

# Sunbed Use Among Belgrade High School Students

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## Abstract

**Introduction:** The incidence of melanoma has been increasing worldwide. Ultraviolet (UV) radiation from the sun and sunbeds are the major risk factors for the development of melanoma and non-melanoma skin cancers. Excessive UV exposure during childhood and adolescence increases the probability of skin cancer in adulthood. The objective of this study was to analyze the exposure to artificial UV radiation using sunbeds among Belgrade high school students. **Material and Methods:** The study was conducted using a questionnaire among 549 3<sup>rd</sup> and 4<sup>th</sup> grade students in 4 Belgrade high schools. The questionnaire included 10 questions on the sunbed use, attitudes, and general knowledge about effects of UV radiation from sunbeds. Statistical analysis assessed the frequency rate and relative frequency as methods of descriptive statistics. **Results:** A total of 39% of participants had used a sunbed at least once, and 38% plan on using it in the future. When asked at what age they first used a sunbed, 45.66% of high school students stated that it was at the age of 13 or 14. Most adolescents have used a sunbed less than 5 times (38%), whereas 8% of them used it over 30 times. **Conclusion:** The awareness of the risks associated with UV exposure in sunbeds is not at a satisfying level among Belgrade high school students. Educational and legislative measures are necessary to protect this highly sensitive population and prevent malignant consequences.

**Key words:** Skin Neoplasms; Sunbathing; Ultraviolet Rays; Neoplasms, Radiation-Induced; Melanoma; Adolescent

The incidence of melanoma is steadily increasing worldwide, making it a global health problem. The number of newly diagnosed patients is increasing at a faster rate than for any other neoplasm, with the exception of lung cancer in women. The incidence increase varies, but on average it is estimated to be 3 - 7% per year among white population (1). This increase can partially be explained by earlier detection and better diagnosis of the disease, but it is believed that higher exposure to risk factors can also be of great influence (2).

Ultraviolet (UV) radiation plays an important role in the pathogenesis of both melanoma and non-melanocytic skin cancer (3). International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) considers exposure to natural and artificial sources of UV radiation an important risk factor, as level 1 – “carcinogenic to humans” (4). It is well established that excessive exposure to sun in the childhood and adolescence increases the risk of skin cancer in adulthood. As much as 50 - 80% of the total

amount of UV radiation is accumulated in this period of life, although the exact mechanism of this phenomenon is not yet elucidated (5).

Acute skin reactions to the UV radiation in sunbeds include erythema, phototoxic skin reactions, pseudoporphyria, while potential chronic effects of sunbed use are premature skin aging and skin cancer (6). A recent study revealed that the risk of melanoma was 41% higher in participants who had used a sunbed compared with those who had never used a sunbed, and also that the risk of melanoma was greater with earlier age at first use of sunbeds and for earlier disease onset. The participants who reported more than 10 lifetime sessions appeared some six times more likely to be diagnosed with melanoma before 30 years of age compared with never-users (7).

The objective of this study was to analyze the exposure to artificial UV radiation among Belgrade high school students, as well as their knowledge and attitudes towards its harmful effects on health.

## Material and Methods

The study was conducted among students of four high schools in Belgrade, two general high schools, and two high schools of special profiles. Since all schools are in the city territory, our sample represented mainly urban population.

Using a questionnaire, we interviewed 549 students of the 3<sup>rd</sup> and 4<sup>th</sup> grade (17- and 18-year-olds) of the selected schools, 406 females and 143 males. The study took place over the course of 2 weeks (January 16 – February 01, 2012). The timing of the researcher's school visits was based on each school's program schedule.

The questionnaire about the sunbed use was anonymous and included 10 questions (Table 1). The questionnaire was pilot tested among fifty 5<sup>th</sup> year students of the School of Medicine, University of Belgrade, who evaluated it and gave their suggestions.

The researcher was present while students completed their questionnaires and was available to any student who needed clarification regarding the questions.

Statistical analysis assessed the frequency rate and relative frequency as methods of descriptive statistics.

## Results

The results are shown in the Table 1. The first question was "Have you ever used a sunbed?" A total of 39% of interviewees (n=219) answered positively: the majority were females (almost half of all females – 206/406) compared to only 9% (13/143) of males who have used a sunbed at least once in their lives.

The next five questions were answered only by those students who reported using sunbeds (n=219). When asked at what age they first used a sunbed, most students (45.66%) answered that it was at the age of 15 or 16, while almost a negligible percent of students (1.37%) reported using a sunbed before the age of 12. The next question was about the use of sunbeds in the past year, that is, in 2011, and most adolescents used sunbeds less than 5 times (38%), whereas 8% of them used it over 30 times. The students used sunbeds predominantly during the spring season (39%), followed by summer and winter season (about

one quarter of them). The students were able to circle more than one answer to this question; therefore the percentages were calculated based on all the answers (282 answers in total). The next question was about the average time spent in sunbeds. The vast majority (69.41%) of interviewees answered 5 - 10 minutes, but 16.44% of adolescents spent 11 - 16 minutes sun tanning in sunbeds during each visit. Furthermore, around 56.62% of students were given instructions by sunbed employees about the proper use and potential harmful effects. However, the answers differed significantly between genders – only 4/13 males (31%) compared to almost twice as much percentage of females (120/206, 58%) reported receiving the information.

As for the use of sunbeds in the future, 37.7% of all interviewees are planning to continue using sunbeds, while 62.3% do not. All students were instructed to answer this question, that is, both those who have and those who have not used sunbeds before. The next question was about the financial aspects of sunbed use, i. e., whether the examinees would use it more often if they could afford it. As it turned out, money was not the main issue, because 84.34% of students said they would not. The following question was about the adolescents' attitude towards sunbeds. The majority of students considered their use to be very harmful (43.53%), but on the other hand, a high proportion of students (38.44%) believed that harmful effects depend on the number of visits and the total time spent on a sunbed. Merely 1.09% of interviewees thought that using sunbeds is not harmful, whatsoever.

Moreover, the largest proportion of students considered that tanned skin, obtained either using sunbeds or in the sun, was a sign of skin damage, but at the same time, one third considered that it gives them slimmer and more beautiful appearance. Almost every eight adolescent thinks that tanning helps treat acne (12.01%), and every tenth feels that it makes him or her look 'cool' (10.43%). In the survey, choosing more than one answer was possible (total number of answers was 633).

## Discussion

Sunbed use is a well-known risk factor for skin cancer; it has been included in differ-

**Table 1.** Questionnaire about the sunbed use among Belgrade high school students

Questions	Answers				
Have you ever used a sunbed? (n=549)	Yes	No	–	–	–
Number (%) of females (n=406)	206 (50.74%)	200 (49.26%)	–	–	–
Number (%) of males (n=143)	13 (9.09%)	130 (90.91%)	–	–	–
At what age have you used a sunbed for the first time? (n=219)	<11	11 - 12	13 - 14	15 - 16	17 - 18
Number (%)	3 (1.37%)	3 (1.37%)	61 (27.85%)	100 (45.66%)	52 (23.75%)
How many times have you used a sunbed during the past year? (n=219)	<5 times	5 - 10 times	11 - 15 times	16 - 30 times	> 30 times
Number (%)	82 (37.44%)	71 (32.42%)	18 (8.22%)	31 (14.16%)	17 (7.76%)
At what season do you use a sunbed most frequently? (n=282)	Spring	Summer	Autumn	Winter	–
Number (%)	111 (39.36%)	68 (24.11%)	37 (13.12%)	66 (23.41%)	–
How much time do you spend in sunbed on average? (n=219)	<5 minutes	5 - 10 minutes	11 - 15 minutes	16 - 20 minutes	–
Number (%)	21 (9.59%)	152 (69.41%)	36 (16.44%)	10 (4.57%)	–
Did you get any information about the possible consequences of sunbed use from the employees? (n=219)	Yes	No	–	–	–
Number (%)	124 (56.62%)	95 (43.38%)	–	–	–
Do you plan on using the sunbed in the future? (n=549)	Yes	No	–	–	–
Number (%)	207 (37.7%)	342 (62.3%)	–	–	–
Would you use the sunbed more often if you could afford it? (n=549)	Yes	No	–	–	–
Number (%)	86 (15.66%)	463 (84.34%)	–	–	–
I think that sunbed UV radiation is: (n=549)	Very harmful	Moderately harmful	Not harmful at all	Health hazard depends on the frequency and length of exposure	–
Number (%)	239 (43.53%)	93 (16.94%)	6 (1.09%)	211 (38.44%)	–
I think that suntan from sunbeds: (n=633)	Reflects general health	Means that I am in trend	Helps treating acne	Gives more beautiful and slimmer look	Represents a type of skin damage
Number (%)	30 (4.74%)	66 (10.43%)	76 (12.01%)	212 (33.49%)	249 (39.33%)

ent risk prediction models not only for melanoma (8, 9), but also for other forms of skin cancer, such as squamous cell carcinoma (10). The questions in our questionnaire were primarily targeted at different aspects of sunbed use among the high school population. It has been proved that sunbed use before the age of 35 increases the risk of melanoma development by 75% (11). A large number of Belgrade high school students have used a sunbed at least once in their lives (almost 40%), which is significantly more than their peers in England (11.2%) (2), United States (15.6%) (12) and Hungary (15.1%) (13), but similar to Danish population (38%) (14). On the other hand, most of our adolescents used it at the age of 15 or 16 years for the first time, which is nearly two years later compared to English high school students (2).

About 70% of our examinees, who reported using sunbeds, have used them less than 10 times during the previous year, whereas, for example, American students answered similarly only in 51% of cases (12). The majority of students use sunbeds for 5 - 10 minutes per visit; 16% of our students use them for >11 minutes (the same as in England) (2). On the other hand, a higher proportion of English students were properly informed about the potential hazards of tanning – only 20% of them were not given proper information, compared to 40% of our students.

Tanning is thought to be very dangerous by 44% of Belgrade adolescents, and every other Turkish student agrees with this (15). Nevertheless, one third of our students and as much as two thirds of Greek peers feel that dark skin tone from tanning improves their appearance (5). As for another example, 32% of young Americans and 45% of young Maltese even consider it to be a reflection of good health (5); only 5% of Belgrade students agree with this.

## Conclusion

In conclusion, awareness about risk factors associated with sunbed UV exposure is not at a satisfying level among the Belgrade high school population. A high number of our adolescents show poor behavior patterns: alarmingly large number use sunbeds regularly (and plan to continue doing so) and ap-

preciate dark skin tone from tanning. Taking into consideration the extent of damage that UV exposure in sunbeds may have at this age, it seems reasonable to ban the use of sunbeds for minors (under the age of 18) in our country, as it has been done in numerous countries in the world.

## Abbreviations

UV - Ultraviolet

WHO - World Health Organization

IARC - International Agency for Research on Cancer

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## Upotreba solarijuma kod beogradskih srednjoškolaca

### Sažetak

Uvod. Incidencija melanoma je u stalnom porastu širom sveta. Ultravioletna radijacija, koja potiče od sunca i veštačkih izvora – solarijuma, predstavlja jedan od glavnih faktora rizika za razvoj melanoma i nemelanomskih kancera kože. Produženo izlaganje suncu u detinjstvu i adolescenciji povećava rizik za nastanak raka kože u odraslom dobu. Cilj ovog rada jeste analiza ponašanja beogradske srednjoškolske populacije po pitanju izlaganja veštačkim izvorima ultravioletnih zraka. Materijal i metode. Studija je izvedena anketiranjem 549 učenika trećeg i četvrtog razreda u četiri beogradske srednje škole. Anketa se sastojala od 10 pitanja u vezi sa upotrebom solarijuma i informisanosti o efektima ultravioletnog zračenja koje potiče iz solarijuma. Od

statističkih metoda korišćeni su procena učestalosti i relativni brojevi, kao metode deskriptivne statistike. Rezultati. Čak 39% ispitanika koristilo je solarijum bar jednom u životu, 38% planira da ga koristi i u budućnosti. Na pitanje kada su prvi put koristili solarijum, 45,66% srednjoškolaca je odgovorilo da je to bilo sa 13 ili 14 godina. Većina adolescenata (38%) koristila je solarijum manje od pet puta, dok je njih 8% koristilo solarijum više od 30 puta. Zaključak. Svest o rizicima koje nosi izlaganje ultravioletnim zracima u solarijumu nije na zadovoljavajućem nivou među beogradskom srednjoškolskom populacijom. Stoga je od ključne važnosti sprovođenje edukativnih i zakonskih mera da bi se ova osetljiva populacija zaštitila od malignih posledica.

**Ključne reči:** Neoplazme kože; Sunčanje; Ultravioletni zraci; Zračenjem indukovane neoplazme; Melanom; Adolescenti