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Self-Protection against UV Exposure: Behavioral Patterns and Phototype Correlations among Medical Students in North Jakarta, Indonesia

Jesslyn Alvina[1], Zita Arieselia[2], Regina[3]

[1]School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia

[2]Department of Pharmacology and Pharmacy, School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia

[3]Department of Dermatology and Venereology, School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia

*Corresponding author: Regina, regina@atmajaya.ac.id

Abstract

Introduction: UV radiation is a well-known environmental risk factor for skin damage and cancer. Despite this, medical students—who are expected to become future health educators—often neglect sun protection practices. This study analyzes sun protection behaviors among medical students and explores whether inherent skin types, as measured by the Fitzpatrick scale, are associated with behavioral differences, regardless of personal awareness of their skin type. It proposes targeted educational strategies to improve UV protection compliance and reduce skin cancer risk among healthcare professionals.

Methods: An observational study with a cross-sectional approached on 230 respondents consisting of medical students, conducted through online questionnaires within 3-month period on a systematic random sampling method. Data on demographic data, Fitzpatrick skin type scale, and 5 questions on self-protection behavior obtained was analyzed using Spearman's rank correlation and chi-square analysis, $p < 0.05$ indicating a significant relationship.

Results: Type III, IV, and V are the most common Fitzpatrick's phototypes found on subjects where 69.6% of students had low sun protection behavior. Male exhibit lower sun protection behavior than female, and there was no relationship between students' Fitzpatrick's skin type and sun protection behavior, ($p = 0.112$).

Conclusion: Sun protection behavior among medical students at FKIK UAJ is low, especially among males. This study aimed to assess sun protection behaviors and their correlation with Fitzpatrick skin types among medical students. While gender correlates with behavior, skin type does not. These findings highlight the gap between knowledge and action, emphasizing the need for targeted interventions. Improving sun safety in future healthcare professionals is essential for reducing skin cancer risk and strengthening their role in promoting preventive health behaviors to the wider community.

Keywords: fitzpatrick skin type - medical students - phototype - sun protective behavior - UV rays

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INTRODUCTION

Dangers behind ultraviolet (UV) rays have been increasingly identified along with the rapid development of science and technology. UV rays is classified as a carcinogen because it contains non-ionizing mutagens which can cause degradation of dermal collagen, photoaging, and initiator of tumors in the skin.[1] Preventive self-protection behavior against UV rays is important to minimize the dangers of UV exposure. Self-protection behavior that can be carried out is by avoiding outdoor activities in the middle of the day, using sunscreen, wearing long-sleeved clothes and trousers that cover the skin, hats, and seeking shade when doing outdoor activities.[2]

The Fitzpatrick scale is the most common skin type classification system used in dermatology. This classification system was originally developed to see the skin's tendency to burn in phototherapy practices.[3] The Fitzpatrick scale consists of phototypes I-VI which classifies skin type based on several factors, namely, skin color, inflammatory response to UV, melanin level, and risk of skin cancer.[4] Research reported that phototypes I-III have skin that is more sensitive to sunlight, compared to those with phototypes IV-VI.[5] Indonesian people have diverse skin colors because they come from various ethnicities. Medical students' knowledge of the dangers and sun protections behavior among Airlangga University medical students have quite good knowledge regarding the matters.[6]

In contrast to research on medical students at Airlangga University, one study showed that medical students had knowledge about skin cancer and self-protection behavior against the sun, but the majority of participants did not carry out sun protection behavior.[7] Although previous studies have shown that medical students possess adequate knowledge of UV risks, their actual sun protection practices remain inconsistent. Few studies have examined whether skin type influences such behaviors in the Indonesian context. Therefore, this study aims to analyze the relationship between Fitzpatrick skin types and sun protection behaviors among medical students in North Jakarta, identify contributing behavioral patterns, and explore potential areas for targeted educational interventions.[2]

METHODS

This study used a cross-sectional design and included a total of 230 medical students from years 1 to 3. The minimum required sample size was calculated using the Slovin formula with a 95% confidence level and 5% margin of error, resulting in a minimum sample of 146. We exceeded this number to increase statistical power and accommodate potential drop-outs or data issues. Sampling was conducted using convenience sampling, by distributing online questionnaires through student

representatives of each year group. A total of 250 students were invited to participate, with 230 responding and completing the questionnaire (response rate: 92%). No participants were excluded due to incomplete data or failure to meet inclusion criteria.

Inclusion criteria were all active medical students at Atma Jaya Catholic University of Indonesia without a personal history of albinism or skin cancer. There were no drop-out criteria applicable after data submission since the questionnaire was completed in one sitting and all responses were usable. Ethical clearance was obtained from the Atma Jaya Research Ethics Committee (No. 03/03/KEP-FKIKUAJ/2023). The sample collection was conducted online through Google Forms, with responsibilities delegated to representatives from each medical student cohort. Samples were collected in January 2023, spanning a 5-day period.

The questionnaire included the Fitzpatrick's skin type classification8, and a sun protection practices questionnaire.[7] The Fitzpatrick scale is widely used in dermatology, serving as a useful tool for assessing sun sensitivity and guiding dermatological care. The Fitzpatrick's skin type questionnaire was classified into three subsections: genetic (physical traits), sensitivity (reaction to sun exposure), and intentional exposure (tanning habits). The questionnaire comprised 10 questions, each scored on a scale of 0-4. The total score classified the subject into a specific skin type. Subject with score 0 - 7 was classified as phototype I, score 8 - 16 as phototype II, score 17 - 25 as phototype III, 25 - 30 as phototype IV, and score over 30 as phototype V.[8]

The sun protection practices questionnaire consisted of 5 questions regarding subjects' attitudes under sun exposure, answered with yes or no. Subject behavior was categorized as low if the total score was 1-2, medium if 3, or high if 4-5 based on their answers.[7] The sun protection practices questionnaire underwent a series of processes under the supervision of dermatology experts. It was distributed to 40 individuals and underwent reliability testing using Cronbach's Alpha, yielding a value of 0,602.

Data were analysed using statistical software, describing the study population through frequencies and percentages. Chi-square tests of independence were employed to determine the association between gender and sun protection behavior in medical students. The correlation between Fitzpatrick skin type and sun protection behavior among students was tested using the Spearman’s rank correlation test.

RESULTS

The data obtained from 230 respondents revealed that 63 (27.4%) were male, while 167

(72.6%) were female. Skin types, as per the Fitzpatrick scale, were categorized into three levels: type III (20.4%), type IV (65.7%), and type V (13.9%). The Fitzpatrick scale further grouped skin types based on genetics, sensitivity, and deliberate sunlight exposure into six categories (skin types I-VI).8 Sun protection behavior for each respondent was classified as low, medium, or high. Since there were very few results in the high category, the researchers combined the numbers with the medium category when analyzing the data. The data indicated that the highest rate of sun protection behavior was categorized as low. The respective percentages based on Fitzpatrick skin types III, IV, and V were 57.5%, 72.9%, and 71.9%. Overall, sun protection behavior was categorized as low for 69.6% of respondents, moderate for 29.7%, and high for 0.7% [Table 1].

Table 1. Distribution of Sun Protection Behavior Levels by Fitzpatrick Skin Types among Medical Students in North Jakarta

		Low	Medium	High	Total
Fitzpatrick Phototypes	III	27	20	0	47
	IV	110	39	2	151
	V	23	9	0	32
Total		160	68	2	230

The results of the Spearman's rank correlation test revealed a value of (Sig. (2-tailed = rs -0.105, p = 0.112, n=230)), leading to the conclusion that there was no significant relationship between Fitzpatrick's skin type and respondents' sun protection behavior [Table 2].

Table 2. Relationship between Fitzpatrick's Skin Type and Sun Protection Behavior in Medical Students in North Jakarta

		Low	Medium and High	P	r_s
Fitzpatrick Phototypes	III	27	20	0.112	-0.105
	IV	110	41		
	V	23	9		

Analysis of the relationship between gender and sun protection behavior among respondents showed a result of $p < 0.05$, indicating a significant relationship between gender and self-protection behavior against sunlight [Table 3].

Table 3. Relationship between Gender and Sun Protection Behavior in Medical Students in North Jakarta

		Low	Medium and High	P value*
Gender	Male	57	6	<0.001 OR= 5.9
	Female	103	64	
Total		160	70	

DISCUSSION

The skin types that students have are Fitzpatrick III, IV, and V. Skin types III, IV, and V, according to Fitzpatrick, are characteristic of the skin types typically found in Asian individuals.[8,9] The medical students who participated in this study represent a diverse range of ethnicities and races within the Asian population. Fitzpatrick IV is the most common skin type among the students (65.7%), characterized by low sensitivity, minimal risk of sunburn with exposure to sunlight, and a tendency to darken (moderate brown).[8,10] The second most common skin type among students is Fitzpatrick III (20.4%), described as sensitive, occasionally prone to sunburn, slow to darken, and typically light brown when darkened.[8,10] The least common skin type among students is Fitzpatrick V (13.9%), described as dark brown, resistant to sunburn, and prone to darkening easily.[8,11,12] There were no students who had Fitzpatrick's skin type I, II, and VI in this study.

Our study found that female students overall perform more sun protection behavior statistically based on the assessment of 5 behaviors compared to male students. These findings align with research which demonstrated that several factors, including gender, age, economic ability, and education, significantly influenced individuals' choices and practices related to sun protection.[2,13,14]

This study confirms a significant association between gender and sun protection behaviors, with male students being 5.9 times more likely to show inadequate protection.[15] However, despite differences in skin phototypes, no statistical correlation was found with behavior. This directly supports the study's hypothesis that individual skin type may not predict protective behavior, underscoring the need for interventions that focus on behavioral education rather than biological risk perception alone.

Gender appears to play a crucial role in determining how individuals engage in protective measures against sun exposure. The female gender tends to engage in more self-protection behavior from sunlight compared to males, possibly due to some factors. Research shows that women tend to exhibit higher awareness of the negative effect of sun exposure than men. Women are often more engaged with health education related to skin aging and skin cancer which highly associated with sun exposure and do preventive health measures accordingly. This awareness translates into more consistent of sun protection practice such as sunscreen application and wearing protective clothings.[16]

Female students also showed increased awareness of the importance of skincare for maintaining beauty.[17] This could be associated with social and culture role where female

usually experience greater social pressure regarding physical appearance, which includes maintaining a youthful skin appearance. This pressure may lead to higher level of sun protection behavior among female students, as they are more likely to be influenced by the potential for skin damage and premature aging, in contrast to generally lower level of concern among male students about such issues.[18] This reinforces the notion that gender-specific differences are an important consideration in understanding and addressing sun protection behaviors.[14] Overall, the result of this study underscore the importance of considering gender when developing strategies and interventions aimed at improving sun protection practices. By recognizing and addressing these gender-related differences, more targeted and effective sun safety initiatives can be designed to better meet the needs of different populations.

On the other hand, this study also showed that there is no relationship between Fitzpatrick skin type and sun protection behavior among medical students in North Jakarta. These findings align with research that was conducted in the Chinese population, where sun protection behavior and Fitzpatrick skin type did not show a significant relationship due to various sociodemographic factors such as economy, education level, gender, and age.[2] Previous research also revealed that while medical students have knowledge about skin cancer and sun protection behavior, the majority do not engage in protective behaviors against sunlight.[7]

It could be an indicator that knowledge is not always accompanied by efforts to protect oneself.[7] Another factor is that there is no relationship between Fitzpatrick's skin type and self-protective behavior against sunlight is with life medical students who have a duration of teaching and learning activities quite long and always indoors, so there is no urgency to implement self-protection behavior against sunlight.[15]

Sun protection behaviors were influenced by gender, education, and socioeconomic rather than individual inherent skin type.[2] Another research also indicates role of psychological factors and personal attitudes towards sun exposure. For example, individuals with darker skin types might underestimate their risk of skin damage and cancer due to a lower perceived susceptibility, leading to inconsistent use of protective measures, while individuals with lighter skin types might still neglect protective behaviors due to habit and convenience factor.[19] Social norms and environmental factors may also override biological risk factors. Medical students are often influenced by their peers, institutional norms, and societal trends, which may lead to uniform behaviors in sun protection across different Fitzpatrick skin types. One limitation

is that although Fitzpatrick skin types were assessed objectively, the study did not evaluate participants' awareness or knowledge of their own skin type. Therefore, behavioral patterns may not reflect perceived skin-related UV risk, which could affect the strength and interpretation of the association.[6,7]

People with skin phototypes IV and V sometimes feel they don't need to use sunscreen because they rarely experience erythema or even sunburn after exposure to sunlight. Dark skin is also known to have a sun protecting factor (SPF) equivalent to SPF 15 in sunscreen. In fact, individuals with this skin type can still experience photoaging, pigment disorders, and skin cancer. Diagnosis of skin cancer in this group is usually late with severe prognosis. Therefore, education is needed for all medical students regardless of their skin phototype regarding the importance of sun protection practices.[20]

The limitations of this study include the reliance on self-reported data, which may be subject to recall bias or social desirability bias, potentially affecting the accuracy of the findings. This research is also limited to one medical school with not too many variations in student skin phototypes, and there tends to be a lot of skin type IV. The use of the Fitzpatrick scale, while widely utilized, may not fully capture the nuances of skin type diversity in an I

ndonesian population with varied ethnic backgrounds. Additionally, the study did not assess participants' knowledge of sun protection, which could have provided a more comprehensive understanding of the factors influencing behavior. Future research should incorporate a broader range of skin typing tools and evaluate participants' sun protection knowledge to better understand the determinants of sun protection behaviors.

CONCLUSION

The study reveals a predominant distribution of Fitzpatrick skin types among medical students, with Fitzpatrick IV being the most common. Female students generally engage more in sun protection behaviors compared to males, supported by a significant relationship between gender and sun protection practices. However, no direct correlation was found between Fitzpatrick skin type and sun protection behavior, aligning with previous research. These findings highlight a critical gap in health behaviors among future healthcare professionals, underscoring the need for targeted interventions that focus on improving sun safety practices beyond skin type awareness. By addressing these behavioral discrepancies, particularly among male students, educational programs can more effectively foster a culture of preventive care against skin damage caused by UV exposure.

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CONFLICT OF INTEREST

None.

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