

ORIGINAL ARTICLE

Sun Exposure Among Healthy Adults in a Health Facility

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ABSTRACT

Introduction: Sun exposure is a risk for skin cancer but is beneficial for multiple other diseases. Recommendations for photoprotection are well defined, guidelines for optimal sun exposure is not clear. We determined sun exposure in healthy adults, considering their skin phototype and amount of skin exposed. **Methods:** A cross sectional study was performed involving healthy adults working in a tertiary health facility. Fitzpatrick skin phototype quiz was used to determine skin phototype. Sun exposure was quantified as an index (SEI); body surface area exposed times duration of exposure. **Results:** We recruited 167 volunteers, 110(66%) women and 56(34%) men. Mean age was 29.77 ± 6.58 years, 124(74.7%) were Malay, 27(16.3%) Chinese, 14(8.4%) Indians and 1(0.6%) of other ethnicity. Fitzpatrick skin phototypes were 30(18.1%) type III, 109(65.7%) type IV and 27(16.3%) type V. Exposed body surface area was $13.96 \pm 8.33\%$ in males and $14.55 \pm 9.58\%$ in females. The duration of sun exposure per week in males was 11.52 ± 6.11 hours and 10.71 ± 5.75 hours in females. Mean SEI was 160 ± 144 . The SEI in females was 158 ± 151 , 164 ± 130 in males, p value = 0.81. There were no significant differences in SEI between gender and skin phototypes. **Conclusion:** SEI was very low in our study population due to limited body surface area exposed and duration of sun exposure. SEI was higher in darker skin and males, however these were not statistically significant.

Keywords: Sun exposure, Photoprotection, Asian, Skin phototype, Sun avoidance**Corresponding Author:**

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cultural or religious influences. We hypothesized that the amount of sunlight that reached the skin in our population is very low due to these factors. This could lead to a public health issue. Thus, we embarked on this study to objectively determine sun exposure in healthy adults who works indoors, taking into account their skin phototype, duration of sun exposure and the amount of skin exposed to the sun.

INTRODUCTION

Sun exposure is a well-known risk for skin cancers. The beneficial effects of sunlight other than its role in vitamin D synthesis have not been well explored. Sun exposure has been associated with protection against malignancy, improved cancer prognosis, reduced cardiovascular mortality, lower risk of Alzheimer's disease, cognitive decline and multiple sclerosis (1). Contrary to recommendations for photoprotection which are well defined, guidelines for beneficial sun exposure is not clear. There is limited data on quantification of sun exposure even in vitamin D related research.

Most Asians tend to avoid the sun for a few different reasons. Sun avoidance is practised to achieve lighter skin tone (2,3) and to escape the heat. When sun exposure is unavoidable, the amount of ultraviolet light that actually reaches the skin is further limited by the choice of clothing. Most Asians dresses modestly due to tradition,

METHODS

This was a cross sectional study performed in a tertiary health facility from June 2017 to February 2018. Participants included healthy adults who were staff and students of University Kebangsaan Malaysia Medical Center. Exclusion criteria were current or previous photosensitivity or photodermatitis and presence of chronic diseases. The Fitzpatrick skin phototype quiz, a self-administered quiz was used to determine the participants' skin phototype (4). The Fitzpatrick skin phototype quiz assessed genetic disposition to sun exposure by natural eye, hair and skin colours and existence of freckles. The second part of the quiz assessed the reaction of the skin to extended sun exposure in terms of burning, tanning and sensitivity. Sun exposure was quantified as a sun exposure index (SEI). It is calculated as total body surface area exposed in percent, times the duration of sun exposure in hours

(5). The SEI was determined for a duration of 1 week. There is no recommended standard assessment method for sun exposure. We chose the SEI as takes in account both the duration of exposure and the amount of exposed skin which better reflect the amount of sun that reached the skin.

Statistical analysis was performed using the SPSS (version 23.0; SPSS Inc., Chicago, IL, USA). Analysis of Variance (ANOVA) was used to evaluate the differences in SEI and skin phototypes. $p < 0.05$ was considered as significant.

RESULTS

We recruited 167 volunteers. There were 110 (66%) women and 56 (34%) men with a mean age of 29.77 ± 6.58 years. A total of 124 (74.7%) were Malay, 27 (16.3%) were Chinese, 14 (8.4%) were Indians and 1 (0.6%) of other ethnicity. Their Fitzpatrick skin phototypes were 30 (18.1%) type III, 109 (65.7%) type IV and 27 (16.3%) type V. Characteristics of the study population is shown in Table I.

Exposed body surface area was $13.96 \pm 8.33\%$ in males and $14.55 \pm 9.58\%$ in females. The duration of sun exposure per week for males was 11.52 ± 6.11 hours while in females it was 10.71 ± 5.75 hours. The mean SEI for the study population was 160 ± 144 . The mean SEI in females was 158 ± 151 and 164 ± 130 in males with p value of 0.81. SEI according to Fitzpatrick skin

Table I: Characteristics of the study population

| Characteristics | | n(%) or (mean±SD) |
|----------------------------|---------|-------------------|
| Age | | 29.77±6.58 |
| Gender | Male | 56(34%) |
| | Female | 110(66%) |
| Ethnicity | Malay | 124(74.7%) |
| | Chinese | 27(16.3%) |
| | Indian | 14(8.4%) |
| | Other | 1(0.6%) |
| Fitzpatrick skin phototype | III | 30 (18.1%) |
| | IV | 109 (65.7%) |
| | V | 27 (16.3%) |
| Body surface area exposed | Male | 13.96±8.33 |
| | Female | 14.55±9.58 |
| Sun exposure (hours) | Male | 11.52±6.11 |
| | Female | 10.71±5.75 |
| SEI | Total | 160 ±144 |
| | Male | 164 ±130 |
| | Female | 158 ±151 |

phototypes were 129.33 ± 125.82 for type III, 158.11 ± 151.85 for type IV and 202.22 ± 123.37 for type V. There was no significant differences in the SEI between all the skin phototypes (Table II). SEI in females with skin phototypes III and IV were higher than males. In skin phototype V, the SEI was higher in males than females. The SEI for males and females according to the Fitzpatrick skin phototypes is summarized in Table III.

Table II: Sun exposure index according to Fitzpatrick skin phototypes

| Fitzpatrick skin phototype | SEI Mean ± SD | p value |
|----------------------------|---------------|---------|
| III | 129 ±126 | 0.157 |
| IV | 158 ±152 | |
| V | 202 ±123 | |

Table III: Sun exposure index in males and females according to Fitzpatrick skin phototypes

| Fitzpatrick skin phototype | Sun exposure index (SEI) | | | |
|----------------------------|--------------------------|---------|-----------|---------|
| | Male | | Female | |
| | Mean ± SD | p value | Mean ± SD | p value |
| III | 103 ±47 | 0.185 | 135 ±135 | 0.518 |
| IV | 157 ±143 | | 159 ±158 | |
| V | 224 ±69 | | 189 ±147 | |

DISCUSSION

SEI among our cohort was low. The estimated SEI for an individual wearing short sleeves, knee length pants with no head cover and spend at least 4 hours in the sun per day is 560. The low SEI observed in our study is explained by a few factors. Two-thirds were females and the majority were Malay. Long sleeves top, a long bottom wear with head and neck cover were their common attire as part of work uniform or personal preference. Most of our male participants wore long pants due to the same reason. The predilection to this dressing pattern among the Malay ethnicity has been documented (6) and it is reflected by our cohort in terms of low percentage of exposed body surface area. The amount of time spent under the sun is limited as all the study participants worked indoors. Physicians and nurses had been reported to have only 25 minutes of sun exposure per day even in summer months (7). In Asians, there is a tendency by most to minimize sun exposure to avoid tanning and discomfort due to heat and sweating. Tanned skin is considered less attractive by most Asians (2,3).

Our cohort’s mean SEI was slightly higher in those with darker skin and in males. However, females with skin

phototype III and IV had SEI higher values than their male counterpart. Skin phototype III and IV has been documented as a predictor of sun exposure (8,9) and less use of sun protection measures (10). However, the difference in SEI between genders and skin phototypes that we observed were not statistically significant.

The detrimental effect of inadequate sun exposure is commonly linked to vitamin D insufficiency and its resultant complications. Hypo-vitaminosis D was observed in about half of healthy adults exposed to the sun between 3 to 4 hours per day in a tropical country (11). Vitamin D levels were sufficient with about 5.4 hours of sun exposure per day and 41% body surface area exposed (12). Vitamin D levels were not assessed in our study cohort. However, inadequate vitamin D was expected due to very low SEI values. A previous study involving healthy volunteers working in our medical center found low vitamin D levels with a mean of 15.3 ± 4.2 ng/mL (13). In the Asian population with skin types III, IV and V, sun avoidance may cause more harm than good. Photoprotection is recommended to reduce the risk of melanoma and non-melanoma skin cancers, however the prevalence of both cancers in darker skin is low (14). Benefits of sun exposure in many other diseases may outweigh skin cancer risks in our population.

Interpretation of the results of this study is limited as photoprotection methods and behaviour were not documented. These aspects would provide further information on the amount of ultraviolet light exposed to the skin.

CONCLUSIONS

SEI was very low in our study population with skin phototype III, IV and V due to limited body surface area exposed and duration of sun exposure. SEI increased with darker skin and is higher in females compared to males in skin phototype III and IV, however both findings were not statistically significant.

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