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Effects of Sunscreen on the Facial Skin of Female Students in Federal University Dutse, Jigawa State

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Abstract

Sunscreens have long been recognized as substances to provide effective protection against the detrimental effects of solar radiation. The deleterious effects of sun exposure can be either acute (e.g. sunburn and drug-induced photo toxicity) or chronic (potential long-term risks of repeated sun exposure). Sunscreen products are designed to be applied topically to the skin in order to absorb or reflect UVR and thus provide some degree of protection to the skin of the wearer from sun damage. To evaluate the skin types of the students using sunscreen using Fitz-Patrick scale. To ascertain the effects of sunscreen on different skin types post treatment. Data were collected from the samples via administration of well-structured questionnaire. The first part of the questionnaire consists of socio-demographic information such as age, socioeconomic status and ethnicity. The demographic characteristics of the participants as revealed from Table 1 below indicated that there were 50 participants. Participants of age range 10-14 years (64.5%) were more compared to younger age of 5-9 years (35.5%). The research study shows that regular use of sunscreen can significantly reduce skin damage and premature aging among female students in Federal University Dutse, Jigawa State. Further research is needed to confirm these findings in larger populations, but these results provide promising evidence for the benefits of sunscreen use and underscore the importance of promoting consistent sunscreen use among individuals to prevent sun-induced skin damage and melanoma.

Keywords: *Sunscreen, Skin types, Ultraviolet Rays(UVR)*

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Introduction

Sunscreens have long been recognized as substances to provide effective protection against the detrimental effects of solar radiation. The deleterious effects of sun exposure can be either acute (e.g. sunburn and drug-induced photo toxicity) or chronic (potential long-term risks of repeated sun exposures like solar elastosis, keratoses, induction of skin cancers, and alteration of immune responses and functions).[1] Sunscreen products are designed to be applied topically to the skin in order to absorb or reflect UVR and thus provide some degree of protection to the skin of the wearer from sun damage. Broad-spectrum sunscreen provides protection against both UVA and UVB wavelengths of UVR. When properly applied, good-quality sunscreen can be effective in preventing or reducing adverse effects including erythema, skin aging and skin cancer.[2]

Ultraviolet (UV) rays are associated with different forms of damage to human health. It is now recognized that both UVA and UVB wavelengths can contribute to the development of chronic skin lesions as a result of changes in elastin and degeneration of surrounding collagen mesh.[3] Excessive sun exposure leads to deleterious effects such as premature aging of the skin, hyperpigmentation, and both pre-malignant and malignant lesions.[4] This recurrent exposure can be reduced by using methods of protection against UV radiation, such as clothing and accessories to protect the most exposed areas, as well as the application of cosmetic products providing a sun protection factor (SPF). The effects of ultraviolet radiation (UVR) on the skin depend largely on the intensity of the source, the duration of the exposure, the UVR wavelength and the level of pigmentation of the skin.[5]

Sun protection has been emphasized since ancient times. It is well known that excessive sun exposure leads to sunburns, skin cancers, skin damage, and early aging. Despite increased awareness over the past few decades of the damaging effects of sun exposure, there has been little change in positive behavior, with continued sunburns (particularly adolescents), tanning and even a decline in sunscreen use in some studies. Sunscreens have been proven to decrease rates of skin cancer and photo-damage. The efficacy of sunscreen is determined by its sun protective factor (SPF), which is based on the minimal erythema dose (MED), defined as the smallest amount of UV radiation that leads to minimal redness of the skin.[6]

Materials and Methos

Study Location

The study was *conducted in Dutse metropolis,* Jigawa State, Nigeria.

Study Population

The study population involved all female students living in the dormitory of Federal University Dutse, Jigawa State Nigeria that use sunscreens as part of their cosmetic routine.

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Ethical Consideration

Ethical approval was obtained from Department of Human Anatomy, Federal University Dutse Research Ethics Committee and permission to conduct the study was obtained from the authorities and administrators of the dormitory. Only subjects who gave consent to participate with the research were included in this study.

Study Design and Sampling Technique

A cross-sectional study design was adopted in this research to determine the effects of sunscreens on skins of female student population living in the dormitory of Federal University Dutse. Stratified sampling was used to select samples and snowball sampling was employed to gain more samples based on referral for sunscreen users known by other participants; G-Power computer software was used to determine sample size, using an effect size of 0.5, α level of significance of 0.05, and statistical power of 0.84 were used which gave minimum sample size of 43 participants. Thus, a minimum number of 43 students would have to be used in this study in order to draw valid conclusions from it. However, a total of 50 females students were recruited for the purpose of this study.

Inclusion Criteria

1. Female students
2. Female students living in the dormitory of FUD
3. Female students using sunscreen

Exclusion Criteria

1. Male students
2. Students living off campus
3. Students not using sunscreen

Method

The details and purpose of the study was explained to the participant to obtain their consent. Data were collected from the samples via administration of well-structured questionnaire. The first part of the questionnaire consists of socio-demographic information such as age, socioeconomic status and ethnicity. Family history of skin diseases, allergic history, surgery history and use of over-the-counter nutritional supplements were presented in the second part of the questionnaire; The skin was analyzed using Fitz-Patrick scale to determine skin type; and the sunscreens used by the participants were evaluated based on the component ingredients in the sunscreens and their respective side-effects. Data was recorded for average skin quality for each skin type before and after use of sunscreen. The data was recorded numerically using scales of 1-10, with one being the lowest score and 10, the highest.

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Data Analysis

Data was collected and sorted out in Microsoft Excel before analysis. IBM Statistical Package (SPSS 20.0) was used to analyze the data. Results were presented as mean ± standard deviation (SD). Frequency and percentage of students using sunscreens were used to determine the prevalence of female students that use sunscreens in Federal University Dutse dormitories. Paired sample t-test was used to compare the mean effect of sunscreens on different types of skin pre and post treatment with sunscreen. Values of $p<0.05$ was considered significant.

Results

The demographic characteristics of the participants as revealed from Table 1 below indicated that there were 50 participants. Participants of age range 10-14 years (64.5%) were more compared to younger age of 5-9 years (35.5%). The prevalence of sunscreen users within the students population living in the dormitory was found to be 3.33% and the prevalence of sunscreen usage among the participants according to ethnicity/tribe to be 40%, 40%, 12%, 4%, 4% for Hausa, Fulani, Yoruba, Igbo and others respectively.

Table 1: Demographic Characteristics of the Participants

Characteristics	Frequency	Percentage (%)
AGE		
15-19	10	20
20-24	34	68
25-29	6	12
Total	50	100
Ethnicity		
Hausa	20	40
Fulani	20	40
Yoruba	6	12
Igbo	2	4
Other	2	4

Table 2 portrays the skin condition and cosmetic history of the participants in which their lifestyle, family history of diseases, surgery and allergic history and use of skin care products were assessed. The results show 86%, 92% and 96% negative history of dermatological diseases, allergy and surgery respectively. Cosmetic assessment indicates 0%, 94%, 84% and 96% negative history of use of bleaching products, skin cleansers, use of moisturizers and exfoliators respectively.

Table 2: Skin Condition and Cosmetic History

Characteristics	Positive (+)		Negative (-)	
	F	(%)	F	(%)
Sc history				
Dermatological disease	7	14	43	86

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Allergy	4	8	46	92
Surgery	2	4	48	96
Cosmetic history				
Use of bleaching agents	0	0	50	50
Use of skin cleansers	3	6	47	94
Use of moisturizers	8	16	42	84
Use of Exfoliators	2	4	48	96

SC = Skin condition

The skin type results revealed a high percentage of 52% normal skin type, 20% oily, 20% oily, 12% combination and 16% dry skin types. The skin type analysis as performed using Fitzpatrick scale shows a higher percentage of Type V skin (64%), Type IV (30%) and Type VI (6%). This adoption of this scaling method was applied to determine the skin quality to ensure the level of merit of the sunscreen effect on skin types.

Table 3: Skin Type and Skin Analysis

Skin Analysis	**Frequency**	**Percentage (%)**
Skin type		
Normal	26	52
Oily	10	20
Combination	6	12
Dry	8	16
Fitzpatrick scale		
Type IV	15	30
Type V	32	64
Type VI	3	6

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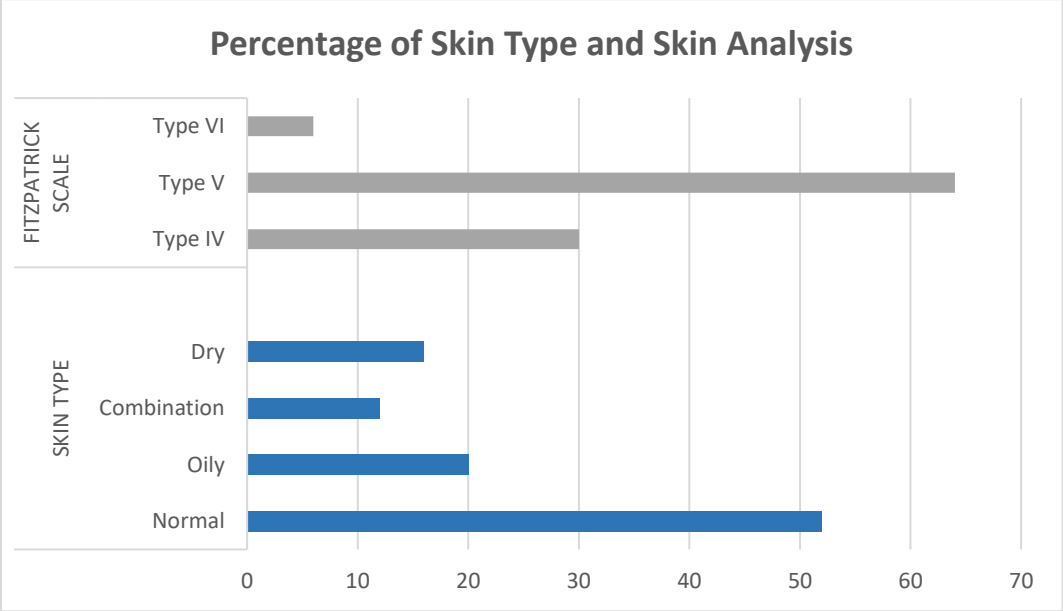

Fig. .1: **Percentage of Skin Type and Skin Analysis**

The usage of sunscreen and level of satisfaction gained by the participants were obtained based on frequency of usage and analyzed using Visual Analog Scale (VAS) ranging from 1 to 4 with 1 = Excellent, 2= Very good, 3 = Good 4 = Fair.

Table 4: Cross Tabulation of Usage of Sunscreen * Satisfaction

		SATISFACTION				Total
		Excellent	Fair	Good	Very Good	
USAGE OF SUNSCREEN	Bi-weekly	3	0	2	7	12
	Monthly	1	0	1	2	4
	Weekly	9	4	8	13	34
Total		13	4	11	22	50

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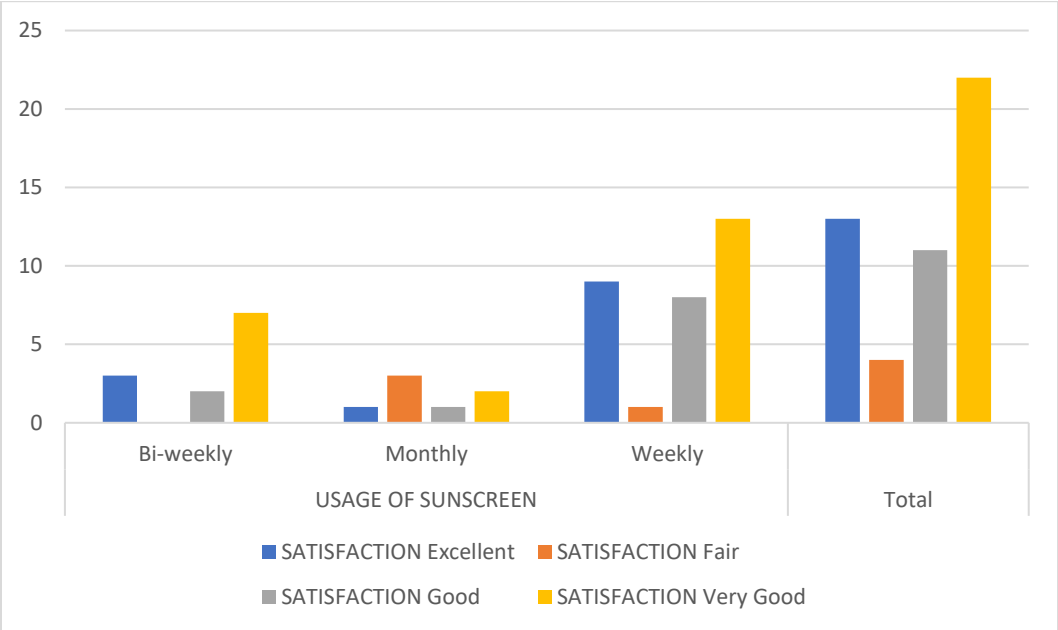

Fig. 2: **Cross Tabulation of Usage of Sunscreen * Satisfaction**

Table 5 revealed the results of paired sample statistics on the effect of sunscreen on skin quality before and after usage of sunscreen. The mean skin quality score was 2.28 ± 0.991 and 5.06 ± 1.132 for baseline and post treatment. The results of Table 6 show a paired sample t-test of skin quality before and after application of sunscreen. There was a highly statistically significant difference (P<0.000) between the means of the two groups pre and post treatment with sunscreen. This revealed a highly significant effect of the sunscreen used on the skin.

Table 5: Paired Sample Statistics on Effect of Sunscreen on Skin Quality

Variable		Mean	SD	SEM
Effect of Sunscreen	Baseline	2.08	1.027	0.145
	Post-treatment	6.32	1.377	0.195

Table 6: Paired Sample t-test

Variable	*N*	Mean	SD	*t*-value	*p*-value
Before — After	50	-4.240	1.723	-17.922	0.000

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Discussion

Based on the data presented in Table 1, it can be observed that the majority of the participants (68%) fall within the age range of 20-24 years. This age group is typically associated with the onset of various skin concerns such as acne, hyperpigmentation, and fine lines. Therefore, it is crucial to educate individuals in this age group about proper skincare practices to prevent or manage these conditions. In terms of ethnicity, Hausa and Fulani participants make up a significant portion of the study population, accounting for 80% of the participants. This is important to note as different ethnic groups may have unique skin types and concerns. For instance, individuals with darker skin tones may be more prone to hyperpigmentation and melisma, while those with oily skin may be more susceptible to acne. Understanding these differences can help tailor skincare recommendations to meet the specific needs of each individual. Overall, these results highlight the importance of considering demographic factors such as age and ethnicity when developing skincare recommendations. By taking into account these variables, healthcare professionals and skincare experts can provide more personalized and effective skincare advice to their clients.

Based on the data presented in Table 2, it can be observed that the majority of the participants (86%) have a history of dermatological diseases, while 92% have a history of allergies. This suggests that these individuals may be more susceptible to skin conditions and may require more attention and care when it comes to skincare. In terms of cosmetic history, it is interesting to note that none of the participants reported using bleaching agents, which could potentially cause skin damage or discoloration. However, half of the participants (50%) reported using skin cleansers, while 84% reported using moisturizers. These findings highlight the importance of proper cleansing and hydration in maintaining healthy skin. Additionally, 6% of the participants reported using exfoliators, which can help remove dead skin cells and promote cell turnover. However, it is important to use exfoliators in moderation as over-exfoliation can lead to irritation and dryness. Overall, these results suggest that individuals with a history of dermatological diseases and allergies may benefit from more personalized skincare routines that address their specific concerns. Additionally, it is important to emphasize the importance of proper cleansing, hydration, and exfoliation in maintaining healthy skin.

Based on the data presented in Table 3, it can be observed that the majority of the participants (52%) have normal skin type, while 20% have oily skin and 12% have combination skin. This distribution is consistent with previous studies that have reported normal skin as the most common skin type. In terms of Fitzpatrick skin type, the majority of the participants (64%) fall within types IV and V, which are associated with moderate to high sun sensitivity. This highlights the importance of sun protection for these individuals, as they are at a higher risk of developing sun-induced skin damage and melanoma. Interestingly, only 6% of the participants fall within Fitzpatrick type VI, which is associated with very dark skin tones. This is lower than the prevalence reported in previous studies, which have suggested that individuals with darker skin tones may make up a larger portion of the population. However, it is important to note that the sample size in this study is relatively small, and further research is needed to confirm these findings. Overall, these results emphasize the importance of considering both skin type and Fitzpatrick skin type when developing skincare recommendations. By taking into account these variables, healthcare

professionals and skincare experts can provide more personalized and effective skincare advice to their clients. Additionally, it is crucial to emphasize the importance of sun protection for individuals with higher sun sensitivity to prevent sun-induced skin damage and melanoma.
This study revealed a positive and significant effect of sunscreen on facial skin of female student subjects with mean skin quality 2.08 ± 1.027 and 6.32 ± 1.377 pre and post treatment with highly significance difference ($p<0.000$) which explained the positive impact of sunscreens on quality of facial skin of the users as described by previous work which showed a positive effect.[7] Therefore, the significant difference observed from this study when assessing the effect of sunscreen on facial skin suggests that sunscreens possess high impact on facial skin assuming all other factors such as genetic history of skin disease, allergy, probably history of maxillofacial surgery, abstinence from skin bleaching agents, lipid and hydration level and lifestyles are in absolute control.

Conclusion

This research study was carried out on the female students in Federal University Dutse, Jigawa state. It was carried out on the facial skin of the female students living in the dormitory in Federal University Dutse, Jigawa state. The research study shows that regular use of sunscreen can significantly reduce skin damage and premature aging among female students in Federal University Dutse, Jigawa State. It is recommended that students be educated on the importance of using sunscreen with an SPF of at least 30 and applying it liberally and evenly to all exposed areas of the skin including the face, at least 15-30 minutes before going outside.

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