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Questionnaire-Based Study of 392 Women in Abbottabad, Pakistan, to Evaluate the Types of Cosmetic Products Purchased Between December 2018 and March 2019 and Their Associated Adverse Events

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Conflict of interest:

None declared

Background:

Cosmetics are applied topically to enhance appearance and are commonly used by women of all ages. Cosmetics contain many chemical agents, but the incidence of adverse reactions is low, possibly due to underreporting. This questionnaire-based study included 392 women to evaluate information on the types of cosmetics purchased between December 2018 and March 2019, their use by the women surveyed, and their associated adverse events.

Material/Methods:

A cross-sectional study was conducted among 392 women in Abbottabad, Pakistan, using a pre-structured and validated questionnaire to evaluate information on the types of cosmetics, their use, and their associated adverse events. Part 1 of the study collected information about demographics. Part 2 contained a total of 11 items, and collected the frequency of use of cosmetic on skin and hair care products. Part 3 consisted of 4 items and collected information about problems encountered due to the use of cosmetics.

Results:



In the winter season, 47.7% (n=187) of women preferred chemical-based cosmetic products, while 30.9% (n=121) preferred Ayurvedic products. Among commonly used cosmetic products, 26.9% (n=106) of women used foundations. The most frequently used skin care product was face wash 39.5% (n=155). The most prevalent adverse events related to cosmetics were pimples (19.9%, n=78), redness (17.6%, n=69), and eye discomfort (15.8%, n=62). Furthermore, 51.3% (n=201) strongly agreed that cosmetics aid in getting a whiter complexion.

Conclusions:

The survey concluded that most women preferred cosmetics with a chemical base, which are associated with rashes, redness, and acne. It is important to encourage cosmetovigilance and awareness campaigns among cosmetic product sellers and users.

Keywords:**Cosmetics • Drug-Related Side Effects and Adverse Reactions • Economics • Practice Valuation and Purchas**

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Introduction

Seasonal and climatic changes can have an impact on the skin and make some skin diseases worse [1]. Individuals and patients who have skin diseases can find the severe temperatures in summer and winter months problematic [1]. It is common knowledge that factors including heavy perspiration, ultraviolet (UV) rays, wind, and cold can worsen skin that is already dry, cracked, and inflamed [2]. Additionally, altering one's diet, wearing more layers of clothing, using protective emollients, such as corticosteroids or aqueous cream BP, and frequently switching between indoor and outdoor temperatures can aggravate conditions that already react poorly to even a small change in daily routine [3]. While the summer can be the worst time of the year for those who experience bouts of rosacea [4], the winter months bring other challenges as well.

Cosmetics are defined by the US Food and Drug Administration (FDA) as products that are anticipated for application to the human body for beautifying, cleansing, promoting a pleasant appearance, or modifying the physical appearance without disturbing the functions or the structure of the body [1]. Commonly used cosmetics include creams, lip cosmetics, powders, sunscreens, lotions, perfumes, face wash, nail polish, foundation, eye makeup, hair products, perfumes, deodorants, and bubble baths [2-4]. Hair cosmetic agents are the products used for cleansing, changing appearance, and protecting the hair. Lip cosmetics include lipstick, lip liner, lip gloss, lip balm, lip plumper, and lip primer. Lipsticks have been used to add texture and color to lips and often come in a variety of colors with different finishes, such as satin, matte, and luster [3].

Cosmetics have become crucial products and are used by most female populations, regardless of their age, marital status, occupation, and education [5]. However, due to the absence of formal and reliable reporting systems, little or no knowledge about the undesirable effects at the population level is available [6]. The associated effects of cosmetic products are damaging reactions attributable to their normal use [7]. Regular use of unreliable cosmetics imposes harmful effects, because they contain different harmful compounds. Skin care cosmetics can cause acne, burning, rashes, and itching. Allergic contact dermatitis in women due to the use of cosmetic products is very common [8]. Furthermore, fragrance blends, thiomersal, formaldehyde, neomycin, and balsam of Peru can include allergens and induce different skin sensitivities [9,10].

Elderly people are more likely to develop dermatitis in winter, which occurs mainly due to the use of antiperspirants and deodorants [11]. Photosensitivity, skin cancer, and premature aging occur because of UV radiation, which has led to the increased use of UV filters in skin care products. Hence, this becomes the main reason for an increased risk

of photo contact allergy to UV filters [11]. Most of these cases are caused by the UVA-filtering benzophenone, dibenzoyl methane, isopropyl dibenzoyl methane, and butyl methoxy dibenzoyl methane. Other examples of photosensitizers are p-aminobenzoic acid (PABA), octyl dimethyl, and ethylhexyl-p-methoxycinnamate [11,12]. Some tiny nanoparticles, such as titanium dioxide and zinc oxide, penetrate the skin and can damage brain cells, and making them transparent in products creates a higher risks of developing this problem [12,13]. Cosmetovigilance emerged from the French Health Products Safety Organization to debate cosmetic product safety and to evaluate the procedures involved in gathering, analyzing, and tracking reports of unfavorable incidents that occur during or after the regular or reasonably anticipated use of cosmetic products [9,10].

Understanding consumer behavioral patterns, on the other hand, is critical to the success of corporate organizations. It aids individuals and the public in predicting future trends by evaluating patterns of purchase behavior and decisions [12,13]. Consumer behavior can be defined as the study of how, when, and why people purchase a specific product. According to Global Cosmetic Industry research, advanced education provided by businesses about the ingredients and advantages of products has made today's consumers more aware of what they are putting on their bodies and more prepared to pay [1,13]. In the cosmetic market, it is critical to include both Western and Eastern countries to compare various people's purchase habits for cosmetic items. Pakistan is a part of the Eastern culture, which has the highest proportion of women who buy cosmetics. To the best of our knowledge, no research has been conducted on how this population responds when the winter season arrives. Therefore, this questionnaire-based study included 392 women in Abbottabad, Pakistan, to evaluate the types of cosmetic products purchased between December 2018 and March 2019 and their associated adverse events.

Materials and Methods

Study Design and Setting

Before data collection, the Institutional Review Board at the Academic Unit of the Commission on Science and Technology for Sustainable Development in the South (COMSATS) University in Islamabad (CUI-Reg/Notif-1710/19/1998) approved this study. In addition, informed consent was acquired before completing the questionnaires. Participants were told about the study and given the assurance that the responses they submitted would remain confidential. No participants were coerced to provide an answer. Further, participants were allowed to leave the study at any time. In addition, this study followed the guidelines of the Declaration of Helsinki for human research.

A cross-sectional study was conducted in Sarban Hills, in Abbottabad, Khyber Pakhtunkhwa, Pakistan. According to Khyber Pakhtunkhwa Economic Zones Development and Management Company, it has a total population of approximately 1 332 912 and spans an area of approximately 179 653.5 km², lying geographically between 34°09'N latitude and 73°13'E longitude at an altitude of 1260 m. It is located 110 km north of the capital Islamabad, 130 km from Rawalpindi, and 150 km northeast of Peshawar [14]. The study was conducted from December 2018 to March 2019 in Abbottabad, Pakistan. The data were collected using a simple random sampling technique. The inclusion criterion was women who were using cosmetics in the winter season. Exclusion criteria were vision problems (blindness) or inability to read and/or write.

Sample Size Estimation

The sample size was calculated by the online calculator (http://www.raosoft.com/sample_size.html) at a 5% margin of error and 95% confidence interval; at an unknown population size, the required sample size for this study was n=377. However, to avoid sampling bias, we opted to survey the maximum number of women to participate in this study. A total of 392 women were included in the study.

Study Instrument/Questionnaire

A questionnaire was developed and modified according to the needs of this study [15,16]. Part 1 of the questionnaire collected demographic information, including age, marital status, and educational status. Part 2 contained a total of 11 items and collected the frequency of use of the cosmetic products (daily/occasionally/rarely/never), frequency of use of various color cosmetics (lipsticks, foundation eyeliner, mascara, nail polish), skin care, and hair care products, and use of fragrance. We also collected the frequency of purchasing cosmetics, (once or twice in a month, once in 2 months, or as needed), types of cosmetics purchased, and the source of purchase. Participants were asked what they specifically look for in cosmetic products, whether they share cosmetics with others, whether they read the label for expiry date before buying the product, the purpose of using cosmetics, habits of removing makeup, and perspective of how cosmetics help an individual.

Part 3 consisted of 4 items and collected information about problems encountered due to the use of cosmetics assessed on a 5-point scale. The second question of part 3 collected information about the type of adverse events experienced after the use of cosmetics, what was done after the arrival of the effect, and who was consulted. All these questions were open-ended with multiple choice answers. Detailed information is presented in **Table 1**.

Table 1. Self-reported effects and action after their occurrence among women in Abbottabad between December 2018 and March 2019 (n=392).

Questions	n (%)
What type of effects do you come across after use of cosmetics	
Burning	20 (5.1%)
Itching	19 (4.8%)
Pimples	78 (19.9%)
Redness	69 (17.6%)
Rashes	54 (13.8%)
Eyes irritation	62 (15.8%)
Pigmentation	30 (7.7%)
Nausea	20 (5.1%)
Eczema	28 (7.1%)
Dizziness	12 (3.1%)
Vomiting	0
What do you do after the arrival of the effect	
Stop using the product	96 (24.5%)
Quit the product until the effect was gone	119 (30.4%)
Start using another product	177 (45.2%)
Who did you consult after arrival of these effects	
General practitioner	53 (13.5%)
Medical specialist	76 (19.4%)
Pharmacist	0
Beautician	7 (1.8%)
None	256 (65.3%)

A pilot study was conducted with 20 women, whose responses were statistically evaluated to check the readability flow of the content using SPSS. Cronbach's alpha value for reliability and consistency was assessed. The value of Cronbach's alpha of 0.64, which is greater than 0.5 suggested that questionnaires are valid and reliable to use in the study.

Data Collection Procedure

A pre-structured and validated final questionnaire was individually distributed to the participants. The details and nature of the study were then explained. A researcher from the College of Pharmacy collected the responses. The participants were assured that the responses would be used only for research

Table 2. Demographic characteristics of cosmetic users in Abbottabad between December 2018 and March 2019 (n=392).

Demographic variables	Frequency n (%)
Age (years)	
18-27	224 (57.1)
28-39	138 (35.2)
40-50	30 (7.7)
Marital status	
Single	289 (73.7)
Married	103 (26.3)
Educational status	
School	24 (6.1)
College	30 (7.6)
University	338 (86.2)

purposes, confidentiality would be maintained throughout the study, and they could withdraw from the study at any time. The filled questionnaires were collected upon completion. Of the 400 questionnaires issued to participants in the studies, 392 were collected, and 8 were eliminated owing to incompleteness.

Statistical Analysis

Data obtained from the study were recorded and documented using SPSS, version 26. Descriptive statistics, such as percentages (%) and frequencies (n), were calculated.

Results

Demographic Characteristics

All 400 questionnaires distributed to the study participants were collected, and 8 were discarded due to incompleteness, resulting in a response rate of 98%. The age of study participants ranged from 18 to 50 years, with a mean age of 34

years. The age distribution was as follows: 57.1% (n=224) were 18-27 years old, 35.2% (n=138) were 28-39 years old; and 7.7% (n=30) were 40-50 years old. Most participants were single, at 73.7% (n=289), and 26.3% (n=103) were married. Finally, 86.2% (n=338) attended university, 7.6% (n=30) attended college, and 6.1% (n=24) attended school (**Table 2**).

Effects on Purchase

The effect on purchasing was examined, showing that the participants purchases of color cosmetics varied. Colored cosmetics were purchased as needed by 70.7%, once every 2 months by 27.8%, once a month by 0.8%, and twice a month by 0.8% of participants. Purchasing of skin care products was reported to be as needed by 80.1%, once in 2 months by 18.9%, once a month by 0.8%, and twice in a month by 0.3%. Purchase of hair care products was reported to be as needed by 88.5%, twice a month by 11.0%, and once a month by 0.5%. Purchasing of fragrances was reported to be as needed by 86.0%, once every 2 months by 13.5%, and once a month by 0.5% of participants. More details are shown in **Table 3**.

Commonly Used Cosmetic Products

Table 4 illustrates the various types of cosmetic products, including color cosmetics, skin care products, hair care products, and fragrances, used by the study participants. Frequently used color cosmetics were reported to be foundations by 26.9% (n=105), nail polish by 23% (n=93), lipstick by 21.5% (n=84), eyeliner by 16.4% (n=64), and mascara by 11.5% (n=45). Frequently used skin care products were reported to be face wash by 39.5% (n=155), moisturizers by 26.5% (n=104), sunscreens by 23.2% (n=91), body wash by 7.7% (n=30), and anti-aging creams by 3.1% (n=12). The most widely used hair care products were shampoos by 75.5% (n=296), conditioners by 17.1% (n=67), hair colors by 4.8% (n=19), styling gels/sprays by 1.8% (n=7), and protein packs by 0.8% (n=3). The frequently used fragrances were reported as deodorant sprays by 46.7% (n=183), perfumes by 36.7% (n=144), and deodorant sticks by 16.6% (n=65).

Table 3. Purchase period of cosmetic products among women of Abbottabad between December 2018 and March 2019 (n=392).

Cosmetic products	Once a Month	Twice a Month	Once in 2 Months	As needed
Color cosmetics	3 (0.8%)	3 (0.8%)	109 (27.8%)	277 (70.7%)
Skin care products	3 (0.8%)	1 (0.3%)	74 (18.9%)	314 (80.1%)
Hair care products	2 (0.5%)	0	43 (11.0%)	347 (88.5%)
Fragrances	2 (0.5%)	0	53 (13.5%)	377 (86.0%)

Table 4. Commonly used beauty cosmetic products among women in Abbottabad between December 2018 and March 2019 (n=392).

Cosmetic products	Frequency (%)	
Color cosmetics		
Foundation	106	(26.9%)
Lipstick	84	(21.5%)
Mascara	45	(11.5%)
Eyeliners	64	(16.4%)
Nail polish	93	(23.8%)
Skin care products		
Sunscreen	91	(23.2%)
Moisturizer	104	(26.5%)
Anti-aging cream	12	(3.1%)
Face wash	155	(39.5%)
Body wash	30	(7.7%)
Hair care products		
Hair color	19	(4.8%)
Shampoo	296	(75.5%)
Conditioner	67	(17.1%)
Styling gels/sprays	7	(1.8%)
Protein packs	3	(0.8%)
Fragrances		
Perfumes	144	(36.7%)
Deodorant sprays	183	(46.7%)
Deodorant sticks	65	(16.6%)

Types of Cosmetic Products and Their Source

In this study, nearly half (47.7%) of participants preferred chemical-based products, 30.9% preferred Ayurvedic products, and 21.4% preferred both (Table 5). Among all study participants, 62% were buying cosmetics from local shops, 21.7% from supermarkets, 13% from drug retail outlets, and 3.3% from online sources. The following specifications were considered before buying the products: 57.1% looked for price, 24.7% looked for company name, 10.7% looked for natural ingredients/formulas, and 7.4% looked for packaging (Table 5).

Table 5. Cosmetic purchase and usage behavior among women in Abbottabad between December 2018 and March 2019 (n=392).

Questions	Frequency n (%)
What types of cosmetic products are preferred by you to purchase	
Ayurveda	121 (30.9%)
Chemical	187 (47.7%)
Both	84 (21.4%)
None	0
What is the source of cosmetics you use	
Drug retail outlets	51 (13%)
Super markets	85 (21.7%)
Local shops	243 (62%)
Online	13 (3.3%)
Others	0
What do you specifically look for in your cosmetic products	
Packaging	29 (7.4%)
Company name	97 (24.7%)
Price	224 (57.1%)
Natural ingredients/formulas	42 (10.7%)
Do you share your cosmetics with others	
Yes	272 (69.4%)
No	120 (30.6%)
Do you read the label for expiry before buying the product	
Yes	289 (73.7%)
No	103 (26.3%)
Do you always remove your makeup completely before bed	
Yes	290 (74%)
No	102 (26%)

Sharing Cosmetics and Reading the Label for Expiry Date Before Purchase

Regarding sharing their cosmetic products with others, 69.4% of participants reported they shared their cosmetic products with others, and 30.6% reported they did not share their cosmetics with others (Table 5). Furthermore, 73.7% of participants did read the expiry date before buying the product, while 26.3% did not read the expiry date before buying (Table 5).

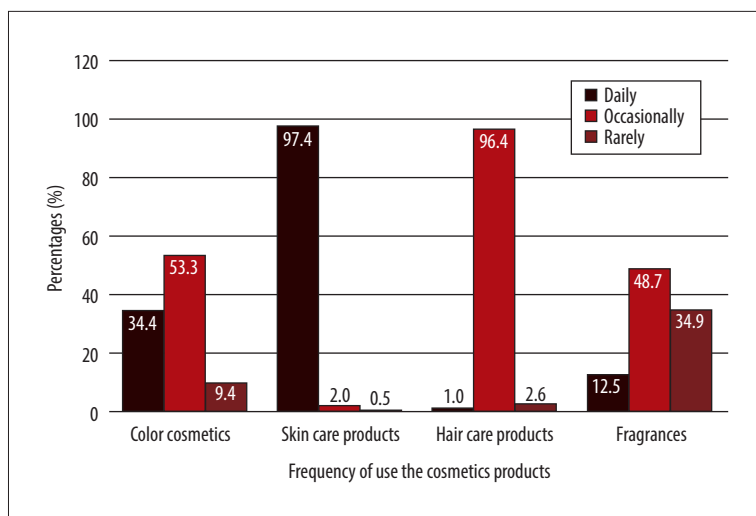


Figure 1. Frequency of use of the cosmetic products among women of Abbottabad between December 2018 and March 2019 (n=392).

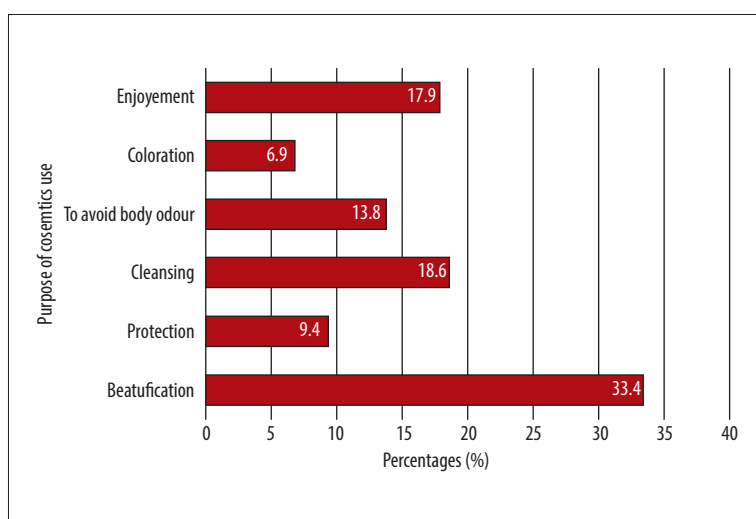


Figure 2. Purpose of cosmetics use among women in Abbottabad between December 2018 and March 2019 (n=392).

Frequency of Use

In our research, 53.3% (n=209) of participants reported using color cosmetics occasionally, 34.4% (n=135) reported using them daily, 9.4% (n=37) reported using them rarely, and 2.8% (n=11) reported no use. Meanwhile, 97.4% of participants reported using skin care products daily, 0.5% reported using them rarely, and 2.0% reported using them occasionally. The stated frequency of using hair care products was occasionally by 6.4%, rarely by 2.6%, and daily by 1.0%. The frequency of fragrances was reported as occasionally by 48.7%, rarely by 34.9%, daily by 12.5%, and never by 3.8% (Figure 1).

Personal Interest

In this study, 33.4% of women were using cosmetics for beautification purposes, 18.6% for cleansing, 17.9% for enjoyment, 13.8% for body odor, 9.4% for UV protection, and 6.9% for coloration. Of the total, 74% of participants had the habit of

completely removing makeup before going to bed, while 26% had no habit of makeup removal before bed (Figure 2).

Appearance of Adverse Events Associated with Cosmetic Products, Actions Taken, and Consultation Sought After Appearance of Adverse Events

Table 1 illustrates adverse events associated with cosmetic products. The most common adverse events were pimples (19.9%), redness (17.6%), eye irritation (15.8%), rash (13.8%), pigmentation (7.7%), eczema (7.1%), burning (5.1%), nausea (5.1%), itching (4.8%), and dizziness (3.1%). Furthermore, Table 1 illustrates the actions taken and consultation sought after the onset of the adverse events. After the arrival of effects, 45.2% started using another product, 30.4% quit the products until the adverse event was gone, and 24.5% stopped using the product. After the arrival of adverse event, 65.3% consulted no one, 19.4% consulted medical specialists, 13.5% consulted general practitioners, and 1.8% consulted beauticians.

Table 6. Responses on beneficial effects of commonly used cosmetics between December 2018 and March 2019 (n=392).

Variables	Response	Frequency n (%)
Cosmetics help to get the whiter complexion	Strongly agree	201 (51.3%)
	Agree	61 (15.6%)
	Neutral	126 (32.1%)
	Disagree	4 (1%)
	Strongly disagree	0 (0%)
Cosmetics help to remove pimples and blemishes	Strongly agree	70 (17.9%)
	Agree	122 (31.1%)
	Neutral	79 (20.2%)
	Disagree	72 (18.4%)
	Strongly disagree	49 (12.5%)
Cosmetics help to remove acne scars for a smooth skin	Strongly agree	21 (5.4%)
	Agree	145 (37%)
	Neutral	82 (20.9%)
	Disagree	82 (20.9%)
	Strongly disagree	62 (15.8%)
Cosmetics help to get high social rank	Strongly agree	96 (24.5%)
	Agree	115 (29.3%)
	Neutral	21 (5.4%)
	Disagree	48 (12.2%)
	Strongly disagree	112 (28.6%)
Cosmetics help to look trendy and fashionable	Strongly agree	145 (37%)
	Agree	176 (44.9%)
	Neutral	71 (18.1%)
	Disagree	0 (0%)
	Strongly disagree	0 (0%)

Responses on Beneficial Effects of Commonly Used Cosmetic Products

The responses recorded by study participants on the beneficial effects of cosmetic products are documented in **Table 6**. Among the study population, 51.3% strongly agreed that cosmetics help to get whiter complexion, 44.9% agreed that cosmetics contribute toward looking trendy and fashionable, 37% agreed on cosmetics role in the removal of acne scars for smooth skin, 31.1% agreed that cosmetics help to remove pimples and blemishes, and 29.3% agreed that cosmetics help to get high social rank (**Table 6**).

Responses on Problems Associated with Commonly Used Cosmetic Products

The responses to problems associated with commonly used cosmetic products are shown in **Table 7**. According to the present findings, 60.2% of participants were neutral to the statement that harmful substances can be absorbed through the skin and can lead to organ failure, 52.8% of participants strongly agreed that chemical dyes cause white hair, 51% strongly agreed that inappropriate use of cosmetics causes skin problems, 47.2% agreed to an increased risk of sunburn due to cosmetic use, 29.1% agreed that hair dying in pregnant

Table 7. Responses on problems associated with commonly used cosmetic products between December 2018 and March 2019 (n=392).

Variables	Response	Frequency n (%)
Inappropriate use of cosmetics causes skin problems	Strongly agree	200 (51%)
	Agree	192 (49%)
	Neutral	0 (0%)
	Disagree	0 (0%)
	Strongly disagree	0 (0%)
White hair due to the use of chemical dyes	Strongly agree	207 (52.8%)
	Agree	181 (46.2%)
	Neutral	4 (1%)
	Disagree	0 (0%)
	Strongly disagree	0 (0%)
Hair dying on pregnant and breast-feeding women has harmful effects	Strongly agree	66 (16.8%)
	Agree	114 (29.1%)
	Neutral	101 (25.8%)
	Disagree	67 (17.1%)
	Strongly disagree	44 (11.2%)
Increase risk of sunburn	Strongly agree	86 (21.9%)
	Agree	185 (47.2%)
	Neutral	85 (21.7%)
	Disagree	36 (9.2%)
	Strongly disagree	0 (0%)
Suppression of immune system	Strongly agree	66 (16.8%)
	Agree	56 (14.3%)
	Neutral	103 (26.3%)
	Disagree	101 (25.8%)
	Strongly disagree	66 (16.8%)
Harmful substances may absorb through the skin and may lead to organ failure	Strongly agree	36 (9.2%)
	Agree	42 (10.7%)
	Neutral	236 (60.2%)
	Disagree	66 (16.8%)
	Strongly disagree	12 (3.1%)

and breastfeeding women has harmful effects, 26.3% reported a neutral response on suppression of the immune system, and 16.8% strongly agreed to the suppression of the immune system due to the use of cosmetics (Table 7).

Discussion

Various cosmetic products are being used to improve physical appearance; however, using cosmetics is associated with adverse events [1,17]. Creating adequate awareness and knowledge about the impacts produced by the use of as well as the sharing of these cosmetics can help in avoiding complications associated with cosmetics. In this study, 34.4% of participants reported using cosmetics daily; among the users, 47.7% preferred chemical-based products, while 30.9% of preferred Ayurvedic products. Furthermore, 33.4% were using cosmetics for beautification purposes. The most used color cosmetics were foundations, reported by 26.9%, nail paints by 23%, lipstick by 21.5%, eyeliner by 16.4%, and mascara by 11.5%. These findings were similar to earlier findings by Lucca et al [1], who reported makeup products (24.56%) and personal care products (22.43%) were the most frequently used cosmetics by the study population. Furthermore, previous research has shown that younger women use cosmetics more than older women [18], which is consistent with our present findings, in which 190 young women aged 18 to 27 used cosmetics. These findings could be related to a high incidence of use, and increased knowledge of the adverse events of cosmetics is required among the younger age group. Furthermore, the high usage of cosmetics in this age range is attributed to a need for self-care and beautification [1]. Seasonal and climatic variations can affect the skin and exacerbate pre-existing problems, which can be the reasons to use cosmetics.

The present study showed that women purchased cosmetic products according to their preferences and needs. Most women purchased color cosmetics once or twice a month. They were purchasing skin and hair care products twice a month or once in 2 months, while they purchased fragrance as per their need. Most women purchased cosmetics to get a fair complexion and beautification. These findings were comparable to earlier findings in which the author reported that women use cosmetics to look more attractive and to hide the imperfections of their appearance, to influence their self-perceptions [16].

An earlier study showed that many facial and hair cosmetics contain high amounts of heavy metals, demonstrating that the accumulation of heavy metals in internal organs and skin causes toxicity [17]. In the present study, most women reported using chemical-based cosmetic products. Studies showed that chemical-based cosmetic products cause more adverse events than do Ayurvedic products [18,19]. The effects of cosmetics are

related to the source from which they are bought and with the nature of products [20,21]. Further, in the present study, 62% of women bought their cosmetic products from local shops because of the product's nature and their low budget, and 21.7% bought their cosmetic products from the supermarket, perhaps with the belief that products from the supermarket are better than those at local shops. The most common adverse events associated with cosmetic use in the present study were pimples (19.9%), redness (17.6%), eye irritation (15.8%), rash (13.8%), pigmentation (7.7%), eczema (7.1%), burning (5.1%), nausea (5.1%), itching (4.8%) and dizziness (3.1%), which is consistent with previous findings by Di Giovanni et al and Lucca et al. For instance, Di Giovanni et al reported that 36.3% of participants had burning and 32.9% had itching [22]. In addition, earlier findings reported headache (40.3%) followed by nausea (24.2%) as other adverse events of cosmetic use [22]. On the other hand, redness of the skin (19%), pimples (15%), and itching (13%) was reported by Lucca et al, in 2020 [1].

In the present study, 69.4% of women were sharing their cosmetics with others at home. Those who share cosmetics have more adverse events than those who did not share their cosmetics [23]. Sharing cosmetics means sharing all infections that are present on the skin with others. According to a study, sharing cosmetics with others caused 50% of the women to develop adverse events from the cosmetics [24]. Women who did not read the label are more prone to cosmetic adverse events because of lack of knowledge [25]. In our study, most participants read the expiry date on the label before buying. It was recently reported by the US FDA and the European Union's Restriction on Hazardous Substances directive that some cosmetic materials used by humans contain hazardous substances [26]. For these reasons, there is a growing concern that some of the cosmetic products used by humans contain hazardous substances that are injurious to health [27].

The present study had some limitations. First and foremost, the fact that the results were based on a self-administered survey may have increased the possibility of biases, such as social desirability bias. Further, estimates of adverse events of cosmetics reported by participants were dependent on self-reports, which could be influenced by recollection bias, resulting in underestimation. Second, the findings are not representative of other regions in the country and cannot be extended globally, because they were gathered from a particular region of Pakistan. Despite these limitations, our research reveals that to avoid adverse events related to the use of cosmetics, women must have knowledge and awareness of how to use them. To avoid adverse events, subsequent cosmetics containing medicinal ingredients should be used under the supervision of a healthcare provider. As a result, more research is needed to understand how women use and behave with cosmetics. Furthermore, this study can provide a solid foundation for future domain-specific research.

Conclusions

Reliable data on temperature change, especially in winter, are needed to determine the health risks posed by the ingredients of cosmetic products, such as parabens and phthalates. Most participants in this study reported using chemical-based cosmetic products and sharing their cosmetics. Furthermore, participants strongly agreed that inappropriate use of cosmetics causes adverse reactions on the skin. In addition, it was found that every user of cosmetics had at least 1 adverse effect. The most commonly reported adverse events from the cosmetics were redness, rashes, eye irritation, and pigmentation. This implies the need to have cosmetic use-related safety guidelines. There is a need for systematic monitoring of the safety of cosmetic products. This

will ensure the quality of cosmetics and keep a check on the safe chemical limits for consumer usage, protecting public health in the long term in Pakistan.

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Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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