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Use of Facial Cosmetics and their Effects on Skin Among Female Students of Bayero University Kano, Nigeria

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Abstract
Cosmetics are used for cleansing, beautifying, enhancing attractiveness, or altering appearance and commonly applied by young women. This study examined the use and effects of cosmetics on the skin of female students at Bayero University Kano, Nigeria. A sample of 360 students from five faculties were randomly selected. Data on age, purpose, type, frequency of use, and effects of cosmetic products were collected. The age groups were divided into younger (18-25 years) and older (25+ years). Pearson's Chi-square test assessed associations between age, ethnicity, and cosmetic use. The study found that facial creams (83.1%), lipstick (52.2%), eyeliners (54.7%), mascara (33.1%), eyelashes (12.5%), eyeshadow (16.1%), and foundation (15.6%) were the most commonly used cosmetics. Usage was mostly occasional (63%) or daily (37%), with 88% preferring daytime application. Significant associations were found between age and usage purpose (p=0.043), and between ethnicity and choice of cosmetics (p=0.030). Reported side effects included acne (23.3%), bleaching (25.7%), pigmentation (12.2%), rashes/itching (13.9%), irritation (5.2%), skin hardening (4.5%), and other complications (15.3%). Eye-related issues included redness (52.2%), itching (20.2%), soreness (15.4%), puffiness (3.5%), and miscellaneous problems (8.8%). Lip problems were primarily cracking (70.8%), swelling (16.9%), and bumps (12.3%). In conclusion, the use of facial cosmetics is prevalent among students, mainly for occasional use and primarily during the day. The purpose of cosmetic use varies with age and ethnicity. The most common side effects are skin pigmentation, eye redness, and swollen lips.

Keywords: Age, Ethnicity, Facial cosmetics, Side effects

INTRODUCTION
Cosmetics are products designed to be applied to the human body for cleansing, beautifying, enhancing attractiveness, or altering appearance. These include skin creams, lotions, perfumes, makeup, hair preparations, and deodorants (Martin, 2002; Clarence, 1994). The daily grooming routines of many, especially fashion-conscious young females in higher institutions, now prominently feature cosmetics (Eyob & Yenet, 2007). These products consist of chemical compounds derived from natural sources or created synthetically (Schneider *et al*., 2005). Continuous use of these cosmetics can lead to metal absorption through the skin, particularly in thin facial areas like the peri-ocular region and lips, where absorption is high

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(Corazza *et al*., 2009). Facial cosmetics are used to colour and highlight facial features, either by directly adding or altering colour or by being applied over a foundation to create an even and smooth appearance.

The use of cosmetics dates back to around 10,000 BC, with significant historical information from around 3000 BC found in ancient Egyptian texts and artifacts (Massoume, 2004). There is debate over the earliest form of cosmetic use, but cosmetic body art is considered one of the earliest rituals in human culture, with evidence from red mineral pigments (red ochre) dating back over 100,000 years to the African Middle Ages (Massoume, 2004).

Health risks associated with cosmetic products are an emerging public health concern, with about 12% of users experiencing adverse effects from one or more products (Vigan *et al*., 2014). Toxic heavy metals such as lead (Pb), cadmium (Cd), nickel (Ni), arsenic (As), and mercury (Hg) are hazardous substances found in some cosmetics. Some products may also contain aluminum (Al). Due to the lack of comprehensive global regulations, cosmetics like colourful cosmetics, face and body care products, hair cosmetics, and herbal cosmetics may contain relatively high levels of these metals. These elements can accumulate in the skin and internal organs, causing toxic effects such as contact dermatitis and systemic allergic dermatitis (Borowska *et al*., 2015).

Chromium (Cr) is commonly used in pigmented cosmetics like eyeshadows and blushes, while reddish pigmented cosmetics can be contaminated with arsenic (As), lead (Pb), and mercury (Hg) (Bocca *et al*., 2014). Traditional eye cosmetics such as Kohl and Surma have been identified as potential sources of lead exposure for both adults and children (Parry & Eaton, 1991; Alkhawajah, 1992; Sprinkle, 1995). The use of these traditional cosmetics in Asia, Africa, and the Middle East has been a topic of scientific debate due to their health risks (Smart & Madan, 1990; Al-Hazza & Krahn, 1995; Lekouch *et al*., 2001; Hardy *et al*., 2004).

Earlier research revealed significant differences in cosmetics usage based on age, gender, marital status, and consumer behavior. Specifically, it was noted that women tended to decrease their use of cosmetics after marriage. Additionally, married men were found to use cosmetics more than unmarried men, with both genders citing the desire to enhance appearance and gain societal acceptance as reasons for their cosmetic use (Ramshida & Manikandan, 2014). A study conducted in 2021 among Sudanese undergraduate females regarding the use of skin whitening products showed that the majority (68%) had a negative perception of skin whitening (Khalil, 2021). Respondents believed that skin whitening could increase their prospects of marriage (21.9%) and job opportunities (18.6%). Furthermore, a significant portion (27.7% and 22.2%) believed that skin whitening could enhance their social acceptance and attractiveness, respectively.

Facial cosmetics play a significant role in enhancing self-esteem and attractiveness, especially among women of all ages and statuses. Despite the satisfaction they provide, around 12% of users have reported adverse effects from cosmetic products worldwide (Vigan *et al*., 2014). In Nigeria, studies demonstrated the awareness of the term cosmeceutical as well as the use of the products among students of tertiary institutions (Bolori *et al*., 2023), however there is limited research on the purposes, types, frequency, and effects of these products on the skin.

MATERIALS AND METHODS

Study Area
The study was conducted at both Old and New campuses of Bayero University, Kano (BUK).

Study Population and Design
The study was a cross-sectional targeted female student population at Bayero University Kano selected from the faculties of Basic Medical Sciences, Physical Sciences, Law, Social and Management Sciences and Art and Islamic Studies. Sixty (60) students were sampled from each faculty.

Ethical Considerations
This study was approved by the Departmental Review Board, and a letter of introduction was acquired from the Department. A consent form, which assured confidentiality and explained the study's aim and objectives, was attached to the questionnaires for participants to give their approval to participate in the study.

Sample Size Determination
A total of three hundred and sixty (360) students were randomly selected from the six faculties using the sample size formula below;

$$n = \frac{Z^2PQ}{d^2}$$

Where, n =Minimum Sample Size, Z =Standard Normal Deviation with (±1.96, CI (95%)), P =Probability value of the previous study 30% (0.5), Q =1 – p, Q =1 - 0.3 = 0.7, d =Standard error 5% (0.05).
Therefore,

$$n = \frac{(1.96)^2 \times 0.3 \times 0.7}{(0.05)^2}$$

n = 323
323 participants are required to be examined in the present study and it was rounded to 360 for better result.

Inclusion and Exclusion Criteria
Only registered students who consented to participate in the study were included in the study. On the other hand, students who were involved in fire accidents or severe acids and other chemical attacks, vitiligo or albino, underwent plastic surgery and other skin manipulations or history of skin disease were excluded from the study.

Data Collection
A pro forma comprised of biodata (age, tribe, marital status & faculty/departments) and close-ended questionnaire sections (which demanded to know the use, types, time, frequency, and side effects of facial cosmetics experienced by the students) was administered.

Data Analyses
Minitab 17 was used for all the analyses. The age of the participants was grouped into two age groups; younger data (18-25 yrs) and older (25+ yrs). A simple percentage was used to determine the frequencies of the variables. Pearson's Chi-square test was used to determine the associations between age groups and the use of facial cosmetics on one hand, and the association between ethnicity and choice of facial cosmetics on the other hand among the students. While charts and figures were plotted using Microsoft Office 19, $p < 0.05$ was considered significant.

RESULTS

Table 1 illustrates the demographics profiles, usage patterns, and purpose for facial cosmetic use among Bayero University Kano Students. The majority of participants fell within the 18-25 age bracket (81.9%), with a minority (18.1%) aged 25 and above using cosmetics primarily for attraction. Hausa students constituted the largest ethnic group (66.6%), followed by Yoruba (15.6%), with other ethnicities comprising 10.6% and Igbo students forming the smallest percentage (7.2%). Common cosmetic types included facial creams (83.1%), lipstick (52.2%), eyeliners (54.7%), mascara (33.1%), eyelashes (12.5%), eyeshadow (16.1%), and foundation (15.6%). Most students used cosmetics occasionally (63%), while 37% used them daily. Additionally, 88% preferred daytime use compared to 12% at night.

Table 2 demonstrates the relationship between age and the purpose of facial cosmetic use among female students. A significant association (p=0.043) exists between age and usage purpose, particularly regarding attraction, which is more pronounced in older age groups. However, fashion remains the primary motivation across all age demographics, with attraction showing a stronger association, indicated by a higher chi-square value.

Table 3 presents the link between ethnicity and cosmetic preference among female students. A significant association (p=0.030) is noted between ethnicity and choice of cosmetics. While fashion is a prevalent motive irrespective of ethnicity, the Yoruba group shows a higher inclination towards using cosmetics for attraction.

Table 4 outlines common side effects of facial cosmetics on students' skin, eyes, and lips. Skin issues include acne (23.3%), bleaching effects (25.7%), pigmentation (12.2%), rashes/itching (13.9%), irritation (5.2%), skin hardening (4.5%), and other complications (15.3%). Eye-related problems encompass redness (52.2%), itching (20.2%), soreness (15.4%), puffiness (3.5%), and miscellaneous issues (8.8%). Lip concerns predominantly involve cracking (70.8%), followed by swelling (16.9%) and bumps (12.3%).

Table 1. Demographics Profiles, Usage Patterns, and Purpose for Facial Cosmetic Use among Bayero University Kano Students

Variables		Frequency	Percent (%)
Age group (yrs)			
i.	18-25	286	79.4
ii.	25+	74	20.6
Marital Status			
i.	Single	286	79.4
ii.	Married	74	20.6
Tribes			
i.	Hausa	240	66.6
ii.	Igbo	26	07.2
iii.	Yoruba	56	15.6
iv.	Other	38	10.6
Types			
i.	Eyeliners	197	54.7
ii.	Eyelashes	45	12.5
iii.	Eyeshadow	58	16.1
iv.	Mascara	119	33.1
v.	Foundation	56	15.6
vi.	Facial creams	299	83.1

vii.	Lipsticks	188	52.2
viii.	All	92	25.6
Frequency			
i.	Daily	132	37.0
ii.	Occasionally	225	63.0
Purpose			
i.	Attraction	65	18.1
ii.	Fashion	295	81.9

Table 2: Association Between Age and Purpose for the Use of Facial Cosmetics in Female Students of Bayero University Kano

Age (yrs)	Test	Attraction	Fashion	Total	*p*-value
18-25	Observed	42	239	281	0.043
	Expected	47.79	233.24		
	χ^2contribution	0.70	0.14		
25+	Observed	18	54	72	
	Expected	12.24	59.76		
	χ^2contribution	2.71	0.56		
Total		60	293	353	

Table 3: Association Between Ethnicity and Purpose for use of Facial Cosmetics in Female Students of Bayero University Kano

Tribe	Test	Attraction	Fashion	Total	*p*-value
Hausa	Observed	35	203	238	0.030
	Expected	40.34	197.66		
	χ^2 contribution	0.71	0.14		
Igbo	Observed	2	23	25	
	Expected	4.24	20.76		
	χ^2 contribution	1.18	0.24		
Others	Observed	7	31	38	
	Expected	6.44	31.56		
	χ^2 contribution	0.05	0.01		
Yoruba	Observed	16	37	53	
	Expected	8.98	44.02		
	χ^2 contribution	5.48	1.12		
Total		60	294	354	

Table 4: Adverse Effects of Facial Cosmetics Among Female Students at Bayero University Kano: A Comprehensive Analysis of Skin, Eye, and Lip Reactions

Side effects		Frequency	Percent (%)
Facial Skin			
i.	Acne	67	23.3
ii.	Irritation	15	05.2
iii.	Skin hardening	13	04.5
iv.	Rashes/Itching	40	13.9
v.	Pigmentation (Black spot)	35	12.2
vi.	Bleaching	74	25.7
vii.	Others	44	15.3

Eyes			
i.	Eyesore	35	15.4
ii.	Puffiness	8	03.5
iii.	Eyes redness	119	52.2
iv.	Itching	46	20.2
v.	Others	20	08.8
Lips			
i.	Swollen lips	11	16.9
ii.	Lips bumps	8	12.3
iii.	Lips cracks	46	70.8

DISCUSSION

The global use of cosmetics and skincare products is on the rise, leading to increased exposure to various chemical compounds in these products. Facial cosmetics, often applied daily, are used on sensitive skin areas like the peri-ocular regions and lips, where absorption rates are high (Corazza *et al*., 2009). This study investigates the usage and effects of facial cosmetics among female students at Bayero University Kano, Nigeria, focusing on age, ethnicity, types, frequency, and reasons for use. The findings show that the majority (79.4%) of participants are aged 18-25, indicating a youthful demographic with a strong interest in cosmetics. Previous research found that over 80% of facial cosmetic users among female students in Maiduguri, North-Eastern Nigeria, were over 25 years old (Bolori *et al*., 2023), likely due to a greater emphasis on enhancing beauty and appearance in this age group. Another study revealed lower cosmetic use among women under 19 (15.9%), with a peak at ages 19-23 (30.8%) and 24-28 (23.8%), followed by a decline (Ramshida & Manikandan, 2014).

The reasons for using cosmetics vary by age, sex, and ethnicity, including improving appearance, reducing aging signs, increasing social approval, and boosting sex appeal (Ramshida & Manikandan, 2014). Interestingly, participants aged 25 and above primarily use cosmetics for attraction, while those under 25 cite fashion as their main motivation. This highlights different motivations across age groups. In Kerala, cosmetics are used to enhance appearance and gain social approval (Ramshida & Manikandan, 2014). The ethnic distribution among the students shows a dominance of Hausa students, followed by Yoruba, suggesting cultural influences on cosmetic preferences. Previous studies reported a 40.9% prevalence of skin toning among female university students in Ghana (Agyemang-Duah *et al*., 2019), 77.3% of traders in Lagos State practicing skin lightening (Adebajo, 2002), and 48.1% of university undergraduates in Maiduguri using skin lightening products (Amodu *et al*., 2018). The use of cosmetics in Africa, Asia, and other regions is believed to be influenced by colonialism and white supremacy (Lewis *et al*., 2013).

This study also identifies the most popular types of cosmetics among students, with facial creams being the most used, followed by lipstick, eyeliners, and mascara. This reflects current trends in the student community. High usage of facial toners, cleansers, and moisturizers was previously reported among undergraduate medical students at Niger Delta University, Nigeria (Egbi & Kasia, 2021), likely due to their role in enhancing beauty, attracting the opposite sex, and boosting confidence (Hunter, 2011; Apuke, 2018). Most students use cosmetics occasionally rather than daily. A study found that 65.8% used facial makeup for special occasions, 16.2% daily, 9.6% weekly, 4.2% were neutral, and the rest used it biweekly or not at all (Marfo *et al*., 2019a). This suggests that many students do not rely on makeup as heavily as those in America and Asia. The preference for daytime use over nighttime use may be influenced by social norms and practical considerations, with most public engagements in

African society occurring during the day. This contrasts with American college students, who often apply makeup for nighttime events like clubbing (Verbickaite, 2017). Additionally, leaving makeup on overnight is harmful due to heavy metal content.

The study reveals a significant correlation between age and the purpose of cosmetic use among female students. Older students use cosmetics more for attraction, while fashion is a universal motivator across all ages. Over 75% of the students were single and aged 18-25. Single women tend to use more cosmetics to attract suitors, while married women use them to maintain their partner's attraction (Mohammed *et al*., 2022). The greater use of cosmetics for attraction among older students underscores age as a factor in marriage suitability (Mafra *et al*., 2020), with younger women being more attractive for marriage and older women using cosmetics to enhance beauty.

The study also examines the relationship between ethnicity and cosmetic preferences, revealing cultural influences on choices. Despite fashion being a common motive, the Yoruba group shows a stronger tendency to use cosmetics for attraction, indicating cultural differences in beauty standards. Racial and ethnic differences in facial product use have been reported, with Asian women more likely to use face wash, exfoliators, and moisturizers (Alexis *et al*., 2019). This highlights the importance of considering cultural factors in cosmetic consumption analysis.

Common side effects of facial cosmetics among students include acne, bleaching effects, eye problems, and lip issues. Acne and allergies were frequently reported side effects among students at Municipal Institute of Medical Education and Research (SMIMER) and Government Medical College, Surat, India (Tejal *et al*., 2013). These findings stress the need for awareness and education on the potential risks of cosmetic use, encouraging informed consumer choices.

CONCLUSION

This study evaluated use of facial cosmetics and its effects on skin among female students of Bayero University Kano, Nigeria. The use of facial cosmetics is common among the students, mainly occasional and mostly during the daytime. This study provides valuable insights into the demographic characteristics, usage patterns, motivations, and associated risks of facial cosmetic usage among female students at Bayero University Kano. For instance, the purpose of cosmetic use is influenced by age and ethnicity. Common side effects observed include skin pigmentation, eye redness, and swollen lips. This underscores the importance of awareness regarding the potential side effects of cosmetic products.

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