Sun protection in Singapore's schools

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ABSTRACT

Introduction: The World Health Organisation has identified schools as key players in the global effort to reduce the rising incidence of skin cancer. Singapore lies 70 miles from the Equator, with one of the world's highest ultraviolet (UV) index scores. It is a multi-ethnic society, with many expatriates. Children in Singapore are likely to be exposed to high levels of UV radiation, and represent a variety of skin types. This study aimed to assess sun protection measures in schools, the frequency of reported sunburn in schoolchildren of different ethnic groups, the level of parental and school concern about sun exposure, the sun-protective measures currently in place, and the parental and school support for public education and "sunsmart" school programmes.

Methods: Questionnaires were sent to principals and parents of primary schoolchildren in 20 local and eight international schools in January 2003.

Results: The majority of children in all ethnic groups in Singapore were reported to suffer to some degree from sunburn during their first ten years. Over 50 percent of parents and head teachers predicted an increased risk of skin cancer in their children. Some protective measures were in place. But teachers and parents were concerned, and most favoured the promotion of more active measures.

Conclusion: The reported incidence of sunburn among Singaporean school children is higher than expected across all ethnic groups. Given the current level of sun protective measures in place, more could be done to educate parents and schools regarding "sunsmart practice", and reducing their future risk of skin cancer and eye damage.

Keywords: cataract, melanoma, school children, skin cancer, sunburn

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INTRODUCTION

Childhood exposure to ultraviolet (UV) radiation and sunburn has long been associated with the later development of skin cancer, including melanoma, basal cell carcinoma and squamous cell carcinoma[1,2]. UV radiation is also responsible for significant eye damage, especially cataract formation[3,4].Singapore, an equatorial country with a multi-ethnic population, has one of the highest ultraviolet (UV) index scores in the world, on par with Darwin, Australia but with little seasonal variation[5] (Fig. 1). There is no data on the incidence of sunburn in Singapore. Therefore, this study was undertaken to establish whether there was a need for public education regarding the risks of UV radiation and the establishment of a "sunsmart" public health campaign in Singapore. This study aimed to assess: (1) sun protection measures in schools; (2) the frequency of reported sunburn in schoolchildren of different ethnic groups; (3) the level of parental and school concern about sun exposure; (4) the sun-protective measures currently in place; and (5) parental and school support for public education and "sunsmart" school programmes.

METHODS

With the support of the National Skin Centre, the Health Promotion Board and the Ministry of Education, we surveyed 20 Singaporean primary schools catering to the local population, and eight international schools attended mainly by children of expatriates. Ethical approval was granted by the National Skin Centre. Schools were selected from the four different sectors that school nurses were visiting during that time. International schools were randomly selected. In both cases, they were felt to be typical of those school types. Principals and parents were asked to fill in anonymous questionnaires on the measures they were using to protect children aged 11 years or less from the sun during school hours. Questionnaires were printed in English and Mandarin.

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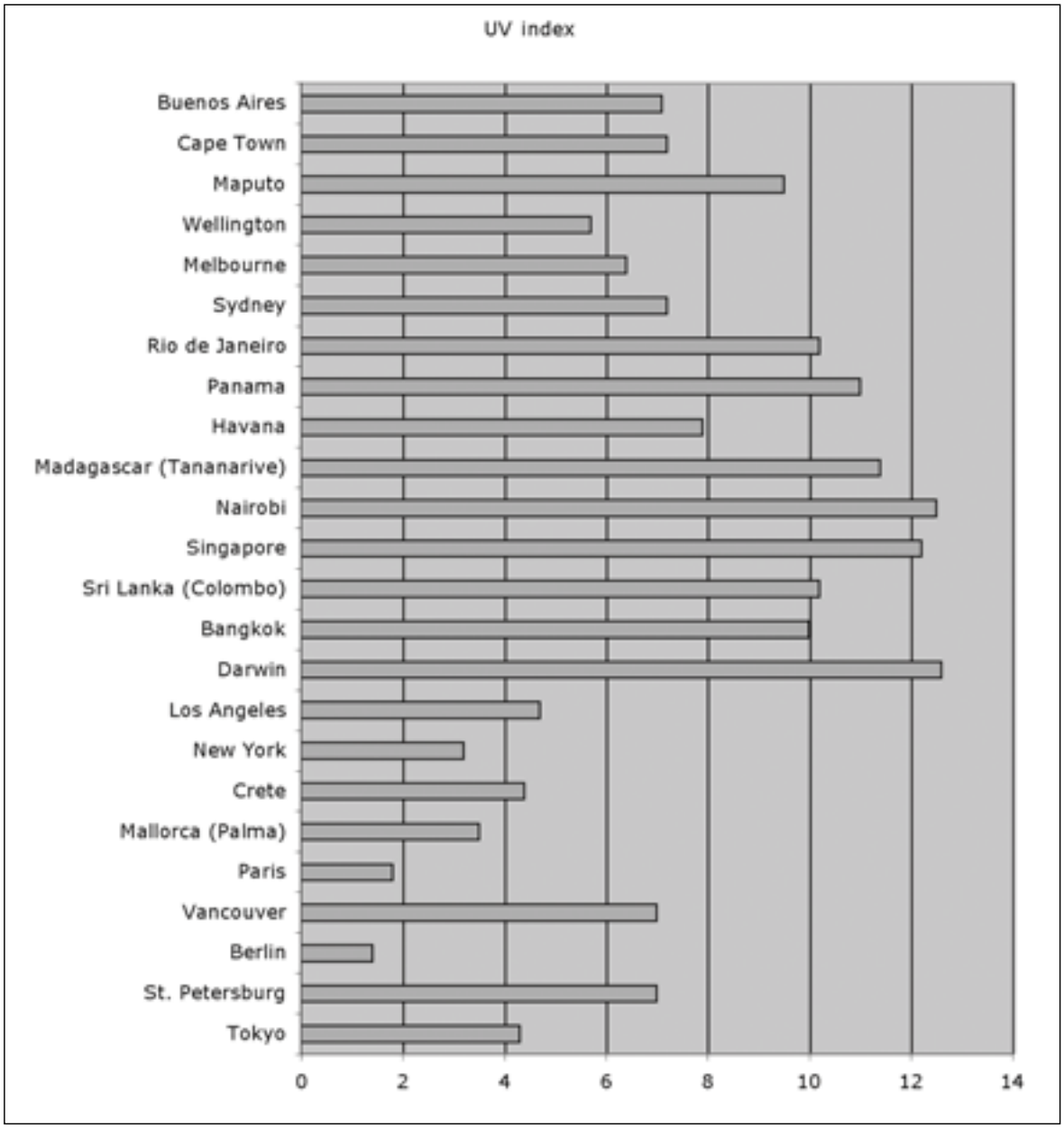
Fig. 1 UV index comparison.



Source: Federal Office for Radiation Protection, Germany[5].

RESULTS

A total of 1,730 of 2,134 parental questionnaires were returned, adequately completed, providing an 81% response rate (69% for international schools, 85% for local schools). For the local schools, response rates among different ethnic groups closely reflected the overall ethnic mix in Singapore, using the Singaporean convention of classifying races as Chinese, Malay, or Indian. International schools provided children with a further variety of skin types, in particular, Caucasian, Japanese and Eurasian. Results were collated into a database and correlated by ethnic group (Table I).

The mean age of the children surveyed was 6.3 years. Parents were asked in the questionnaire

Table I. Ethnicity and number of school children respondents.

Chinese	1,093
Malay	142
Indian	119
Eurasian	57
Caucasian	216
Afro-Caribbean	1
Japanese	45
Other / Not stated	57
Total	1,730

Table II. Burn frequency of all respondents.

Burn frequency	Percentage of all respondents
Always	3.5
Usually	9.2
Sometimes	51.1
Never	35.6
Not Stated	1.0

whether their child's skin burned when exposed to the sun. The question was worded as follows:

Does your child's skin burn if exposed to the sun?

- Never
- Sometimes
- Usually
- Always

Surprisingly, a majority of all respondents – including more than 50% of Malay and Indian respondents, reported that their child's skin burned, at least sometimes, during their first ten years of life (Table II).

Breakdown of the results according to the main ethnic groups (Table III) showed that 60% of all school children burn in Singapore's sunshine, 50% of Malay and over 50% of Indian children burn, 60% of Chinese children burn, and 80% of Japanese and Caucasians burn, and more than 40% burn frequently.

Parents were asked a series of questions to test their awareness of the risks from sun damage. Although Caucasians and Japanese showed higher levels of concern than other groups, approximately 80% of respondents at local schools were somewhat or very concerned about sun damage. Overall concern about irregular pigmentation and early aging was lower than concern about skin cancer in response to the following question:

Sample questionnaire number 9.

How do you view the following potential long-term risks to your child from the sun:

a. Irregular pigmentation
- No risk
- Minor risk
- Serious risk

b. Early aging changes in the skin
- No risk
- Minor risk
- Serious risk

c. Skin cancer in later life
- No risk
- Minor risk
- Serious risk

In both local and international schools, the trend was the same with more parents being concerned about a future risk of cancer than about aging and even fewer about pigmentation. 55% of parents predicted a serious risk of future skin cancer in their children, 44% a serious risk of premature skin aging and 30% of pigmentary change. Perceived risk of skin cancer was highest among Caucasians and Japanese, but also among Indian and Malay respondents (Table IV).

Although parents were asked to state their level of education, we feel unable to draw meaningful correlation between education levels and parental attitudes to sun protection. The sample of Japanese and Caucasians was drawn mainly from an expatriate

Table III. Burn frequency (in percentages) by ethnic group.

	Chinese	Malay	Indian	Eurasian	Caucasian	Japanese	Others
Never	39.4	49.3	38.7	40.4	10.2	13.3	29.8
Sometimes	52.6	46.5	49.6	52.6	49.5	35.6	54.4
Usually	6.1	3.5	8.4	7	23.6	33.3	12.3
Always	1.2	0.7	3.4	0	15.7	15.6	1.8
Not stated	1.1	0	0	0	1	2.6	2.5

Table IV. Perceived risk of skin cancer (in percentages) by ethnic group.

	Chinese	Malay	Indian	Eurasian	Caucasian	Japanese	Others
None	9.4	21.8	18.5	7	0.9	4.4	8.8
Minor	35.5	23.2	33.6	43.9	14.8	31.1	42.1
Serious	52	50	45.4	47.4	83.3	62.2	45.6
Not stated	3.1	4.9	2.5	1.8	0.9	2.2	3.5

community recruited to work in Singapore because of their professional skills: most such expatriates have tertiary education. It is therefore difficult to know whether their higher awareness reflects further education or the fact of having more vulnerable skin.

Over 90% of school principals were concerned about the effect of UV radiation on their children's health, and most perceived a serious risk of long-term effects, especially skin cancer. Given the level of concern among teachers and parents, we might have expected extensive use of sun protection. 50 percent of international schools had no sun protection policy. Local schools had a policy of scheduling outdoor physical exercise out of peak UV hours (ie, before 10am and after 4pm).

Hats and sunglasses were seldom worn, and were not actively promoted. Less than 3% of all children sampled wore sunglasses outside (most of the time), and wearing of sunglasses was often discouraged. 6% of children in local schools wore caps usually or always, compared to 77% in the international schools sample.

Few local or international schools had extensive shades over their play areas. International schools exposed their pupils to more sun by scheduling playtimes closer to noon. Approximately one-third of children wore protective swimwear most or all of the time. Chinese, Malays and Indians used them less than Caucasian and Japanese. Sunblock was used infrequently by all ethnic groups, where only 22% of all children used sunblock at school (usually or always); this reflects 18% usage in local schools and 35% in international schools.

A minority of local schools provided sunblock for use by pupils. None of the international schools provided sunblock for pupils, and if used at all, it tended to be applied by parents, before school, often many hours before playtimes. Overall, sun protection, especially sunblock, appeared to be left largely to parents.

To test attitudes to more active measures, we asked both principals and parents how they would view another parent who insisted on protecting their child with sunblock, hat, protective swimwear and sunglasses. Fewer than 10% of parents said they would view this as unreasonable, although most local school respondents said they would consider the other parent overcautious.

We also asked whether, if a doctor or government body advised such measures, schools and parents would comply. The response was overwhelmingly positive. 100% of school principals said that they would accept and comply, although 25% admitted that they might skip some of the suggested protective provisions. Local and international schools' responses were identical in this respect. Even more strikingly, 83% of parents said that they would comply with advice to protect their children. This response varied very little across ethnic groups.

Similarly, when principals were asked whether they would welcome further educational input in their schools to increase confidence in managing sun protection, 88% of local schools and 100% of international schools said yes. Among parents, 79% said that they would be interested in learning more about how to protect their child from the effects of the sun, where interest was higher among Malay and Indian parents than among Japanese parents.

DISCUSSION

The idea – common in the west – that only Caucasians burn and are at risk needs reviewing; children with darker skins burn too, some frequently. This finding goes against the received wisdom, and has important implications given the strong link between sunburn and skin cancer. If these children are burning, we can speculate that their risk of skin cancer is increasing steadily. What is not clear is why they burn: it may be that dark skin provides less protection against UV damage than is commonly believed; or it may be that dark-skinned children are simply spending more time in the sun, with less protection, than their light-skinned contemporaries. This needs further investigation.

Currently, the reported incidence of skin cancer in Singaporean residents is low, but rising. It is the seventh most common cancer in Singaporean residents[6]. In general, skin cancer is seen as mainly affecting Caucasians, and the national statistics naturally do not reflect cancers developed by transient expatriate children in later life. Nevertheless, among the local population, cultural and economic changes mean that today's children probably spend more time in the sun than their parents who grew up in the 1970s.

According to a recently published World Health Organisation (WHO) guidance, one in three cancers diagnosed worldwide is skin cancer[7]. Two to three million cataracts worldwide are sun-related, especially in countries close to the equator. The WHO has pointed out that, although skin cancers are less common in dark-skinned people, prognosis is worse because the cancers are diagnosed late. In addition, darker skin is no protection against eye damage from UV radiation. Hence all children should be included in health campaigns directed at UV protection.

Sun protection is increasingly being recognised as an important public health issue. The WHO recently issued guidance to schools worldwide, recommending UV protection of children's eyes and skin as a priority under the UN Convention on the Rights of the Child. In the United Kingdom (UK), results of a recent survey released on March 30, 2004 by Cancer Research UK showed that over 30% of children in the UK suffer with sunburn during the British summer (unpublished data). Melanoma rates are rising at an alarming rate in the UK, and action, in the form of public education, has been instituted.

The WHO has identified schools as key players in its worldwide campaign to reduce skin cancer mortality. The Centers for Disease Control and Prevention (CDC), USA has produced guidelines for American schools, recognising the vital role that motivated schools can play in the prevention of skin cancer. Childhood is the key time for exposure, and children spend most daylight hours at school. Schools are geared to teaching good habits. School programmes are cost-effective, and save health costs later. A school programme in Victoria, Australia, has played a major role in reducing skin cancer in 14-49-year-olds by 11% over the past decade[7].

In conclusion, this survey shows that Singapore's school principals and parents are rightly concerned about the risks of UV radiation to children. Further measures could be taken to reduce damage in childhood and to encourage sunsmart behavior. International schools especially might look at rescheduling playtimes and physical education (PE) classes to avoid peak UV hours, in a way that has been traditionally recommended in local schools. Local schools could look at children wearing sunsmart hats where appropriate and ensure that the policy for avoiding outdoor activities during peak UV hours is reinforced. Increasing shade should be an important long-term objective for all schools, and parents could be encouraged to provide sunblock and protective swimsuits for their children.

Our survey shows that in Singapore, schools and parents are willing to be guided, and would comply with advice if given. This study indicates that a public health campaign in Singapore's schools would be welcome and effective, and could provide a model for other school systems in multi-ethnic societies. An important limitation in this study was the fact that the frequency of sunburn was assessed through parental reporting, and was therefore, subjective.

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REFERENCES

1. Weinstock MA, Colditz GA, Willett WC, et al. Nonfamilial cutaneous melanoma incidence in women associated with sun exposure before 20 years of age. Pediatrics 1989; 84:199-204.
2. Gilchrest BA, Eller MS, Geller AC, et al. The pathogenesis of melanoma induced by ultraviolet radiation. N Engl J Med 1999; 340:1341-8.
3. Taylor HR, West SK, Rosenthal FS, et al. Effect of ultraviolet radiation on cataract formation. N Engl J Med 1988; 319:1429-33.
4. Rosmini F, Stazi MA, Milton RC, et al. A dose-response effect between a sunlight index and age-related cataracts. Italian-American Cataract Study Group. Ann Epidemiol 1994; 4:266-70.
5. Federal Office for Radiation Protection. Worldwide UV Index. Salzgitter, Germany: Federal Office for Radiation Protection, 2003. Available at: www.bfs.de/uv/uv2/uvi/world.html. Accessed August 10, 2005.
6. Chia KS, Seow A, Lee HP, et al. Cancer incidence in Singapore 1993-1997. Singapore Cancer Registry Report No. 5. Singapore Cancer Registry, 2000.
7. World Health Organisation. Sun Protection and Schools. How to Make a Difference. Geneva: World Health Organisation, 2003. ISBN 92 4 159062 9. Available at: www.who.int/uv/publications/en/sunprotschools.pdf. Accessed July 28, 2004.