Original Article

Evaluation of Students' Knowledge and Attitudes on Sun Radiation Protection

Maria Saridi, PhD
Director of Nursing, General Hospital of Korinthos, Greece. Research Fellow, Faculty of Social and Educational Sciences, University of Peloponnese, Korinthos, Greece

Dimitrios–Stylianos Lionis,
Clinical Research Associate, Zeincro Hellas S.A.

Aikaterini Toska, PhD
General Hospital of Korinthos, Greece

Theodora Kafkia, PhD (c)
Clinical Lecturer, Department of Nursing, Alexander Technological Educational Institute of Thessaloniki, Greece

Styliani Vonoparti, BSc (c)
Faculty of Social and Educational Sciences, University of Peloponnese, Korinthos, Greece

Margarita-Marina Barmpari, BSc (c)
Faculty of Social and Educational Sciences, University of Peloponnese, Korinthos, Greece

Zafirenia Fasoula, BSc (c)
Faculty of Social and Educational Sciences, University of Peloponnese, Korinthos, Greece

Kyriakos Souliotis, PhD
Associate Professor, Faculty of Social and Educational Sciences, University of Peloponnese, Korinthos, Greece

Correspondence: Maria Saridi, Sina 33 Str. Korinth, Greece, P.K.20100
E-mail:sarmar32@windowslive.com

Abstract

Background: An individual's over-exposure to sun, during his childhood and adolescence and the accumulation of this radiation, are significant risk factors for the development of various damages and mainly skin cancer.
Objectives: The aim of the study was the evaluation of knowledge, attitudes and perceptions of students, regarding the risks of sun radiation and the protective measures that have to be taken during sun exposure.
Methods: The sample was 387 pre-graduated and post-graduate students in the University of Peloponnese. For the data collection, a self administered questionnaire was used, for data analysis the SPSS 20.0 was used.
Results: The majority of the students had dark (69.8% brown and 16,5% black) hair. As far as their knowledge, 70.8% reported they knew what the melanoma was and that 11.6% had a melanoma case in the relative's environment. About half of the participants knew what the sun radiation and sun screen is (53.2% and 52.2%, respectively). The 47.5% of the participants answered that they had 20-50 sea baths during the summer prior to the study, whereas 70.5% of them used to go to the sea between 10.00pm-16.00am, with friends or parents (80.1% and 26.6% respectively). The participants considered that the protective measures were only avoiding a sun burn (49.4%) and covering the body with clothes (40.6%).
Conclusion: The knowledge of students about the sun radiation risks is satisfactory, with definitely possibilities for further improvement. On the other hand, their attitudes, perceptions and compliance to sun protection measures, do not seem to reflect their good level of knowledge.

Key words: Attitudes, knowledge, sun protection, sun-screen, sun-block.

Introduction

The harmful effects of sun radiation are stated widely in the international literature. The climatologically conditions, mainly the ozone depletion in the earth atmosphere, allows ultraviolet sun radiation to penetrate into the skin and eyes, increasing the risk for serious health problems such as skin cancer (Fitzpatrick et al, 2003;Saridi et al, 2012).

During the last 50 years, the incidence of malignant melanoma has been internationally increased, mostly in populations with fair skin, and those of younger age. This increase is recorded mainly in countries such as Australia, New Zealand, North America and North Europe. Nevertheless, many studies display a stabilization trend in these countries, which is attributed to the implementation of systematic population awareness programs (Armstrong and Kricker, 2001).

According to the literature, it seems that over-exposure to sun, during childhood and adolescence, as well as the accumulation of this radiation, are significant risk factors for the development of various damages and mainly skin cancer (Hoang and Eichenfield, 2000).

Apart from the ultraviolet radiation during the childhood and adolescence, without any protective measures, there are also other risk factors affecting the development of skin cancer. These are a malignant melanoma history in family, increased number of dysplastic nevi without monitoring, at least a sun-burn during childhood, fair skin phototype, as well as sunless tan (solarium).

Worldwide, knowledge, perceptions and attitudes of children and adolescents have been studied and published by researchers in many countries (Purdue et al, 2008; Lucas 2010). In the context of reducing the malignant melanoma incidences, many countries aimed at population awareness about the risk of sun radiation and sun overexposure, especially without protective measures. Countries with high rates of malignant melanoma, have implemented not only targeting awareness studies, but also interventional programs for all age groups, in an attempt to prevent skin cancer. The majority of these studies have showed that the more the knowledge was increased, the better attitude and behavior was achieved. The only predisposition was that knowledge should be provided systematically and continuously, starting at an early age to adulthood, with concurrent society,

family and school participation (Davis et al, 2002; Dadlani and Orlow, 2008; Buller et al, 2006; Stankeviciute et al, 2004).

In Greece, during the last years, studies have been conducted researching knowledge and attitudes regarding sun protection, mostly in children and adolescents. In generally, these researches displayed an adequate level of knowledge on sun radiation risks, however, both children and adolescents did not endorse efficient protective measures against sun radiation (Saridi et al, 2015). A similar intervention program in Greece showed that although an increase of knowledge had been achieved, however, the adoption of proper behaviors and attitudes required a co-operation of the state's actions through health care programs, as well as the adoption of different health culture (Saridi et al, 2014).

Aim

The aim of the present study was the evaluation of knowledge, attitudes and perceptions of students of the University of Peloponnese regarding the risks caused by sun radiation, as well as the protective measures implemented during sun exposure.

Material and methods

The sample of the study consisted of 387 pre-graduate and post-graduate students of the Department of Social and Educational Policy of the University of Peloponnese. In totally, from the 425 questionnaires distributed, 387 were returned fully completed, giving a response rate 91.05%, which is considered completely satisfying in order safe conclusions to be ensured. An approval from the University of Peloponnese Department of Ethics.

Research Tool

For the data collection, a self-administered questionnaire was used. This questionnaire was used in a similar study, previously conducted in adolescents (Saridi et al, 2015). The author's permission was obtained before the study. On the initial questionnaire a few adaptations have been made, like in demographic data, and five more questions were included concerning the economic crisis effects on adopting protective measures against sun radiation.

The questionnaire, consisting of 50 questions, included demographic data, questions on knowledge, attitudes and perceptions, as well as questions investigating the impact of economic crisis to the adoption of correct behavior of the students.

Calibration and measurement of the tool Reliability- Validity

A pilot study with 50 students of another University Department was conducted. The data were not included in the final study sample. During the pilot study no difficulties were observed as far as the completion of the questionnaire.

0840040140240340440540640740840740840740840 this study, was evaluated with the correlation coefficient alpha (Cronbach's a) and was found equal to 0.75, which is considered adequate. The questionnaire also, was checked for face validity *r*s = 0.78, in which was evaluated positively.

Ethics

An approval was obtained from the University's Ethics Committee. A consensus informed form was used and the anonymity of the participants was completely ensured.

Statistical analysis

The mean, the Standard Deviation=SD) or/and median, as well as the interquartile range were used for the description of quantitative variables, whereas the absolute (N) and relative (%) frequencies were used for the description of the qualitative variables. For the comparison of two variables between two groups, the Student's t-test was applied and for the comparison among three or more variables, the parametric control analysis dispersion (ANOVA) was used. The significance levels were bilateral and the statistical significance was set to 0.05. For the analysis of the results the statistical package SPSS 20.0 was used.

Results

Individual characteristics

The sample study was 387 individuals. Of these, 73% were females and 27% males, 5.9% of them had a nationality other than Greek, whereas the majority (85%) were from a rural area.

As far as the year of study, 30% were on their second year, 37% in third, 22% in first year and 11% in fourth year.

The study of the physical characteristics displayed that a high rate of students (69.8%) had brown hair, 16.5% black, 10.9% blond, whereas only 2.1% of them had red hair. Respectively, 72.4% of the participants had brown eyes, 19.6% blue or green, and only 8% had black eyes. Finally, fair skin had the 35.1% of the students.

Concerning the number and the location of the moles, 32.1% reported they had 1to 5 moles, 38.9% had 5 to10, whereas 29% had over 20 moles. The arms were the body area with most moles reported (35.1%), followed by legs (19.1%), face (16.3%) and breast (15.8%). Almost 80% of the participants reported that they had not visited a doctor for mole inspection, 32.3% watched the moles for any changes by themselves and 38.2% answered that their moles were monitored by their parents (table 1).

Knowledge

As far as the knowledge was concerned, 70.8% of the sample reported that they knew the definition of melanoma, and 11.6% had a case of melanoma in the relative's environment. About half of the participants knew what the sun radiation and sun screen was (53.2% and 52.2%, respectively). The majority of the students (91.7%) reported knowledge of the risks of sun radiation exposure. As main sources of this knowledge, were reported the family (87.9%), media (61.2%), school (52.2%) and the internet (48.6%). The vast majority of the students (98.7%) also knew that the risk of a serious damage, increased due to sun exposure without protection, whereas as risk factors were considered the fair skin (66.7%), a previous sun-burn (31.5%), existence of numerous of moles (53.7%), whereas the obesity was reported by 5.7% of the participants. Moreover, 90.4% of the sample reported avoiding of the sun exposure during 12.00 am-15.00 a.m, and 57.6% believed that the use of an umbrella and/or shadowed space, did not offer a sun protection. The 38.2% considered that the sun reflection in sand and sea could not increase the strength of sun radiation, whereas 34.6% responded that they did not know.

Overall, the 46.5% of the students reported that the sun was equally dangerous in the winter, as well as in the summer time. According to the answers, the main problems sun radiation can cause, was skin cancer (97.7%), followed by allergy (30.5%), skin aging (72.9%), and blinding (12.9%).

Attitudes

The 47.5% of the participants answered they had 20-50 sea-baths during summer prior to the study, whereas 70.5% of them, used to go to the sea between 10.00 pm-16.00 am, with friends or parents (80.1% and 26.6%. respectively). Furthermore, 37.7% reported no use of hat for sun protection, and 59.7% used to wear sunglasses, provided by an optician (83.7%).

The 43.4% of the respondents stayed in the shadow for few minutes, whereas 31% stayed longer.

Only 7.2% reported they had not use a sun-block during the previous summer, whereas 46.5% used to use always a sun-block. Half of them (50.1%) reported the use of sun protection index between 20-40. Especially for the face, 32.3%, reported the use of a sun-block with sun protection index below 20.

Moreover, 48.8% used the sun-block when arriving at the beach, 24.5% didn't renew the sun-block after each dive, whereas 12.1% of the participants did it every hour. The purpose of sunbathing for the 64.9% of students was the obtaining of dark skin color, and for this reason, 45.5% stayed under the sun for 1- 2 hours, whereas the 28.9% stayed for 3-4 hours.

A far as sun-burns, 35.1% of the sample reported at least one sun-burn during the last summer. As it was reported, the sun-burn areas were mainly at the back (47.8%), in face (41.1%), on the arms (24.5%) and breast (9.8%). In the majority (57.1%), these sun-burns were described as light red skin without pain, whereas a sun-burn with blisters and pain was reported by 10.3% of the respondents.

Perceptions

The participants considered that the ways of protection from sun radiation were: avoiding a sun-burn (49.4%), covering the body with clothes (40.6%). sun-block application (87.9%). wearing a hat (64.1%), wearing sunglasses (36.8%).   The 50.1% of the sample believes that skin tan help them appeal more good looking, whereas 62.3% supported that the use of sun-block is necessary for health protection reasons. Regarding the sunglasses use, 43.7% of the sample use it for the eyes' protection, 30.5% wear sunglasses due to the discomfort the sun causes to their eyes, whereas 13.7% use them for style reasons only.

As far as the use of sun-block by their family 12.7% of the sample reported they use sun-block because the family imposed it and 16.8% were complied because their doctors recommended it. According to 56.3% all their family members used to use sun-block, whereas 79.1% of them mentioned that the family encourage the use of sun-block. On the contrary, friends seems to encourage them less (34.1%), following by doctors (29.2%), teachers (17.3%) and media (12.1%).

The economic crisis

A low percentage of the sample reported that they have omitted the sun-block and sunglasses purchase due to the economic crisis (11.9% and 28.9%. respectively), whereas 3.1% described their economic condition as bad. 26.9% as moderate and 32.6% as good.

Correlations

According to p-value, no statistical significance was found (p=0.05) among sex, numbers of moles and doctor visits, as well as between sex and sunglasses use, whereas, there was a statistical significance between age and moles' existence (table 2). There was also a statistical significance between place of residence and number of moles. More specifically, the individuals living in rural areas reported higher numbers of moles compared to those living in an urban area (30.1% vs 8.8%. p=0.002).

The knowledge of risk was connected to gender (p<0.001), with girls knowing the risks more than boys (68.9% vs 23.1%). It was, also, found that girls used more frequently a protection index over 40 than boys (22.5% vs 9.9%). There was no statistical significance between year of study and risk knowledge, between nationality and skin color, neither between nationality and number of moles (p=0.05).As far as the relation between nationality and the existence in the family of a relative with a skin cancer history, was showed that students of Greek nationality mentioned a higher percentage of skin cancer history in their family compared to the participants of other nationality (11.1% vs 0.5%). No significant relation was observed between the place of residence and doctors' visits for mole evaluation.   More specifically, it seems that individuals residing in rural areas visited more often doctors in order to have their moles checked, compared to those living in urban areas (14.8% vs 1.6%. p= 0.20). The time spent also under the sun, was not correlated to gender, but it was connected to the age (table 3).

Discussion

The results of this study provided important data related to the knowledge and attitudes of students about the sun radiation risks.   According to demographic and individual characteristics, identification of skin photo type, according to which,

Table 1. Sociodemographic and Somatic information

		(N)	(%)
Gender	Woman	280	73
	Man	106	27.4
Nationality	Other than Greek	22	5.9
	Greek	364	94.1
Place of residence	Urban	58	15.0
	Rural	328	85
Year of study	1st Year	88	22.7
	2nd Year	114	29.5
	3rd Year	142	36.7
	4th Year	42	10.9
Hair color	Blood	42	10.9
	Brown	270	69.8
	Red	8	2.1
	Black	64	16.5
Eye color	Blue or green	76	19.6
	Brown	280	72.4
	Black	30	7.8
Skin color	Dark skin	56	14.5
	No dark neither fair skin	194	50.1
	Fair skin	136	35.1
Number of moles	1-5	124	32
	5-10	150	38.8
	>20	112	28.9
Sites where moles were existed	Back	51	13.2
	Face	63	16,3
	Hands	136	35.1
	Legs	74	19.1
	Breast	61	15.8

Table 2. Correlation between age and moles' existence

Age	%	Number of moles 1-5	Number of moles 5-10	Number of moles >20	Total
18		6	4	4	14
	%	1.6%	1,0%	1.0%	3.6%
19		26	34	26	86
	%	6.7%	8.8%	6.7%	22.3%
20		32	48	26	106
	%	8.3%	12.4%	6.7%	27.5%
21		30	30	32	92
	%	7.8%	7.8%	8.3%	23.8%
22		12	30	20	62
	%	3.1%	7.8%	5.2%	16.1%
23		12	2	4	18
	%	3.1%	0.5%	1.0%	4.7%
24		4	2	0	6
	%	1.0%	0.5%	0.0%	1.6%
25		2	0	0	2
	%	0.5%	0.0%	0.0%	0.5%
TOTAL		124	150	112	386
	%	32.1%	38.9%	29.0%	100 %
p-value					**0.012**

Table3. Correlation between age and duration of sun exposure

Age	Duration of sun exposure				TOTAL
	>1 hour	1-2 hours	3-4- hours	> 4 hours	
18	6	4	4	0	14
	1.6%	1.0%	1.0%	0.0%	3.6%
19	20	38	24	4	86
	5.2%	9.8%	6.2%	1.0%	22.3%
20	26	50	24	6	106
	6.7%	13.0%	6.2%	1.6%	27.5%
21	10	52	30	0	92
	2.6%	13.5%	7.8%	0.0%	23.8%
22	20	24	18	0	62
	5.2%	6.2%	4.7%	0.0%	16.1%
23	4	8	6	0	18
	1.0%	2.1%	1.6%	0.0%	4.7%
24	2	0	4	0	6
	0.5%	0.0%	1.0%	0.0%	1.6%
25	0	0	2	0	2
	0.0%	0.0%	0.5%	0.0%	0.5%
TOTAL	88	176	112	10	386
	22.8%	45.6%	29.0%	2.6%	100.0%
p-value					0.013

A finding which is in agreement with a Greek study contacted in adolescents (Saridi et al. 2015).

A high percentage of the participants reported a significant number of moles in their body, not necessary a risk factor, but a situation requiring special care, management and follow up. In our study, about 32% of the students mentioned that they assessed the moles for any possible changes. In a study conducted in a University in USA, the rate of students assessing their moles was 20.7% (Hobbs et al. 2014), whereas students in Turkey considered that moles should be systematically assessed because they are risk factors for malignant melanoma (Yurtseven et al. 2012).

The student's knowledge on sun radiation's risks is generally low. Despite the high response rate (91%). the knowledge of these risks. however. is not supported by the answers given, as those questions concerned sun radiation or sun block index. Our findings were not consisted to those of a study conducted in university students in North East China, where the levels of knowledge was very high due to the education they receive on this issue (Gao et al. 2014). Opposite to this, low levels of knowledge were displayed in a research conducted in the University of Athletic Sciences in USA (Cottrell et al. 2005).

Family seems to be the main source of information, whereas school and media are following with much lower rates. Our findings, as far as the significant role of the family in the awareness on sun radiation, is in agreement with other studies (Saridi et al. 2012; Piperakis et al. 2003; Wright et al. 2008). On the contrary. a study in Turkey, reported as a main mean of awareness, television and the internet (Yurtseven et al. 2012).

We considered as positive the fact that the majority of participants (98.7%) knew that the exposure on sun radiation can cause serious damages in health, despite the fact that only 31.5% of the students considered the sun burn as a significant factor for skin cancer. Respectively, very good levels of knowledge showed other studies conducted in medical schools' students. Those levels could be attributed to the special education within their curriculum (Gao et al. 2014; Dadlani and Orlow 2008; Wright et al. 2008). Positive is considered also, the percentage of the respondents (90.4%) which avoided the sun exposure during 12.00 pm-15.00 pm. a finding which is higher than other researchers (Hobbs et al. 2014).

about one third of the participants have fair complexion, eyes and hair. The importance of knowledge and the necessity of sun protection for young people were evident. A similar study in USA displayed that individuals with fair photo type had better compliance as far the sun protections measures (Cottrell et al. 2005).

In this study about half of the participants did not use umbrella, or a place with shadow, in order to be protected by the sun. A research in Turkey found that students mostly preferred to stay in a shadow, as a protective measure against sun radiation, and they avoided sum exposure during noon (Yurtseven et al. 2012).

When studying the students' attitudes. 70.5% of the respondents used to go to the beach with their friends, during high risk hours, when the intensity of sun radiation is extremely high. The majority of the younger students, didn't take protective measures (hat or shadow), but they wore sunglasses bought in optics store. This is a finding which is not in agreement with the study of Gao et al. (2014), a study of medical school students in China, where the majority of students didn't use sunglasses at all.

Although a sun-block was used by the majority of the respondents, less than 50% reported the use of protective index between 20-40. The use of sun-block seems to be incorrect for about half of the students, given that they applied it at the time of arrival at the beach. Similar are the findings of studies in USA (Hobbs et al. 2014), Turkey (Yurtseven et al. 2012) and Palestine (Zaid and Ramahi 2012).

The sunburn incidences (47.8%), during the previous summer, showed the lack of protective measures. The most common sunburn was first degree burn (57.1%), whereas only the 10.3% was extended and higher degree. Other researchers also reported high rates of sunburn incidences among students (Dadlani and Orlow 2008). Although the participants' attitudes showed no consistency concerning the protective measures, nevertheless, they believed that they had to protect their body from sun exposure by wearing clothes, hat, sunglasses and sun-block as well as by avoiding sun-burn. However, it is warring the fact that a lot of the students (64.9%) was exposed to sun for many hours in order the desirable suntan to be achieved. In our study the suntan is considered to add charm according to the suggested standards of life beauty style (Ermertcan et al. 2005), and this is a perception which is met in students in other countries (Hobbs et al. 2014; Olson et al. 2008; Pagoto et al. 2009).

Opposite are the findings of other studies, showing that students did not consider skin-tan more attractive, probably due to differences in culture, as well as to different beauty standards which define their culture (Alghamdi 2010; Olson et al. 2008; Zaid and Ramahi 2012).

The use of sun-block by all family members, indicates that the family environment can influence the behavior through imitation, leading to adaptation of proper perceptions and attitudes as far the use of sun-block. However, friends and teachers can play a negative role to this, since they may not encourage the use of sun-block. According to studies, healthcare workers and pharmacists can play a role in adapting of healthy attitudes (Zaid and Ramahi. 2012; Gavin et al. 2011).

The economic crisis seems to influence sometimes the use of sun-block or sunglasses, but this influence is not considered as important. In a similar international study, it was found that the economic status doesn't play an important role in the sun block purchase (Zaid and Ramahi, 2012).

Different are the findings of another study (Gavin et al. 2011), which showed that the use of sun-block and sunglasses was strongly defined by the economic status. The knowledge on the risks of sun radiation exposure was better in girls which also had better compliance regarding protection index. This is a finding of other studies also, showing that women generally have a better level of knowledge than men. (Mermelstein and Riesenberg, 1992; Hobbs et al. 2014; Zaid and Ramahi, 2012). This could be explained by the fact that girls have higher trend to embellish themselves using more beauty products, so in this context, it's more possible to use products of sun protection.

In our study, no significant correlation was found between nationality, knowledge and students' attitudes on sun radiation. An international study, showed that white and Spanish students in the USA, have a better attitude and behavior in comparison with the dark color students and this can be attributed to their higher proportion of melanin (Hobbs et al. 2014).

Finally, an important finding was the estimation that the more the age increased, the more the duration of the stay under the sun is increased, a finding which is in agreement with the findings of Hobbs et al. (2014), despite the fact that many studies reported increased knowledge in older ages (Gao etal. 2014; Yurtseven et al. 2012; Gilaberte et al. 2008).

Limitations of the study

This study was conducted in a distal Department of the University of Peloponnese and therefore cannot be considered as representative of Greek students.

A larger sample from many and different university departments could provide us more reliable results.

Conclusions

The knowledge of students about the sun radiation risks is satisfying, with definitely possibilities for further improvement. On the other hand, their attitudes, perceptions and compliance to sun protection measures, did not seem to reflect this good level of knowledge. The modification of the incorrect behaviors related to the sun exposure protection, is a difficult but vital obligation of the State, which should be implemented through coordinated health care programmers in all age groups and with the involvement of all regulators and constructions of the society.

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