels were 16 year-olds and those who thought they could be better protected from the sun and the difference between them was statistically significant ( $p<0.01$ ). Gender and the longest place of residence did not affect the knowledge level ( $p>0.05$ ). It was determined that while those with lower knowledge level had primary school graduate parents, those with medium and high knowledge levels had high school graduate parents and a statistically significant difference was found between knowledge levels according to these variables ( $p<0.05$ ). Revenues were higher in the families of students who

gave the answer “revenue is equal to expenses” among all knowledge levels; and the fact that the number of those whose revenue was higher than their expenses among those with higher knowledge levels created a significant difference between knowledge level and revenue statuses.

As a result of the pre-test, the knowledge mean scores were higher among those in the experimental group who had birthmarks ( $p<0.01$ ), who had skin cancer histories in their families ( $p<0.05$ ), who remained outdoors for longer than one hour ( $p<0.01$ ), whose skin type was light-coloured ( $p<0.05$ ) and who had 11 and more moles on their bodies ( $p<0.01$ ). The significance of skin type was found to be arising from the mean scores between light-coloured and dark-coloured skins in the paired comparisons (Mann-Whitney U test,  $p=0.004$ ).

When students’ risk levels to contract skin cancer and their knowledge levels were examined; it was determined that among all knowledge levels, those who had medium risk levels had higher rates and this rate increased as knowledge levels escalated ( $p<0.01$ ).

#### *Examination of attitudes of students regarding sun protection*

Statements given in the post-test by students in the experimental group as “*I don’t mind having a little bit of sunburn to get a tan*”, “*I prefer sun-tanned skin*”, “*Being under the sun between 10:00-16:00 does not disturb me*”, “*Sunglasses should be used to protect eyes*” and “*Hats should be used to look good*” decreased compared to the pre-test; whereas, statements “*Sun creams should be used for health protection*”, “*Sunglasses should be used because sunlight disturbs eyes*”, “*Hats should be used to be protected from the sun*” and “*Long-sleeved clothes should be used to protect our skin from the sun*” increased and the difference between them was significant (Table 4). No statistically significant difference was found between the pre-test and post-test results in the attitudes of students in the control group regarding sun protection ( $p>0.05$ ).

#### *Evaluation of Behaviours of Students Regarding Sun Protection*

The rates of students in the experimental group to use sun protection creams in summertime to be protected from the sun, use sun protection creams again when remaining under the sun too long, use sun creams that contain more than 20 sun protection factors, remain in the shade generally in summertime, pay attention not to go out between 10:00-16:00 and use hats with long edges while going out increased compared to the pre-test and the difference between them was significant ( $p<0.01$ ) (Table 5). The number of those in the control group who use sun protection cream again while remaining too long under the sun increased in the post-test and the difference between them was significant ( $p<0.05$ ).

## **Discussion**

#### *Examination of Risk Statuses of Students in Terms of Skin Cancer*

Among students’ risk factors, a difference was found between the groups only in terms of in the numbers of

moles on their bodies. In a conducted meta-analysis, it was found that those who had more than 100 moles which were greater than 2 mm had 6.3 times more melanoma risks than those who had less than 15 moles (Grichnk et al., 2008). The fact that the number of students who had 11 and more moles in the experimental group was excess made us think that they were at higher risks compared to the control group. In studies conducted by İltter et al. (2009) and Andsoy et al. (2013), since two cases were diagnosed and the presence of moles did not affect their knowledge and behaviours; according to these study results it was thought that they would not affect the knowledge, attitudes and behaviours of students because of changing of them in the long term.

One of the most important results obtained was that among the risk factors for contracting skin cancer; the rates of remaining outdoors in risky hours (10:00-16:00) for longer than one hour were high in students in both experimental and control groups. More than half of the students within the scope of the study stated that they experienced sunburns within the last year (redness, painful, aching, blister.). Severe sunburns increase the risk of skin cancer 3.6 times among children under the age of 12. It has also been found that severe sunburns increase the risk of development of skin cancer 2 times more within 10 years among adults (Berwick, 2011). In the light of this information, it is revealed that the whole society and particularly children should be protected from the harmful effects of the sun.

Developing proper protection behaviours against skin cancer is possible through the determination of individuals’ characteristics and behaviours that involve risks. It was remarkable in this study that there are risk factors such as skin types and the presence of moles which cannot be changed, and the rates of long hours spent under the sun in risky hours and the formation of sunburns were higher than the other factors. Reducing the number of hours spent under the sun which is a preventable risk factor could be thought to be advantageous for children and adolescents.

#### *Examination of Knowledge Levels of Students in terms of Skin Cancer and Sun Protection*

While the knowledge mean scores before the training were similar in both groups, the significantly increasing knowledge levels of students in the experimental group after the training compared to the control group showed the efficiency of the training. Although there have been no experimental studies conducted in Turkey regarding skin cancer and sun protection except for the study conducted by Balyacı et al. (2012) there have been studies that measure knowledge of students in several school groups (Filiz et al., 2006; Yurtseven et al., 2012). In the study of Balyacı et al. (2012) in which they aimed to raise awareness for protection from skin cancer among second grade students of primary education regarding behaviour of self-skin examination, skin cancer knowledge scores increased from 4.19 to 6.79 after the conducted interventions. With trainings provided, students’ knowledge scores increased in other conducted studies (Geller et al., 2005; Gilaberte et al., 2008). As is in this study, the increasing knowledge

levels of students which were lower before training may be asserted as having raised awareness and increased knowledge of students. It is therefore thought that adolescents who were trained in early stages of life could take the necessary and correct precautions to be protected from skin cancer and the importance of education is once more revealed. Therefore, the instructive and consultative roles of public health nurses on this subject are considered important to raise this awareness within the society.

Another important results obtained from this study was that the rates of correct responses given by students in the experimental group to knowledge questions were high and these rates significantly increased in all questions in the post-test compared to the pre-test. These results showed that the conducted interventions were effective. In the experimental and quasi-experimental studies that were conducted with control group or one group (Geller et al., 2003; Stankeviciute et al., 2004; Geller et al., 2005; Gritz et al., 2005; Kaymak et al., 2007; Livingston et al., 2007; Naldi et al., 2007; Cercato et al., 2008; Gilaberte et al., 2008; Reynolds et al., 2008; Wright et al., 2008; Quereux et al., 2009; Rouhani et al., 2009; Hunter et al., 2010; Roetzheim et al., 2011; Buendia-Eisman et al., 2012; Hawkes et al., 2012; Sancho-Garnier et al., 2012; Stöver et al., 2012), the conducted interventions created a significantly positive difference between the experimental and control groups before and after the intervention. The importance of raising related awareness and continuous education is revealed. Nurses should not miss these opportunities in the areas they work at.

In a literature review, several studies conducted with students in the age group of 9-20 from 10 countries were examined and their knowledge levels related to sun protection and sunburn incidences were revealed (Saridi et al., 2014). Turkey is on the seventh rank with a knowledge level of 47.8% and sixth rank in terms of sunburn incidences with a rate of 39.6%. This shows that the knowledge of students in terms of sun protection is insufficient and they are in need of trainings. These study results were obtained from maritime high school students, who shall be working in outdoors in the future and therefore be frequently exposed to the sunlight, in the city of Antalya where the annual rates of receiving sunlight are the highest in Turkey. The results of students related to their awareness on this subject are considered important with regard to providing education on the subject and pointing out its advantages.

#### *Comparison of Some Socio-Demographic Characteristics of Students with Their Knowledge Levels*

No difference was found between gender and knowledge levels among the maritime high school students who were mostly male. There have been studies on skin cancer and sun protection indicating that women are more willing to sunbathe and get a tan than men, therefore women's knowledge are lower (Uysal et al., 2004; Cokkinides et al., 2006); however there have also been studies quite the contrary indicating that girls' knowledge and sun protection are higher since the body image is more important for girls (Stinco et al., 2005; Suppa et al., 2012). In the literature, the risks of basal cell

carcinoma and squamous cell carcinoma among men are 2 times higher than women (Saraiye et al., 2003). There have been also studies supporting the results of this study and showing that gender does not affect knowledge level (Gilaberte et al., 2008; Ergul and Ozeren, 2011).

It was found that knowledge levels of the students in the age group of sixteen were higher and significant in the conducted statistical analysis. Higher knowledge levels of the medium group may be associated with the fact that the students in the age group of 14-15 who just reached adolescence period exhibited reactional and maladaptive behaviours, students in the age group of 17-18 started to prepare for the university entrance exam and experienced negativities such as exam stress, therefore their knowledge levels reduced.

In consequence of the study, the fact that the majority of students with higher knowledge levels received their previous knowledge related to skin cancer and sun protection from their families is one of the important results of the study. This result shows that students are in need of training, they would obtain the correct information when they are trained and families should also be trained on the subject since families are their most important sources of knowledge. It was observed that while the students who received sun protection knowledge from their families exhibited better protection behaviours, children from families with insufficient protection knowledge were not adequately protected (Stanton et al., 2004). It has been determined in the study that the best consultants of adolescents on this subject are their families (de Vires et al., 2006; Saridi et al., 2009).

Another one of the prominent findings was that students' knowledge levels increased as their risk levels increased. In a study conducted by Baron-Epel and Azizi (2003), they specified that adults with higher skin cancer risk were more sensitive to sun protection. Knowledge mean scores of students were almost equalised at the end of the provided training in this study and it was an important result that the differences between risk factors and knowledge status were almost eliminated. Higher knowledge levels of students with higher risk factors at the beginning made us think that they were aware they had the risk of skin cancer and they were more conscious. The fact that students with different risk factors reached the same knowledge level at the end of the training interventions in the study revealed the importance of the study. Results of some conducted studies supported this result (Gilaberte et al., 2008; Patel et al., 2010).

#### *Examination of Attitudes of Students in Terms of Sun Protection*

One of the prominent results of the study was that there was a significant increase in attitudes of students in the experimental group regarding sun protection according to the results of the pre-test and post-test; whereas there was no significant change in the attitudes of students in the control group. It could generally be asserted that those who had knowledge and awareness regarding skin cancer within the society developed quite positive attitudes in terms of sun protection (Hawkes et al., 2012). In this study, in parallel with the increase in the knowledge levels in



the experimental group, there was also an increase in the positive responses given to questions related to attitude. It was observed in several conducted studies that students exhibited similar attitudes (Geller et al., 2003; Wright et al., 2008; Patel et al., 2010; Spradlin et al., 2010; Kaptanoglu et al., 2012; Reinau et al., 2012).

Primarily, it is necessary to determine the knowledge levels and attitudes of children and adolescents related to sun protection methods and skin cancer. Thus, it is important to analyse the factors affecting their attitudes and arrange education programs intended for subjects that are lacking. By ensuring that children are informed and self-conscious regarding the useful and detrimental effects of the sun and accordingly develop appropriate attitudes; it will be possible to reduce sun-related diseases in the long term and protect public health.

#### *Examination of Behaviours of Students Regarding Sun Protection*

The most important method of protecting from skin cancer is sun protection. Skin cancer development significantly decreases with sun protection used starting from childhood (Grossman and Leffell, 2008). A significant increase was observed in students' habits of using sun protection creams after the training. A positive increase was observed in students' behaviours after the training in conducted studies (Geller et al., 2003; Naldi et al., 2007). In another study, it was determined that almost half of skin cancer patients did not use any sun protection cream before diagnosis (Renzi et al., 2008). This was an important result that these interventions showed a positive effect on choosing sun protection creams with the right factors by maritime high school students, who will be frequently exposed to the sun, and on the application way of the cream.

Similarly with this study, a significant increase was observed in students' behaviors of remaining in the shade (Filiz et al., 2006; Sancho-Garnier et al., 2012) and using sunglasses (Stankeviciute et al., 2004; Geller et al., 2005) at the end of the training in several studies. A slight increase was also observed in the rates of wearing t-shirts that cover shoulders in summer months and using hats with long edges while going out, however this increase was not significant. It has been reported by many studies conducted in Turkey that protection behaviours of adolescents were not sufficient (Emertcan et al., 2005; Filiz et al., 2006; Uslu et al., 2006). In addition, there have been studies showing that the rates of using protective clothes and hats are low in Turkey (Uslu et al., 2006; Kaymak et al., 2007; İlter et al., 2009). In this respect, results are in parallel with the general behaviours of the Turkish society. Several studies conducted with students have similar results (Stanton et al., 2004; Filiz et al., 2006; Reinau et al., 2012). These studies have indicated the necessity to start the education for behaviours of adolescents in childhood period.

It was also a significant result that the training provided for the experimental group was effective on students' behaviours although not as high as the rates of students' knowledge and attitudes. It has also been determined in several conducted studies that interventions performed to develop behaviours related sun protection produced

positive results (Norman et al., 2007; Gilaberte et al., 2008; Hawkes et al., 2012). Therefore, students should be encouraged to perform sun protection methods efficiently and prevent skin cancer in the school age. These interventions should be performed through continuous training and briefings by considering the school's physical conditions and involving teachers, students and families in the training. In the study conducted by Gomez-Mayona et al. (2010) with patients diagnosed with skin cancer, 98% of patients stated that it is important to be protected from the sun.

In conclusions, Consequently, it was determined that the provided training increased the knowledge levels of students in the experimental group regarding skin cancer and sun protection, and increased their attitudes and behaviours related to sun protection positively, and therefore the study's hypotheses was verified.

In line with the results obtained from the study, it is recommended to; *i*) Add a lesson concerning this subject to the curriculum of maritime high school students, *ii*) Arrange training programs for both students and their families as families are their main sources of information, *iii*) Perform interventions for protection such as increasing the number of shades at schools.

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