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Knowledge, attitude and practice regarding solar ultraviolet exposure among medical university students in Northeast China ☆

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ABSTRACT

To assess the knowledge, attitudes and practices regarding the health effects of ultraviolet radiation (UVR) and sun exposure among medical university students in Northeast China, 385 subjects were investigated on October 2013 using a self-administered multiple-choice questionnaire. Most of the subjects knew the effects of UVR on skin cancer (95.6%) and sunburn (92.2%), but fewer knew of the eye damage that can result from UVR (27.8% cataract and 3.1% pterygium). Correspondingly, the main purpose of adopting sun protection was considered to be 'preventing sunburn' (55.4%), but 'preventing eye damage' was the least (1.8%). In actual behaviour, the eyes received the least protection as well. Although knowing the effects of UVR on vitamin D synthesis (87.3%), 66.8% of participants never or seldom increased sun exposure. Compared to men, women were more likely to reduce sun exposure ($P < 0.001$). Only a small fraction of subjects (6.6%) thought that tanning was attractive. Considering the response variability to UVR in people with different skin colours, different sun protection programs should be provided. In China, especially in the North, the public should be educated to moderately increase sun exposure to maintain adequate vitamin D status while also protecting against eye damage from UVR.

1. Introduction

Solar ultraviolet radiation (UVR) is an important environmental factor that affects human health, and we are exposed to it more or less almost every day. Every coin has two sides, and UVR is no exception. Exposure to UVR can have negative and positive effects. On the negative side, excessive UVR exposure may lead to skin cancer, eye damage, immune suppression, skin photo-ageing and other ailments [1]. On the positive side, exposure of the skin to ultraviolet radiation B (UVB) is the main source of vitamin D synthesis, which prevents skeletal diseases and is positively associated with reduced risk of a number of other diseases [2,3].

Information from knowledge, attitude and practice (KAP) studies could help develop tailored strategies appropriate to the social and cultural contexts of different populations. Proper knowledge and positive attitudes can influence one's sun exposure behaviour and protection practices. For the purpose of preventing skin cancer through sun protection, many KAP studies on sun protection have been carried out among Caucasian populations. KAP studies regarding vitamin D deficiency have also been carried out by some researchers. However, the important impact of UVR on Asian people, such as Chinese, is different from that on Caucasian people. People of colour are less likely to develop skin cancer [4], but cataracts are the major effect of excessive exposure to UVR [5,6]. In addition, due to darker skin pigmentation, the effect of UVR on vitamin D synthesis in people of colour is reduced [7]. Currently, China has more than 60 million patients with cataracts, and more than 7 million of them have a visual disability [8]. Vitamin D deficiency is a major global public health problem [9] and also found to be widely prevalent in the Chinese population in almost all age groups and areas [10], especially in women [11,12] and children [13]. Furthermore, chronic diseases related to UVB or vitamin D is an increasing concern in China [14–16]. However, as far as we know, few studies have focused on the KAP of Chinese people on solar UVR and its effects. Therefore, it is significant to understand the KAP of Chinese people. University students are considered as the most highly educated young people in China, and medical university students should have more health knowledge than others. Hence, we conducted a population survey of medical university students in Northeast China to assess their KAP of UVR and sun exposure protection. By characterising their KAP and analysing

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its differences compared to the Caucasian population, we offer a suggestion regarding sun protection for Chinese people.

2. Materials and methods

This survey was conducted among 385 medical undergraduate students in Shenyang (41°N, 123°E), a city situated in Northeast China with the noon Solar Elevation Angle ranging from 25° to 72°. At China Medical University, we randomly selected 10 junior classes and 3 senior classes in October 2013. All students present on the day of the study were included. Data were collected using a self-report questionnaire that comprised 20 questions including demographic information, the subject's general knowledge of UVR, their attitudes towards UVR exposure and their behaviour regarding sun protection. This study was approved by the ethics committee of China Medical University.

2.1. Measuring knowledge

The general knowledge about UVR was assessed by eight questions. First, we asked whether participants knew that UVR was harmful (question 1) or beneficial (question 2) to human health. 'Yes', 'no' and 'not sure' were the answer options. In question 3, participants were asked about the health effects of UVR in humans. In question 4, participants were asked which of the answers to question 3 were most important to Chinese. For question 3, the correct answers included sterilisation, skin cancer, skin ageing, sunburn, suntan, cataract, pterygium, protection against rickets, protection against osteoporosis, and effect on immune function. Five distractor options, such as glaucoma, were also used in the two above multiple-choice questions. Question 5 was "Do you know the meaning of ultraviolet index (UVI)?" The answers were 'yes', 'no' or 'I have heard of it, but I do not know the exact meaning'. If the answer was 'yes', participants were further asked to provide the number of levels into which the UVI is divided. Question 6 asked which vitamin (Vitamin A, Vitamin B, Vitamin C, Vitamin D and Vitamin E) is synthesised by exposure to UVR. Question 7 asked which element (iron, calcium, magnesium, zinc, copper and tin) is affected by the vitamin synthesised by exposure to sunlight. In question 8, participants were asked where they obtained information about health effects of UVR. The answers included 'family members', 'school', 'books', 'newspaper', 'Internet', 'TV', 'radio', 'friends', and 'doctors'. For questions 3, 4 and 8, participants could choose more than one answer.

2.2. Measuring attitude

Three questions were used to measure participants' attitude towards sun protection. The first question was "Considering the effects of UVR, what times of day do you think would be appropriate for outdoor activities in the summer, or spring and autumn, or winter?" The answers ranged from '6:00–8:00', '8:00–11:00', '11:00–13:00', '13:00–16:00' and '16:00–18:00'. The second question was about the reason why participants adopt sun protection. The answers included 'preventing skin cancer', 'preventing skin ageing', 'preventing sunburn', 'preventing suntan' and 'preventing eye damage'. The third question asked about individuals' opinions on tanning, and the answers included 'tanning makes people look healthier', 'tanning makes people look more attractive', 'tanning makes people look older' and 'I do not care'. For questions 1 and 3, participants could choose more than one answer.

2.3. Measuring practice

There were seven questions regarding participants' practice of sun protection. Firstly, participants were asked "Have you ever reduced (question 1) or increased (question 2) exposure to the sun when considering the health effect of UV?" Question 3 asked about participants' sun protection behaviour and consisted of six parts, wearing long-sleeve clothes, applying sunscreen, wearing a sun hat or cap, wearing sunglasses, holding a sun umbrella and reducing outdoor activities. Responses to question 3 were further measured using a five-level scale. A score of one was given if the response was 'never' and 5 if the response was 'always'. For participants who answered all six parts of this question, the score values of 'wearing long-sleeve clothes' and 'applying sunscreen' were summed to evaluate the protection against skin damage. The score values of 'wearing sun hat or cap' and 'wearing sunglasses' were summed to evaluate the protection against eye damage. The score values of 'holding a sun umbrella' and 'reducing outdoor activity' were summed to evaluate the full protection against sunlight. In question 4, participants were asked whether they paid attention to the weather forecast. Question 5 asked whether participants paid attention to UVI when reading the weather forecast. The answers to the 5 above questions all ranged from 'never', 'seldom', 'sometimes', 'often', and 'always'. Question 6 was "Would you reduce or increase sun exposure due to the UVI forecast?" Question 7 was "Would you reduce or increase the amount of sunscreen you applied due to the UVI forecast?" The answers to the two above questions were either 'yes, I would' or 'no, I would not'.

2.4. Statistical analysis

All statistical analyses were performed using SPSS for Windows 12.0 (SPSS, Chicago, IL, USA). Categorical variables were compared using the χ^2 test and Fisher's exact test when appropriate. Ordinal categorical variables were compared using ridit analysis. The difference among the mean scores of sun protection behaviour by gender was compared using the Wilcoxon test. A P value less than 0.05 was considered statistically significant.

3. Results

3.1. Characteristics

A total of 385 subjects were included in this study. Men comprised 40.5% of the participants, and 59.5% were women. The average age of the subjects was 21.25 years, with a range of 19–25 years.

3.2. Knowledge of UVR

A partial compilation of participants' knowledge about UVR is shown in Table 1. Approximately 93.8% of participants believed that UVR was both harmful and beneficial to human health. Only 1.9% of them believed that UVR is only harmful to human health, and 4.3% of them thought UVR is only beneficial. Few participants (19 from 385) stated that they knew the meaning of UV index. However, only 5 of them gave the correct number of levels in the UVI.

No one correctly choose all of the health effects of UVR from the 15 answer options of question 3. Among the 10 correct answer options, the least chosen correct options were pterygium (3.1%, 12 from 385) and cataract (27.8%, 107 from 385). The most chosen were skin cancer (95.6%), sterilisation (94.0%), and sunburn (92.2%). For question 4, 71 students responded to this multiple-choice question with the same response given for question 3. The effects chosen for questions 4, which asked about effects that were important to Chinese people, were skin cancer (72.5%), sterilisation (70.7%) and sunburn (66.5%).