Solar UV radiation exposure among South Africans

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NRF UV Symposium, 29 May 2012
• Focus of this symposium is on solar UV radiation,
• However, the impacts of infrared radiation (heat) are also important and closely linked with sun exposure
• Heat and impacts in occupational environments: work, heat, productivity
• The SA MRC Environmental & Health Research Unit work on these topics in South Africa

Joy Oba
Health impacts of solar UV radiation exposure

(Lucas et al., 2006)
Disease treatment, awareness and prevention

• Continued support for screening, treatment
• Increased efforts towards awareness, intervention (physical, behavioural etc)
• Research towards disease prevention and supportive healthy behaviour
Numerous international studies

- Numerous studies in sun exposure patterns, use of sun protection etc in Australia, New Zealand, USA, Europe, less in Africa and South Africa

- Public health interventions to alleviate the burden of these adverse health effects on individuals and healthcare systems should be based on South African information

- To date, no large epidemiological study has been carried out among a South African population; however, this information is probably required for successful implementation of sun protection intervention strategies

- Poor empirical understanding of the full spectrum of our population’s personal behaviour, knowledge, attitudes, sun-protective practices
Earliest study – at-risk subpopulation of beachgoers

Sunscreen use among 231 beachgoers in Cape Town in 1991

90% of sample knew overexposure caused skin cancer yet risk-taking behaviour (sunbathing) was still pursued

About half of the people sampled used sunscreen, only 6% of those used an SPF > 15

(von Schirnding et al, 1991/92)
At-risk subpopulation – Schoolchildren

- Human health risk assessment of solar UV radiation among schoolchildren, outdoor workers (car guards), indoor workers and mixed mode workers in Durban in 2000 (Guy and Diab, 2000)
- Personal dosimetry study of solar UV radiation among schoolchildren in Durban in 2001 (Guy, Diab and Martincigh, 2002)
- Anatomical distribution of solar UV radiation in Durban (Wright, Diab and Martincigh, 2003)
At-risk subpopulation – Schoolchildren and sunburn risk

Number of days per year that schoolchildren of varying skin types may be at risk of sunburn from excess solar UV radiation exposure

<table>
<thead>
<tr>
<th>Site</th>
<th>Skin type</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I (2-3 SED)</td>
<td>II (2.5-3 SED)</td>
<td>III (3-5 SED)</td>
<td>IV (4.5-6 SED)</td>
<td></td>
</tr>
<tr>
<td>Pretoria</td>
<td>71</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Durban</td>
<td>97</td>
<td>69</td>
<td>44</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>De Aar</td>
<td>166</td>
<td>122</td>
<td>99</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Port Elizabeth</td>
<td>76</td>
<td>23</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cape Town</td>
<td>112</td>
<td>57</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cape Point</td>
<td>98</td>
<td>29</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>

(Wright, Coetzee and Ncongwane, 2011)
Continuous UV exposure estimated to elicit sunburn on un-tanned skin

<table>
<thead>
<tr>
<th>Skin type</th>
<th>Description of skin type &amp; phenotypic characteristics</th>
<th>UV exposure (SED) *</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-VI</td>
<td>Brown or black skin, dark hair, brown eyes, rarely burns</td>
<td>6-20</td>
</tr>
<tr>
<td>IV</td>
<td>Light brown skin, brown eyes, burns rarely</td>
<td>4.5-6</td>
</tr>
<tr>
<td>III</td>
<td>White or light brown skin, brown hair, may burn</td>
<td>3-5</td>
</tr>
<tr>
<td>II</td>
<td>Fair skin, fair/red hair, freckles, burns very readily</td>
<td>2.5-3</td>
</tr>
<tr>
<td>I</td>
<td>Fair skin, fair/red hair, light eyes, freckles, always burns on minimal sun exposure</td>
<td>2-3</td>
</tr>
</tbody>
</table>

*(Fitzpatrick, 1988)  * SED = standard erythema dose, 1 SED = 100 Jm²
Potential child total daily solar UVR exposure

(SED, Standard Erythemal Dose; 1 SED = 100 Jm⁻²)
Timing of schoolchildren’s sun exposure on a weekday

Results of a NZ study among schoolchildren in 2005 (Wright et al., 2006)

10am – 2pm

School break and lunch times

High risk period

Time of day

Mean UV exposure (SED)
Sun protection and skin cancer prevention efforts targeted at schoolchildren

Given the sun exposure risk posed to schoolchildren and the link between timing of exposure and risk of skin cancer incidence, schools can play an important role.

CANSA – Be SunSmart – A guide for schools (2010)
- Aimed at primary school teachers
- Activities and programmes for learning

Visits by Health Promoting Officers
School pilot study

- In 2010, 12 schools included through word-of-mouth
- 5 KZN, 4 Gauteng, 2 Free State, 1 Western Cape
- 10 government schools, 2 private
  - 2 Junior Primary, 2 Preparatory, 1 Senior Primary
  - 6 High Schools
  - 1 College (including Primary)
- Results
  - 1 school had a SunSmart School Policy
  - 8 schools encouraged hat use (3 had a ‘no hat, play in shade’ rule)
  - 11 schools did not try to schedule outdoor activities outside peak UV hours
- Not representative of country, pilot only
2012 CANSA CSIR Schools and Schoolchildren Nationwide Study

- Focus on solar UV radiation exposure, knowledge, attitudes and behaviours, school policy and interventions
- Estimate the reach of CANSA’s impact
- Questionnaire-based survey in 36 government primary schools (4 per province, one class per school) among Grade 7 learners
- 36 school-based questionnaires to School Principals
- July, August, September 2012
Outdoor workers in South Africa are susceptible to chronic sun exposure (heat - from infrared radiation - and solar UV radiation).

No studies documenting prevalence of non-melanoma skin cancer and skin damage among outdoor workers (difficult to do, of course).

Role of employers – PPE, supportive environments.

Role of legislation – no standards / limits for environmental exposure.
At-risk subpopulation - outdoor workers

Maximum number of sunburn-risk days skin type & season (averaged for all places)

(Wright, Coetzee and Ncongwane, 2011)
Adult pilot study

• Gauge sun-related knowledge, attitudes and behaviours among adults to direct development of a full, nationally-applicable questionnaire.
• 512 adult participants (22.5% response rate) - 244 males, 265 females, 3 missing
• Results
  – 30% had been taught about sun protection and sun-safe behaviours at school
  – 77% had heard of the UVI
  – 11% thought it was safe to get sunburnt once or twice a year
  – 25% liked a suntan because it makes them feel healthy
  – 33% experienced sunburn last summer
  – 75% said they regularly used sun protection last summer
‘Tools’ for the public

- **Forecasting** UVI readings nationwide – some value
  - Problem of no change, discourages behavioural response
- **Instruments** to give UVI reading available commercially – **caution**!
‘Tools’ for the public

Information and awareness

Long-term interventions have proven successful in Australia. Knowledge attained doesn’t mean attitude and behaviour are appropriate. Targeted approach may work best—‘real-time UVI impact’

Public swimming pool

Marathon
Final thoughts

• There are health risks and implications of solar UV radiation exposure in South Africa
  – Some evidence exists, need more
• Many research questions remain unanswered
• In a changing climate, changes in behaviour, clothing use and activities etc may all impact on personal sun exposure patterns

• We need to find a South African public health message that prompts an appropriate behavioural response to minimise adverse health threats and maximise health benefits of sun exposure
1. **Why South Africa? What makes South Africa relevant / unique regarding this topic?**
   - High solar UV radiation levels, outdoor lifestyle, incidental exposure
   - Range of cultures and nationalities
   - Possible health co-benefits in context of current burden of disease

2. **Thinking about some of the possible solutions to outstanding research questions, challenges or issues why can't we do these things (the steps to tackle the solutions) right now? (what are the obstacles)**
   - There is a lot we don’t yet know, we need evidence
   - Other diseases given priority for funding and research
   - For prevention, we don’t have appropriate SA public health messages
   - Collaboration between researchers is essential
3. If you had R10million at your disposal, what would you invest in to overcome these obstacles / barriers?

- Proper establishment of a SunSmart programme and lab
- Slick data capturing and management systems for all related illnesses and diseases
- Support for the National Cancer Registry
- Inclusion of sun exposure risks and prevention into environmental health and occupational health degree curriculum
- Nationwide SunSmart School Accreditation Programme roll-out
SunSmart Research Programme and Lab

The SunSmart Research Programme and Lab is a co-ordinated set of research projects led by Senior Researchers at several universities, science councils and institutions in southern Africa.

News and notices

Research projects available
The SunSmart Research Programme and Lab has many research projects available for postgraduate studies (Honours, Masters, PhD and Post-doctoral). Fields of research include sun exposure and behaviour, human health impacts, solar UV radiation monitoring and analysis, sunscreens, etc.

Published research articles

Upcoming event
Solar Radiation Symposium
16 February 2012, Gauteng, South Africa
An informative symposium to obtain recent scientific knowledge on solar radiation, its impact and...
A network to share knowledge and ideas about environmental health