Practice of Skin Cancer Prevention among Young Malaysian

Redhwan Ahmed Al-Naggar* and Yuri V Bobryshev*

1Community Medicine Department, International Medical School, Management and Science University, Malaysia
2Faculty of Medicine, School of Medical Sciences, University of New South Wales, New South Wales, Australia

Abstract

**Objective:** The objective of this study was to determine the practice of skin cancer prevention among young Malaysian.

**Methodology:** This cross-sectional study was conducted among 400 university students of Management and Science University (MSU). The questionnaire consists of socio-demographic characteristics such as (age, sex, race, education, residency, family income and family history on skin cancer) and practice toward skin cancer prevention. Data was recorded and analyzed using SPSS 13.

**Results:** A total number of 400 university students participated in this study. The majority of them were female and Malay (70.3%, 70.3%; respectively). Only 25% of the participants stayed in shade, 3.8% wore hat, 10.3% wore sunglasses, 43.3% wore clothes covering most of the body and 43.5% used sunscreen when outdoor. Gender significantly influenced the practice of staying in shade, clothes covering most of the body and sunscreen used (p = 0.009, p = 0.001, p = 0.001; respectively). Race significantly influenced the practice of staying in shade and clothes covering most of the body (p = 0.004, p = 0.002; respectively). Age significantly influenced the practice of wearing hat and staying in shade (p = 0.011, p = 0.013; respectively). Type of educational significantly influenced the practice of staying in shade and clothes cover most of the body (p = 0.001, p = 0.046; respectively). Residency significantly influenced the practice of hat and wearing in shade (p = 0.006, p = 0.002; respectively). Income significantly influenced the practice of staying in shade, sunglasses wearing, clothes covering most of the body, sunscreen used (p = 0.002, p = 0.048, p = 0.014, p = 0.040; respectively). Marital status significantly influenced the practice of clothes covering most of the body and sunscreen used (p = 0.015, p = 0.020; respectively).

**Conclusion:** This study showed poor practice of skin cancer prevention among university students. Gender, marital status and income significantly influenced the practice of sunscreen use among the study participants. Health education about skin cancer prevention among university students is urgently needed.

Keywords: Skin cancer; Prevention; Malaysia

Introduction

Skin is the largest organ in human body, yet skin cancers are uncommon malignancies worldwide [1]. Recently there has been dramatic increase in the prevalence of skin cancer worldwide, and it accounts for 1 in 3 cancer cases worldwide [2,3].

Skin cancer is more common in people with light-colored skin who spend a lot of time in the sun. It can occur anywhere on the body but is more likely to be found in places exposed regularly to sunlight such as the face, arms or hands. The most common warning sign and symptoms of skin cancer include changes in the size, color or shape of a mole, oozing or bleeding from a mole, a mole that feels itchy, hard, lumpy or swollen and a growth or a sore that will not heal [4].

It is well-established that extensive sun exposure during childhood or adolescence increases the probability of skin cancer in adulthood. In addition, 50–80% of the total amount of ultraviolet radiation (UVR) is accumulated during these periods; this may be due to the sensitivity of young skin to UV radiation [5-17]. Non melanoma skin cancer is now the most commonly diagnosed cancer in the United Kingdom accounting for a quarter of all new cancer cases [18,19]. It is a slow growing form of cancer and can be present many years before detection [2]. Malignant melanoma is a more serious form and rates have doubled in the UK in the last 20 years [20].

The predominant cause of skin cancer is exposure to solar radiation [21,22], in combination with the skin’s susceptibility to the damaging effects of sunlight, including lighter complexion and predisposition to burn, blister, or freckle in the sun [21].

Sun exposure is regarded as a major environmental risk factor for cutaneous melanoma, basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) [23-26]. Cumulative sun damage is considered responsible for the development of SCC [23,26] while mixed effects of cumulative and intermittent sun damage seem to account for the development of BCC and melanoma [24-28].

Minimizing sun exposure, either through avoidance or skin protection measures, could greatly reduce the occurrence of skin cancer [8]. The centerpiece of skin cancer prevention efforts is to minimize the harmful effects of sun exposure during childhood and adolescence, as the majority of an individual’s lifetime sun damage tends to occur before adulthood [24,25,29]. Preventative measures for skin cancer include staying out of the sun during the hottest part of the day (10 a.m.-4 p.m.), wearing sunscreen when exposed to sunlight and avoiding exposure to sunlamps and use of tanning salons. There has been a huge amount of research literature on skin cancer especially in the last 10–15 years. There is no doubt that this is indirect relation to the increases in prevalence of the disease on a worldwide basis. Australian and American research has led in the field and it is probable that this has been due to the increase in rates of skin cancer in those countries.

*Corresponding author: Redhwan Ahmed Al-Naggar, Community Medicine Department, International Medical School, Management and Science University, Malaysia, E-mail: radhwan888@yahoo.com

Received January 04, 2012; Accepted February 25, 2012; Published February 27, 2012

Citation: Ahmed Al-Naggar R, Bobryshev YV (2012) Practice of Skin Cancer Prevention among Young Malaysian. J Community Med Health Educ 2:129. doi:10.4172/2161-0711.1000129

Copyright: © 2012 Ahmed Al-Naggar R, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
Overall, primary prevention of skin cancer is concerned with a reduction in the risk factors for skin cancer, most notably sun exposure and sunburn, through environmental changes, social changes and behavioral modification [30-35]. This includes such diverse activities as getting people to wear hats and long-sleeved clothes, stay in the shade, create shade by planting trees or constructing other canopies, reschedule work practices and sporting times, and other activities. In Malaysia, there are yet no studies measuring the practice of skin cancer prevention among university students [36]. Additionally, sun protection policies in universities in Malaysia are lacking. Therefore, the objective of this study was to determine the practice of skin cancer prevention among young Malaysian.

Methodology

This study was conducted among 400 university students at the Management and Science University (MSU), Shah Alam, Selangor during the academic year 2010/2011. The questionnaire was developed based on previous studies. The questionnaire consisted of two parts. The first part consisted of socio-demographic characteristics such as race, religion, marital status, educational background, residency, family monthly income, family history of cancer and family history of skin cancer. The second part was about practice towards skin cancer prevention. Questionnaires were distributed to all faculties at MSU namely, the International Medical School (IMS), the Faculty of Business and Management Professional (FBMP), Faculty of Health and Life Science (FHLS) and Faculty of Informative Science and Engineering (FISE). The questionnaires were distributed among students by simple random sampling techniques. Questionnaires were distributed at the university cafe, university plaza, Islamic center and library and lecture halls. The inclusion criteria were 18 year-old students and above, of Malaysian citizenship and can speak, read and understand English. Students less than 18 years old and foreign students were excluded from this study. All participants were given explanation about the purpose of the study and an assurance of confidentiality. Participants were also assured that their participation in the study was voluntary and that they could withdraw at any time during the interview. The protocol of this study was approved by the ethics committee of the Management and Science University. Data obtained were analyzed using SPSS version 13. T-test and ANOVA test were conducted to determine if there was a significant difference between the study parameters. All tests were analyzed with the confidence interval, α=0.05. The significance level (p value) was set at 0.05.

Results

A total number of 400 university students participated in this study. The majority of them were female, Malay, single and with medical background (70.3%, 70.3%, 99%, 59.8% respectively). About 16.8% of the participants reported that they had family history of cancer and only 1.5% reported that they had family history of skin cancer (Table 1).

Regarding the practice of skin cancer prevention, only 25% of the participants stayed in shade, 3.8% wear hat, 10.3% wear sunglasses, 43.3% wear clothes covering most of the body and 43.5% used sunscreen when outdoor (Table 2).

For the factors that influenced the practice of skin cancer prevention, gender significantly influenced the practice of staying in shade, clothes covering most of the body and sunscreen used (p=0.009, p=0.001, p=0.001; respectively). Race significantly influenced the practice of staying in shade and clothes covering most of the body (p=0.004, p=0.002; respectively). Age significantly influenced the practice of wearing hat and staying in shade (p=0.011, p=0.013; respectively). Type of education significantly influenced the practice of staying in shade and clothes cover most of the body (p=0.001, p=0.046; respectively). Residency significantly influenced the practice of hat wearing and staying in shade (p=0.006, p=0.002; respectively). Income significantly influenced the practice of staying in shade, sunglasses wearing, clothes covering most of the body and sunscreen used (p=0.002, p=0.048, p=0.014, p=0.049; respectively). Marital status significantly influenced the practice of clothes covering most of the body and sunscreen used (p=0.015, p=0.020; respectively) (Table 3).

Discussion

To our knowledge and after intensive literature search, this is the first study in Malaysia to determine the practice of skin cancer prevention among university students. Our findings can be used as baseline measures for current and future behavioral interventions for skin cancer prevention among university students. Gender, race, age, educational background, residency and income significantly influenced the practice of staying in shade or using umbrella.

In this study only 25% of this study’s participants stayed in shade, 3.8% wore hat, 10.3% wore sunglasses and 43.3% wore clothes covering most of the body. Similarly, Saridi et al. [37] reported that only 50% of the participants using a hat and stayed in the shade, and the use of hat and sunglasses was low (39% and 25.5%, respectively). Similar findings were reported by other studies [38-41]. Gillani et al. [42] reported that less than 11.5% respondents reported that they always used sunglasses, sunscreen, protective clothes and cap against sun exposure. Another studies reported that most participants neither used sunscreens nor wore any protective clothes [43-45]. This means that university students

Table 1: Socio-demographic characteristics of the study participants (n=400).

| Variable                        | Categories | Number | Percentage (%) |
|--------------------------------|------------|--------|----------------|
| Sex                            | Male       | 281    | 70.3           |
|                                | Female     | 119    | 29.6           |
| Race                           | Malay      | 21     | 5.3            |
|                                | Chinese    | 100    | 25.0           |
|                                | Indian     | 63     | 15.8           |
|                                | Others     | 35     | 8.8            |
| Marital status                 | Single     | 396    | 99.0           |
|                                | Married    | 4       | 1.0            |
| Educational background         | Medical    | 239    | 59.8           |
|                                | Non-medical| 161    | 40.3           |
| Resident                       | Rural      | 107    | 26.8           |
|                                | Sub-urban  | 83     | 20.8           |
|                                | Urban      | 210    | 52.5           |
| Family income (RM)             | ≤5000      | 333    | 83.2           |
|                                | >5000      | 67     | 16.8           |
| Family history of cancer       | Yes        | 396    | 99.0           |
|                                | No         | 4       | 1.0            |
| Family history of skin cancer  | Yes        | 394    | 98.5           |
|                                | No         | 6       | 1.5            |

Table 2: Practice of skin cancer prevention among the study participants (n=400).

| Variable                        | Categories | Number | Percentage (%) |
|--------------------------------|------------|--------|----------------|
| Stay in shade                   | Yes        | 300    | 75             |
|                                | No         | 100    | 25             |
| Wear hat                        | Yes        | 385    | 96.3           |
|                                | No         | 15     | 3.8            |
| Wear sunglasses                 | Yes        | 359    | 89.8           |
|                                | No         | 41     | 10.3           |
| Wear clothes covering most of the body | Yes | 227    | 56.6           |
|                                | No         | 173    | 43.3           |
| Use sunscreen                   | Yes        | 226    | 56.5           |
|                                | No         | 174    | 43.5           |
did not take adequate sun-safety measures. Furthermore, the use of hats, shirts, shade and other sun protection aids was less common in most studies [43,46-52] except few studies [53-55]. Sun protection policy should be implemented such as compulsory hat use when outside especially during outdoor activities [48,56, 57]. Some barriers to sun protection reported by Hill et al. [58] where males felt hats were a problem in active games and pants and long-sleeve protective clothes make them too hot. Males predominantly rely on baseball caps which do not protect ears, sides of face, or neck. Additionally, hats are restricted in schools because they may represent gang insignias and can promote head lice transmission; thus, many children remain unprotected when outdoors during recess, physical education, and sports activities [59].

Several studies showed higher practice of skin cancer prevention than those found in our study. Miller et al. [60] showed that 58 and 49% of them wore a shirt and a hat respectively. A study by Rademaker et al. [61] in New Zealand showed that 65% of the participants reported sunscreen use, 69% the use of protective clothes and 43% the use of shade. A study by Dixon et al. [62] reported that almost all of the participants wore a hat when in the sun. This difference in fashion trends makes it easier for boys to cover-up during summer. The difference in the percentage of males and females wearing clothes covering most of their body may also reflect different fashion influences [63]. Livingston and other suggested that more work is needed to convince adolescents of the need to adopt sun smart behaviors. Future research is required to address how to shift fashion trends so that they can influence adolescent adoption of recommended sun smart behaviors, such as sun-protective clothing. Focusing on fashion that is acceptable to adolescents and which includes broad-brimmed hats, long pants, long-sleeved shirts, and bather that provide greater cover over the body is crucial for potentially modifying behavior [63].

In this study, gender significantly influenced the practice of staying in shade, wearing clothes covering most of the body and sunscreen used. Race was also significantly influence the practice of staying in shade and clothes covering most of the body. Age significantly influenced the practice of wearing hat and staying in shade. Similar studies reported that the use of hats, protective clothes and seeking shade as measure of sun protection increased with adults’ age [64,65]. Type of education significantly influenced the practice of staying in shade and wearing clothes covering most of the body. Inconsistent with our findings is a study that found the education system did not influence the sun protection practices among university students [42]. Residency significantly influenced the practice of hat wearing and staying in shade. Income significantly influenced the practice of staying in shade, sunglasses wearing, wearing clothes covering most of the body and sunscreen used. The cost of sunscreens, protective hats and clothes is a realistic concern [66,67]. Furthermore, the cost to design and execute intervention programs, create shade structures, and provide educational materials on sun protection requires significant financial resources. Additional barriers involve sun protective apparel and sunscreen. Similar findings reported that the socio-demographic variables such as income and educational level are associated with higher levels of sun protection [66,67]. This highlights opportunities for younger adults, who are more likely to be active outdoors, to be targeted to improve their sun protective habits. A public health campaign about skin cancer prevention is an urgent need.

Experts recommend the use of sunscreen, as well as other sun-protective measures such as wearing protective clothes, wearing wide-brimmed hats, and avoiding the sun to protect persons from sun exposure [68]. Sunscreen use has been shown to be effective in preventing sunburn. Epidemiological studies suggested that sunscreen use can prevent squamous cell carcinoma and reduce the number of acquired nevi that are associated with sun exposure as a risk marker for melanoma [69,70]. However, sunscreen value in skin cancer prevention remains a controversial issue; randomized studies have suggested that sunscreen use could moderately reduce the risk of sun squamous cell carcinomas [69], and it could decrease the number of nevi in certain circumstances [70]. However, many epidemiological studies have suggested that sunscreen use during intentional sun exposure could increase the number of nevi, the risk of melanoma, and the risk of basal cell skin cancer [71-76]. Some randomized studies have also suggested that sunscreen use could increase the time spent in the sun, a phenomenon probably responsible for the increased risk of melanoma and basal cell cancer found in many observational studies [77,78].

The prevalence of sunscreen among the study population was 43.5%. In a Brazilian study, the prevalence of sunscreen use at the beach, work, and outdoor sports was 60.8%, 13.7% and 30.2; respectively [79]. In another study from Saudi Arabia showed that only 8.3% of the Saudi adult populations were using sunscreen regularly [80]. Wichstrom [81] reported that only 50% of all adolescents in their study re-applied sunscreen and only 25% used sunscreen with an adequate sun protection factor (SPF). Sunscreen was the most commonly used measure of sun protection in adults [46,81]. The period between 10 AM and 4 PM is regarded by several institutions as that of greatest risk for sun exposure and, therefore, sunscreen is indicated during this period [82]. Similar studies reported that most women used sunscreen as their favored sun protection method [83-85] and were more reluctant than men to use protective clothes or hats [46,53,83]. Our results on low prevalence of routine sunscreen among university students are consistent with previous studies [85,68,86]. Furthermore, only 50% of the participants reported using sunscreen with sufficient sun protection factor [37]. In a multicentre study in Belgium, Germany, France and Italy, only 25% of children always used sunscreen [87]. A study in Italy reported that 80% of children aged 6-14 years used sunscreen, but only 38% used it on a regular basis [88].

| Variable                  | hat wearing | staying in shade or using umbrella | sunglasses wearing | clothes cover most of the body | sunscreen |
|---------------------------|-------------|-----------------------------------|--------------------|-------------------------------|-----------|
| Gender                    | 0.081       | 0.009                             | 0.862              | 0.001                         | 0.001     |
| Race                      | 0.521       | 0.004                             | 0.752              | 0.002                         | 0.618     |
| Age                       | 0.011       | 0.013                             | 0.570              | 0.350                         | 0.759     |
| Type of Educational       | 0.232       | 0.001                             | 0.100              | 0.046                         | 0.553     |
| Residency                 | 0.006       | 0.002                             | 0.524              | 0.099                         | 0.085     |
| Income                    | 0.090       | 0.002                             | 0.048              | 0.014                         | 0.049     |
| Marital status            | 0.232       | 0.719                             | 0.334              | 0.046                         | 0.046     |
| Family history of cancer  | 0.239       | 0.129                             | 0.401              | 0.015                         | 0.020     |
| Family history of Skin cancer | 0.195   | 0.566                             | 0.822              | 0.606                         | 0.409     |

Table 3: Factors influence the practice of skin cancer prevention.
In this study, females use sunscreen more frequently than males. Similar finding were reported by several studies [89-93]. This is likely related to the fact that women generally have more healthy lifestyles than men, and show greater concern towards the ageing of skin.

In terms of sunscreen barriers, previous studies mentioned such barriers as forgetting to apply sunscreen, sunscreens are too messy, often apply them inadequately or infrequently, miss application to certain areas of the body and forget to reapply after swimming, sweating, and other activities during which sunscreens are degraded or washed off [81,85,94].

**Study Limitation**

There are several limitations to the current study. The study design was cross-sectional, which limits conclusions. Students self-report behavior may be an over estimation of actual behavior. However, as it is practically impossible to observe actual behavior over extended periods in all outdoor contexts, it is difficult to accurately determine whether this is so.

**Conclusion**

This study showed poor practice of skin cancer prevention among university students. Gender, marital status and income significantly influenced the practice of sunscreen use among the study participants. Health education about skin cancer prevention among university students is urgently needed.

**Recommendation**

Skin cancer needs to remain on the social agenda through a variety of mechanisms, and innovative new strategies are needed to increase the awareness about sun protective behavior. Health education needs to be implemented in universities, when students start making independent choices. Universities are ideal settings as they already have the infrastructure to help students acquire the necessary skills to establish healthy behaviors. A larger country-based study among university students need to focus on informing them about strategies they may use to protect them against sun burn. Sun protection university policy, such as compulsory use when outside, is related to increased sun protection in university students, especially during outdoor activities.

**References**

1. WHO World health statistics. GLOBOCAN (2000) Cancer Incidence, mortality & prevalence worldwide. Version 1.0 IARC Cancer Base No. 5 Lyon, IARC Press: 2001.
2. Cancer Research UK (2008) Skin Cancer Overview.
3. Rigel DS, Friedman RJ, Dzubow LM, et al. (2004) Cancer of the Skin. WB Saunders Company, Philadelphia, PA: 29-45.
4. National Cancer Institute (2004) Skin Cancer Screening.
5. Holman CD, Armstrong BK, Heenan PJ (1983) A theory of the etiology and pathogenesis of human cutaneous malignant melanoma. J Natl Cancer Inst 71: 651-656.
6. Green A (1984) Sun exposure and the risk of melanoma. Australas J Dermatol 25: 99-102.
7. Holman CD, Armstrong BK (1984) Pigmentary traits, ethnic origin, benign nevi, and family history as risk factors for cutaneous malignant melanoma. J Natl Cancer Inst 72: 257-266.
8. Stern RS, Weinstein MC, Baker SG (1986) Risk reduction for nonmelanoma skin cancer with childhood sunscreen use. Arch Dermatol 122: 537–545.
9. Spencer JM, Amonette R (1998) Tanning beds and skin cancer: artificial sun + old sol = real risk. Clin Dermatol 16: 487-501.
10. Holman CD, Armstrong BK, Heenan PJ (1986) Relationship of cutaneous malignant melanoma to individual sunlight exposure habits. J Natl Cancer Inst 76: 403-414.
11. Council on Scientific Affairs (1989) Harmful effects of ultraviolet radiation. JAMA 262: 380-384.
12. Walter SD, Marret LD, From L, Hertzman C, Shannon HS, et al. (1990) The association of cutaneous malignant melanoma with the use of sunbeds and sunlamps. Am J Epidemiol 131: 232-243.
13. Marks R, Jolley D, Letchas S, Foley P (1990) The role of childhood exposure to sunlight in the development of solar keratoses and non-melanocytic skin cancer. Med J Aust 152: 62-66.
14. Zanetti R, Franceschi S, Rosso S, Colonna S, Bidoli E (1992) Cutaneous melanoma and sunburns in childhood in a southern European population. Eur J Cancer 28A: 1172-1175.
15. Armstrong BK, Kricker A (1993) How much melanoma is caused by sun exposure. Melanoma Res 3: 395-401.
16. English DR, Armstrong BK, Kricker A, Winter MG, Heenan PJ, et al. (1998) Case control study of sun exposure and squamous cell carcinoma of the skin. Int J Cancer 77: 347-353.
17. Levine JA, Sorace M, Spencer J, Siegel DM (2005) The indoor UV tanning industry: a review of skin cancer risk, health benefit claims, and regulation. J Am Acad Dermatol 53: 1038-1044.
18. Ulster Cancer Foundation (2003) Obsession with the Sun.
19. Cancer Research UK (2008) Cancer Statistics.
20. Sharpe CR, Sniemiatczyk JA, Racnet BP (2002) The effects of smoking on the risk of colorectal cancer. Dis Colon Rectum 45: 1041–1050.
21. Scotto J, Fears TR, Kraemer KH, Fraumeni JF (1996) Nonmelanoma skin cancer. Oxford University Press: 131–30.
22. Elwood JM, Jopson J (1997) Melanoma and sun exposure: An overview of published studies. Int J Cancer 73: 198–203.
23. Kricker A, Armstrong BK, English DR (1994) Sun exposure and nonmelanocytic skin cancer. Cancer Causes and Control 5: 367-392.
24. Gallagher RP, Hill GB, Bajdik CD, Fincham S, Coldman AJ, et al. (1995) Sunlight exposure, pigmentary factors, and risk of nonmelanocytic skin cancer. I. Basal cell carcinoma. Arch Dermatol 131: 157–163.
25. Gallagher RP, Hill GB, Bajdik CD, Coldman AJ, Fincham S, et al. (1995) Sunlight exposure, pigmentary factors, and risk of nonmelanocytic skin cancer. II. Squamous cell carcinoma. Arch Dermatol 131: 164-169.
26. Rosso S, Zanetti R, Martinez C, Torno MJ, Schraub S, et al. (1996) The multicenter south European study “Helios” II: different sun exposure patterns in the aetiology of basal cell and squamous cell carcinomas of the skin. Br J Cancer 73: 1447-1454.
27. AIHW (1997) Australian Institute of Health and Welfare, and Commonwealth Department of Health and Family Services. First report on national health priority areas, full report.
28. Lee C (1998) Overview of the pathology and treatment of malignant melanoma. Cancer Forum 22: 175.
29. Autier P, Dore JF, Cattaruzza MS, et al. (1998) Sunscreen use, wearing clothes and number of nevi in 6- to 7-year old European children. J Natl Cancer Inst 90: 1873–1880.
30. Borland R, Hill D, Noy S (1990) Being Sun Smart: changes in community awareness and reported behavior following a primary prevention program for skin cancer control. Behaviour Change 7: 126–135.
31. Mackie RM (1998) Incidence, risk factors and prevention of melanoma. Eur J Cancer 34: S3–S8.
32. Turner M (1999) Sun safety: avoiding noonsday sun, wearing protective clothing, and the use of sunscreen. J Natl Cancer Inst 90: 1854–1855.
33. Marks R (1999) Two decades of public health approach to skin cancer control in Australia: why, how and where are we now? Australas J Dermatol 40: 1–5.
34. National Health and Medical Research Council (1998) Primary Prevention of Skin Cancer in Australia, Report of the Sun Protection Programs Working Party, Centre for Health Promotion and Cancer Prevention Research, University of Queensland, Brisbane.
35. Morris J, McGee R, Bandaranayake M (1998) Sun protection behaviours and
the predictors of sunburn in young children. J Paediatr Child Health 34: 557–
562.
36. Al-Naggar RA, Al-Naggar TH, Bobryshev YV (2011) Perceptions and opinions
regarding skin cancer prevention in malaysia: A qualitative approach. Asian Pac J
Cancer Prev 12: 995-999.
37. Saridi M, Pappa V, Kyriazis I, Toska A, Giola A, et al. (2009) Knowledge and
attitudes to sun exposure among adolescents in Korrinoth,Greece. Rural
Remote Health 9: 1162.
38. Lowe JB, Borland R, Stanton WR, Baade P, White V, et al. (2000) Sun-safe
behavior among secondary school students in Australia. Health Educ Res 15:
271-281.
39. Livingston PM, White VM, Ugoni AM, Borland R (2001) Knowledge, attitudes
and self-care practices related to sun protection among secondary students in
Australia. Health Educ Res 16: 269-278.
40. Stankeviciute V, Zaborskis A, Pavetskaiene A, Valiukeviciene S (2004) Skin
cancer prevention: children’s health education on protection from sun exposure
and assessment of its efficiency. Medicina (Kaunas) 40: 386-393.
41. Aquilina S, Gauci AA, Ellul M, Scieri L (2004) Sun awareness in Maltese
secondary school students. J Eur Acad Dermatol Venereol 18: 670-675.
42. Gillani F, Rashid A, Anis A, Arif S, Jamal A, et al. (2001) The Skin we are
in- Knowledge and Practices regarding Skin Cancer in Pre- Clinical Medical
Students. J Pak Med Assoc 51: 373-378.
43. Lowe JB, Balanda KP, Gillespie AM, Del Mar CB, Gentle AF (1993) Sun related
attitudes and beliefs among Queensland school children: Role of gender and
age. Aust J Public Health 17: 202-208.
44. Miller D (1995) The public’s current knowledge, attitudes and behaviors
regarding skin cancer prevention. The National Conference to Develop a
National Skin Cancer Agenda. Washington.
45. Robinson JK, Rademaker AW, Sylvester JA, Cook B (1997) summer sun
exposure: knowledge, attitudes and behaviors of Mid-West Adolescents. Prev
Med 26: 364-372.
46. Foot G, Girgis A, Boyle CA, Sanson-Fisher RW (1993) solar protection
behaviours: a study of beachgoers. Aust J Public Health 17: 209–214.
47. Otson AL, Dietrich AJ, Sox CH, Stevens MM, Winchell CW, et al. (1997) Solar
protection of children at the beach. Pediatrics. 99: E1.
48. Lower T, Girgis A, Sanson-Fisher R (1998) The prevalence and predictors of
solar protection use among adolescents. Prev Med 27: 391–399.
49. Glanz K, Lew RA, Song V, Cook VA (1999) Factors associated with skin cancer
prevention practices in a multiclinic population. Health Educ Behav 26: 344–
359.
50. Robinson JK, Rigel DS, Amonette RA (2000) Summertime sun protection used
by adults for their children. J Am Acad Dermatol 42: 746–753.
51. Stanton WR, Chakma B, O’Riordan DL, Eyeson-Aman M (2000) Sun exposure
and primary prevention of skin cancer for infants and young children during
autumn/winter. Aust N Z J Public Health 24: 178–184.
52. O’Riordan DL, Geller AC, Brooks DR, Zhang Z, Miller DR (2003) Sunburn
reduction through parental role modeling and sunscreen vigilance. J Pediatr
142: 67–72.
53. Broadstock M (1991) Sun protection at the cricket. Med J Aust 154: 430.
54. Whitelam DC, Frost CA, Whiteham CA, Green AC (1994) A survey of
sunscreen use and sun protection practices in Darwin. Aust J Public Health
18: 47–50.
55. Baade PD, Balanda KP , Lowe JB (1996) Changes in skin protection behaviors,
atitudes, and sun burn: in a population with the highest incidence of skin cancer
in the world. Cancer Detect Prev 20: 566–575.
56. Fisher KJ, Lowe JB, Gillespie AM, et al. (1996) The relationship between
Australian students’ perceptions of behaviour, school policies and sun
protection behaviors. J Health Education 27: 242–247.
57. Horsley L, Chralton A, Waterman C (2002) Current action for skin cancer risk
reduction in English schools: pupils’ behaviour in relation to sunburn. Health
Education Research 17: 715–731.
58. Hill D, Rassaby J, Gardner G (1984) Determinants of intentions to take
precautions against skin cancer. Community Health Stud 8: 33-44.
59. Buller DB, Geller AC, Cantor M, Buller MK, Rosseel K, et al. (2002) Sun
protection policies and environmental features in US elementary schools. Arch
Dermatol 138: 771-774.
60. Miller DR, Geller AC, Wood MC, Lew RA, Koh HK (1999) The Falmouth safe
skin project: evaluation of a community program to promote skin protection in
youth. Health Educ Behav 26: 369–384.
61. Rademaker M, Wylie K, Collins M, Wotton N (1996) Primary school children’s
perceptions of the effects of sun on skin. Australas J Dermatol 37; 30–36.
62. Dixon H, Borland R, Hill D (1999) Sun protection and sunburn in primary school
children: the influence of age, gender, and coloring. Prev Med 28: 119–130.
63. Livingstong PM, White V, Hayman J, Dobbinson S (2003) Sun exposure and sun
protection behaviours among Australian adolescents: trends over time. Prev Med
37: 577–584.
64. Berwick M, Fine JA, Bolognia JL (1992) Sun exposure and sunscreen use a community
skin cancer screening. Prev Med 21: 302–310.
65. Prui m, Wright L, Green A (1999) Do people who apply sunscreens, re-apply
them? Australas J Dermatol 40: 79–82.
66. Cody R, Lee C (1990) Behaviours, beliefs, and intentions in skin cancer prevention. J Behav Med 13: 373–389.
67. Barankin B, Liu K, Howard J, Guenther L (2001) Effects of a sun protection
program targeting elementary school children and their parents. J Cutan Med Surg 5: 2-7.
68. Hall HI, May DS, Lew RA, Koh HK, Nadel M (1997) Sun protection behaviors of
the U.S. white population. Prev Med 26: 401–407.
69. Pincus MW, Rollings PK, Craft AB, Green A (1991) Sunscreen use on
Queensland beaches. Australas J Dermatol 32: 21–25.
70. Green A, Williams G, Neale R, Hart V, Leslie D, et al. (1999) Daily sunscreen
application and betacarotene supplementation in prevention of basal-cell and
squamous-cell carcinomas of the skin: a randomised controlled trial. Lancet
354: 723-729.
71. Gallagher RP, Rivers JK, Lee TK, Badjik CD, McLean DI, et al. (2000) Broad-
spectrum sunscreen use and the development of new nevi in white children.
A randomized controlled trial JAMA 283: 2955–2960.
72. Kricker A, Armstrong BK, English DR, Heenan PJ (1995) Does intermittent
sun exposure cause basal cell carcinoma? A case-control study in Western
Australia. Int J Cancer 60: 489–494.
73. Autier P, Dore JF (1998) Influence of sun exposures during childhood and during
adulthood on melanoma risk. EPINEL and EORTC Melanoma Cooperative
Group. European Organisation for Research and Treatment of Cancer. Int J
Cancer 77: 533–537.
74. Autier P, Dore JF, Schiﬄers E, Cesarini JP, Bullaerts A, et al. (1995) Melanoma
and use of sunscreens: an EORTC case-control study in Germany, Belgium
and France. The EORTC Melanoma Cooperative Group. Int J Cancer 61: 749–
755.
75. Luther H, Altmeyer P, Garbe C, Ellwanger U, Jahn S, et al. (1996) Increase of
melanoma and use of sunscreens: an EORTC case-control study in Germany, Belgium
and France. The EORTC Melanoma Cooperative Group. Int J Cancer 61: 749–
755.
76. Azizi E, Iscovici J, Paviotvsy F, Shabir R, Luria I, et al. (2000) Use of sunscreen
is linked with elevated naevi counts in Israeli school children and adolescents.
Melanoma Res 10: 491–498.
77. Autier P, Dore JF, Negrier S (1999) Sunscreen use and duration of sun
exposure: a double-blind, randomised trial. J Natl Can inst 91: 1304–1309.
78. Autier P, Dore JF, Reis AC, Grivegnée A, Ollivaud L, et al. (2000) Sunscreen
use and intentional exposure to ultraviolet A and B radiation: a double blind
trial randomized using personal dosimeters. Br J Cancer 83: 1243–1248.
79. Duquial RP, Baptista Menezes AM, Reichert FF, de Almeida HL Jr (2007)
Prevalence and associated factors with sunscreen use in Southern Brazil: A
population-based study. J Am Acad Dermatol 57: 73-80.
80. Al Robaee AA (2010) Awareness to sun exposure and use of sunscreen by the
general population. Bosn J Basic Med Sci 10: 314–318.
81. Wichstrom L (1994) Predictors of Norwegian adolescents’ sunbathing and use
of sunscreen. Health Psychol 13: 412–420.
82. Cokkinides V, Weinstock M, Glanz K, Alban J, Ward E, et al. (2006) Trends
in sunburns, sun protection practices, and attitudes toward sun exposure
Cancer 77: 533–537.
protection and tanning among US adolescents, 1988-2004. Pediatrics 118: 853-864.

83. WHO International (2006) World Health Organization.

84. Hill D, White V, Marks R, Theobal T, Borland R, et al. (1992) Melanoma prevention: behavioural and non-behavioural factors in sunburn among an Australian urban population. Prev Med 21: 654–669.

85. Campbell HS, Birdsell JM (1994) Knowledge, beliefs, and sun protection behaviors of Alberta adults. Prev Med 23: 160–166.

86. Banks BA, Silverman RA, Schwartz RH, Tunnessen WW Jr (1992) Attitudes of teenagers toward sun exposure and sunscreen use. Pediatrics 89: 40-42.

87. Merrinstein RJ, Riesenber LA (1992) Changing knowledge and attitudes about skin cancer risk factors in adolescents. Health Psychol 11: 371–376.

88. Severi G, Cattaruzza MS, Baglietto L, Boniol M, Dore JJ, et al. (2002) Sun exposure and sun protection in young European children: an EORTC multicentric study. Eur J Cancer 38: 820-826.

89. Stancer G, Favot F, Quinkenstein E, Zanchi M, Valentin F, et al. (2005) Children and sun exposure in the northeast of Italy. Pediatr Dermatol 22: 520-524.

90. Courtenay WH (2000) Constructions of masculinity and their influence on men’s well-being: a theory of gender and health. Soc Sci Med 50: 1385-1401.

91. Paul C, Tzelepis F, Walsh RA, Girgis A, King L, et al. (2003) Has the investment in public cancer education delivered observable changes in knowledge over the past 10 years? Cancer 97: 2931-2939.

92. Wesson KM, Silverberg NB (2003) Sun protection education in the United States: what we know and what needs to be taught. Cutis 71: 71-74,77.

93. Abroms L, Jorgensen CM, Southwell BG, Geller AC, Emmons KM (2003) Gender differences in young adults’ beliefs about sunscreen use. Health Educ Behav 30: 29-3043.

94. Rasmussen S, O’Connor RC (2005) Factors influencing anticipated decisions about sunscreen use. J Health Psychol 10: 585-595.

95. Saraiya M, Glanz K, Briss P, Nichols P, White C, et al. (2004) Interventions to prevent skin cancer by reducing exposure to ultraviolet radiation: A systematic review. Am J Prev Med 27: 422-466.

96. Spencer JM, Amanette R (1998) Tanning beds and skin cancer: artificial sun+ old sol = real risk. Clin Dermatol 16: 487-501.

97. Weinstock M A (2000) Sunscreen. Curr Opin Oncol 12: 159–162.