

Sun Exposure and Sunscreen Use among Sunbathers in Denmark

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Eight hundred and eight sunbathing Danes were interviewed in order to register the duration of sun exposure and sunscreen use. The mean sun exposure time, 203 min, was found to be independent of sex, age and use of sunscreen. Overall, sunscreens were used by 65%, 73% of the females and 52% of the males. The median sun protection factor used by subjects older than 10 years was 5; in the case of children 10 years or younger, it was 12. Eight per cent of the interviewed subjects used more than one factor. Fifty-seven per cent of the sunscreen users applied the sunscreen prior to arriving at the beach. The sun exposure time was not significantly different in the group of subjects using sunscreens, compared to the group of subjects not using sunscreens. This study indicates that sunscreen users may not increase their exposure to the sun. Key words: sunlight; sun-screening agents.

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Sun exposure has been accepted as the major cause of actinic damage such as cutaneous aging and skin cancer (1–3). Previous studies have shown skin cancer to be far more common in whites than in blacks and among people with long-term sun exposure (4, 5). The principal precaution to lower the risk of melanoma and non-melanoma skin cancers is sun protection. In laboratory animals the use of sunscreen delays the development of skin cancer (6). Sunscreen usage by humans has been found to delay as well as to inhibit the development of actinic keratoses into carcinomas (7).

The use of sunscreen by beachgoers has been evaluated in Puerto Rico, Newcastle, Queensland and Cape Town (8–11). To the best of our knowledge, no evaluation has ever been conducted in Europe. In recent years sunscreen usage has been studied by questionnaires distributed among the general Danish population. In 1990, 36% of the general population claimed to use sunscreens when sunbathing (12). Public campaigns have recommended the use of sunscreen when sunbathing, unless other kinds of protection like clothes and shade are used. Consequently, persons exposing themselves to the sun without other kinds of protection should apply an appropriate sunscreen. The purpose of this investigation was to determine the sun exposure time and the use of sun protective agents among sunbathing persons wearing no more than a bathing suit during a stable sunny midsummer and to evaluate if sunscreen users were exposed more extensively than those not using sunscreen.

METHODS AND SUBJECTS

The interviews were conducted during 4 consecutive sunny days in an extended sunny period in July 1994 on five beaches and in a park with a swimming pool in east Denmark. One beach was located on

an island in the southern part of Denmark (120 km from Copenhagen), whereas the other four beaches and the park were all located in or in the immediate vicinity of Copenhagen. Copenhagen is located at 56° N, 12° E at the entrance to the Baltic Sea (1‰ saltness). The interviews took place between 9 a.m. and 3 p.m. Only subjects wearing no more than bathing suits were approached, while dressed persons and persons just passing by were excluded. The mean age of the 808 subjects (325 males and 481 females) was 28 years. Subjects were randomly picked among Caucasian sunbathers. Among those, only Danes were interviewed in order to find subjects with a relatively homogeneous and fair skin type. The interviews were performed according to a questionnaire. Subjects were asked about sunscreen usage at the very time of the interview. Those using sunscreens were asked to specify application area as a) face b) arms c) body d) legs or e) entire body. They were also asked if the sunscreen had been applied before or after arriving at the location of sunbathing and if they had been swimming on the day of the interview and if so, if they had reapplied the sunscreen after bathing. We did not ask if the sunscreen used was declared waterproof or water-resistant. Those not using sunscreen were asked if they ever used sunscreen and presented to eight possible reasons for not doing it: a) I never burn when sunbathing; b) Sunbathing does not make my skin red; c) Sunscreen reduces tanning effect; d) Sunscreen products are too greasy; e) Sunscreen is too expensive; f) I will not stay here for long; f) I don't care or other reasons for not using sunscreen. All persons were asked to reveal their age, time of arrival to location and time of expected departure. The sun exposure time was defined as the interval (minutes) between the arrival time and the time of expected departure.

The sex of the subjects as well as the location and the time of the interviews were noted by the interviewer. All subjects were asked in person; however, adults responded on behalf of the children when too young to answer.

RESULTS

Seventy-three per cent of the females and 52% of the males reported using sunscreens on the day of the interview. Ten per cent of the females and 4% of the males used more than one sun protection factor (SPF). Subjects 10 years and younger used a median protection factor of 12, whereas subjects older than 10 years used a median SPF of 5 (Fig.1). Twenty-six per cent of the females and 48% of the males reported that they had not applied any SPF on the day of the interview. Forty-three per cent of subjects older than 10 years and 11% of subjects 10 years or younger reapplied sunscreen after bathing. Fifty-seven per cent of the sunscreen users applied the sunscreen before arriving at the location for sun exposure.

Two hundred and eighty-five subjects (35%) had not used any sunscreen product on the day of the interview, and 25% of those (9% of all interviewed subjects) stated that they never used sunscreens. The main reasons given for not using sunscreens are summarized in Table I. About 50% stated that they did not need sunscreen because they never got burned or red. Other reasons for not using sunscreen was "I already have a tan", "I used sun-bed prior to sunbathing" or "I have been sunbathing in Southern Europe".

The sunscreen was applied to at least one body region by 26%, whereas 74% applied it to the whole body. We found no

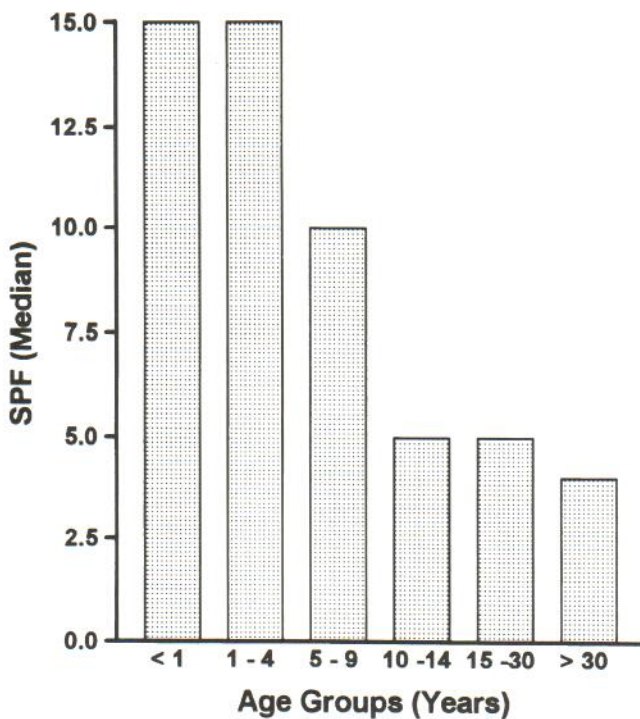


Fig. 1. Median sun protection factor (SPF) used by different age groups.

Table I. Main reasons for not using sunscreens

Reason given by 285 subjects	%
I do not burn when sunbathing	43
Sunbathing does not turn my skin red	6
I get less tanned	2
Sunscreen products are too greasy	3
Sunscreen products are too expensive	1
I will not stay here long	8
I am indifferent	5
Other reasons for not using sunscreens	19
No answer to this question	12

correlation between skin application area and sun exposure time. The mean sun exposure time was 203 min and found to be independent of sex, age and use of sunscreens.

DISCUSSION

Surprisingly, as many as 65% of the sunbathing population used sunscreen. The summer of 1994 was exceptionally hot and sunny in Scandinavia. The average temperature at 2 p.m. during the days for the interviews was 22°C, and this may have influenced the use of sunscreens either by increasing people's awareness of the sun's burning rays or by hardening the skin, resulting in a reduced tendency to use sunscreens. In 1990 only 36% of respondents in a survey used sunscreen (12). This discrepancy may possibly be due to recall errors and the difference in the populations investigated. We interviewed only the subjects in the actual sunbathing situation, whereas the previous study was based on a retrospective questionnaire among the general population, sunbathers as well as non-sunbathers. In the previous study children were not included.

The FDA/DIN methods (13, 14) require that the sunscreen must be applied prior to radiation in order to acquire the protection labelled. Forty-three per cent did not apply the sunscreen before exposure to the sun and consequently may have had insufficient protection. Most sunscreen products declare "tested by the FDA/DIN method", it might be more instructive also to inform the user when to apply the sunscreen.

Eight per cent used more than one sunscreen. We did not ask the subjects about their rationale behind this usage pattern. Similarly to the findings of Johnson & Lookingbill (15), we found that subjects 10 years and younger used a higher protection factor, with no difference in use of protection by boys and girls. This observation indicates that information to parents concerning the protection of small children has been well received (16-18). In a recent study it was reported that subjects younger than 30 years spend more time in the sun than older subjects (15). We found no relation between sun exposure time and age within the sunbathing population. However, the mean age of the sunbathing population (28 years) is 7 years less than the mean age of the general Danish population (35 years).

Children, who generally swim more frequently than adults, are the ones who are least likely to reapply sunscreen after a swim.

Despite public warnings of the potential risk of sunbathing, 35% of the sunbathers did not use any sunscreen on the day of the interview. About 50% stated that they did not expect to get burned or red despite the relatively long sun exposure time (Table I), which usually turns most people red even when already tanned. This statement may indicate an inability to assess if the skin is red. Further studies concerning this matter seem necessary.

In our survey, subjects not using sunscreen were exposed to the sun for as long a period as the subjects using sunscreens. The opinion that sunscreen usage may encourage the user to spend more time in the sun and thereby increase the risk of skin cancer is often cited (19, 20). Comparing the sun exposure time in the group of sunscreen users to the sun exposure time in the group of subjects not using sunscreen, we were not able to confirm this opinion.

We conclude that additional information on how and when to use sunscreen is still needed and that men especially need to understand and accept the importance of sunscreen use when sunbathing.

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