Prevalence, Determinants and Adverse Events of Cosmetics use among University Female Students: A study in Egypt

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Abstract

Background: Concern regarding the potential for health risks associated with chemicals used in cosmetic products is well documented. Cosmetics are commonly used by women. Cosmetics may have allergic, irritating, and harmful effects on human health. **Aim of the study:** The present study aims to estimate the point prevalence and to identify determinant and adverse events of cosmetics use among female students at Mansoura University. **Subjects & Methods:** The study was conducted among 790 female students selected from Mansoura university through stratified cluster sampling with proportional allocation. Data were collected through self-administered structured questionnaire. **Results:** Overall prevalence of cosmetic product use was 87.5%. Student age, residence, family size and income were found to be statistically significant predictors for cosmetic use. About 61% of the students used cosmetics for beautification purpose, while only 26.5% used it for disinfection and 21.1% for treatment. Only 21.9% checked whether cosmetic they used was tested on animals or not and 46.7% of them tested cosmetic for allergic reaction. From 691 cosmetic users, 84.7% self-reported ever experience of at least one adverse event due to cosmetic products. About half of them attained cosmetics from local shops. **Conclusion**: Overall prevalence and self-reported adverse reaction of cosmetic product use were high among university female students. **Recommendation**: The development of educational intervention to raise female awareness about harmful effects of the chemicals contained in cosmetics after prolonged use is important.

Keywords: Cosmetic; Determinants; Adverse Events; University students.

Introduction

Every day, Humans are exposed to naturally occurring metals released by the environment through a variety of routes. One of these routes to be considered, is the use of cosmetics products **(Panico et al., 2019**). According to the U.S., **Food and Drug Administration (FDA) (2018),** cosmetics is defined as a substance that is rubbed, poured, scattered, sprayed, inserted, or otherwise applied to the human body for the purpose of cleansing, beautifying, enhancing attractiveness, or altering appearance without affecting the structure or functions of the body. Cosmetics in general are a mixture of chemical compounds derived from natural or artificial sources (**Shiraz, 2019**).

Cosmetic products include face and body care products (creams, lotions, deodorants, soaps, etc.), color cosmetics (lipsticks, mascaras, eye shadows, nail polishes, etc.), and hair products (shampoos, colors, sprays, gels, etc.). Among them, natural products (henna, various cosmetics containing plant extracts and minerals) as well as preparations containing nanoparticles (especially UV filters) can be distinguished (**Samson et al., 2017**).

The cosmetic industry is expanding worldwide at an alarming rate, with products of varying quality and manufactured by different companies. These can be influenced by the expectations of customers, who are becoming increasingly concerned about their image. Obviously, in their view, this may be due to physiological or social needs. Women are more interested in maintaining their self-image, and thus cosmetics seem to be associated with young women (**Meharie et al., 2014**).

Despite the fact that cosmetics assist consumers to be beautiful, harmful consequences can develop including eye and skin inflammation, rashes, acne, hypopigmentation or hyperpigmentation, pruritus, scalp erosion, falling of hair, laxity of the nail bed and mouth irritation. All of these harmful effects may occur directly or on the long term after use. Additionally, cosmetics can contain many ingredients that have been linked to many illnesses, including cancer, birth defects, reproductive and developmental issues (**Hadi et al., 2020**).

Adverse effects of cosmetic use are due to allergies to specific components or product formulation, product contamination by micro-organisms, inappropriate use due to improper labeling and violations of coloring additives. Toxicological studies on cosmetics in Saudi Arabia revealed the presence of more heavy metals and other ingredients than the approved limit (**Zainy, 2017; AlQuadeib et al., 2018**). Heavy metals found in applied cosmetic products can be accumulated and absorbed by the skin then enter body fluids, where they can reach the customers' important organs (**Ullah et al., 2017; Han et al., 2020**). Also, false and fake brand cosmetics are common in the beauty market (**Dhavalshankh and Dhavalshankh, 2012**).

According to World Health Organization essential public health functions (EPHF) are the indispensable set of actions, that are fundamental for achieving the goal of public health, which is to enhance, promote, protect, and restore the health of the population via collective action. Health protection is one of the EBHF, in which public health authorities conduct risk assessment in order to reduce exposure to health hazards and protect the people by assuring environmental and toxicological safety. Consumer product safety is one of the areas covered by the legal and regulatory framework for health protection and risk assessment. (**WHO, 2021**).

Significance of the study

The use of cosmetic products is increasing around the world and a variety of chemical compounds used in the manufacture of these products grows at the same time. The health risks associated with the use of cosmetic products become currently an emerging public health problem (Pereira and Pereira, 2018). Current evidence indicates that exposures to chemical contaminants play a role in the development of non-communicable diseases. Women all over the world use large amount of cosmetic products in pursuit of everlasting youth, ignoring the probable health risks (**Nicolopoulou-Stamati et al., 2015**). Public health nursing is a nursing specialty focused on public health and should consider cosmetic products use as a factor that may adversely affect women health (**Zota, and Shamasunder, 2017**). Continuous surveillance of human data, both in terms of cosmetic exposures and its associated health outcomes, could provide valuable information for public health in the area of risk assessment and future service regulation. Moreover, such information will help to attract the attention of consumers who are more susceptible to the dangerous effects of chemicals contained in cosmetic products (**Maffini et al., 2021**). There are insufficient studies on the pattern of cosmetic use and cosmetic related adverse reactions in the Arab countries especially among the Egyptian females. Therefore, the aim of this study was to estimate the point prevalence and to identify the determinants and negative events of cosmetic use among female students at Mansoura University.

Subjects and Method

Study Design

This is cross-sectional descriptive study with an analytical component. The cross-sectional study design is best used when the researcher is interested to gather information at one point in time; it provides a snapshot of the population.

Study Setting

This study was conducted at four academic faculties affiliated to Mansoura University, Egypt, from January 2021 to May

2021. Mansoura University is located in the middle of the Nile Delta in Egypt. It is one of the biggest Egyptian universities and had 146235 students, of whom 79318 were female students during the study period during the academic year 2020-2021 according to the official statistics of students' affairs at the university.

Study Population

Female students at Mansoura University, who agreed to participate in the study.

Sample size calculation

Sample size was calculated using Medcalc 15.8 (https://www.medcalc.org/). The primary outcome of interest is the % of female students using at least one cosmetic. A previous study in Saudi Arabia found that 93.4% of university female students use cosmetics (Husain, 2018). With alpha error of 5%, study power of 90% and 5% precision, then the sample size is 358 students. This was multiplied by a design effect of two due to stratified cluster sampling method, thus the final sample size is 716 female university students at least.

Sampling Method

Students were selected from the faculties at Mansoura university campus through stratified cluster sampling with proportional allocation. Faculties were stratified into medical, practical and theoretical stratum. The sample size was allocated proportionally to the total number of female students in each stratum. Accordingly, the sample comprised 160, 110 and 520 female students participated in the survey from the medical, practical, and theoretical faculties; respectively. Five faculties were selected from the three strata of Mansoura faculties. Accordingly, Faculty of Nursing was selected from the medical stratum; Faculty of Science and Faculty of Agriculture were selected from the practical stratum and both Faculty of Law and Faculty of Arts were selected from theoretical stratum. In each faculty, one or more cluster (section) were selected from each academic level.

Tool of data collection

Self-administered structured questionnaire was used to collect data, it was developed from previously reported researches (**Meharie et al., 2014; Getachew &Tewelde 2018**). It was written in Arabic; The reverse translation method was used to confirm the phase validity of the original questionnaire. Moreover, expert opinion was considered for further editing after translation. The questionnaire has three main parts and only closed questions with specific possible answers were used.

Part one: Socio-demographic data of students e.g., age, faculty, academic level, marital status, number of family members, family income, father and mother education and occupation.

Part two: Cosmetics utilization pattern: It consisted of two main questions. The first question was used to obtain information about the frequency of current daily cosmetic usage. Students were asked to check all the products they had used currently on a daily basis. They were asked to indicate the corresponding frequency of use requiring a response on 5-point Likert- rating scale with 5 continuum (more than 3 times, 3 times, twice, once, never). In addition, to indicating the place where they often buy their cosmetic products, purpose of using cosmetics and number of cosmetics applied per day. The second question was used to obtain information about cosmetics utilization caution related practices such as label reading habit, reading special notes such as date of expiration and safety tips, content, and side effects, the user's instructions following, addition of water or other agents to the cosmetics, checking whether there is a pre-testing was made to the cosmetics and sharing the cosmetics with other people.

Part three: Self-reported cosmetics related adverse effects experienced, body parts affected, and type of medical consultation received. The students were allowed to choose more than one answer if they thought they were appropriate to their condition.

Validity & Reliability of the Tool

The tool's content validity was tested by five expert faculty members. Two experts in public health and community health nursing. Furthermore, three pharmacists have previous experience in the field of cosmetology. Important deletions, additions, and language editing were performed in accordance with

their recommendations in order to assure the participants' understanding.

Pilot Study

A pilot study was done on 70 students from various faculties to evaluate the instrument's clearance and accuracy, and they were omitted from the study. As a result, small adjustments were made.

Ethical Considerations

Prior to initiating the study, the Research Ethics Committee at Mansoura University's Faculty of Nursing gave their approval. To carry out the study, an official written letter was obtained from Mansoura University's Faculty of Nursing and directed to the academic faculties of the university to collect the necessary data after clarifying the purpose of the study. Approval for data collection was obtained from the faculties of Mansoura University. After explaining the study's objective to each student, verbal consent was obtained. Furthermore, participants clearly communicated about the right of not answering question if they felt no response. The information of the participants was kept confidential, and the collected data was used for the scientific research purposes only. Researchers created code numbers instead of names and kept them to protect students' identities.

Data processing and analysis

The data was edited before entering the computer. Data entry was performed by the principal investigator and analyzed using Statistical Package for Social Sciences (SPSS) software version 23 (Armonk, NY: IBM Corp). Descriptive statistics were used to summarize socio- demographic characteristics the pattern of cosmetic use, and their adverse reaction experience. The determinants of cosmetic use among students were assessed by using logistic regression model. All variables from the bivariate logistic regression were entered into the multivariate logistic regression. The AOR and its 95% CI were used to show the strength of the association and the statistical significance of the determinants. For all statistical tests, p value <0.05 was considered significant.

Results

Table 1 shows that 23 of the studied cosmetics products were consumed by 87.5% of the female university students. We tried to identify the determinants for the use of cosmetics among females' university students. Student's age, mother education, residence, family size and income were statistically significant predictors of cosmetic use. Utilization of cosmetics noted to be increasing by a factor equal two for students aged more than 20 years old (AOR= 2.0; 95% CI: 1.2-3.2) than those are less than 20 years old. Students whose mothers attained secondary education were likely to use cosmetics than those whose mothers attained below secondary education (AOR=2.2; 95% CI: 1.3-3.6). The use of cosmetics was observed to increase by a factor greater than two for students who live in urban areas than those who live in rural (AOR=2.1; 95% CI: 1.2-3.7). Moreover, students whose family size is less than five members and have enough income were likely to use cosmetics than those whose family size is more than five members and have insufficient income (AOR=2.6; 95% CI: 1.7-4.1) and (AOR=2.8; 95% CI: 1.1-7.3); respectively.

Figure 1 shows that out of 691 users, 98% and 96.1% of use soap and toothpaste: respectively. Regarding, the hair care products, shampoo and hair cream were used by 88.7% and 86% of them; respectively. The lipstick is the highly prevalent one used among the makeup products 75.5%. The special care products including hand lotion, shower gel, and body lotion were used by 77.9%, 77.7% and 74.9% of them; respectively

Figure 2 shows that more than 69% of students reported the use of soap more than 3 times a day. Toothpaste was used twice per day by 42.3% of the users. Moreover, it was reported that about half of them use eye makeup, lipstick, face mask and shower gel once per day. On the contrary, the least frequent used cosmetics were hair dyes and contact lens. However, the frequency of using other cosmetics was more diverse.

Table 2 illustrates that around two third 60.8% of students mentioned that they used cosmetics as a beautification purpose, followed

by 54.7% as entertainment, and 41.4% for body protection. About half of them bought cosmetic products from local shops while 26% bought from pharmacy. About two third of the users 66% bought cosmetic products according to their quality. The majority of students, 94.4%, 88.7%, and 75.3% remove makeup before bedtime and read the expiry date and safety warning on cosmetics; respectively. In contrast, 49.3%, 40.2%, and 21.9%, of them added water or other agents to cosmetics, shared cosmetics with friends and family members, and make sure that the product has been tested on animals before purchasing it; respectively.

Table 3 shows that out of 691 cosmetic users, 84.7% of them self-reported an experience of at least one adverse event due to cosmetics use. Acne, redness, itching, breakage of hair, eye inflammation, and armpit darkening were the most commonly reported unfavorable side effects. Most affected body parts were the face 63.2%, followed by eyes 38.6%, armpit 29.7%, and lips 24.7%. About 40% of the students sought medical consultation from a specialized doctor, while 36.2% of them didn't seek any medical advice.

Table 1: Point Prevalence of cosmetic use among female university students and univariate and multivariate logistic regression analysis of its associated factors. (n=790)

Variables	Total	Univariate analysis			Logistic regression	
	N(%)*	Cosmetic use N(%)**	P	COR(95% CI)	P	AOR(95% CI)
Overall	790(100)	691(87.5)				
Age (years):≤20	439(55.6)	368(83.8)	0.001	r(1)	0.005	r(1)
>20	531(44.4)	323(92.0)		2.2(1.4-3.5)		2.0(1.2-3.2)
Mean±SD= 20.3±1.4						
Father education:						
>2ry	269(34.1)	229(85.1)		r(1)		
2ry	385(48.7)	345(89.6)	0.2	1.4(0.9-2.3)		
<2ry	136(17.2)	117(86.0)	0.8	1.1(0.6-1.9)		
Mother education:						
>2ry	219(27.7)	182(83.1)		r(1)		r(1)
2ry	457(57.8)	411(89.9)	0.011	1.8(1.1-2.9)	0.003	2.2(1.3-3.6)
<2ry	114(14.4)	98(86.0)	0.5	1.2(0.7-2.4)	0.1	1.8(0.9-3.6)
Father occupation:						
Not working	30(3.8)	27(90.0)		r(1)		
Government	358(45.3)	317(88.5)	0.8	0.9(0.2-3.0)		
Employee	402(50.9)	347(86.3)	0.6	0.7(0.2-2.4)		
Others#						
Mother's work:						
Housewife	548(69.4)	478(87.2)	0.8	r(1)		
Working	242(30.6)	213(88.0)		1.1(0.7-1.7)		
Residence: Rural	559(70.8)	479(85.7)	0.02	r(1)		r(1)
Urban	231(29.2)	212(91.8)		1.9(1.1-3.2)		2.1(1.2-3.7)
Marital status:						
Married	52(6.6)	50(96.2)	0.05	3.8(0.9-15.8)		
Unmarried	738(93.4)	641(86.9)		r(1)		
Family size:≤5	505(63.9)	465(92.1)	≤0.001	3.0(2.0-4.7)	≤0.001	2.6(1.7-4.1)
>5	285(36.1)	226(79.3)		r(1)		r(1)
Family income:						
Sufficient	497(62.9)	434(87.3)		r(1)		r(1)
Insufficient	171(21.6)	140(81.9)	0.8	0.7(0.3-0.9)	0.03	0.6(0.3-0.9)
Enough & save	122(15.4)	117(95.9)	0.007	3.4(1.3-8.6)	0.04	2.8(1.1-7.3)

*column%, **row %
COR=Crude odds ratio AOR=Adjusted odds ratio CI=Confidence interval
#farmers, manual workers, trades & business

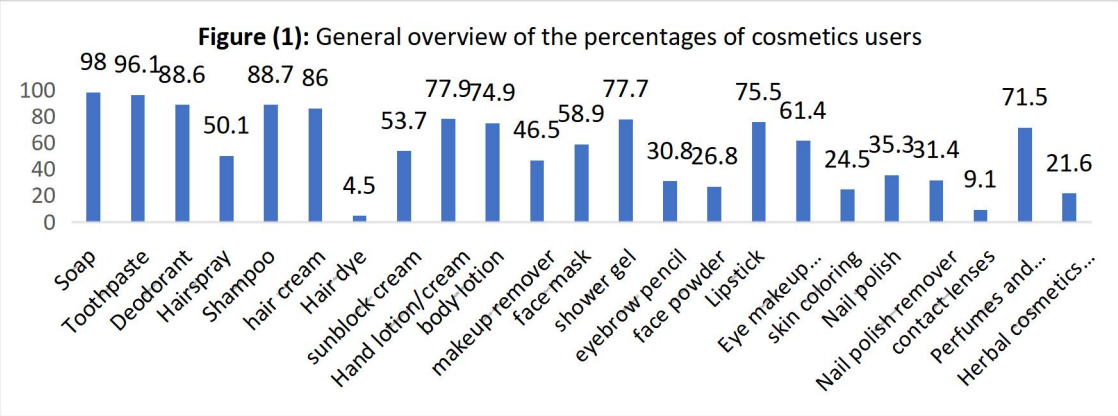
Figure (1): General overview of the percentages of cosmetics users
100
80
60
40
20
0
98
96.1
88.6
50.1
88.7
86
4.5
53.7
77.9
74.9
46.5
58.9
77.7
30.8
26.8
75.5
61.4
24.5
35.3
31.4
9.1
71.5
21.6
Soap
Toothpaste
Deodorant
Hairspray
Shampoo
hair cream
Hair dye
sunblock cream
Hand lotion/cream
body lotion
makeup remover
face mask
shower gel
eyebrow pencil
face powder
Lipstick
Eye makeup...
skin coloring
Nail polish
Nail polish remover
contact lenses
Perfumes and...
Herbal cosmetics...

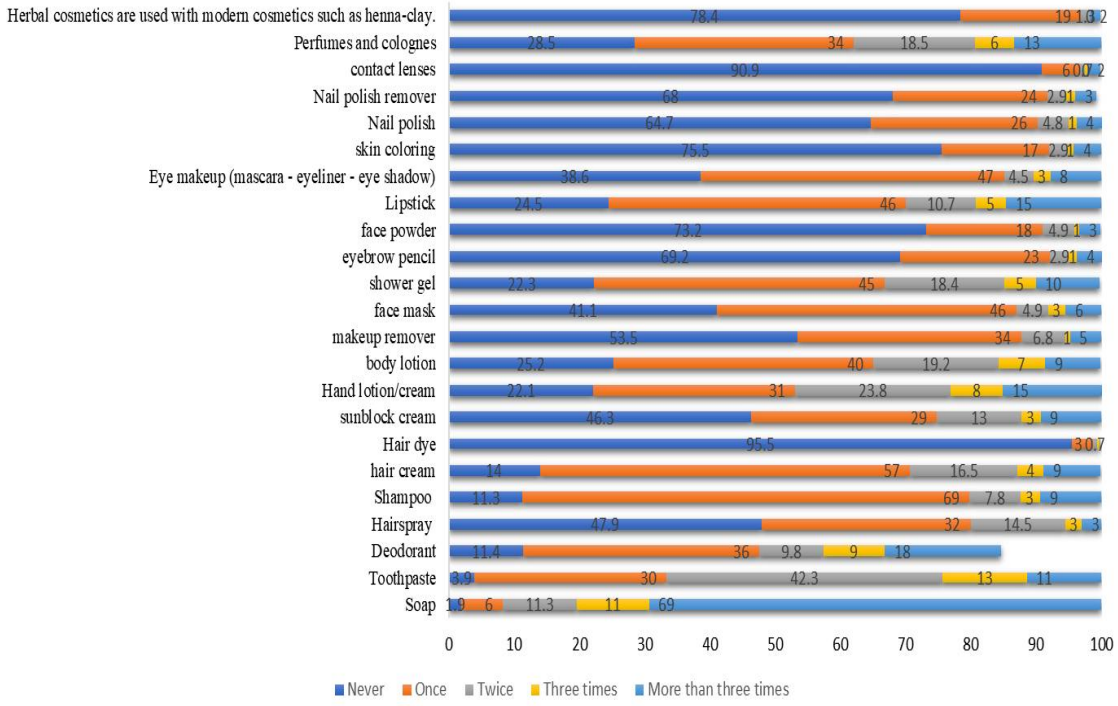
FIGURE (2): Percentage of current daily cosmetic use among female university students
Herbal cosmetics are used with modern cosmetics such as henna-clay.
Perfumes and colognes
contact lenses
Nail polish remover
Nail polish
skin coloring
Eye makeup (mascara - eyeliner - eye shadow)
Lipstick
face powder
eyebrow pencil
shower gel
face mask
makeup remover
body lotion
Hand lotion/cream
sunblock cream
Hair dye
hair cream
Shampoo
Hairspray
Deodorant
Toothpaste
Soap
0
10
20
30
40
50
60
70
80
90
100
Never
Once
Twice
Three times
More than three times

Table 2: The characteristics of current use of cosmetic products among female university students (n=691).

Variables	N(%)
Aim of using cosmetics:	
Anti-aging	44(6.4)
Treatment	146(21.1)
Bleaching	168(24.3)
Disinfection	183(26.5)
Protection	286(41.4)
Entertainment	378(54.7)
Beautify	420(60.8)
Source for shopping cosmetics:	
Pharmacy	180(26.0)
Local shops	314(45.4)
Both of them	197(28.5)
Factors affecting preferences of cosmetics:	
Accessibility	196(28.4)
Affordability	367(53.1)
Quality	456(66.0)
Age of starting using cosmetics	
Mean ± SD (years)	17.7±1.9
Median (minimum-maximum)	18(6-22)
Number of cosmetics used per day	
Mean ± SD (years)	3.3±2.8
Median (minimum-maximum)	3(1-20)
Cosmetics use habit.:	
Make sure that the product has been tested on animals before purchasing it	151(21.9)
Sharing cosmetics with others	278(40.2)
Testing for allergy prior to use of cosmetics	323(46.7)
Adding water/other agent to cosmetics	341(49.3)
Ask about the substance used on the skin or hair during your visit to the beauty salon	447(64.1)
Read the safety warning on cosmetics	520(75.3)
Check the expiration date before cosmetics	613(88.7)
Remove makeup before bed	652(94.4)

Table 3: Reported cosmetic-related adverse events. (n=691).

Variables	N(%)
Adverse events:	
Acne	391(56.6)
Redness	240(34.7)
Darkening of the armpits	207(30.0)
Itching	182(26.3)
Eye inflammation	199(28.8)
Hair breakage	138(20.0)
Soreness	101(14.6)
Facial discoloration	96(13.9)
Skin burns	74(10.7)
Affected area:	
Face	437(63.2)
Eye	267(38.6)
Armpit	205(29.7)
Lips	171(24.7)
Scalp	136(19.7)
Nose	80(11.6)
Neck	55(8.0)
Whole body	48(6.9)
Legs	28(4.1)
Arm	21(3.0)
Heart	13(1.9)
Consultation:	
Specialized Doctor	270(39.1)
Pharmacist	160(23.2)
Plastic Surgeon	81(11.7)
General Practitioner	32(4.6)
None	250(36.2)

Discussion

This study provides information on the current usage patterns of cosmetic products for a cohort of university female students. According to the study, the overall prevalence of using cosmetics was significantly high among female university students in Mansoura University, Egypt. The point prevalence of cosmetics uses was 87.5%, which was much higher than that reported with the previous studies conducted in Iran, Saudi Arabia & Ethiopia by (**Jalilianet al., 2012; Husain, 2018; Getachew, & Tewelde, 2018**); respectively. In this study, the widespread usage of cosmetic products may be attributed to advances in the cosmetic industry and scalable cosmetic companies advertising cosmetics and personal care products.

Cosmetic utilization increasing about two times among students older than 20 years old compared to those younger than 20 years old. Our results were in agreement with other studies conducted in Netherlands & Saudi Arabia by (**Biesterbos et al., 2013; Shaaban & Alhajri, 2020**); respectively which reported that the pattern of use patterns varied by age. This finding could be interpreted that old female students feel more confident with application of cosmetics than younger students. It was also found that female students who lived in urban places, had family size less than five members, and also had enough income were more likely to use cosmetics two times more than those who lived in rural places, had family size more than five members, and had insufficient income. This is in agreement with results from study done by **Salverda, et al., (2013)** in Netherlands. This might be related to female living in high socio-economic class can use various kinds and number of cosmetics as they are able to buy.

Significant percentage of students are using these cosmetics on regular basis. The most commonly used cosmetics were soap, toothpaste, hair cosmetics, eye makeup, lipstick, hand lotion, shower gel, and body lotion lipsticks. The main claimed purpose of cosmetics use were beautification and entertainment which is similar to a study conducted by **Meharie et al., (2014)** in Ethiopia. Beauty may be a common goal for university female students who use cosmetics. This might be attributed to their adulthood age and a higher percentage of unmarried status.

Exposure to various chemical compounds contained in cosmetics presents health risks ranging from a mild hypersensitivity response to fatal poisoning (**Zainy, 2017**). Regarding their experience of adverse reactions, 84.7% of the students complained adverse event. This proportion is a greater as compared with other studies conducted in Ethiopia by (**Meharie et al., 2014; Getachew, & Tewelde, 2018**). Clinical manifestation of adverse reactions caused by cosmetics was various. Acne, redness, itching, hair breakage, eye inflammation, and darkening of armpits were the most commonly reported side effects in this study, according to the majority of reports. The results were consistent with the findings of previous studies conducted by (**Bilal et al., 2016; Lucca et al., 2020**) in Ethiopia and Saudi Arabia; respectively. This finding can be interpreted as the mean number of cosmetics used per day was 3.3±2.8. Consequently, the use of different kinds of cosmetics at the same time may increase the synergistic effect of cosmetics or raise the concentration of chemical compounds to the maximum, which may cause negative events.

Lotions and deodorants were among the top to be used cosmetics. Alpha and beta hydroxy acids, which are found in lotions and deodorants, are thought to help decrease wrinkles. These acids are known to increase the sensitivity of human skin to Ultraviolet rays, resulting in sunburn, cancer, and other harmful consequences. The face, eye, and armpit were the body parts most affected by cosmetics adverse events in this study. This finding is supported by studies conducted in Ethiopia and Malaysia by (**Dibaba et al., 2013; Hadi et al., 2020**); respectively.

Cosmetic sources have shown a significant association with the incidence of adverse reactions. In this study, the proportion of students who obtained their cosmetics from local shops sources was very high than those who bought them from drug retail outlets, such as pharmacy. Cosmetics in stores are likely to be criticized and disadvantaged due to storage

issues. As a result, they are more susceptible to microbial development and cause successive infections than cosmetics purchased from drug retail outlets. This study finding was in agreement with the finding of study conducted by **Dibaba et al., (2013)** in Ethiopia.

Furthermore, cosmetic usage habits have been reported in several studies as a significant predictor of the occurrence of negative events (**Dibaba et al., 2013; Bilal et al., 2016)**. The students in this study had improper habits regarding safety advice that they should follow while using cosmetics. Nearly half of them use cosmetics with friends and family members, according to the findings. Sharing has been shown to expose cosmetics to microbic pollution, which can contribute to acne and other infections. In addition, 46.7% and 21.9% students test the cosmetic products for allergy or check whether they have been tested on animals before using it respectively. The addition of water or saliva to some of their cosmetics was also identified as an undesirable habit. Water and saliva are ideal medium for bacterial development since they reduce the quantities of preservatives in some way. This could be one of the probable reasons for the unpleasant adverse events reported by the students.

The pharmacist's participation in public engagements is widely established. They are considered as the basic and easy communication by the public (**Allison et al., 2017; Ashique and Chandrasekhar, 2017**). The findings regarding the way students solved the adverse effects showed that, about two third of the affected individuals consult a dermatologist and pharmacist, which is similar with the findings of other study conducted in United States by (**St. Sauver et al., 2013**).

Limitations

There might be some limitations in this study and the users must keep them into their account when interpreting the evidence. First, estimations of negative events related to the cosmetics were based on participant self-report, which could be influenced by recall bias and thus cause underestimation. Secondly, social desirability image and unique university, limit generalization to other non-university women. The findings of this study may be useful to safety assessors in protecting the general public and those who are vulnerable.

Conclusion

In this study, a recent information is provided on the pattern of using large number of cosmetics that are widely consumed by female students in Mansoura University. Such data is critical for determining exposure and risk. The overall point prevalence of cosmetic use was significantly high. It was discovered that the utilization of cosmetics varies substantially, and different products are consumed at the same time. Reporting adverse effects of cosmetic products requires observance of safety concerns related to cosmetic use. Furthermore, the majority of students had unacceptable habits regarding the safety precautions that they should follow during use.

Recommendation

There is a need to develop and implement well-being health education programs, as well as hold workshops to raise public awareness, particularly among female students, regarding about consumer product safety, the ingredients and harmful effects of the chemicals contained in cosmetics after prolonged use.

Data Availability: The data used to support the findings of this study are available from the corresponding author upon request.

Funding: This research received no external funding.

Acknowledgments: The authors would like to thank all students and staff of Mansoura university for their support.

Conflicts of Interest: The authors declare no conflict of interest.

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