

KNOWLEDGE AND PRACTICE TOWARDS COSMETICS AND THEIR ADVERSE REACTIONS AMONG UNDERGRADUATE MEDICAL, PHARMACY, AND PHYSIOTHERAPY STUDENTS

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ABSTRACT

Objectives: The objectives of the study were to evaluate the knowledge, practice, and pattern of cosmetic use and their adverse reactions amongst medical, pharmacy, and physiotherapy undergraduates.

Methods: This was a cross-sectional, questionnaire-based study conducted among 202 2nd-year medical (113), Pharmacy (51), and Physiotherapy (38) students of KIMS, Bangalore, India for a period of 1 month. Results obtained were analyzed using descriptive statistics.

Results: About 75.2% of students were aware of cosmetics and their adverse reactions, still 36.7% of students will continue using them because they were convinced about them. Pharmacy students had less knowledge of the animal, alternate testing, and preventive measures compared to medical and physiotherapy students. Overall n=71, (35.1%) of students had adverse reactions from cosmetic usage, the most common product being fairness cream and the adverse reactions include itching, acne, and rashes.

Conclusion: Overall, the undergraduate medical, pharmacy, and physiotherapy students had good insight and practice toward cosmetics and their adverse reactions, nevertheless the awareness of pharmacy students was comparatively less than medical and physiotherapy students. Hence, educational intervention on the effective, safe, and proper use of cosmetics in the future needs to be implemented especially among pharmacy students.

Keywords: Cosmetics, Adverse reactions, Medical students, Pharmacy students, Physiotherapy students, Knowledge, Practice.

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INTRODUCTION

Cosmetics are defined by the Food, Drug, and Cosmetics Act as articles intended to be applied to the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance without affecting the body's structure or functions [1]. Cosmetics included Eyecare (eyeliner, mascara, and eye shadow), Skin-care (cleanser, toner, and moisturizer), Face-care (facial foundations, powders, lipsticks, skin creams, lotions, etc.), UV light screening preparations, Nail-care (nail polish; paint removers), Hair-care (shampoos, hair colors, and styling agents), and Fragrance-care (deodorants, aftershaves, perfumes, etc.). Dental care (toothpaste) and any material intended for use as a component of a cosmetic product [2]. Roughly an adult uses nine cosmetics per day and 25% of the women use 15 or more cosmetics per day. 1-3% of the population is allergic to a cosmetic or cosmetic ingredient [2].

The Indian cosmetic industry is growing at 20% a year [3]. Westernization and Mass media has greatly influenced the current generation to be esthetically appealing [3]. Financially sound, proficient young aged female students concentrate more on their self-image and use cosmetics regularly [4]. But the knowledge of the fact that though cosmetics enhance beauty, they do produce some adverse effects is limited [5]. Most women have a false perception of cosmetic needs and prefer the same type of cosmetics despite the adverse effects [6]. Most cosmetic users give more attention to their transient enhanced look, ignoring the longstanding systemic adverse effects caused by the cosmetics. Since they presume that the cosmetics are safe and do not cause any health risk [7].

As per a study conducted among medical students in south Kerala, there is an increasing trend in the usage of natural cosmetics due to adverse effects associated with other cosmetics [8]. There is a paucity of studies in Indian literature to assess the knowledge and practice of cosmetic use

and its adverse reactions involving medical and paramedical students. This study was done to assess the knowledge, utilization pattern, and practice toward cosmetic use and its adverse reactions amongst medical, pharmacy, and physiotherapy undergraduates. Since, they are the budding healthcare professionals of tomorrow, a better understanding of their knowledge, is important in creating public awareness regarding adverse health-related issues associated with cosmetics; hence, the present study is taken up to generate valid and useful data.

METHODS

This was a cross-sectional, questionnaire-based study conducted using purposive sampling among 202 2nd-year undergraduate medical and paramedical students {(Medical-113, (Paramedical: Pharmacy-51, Physiotherapy-38)}, with a study duration of 1 month (August 2015 to September 2015) at KIMS, Bangalore. Approval and clearance from KIMS Institutional Ethics Committee were obtained before beginning the study. Written informed consent was taken from all the study participants after fully explaining the study procedure to their satisfaction, in both English and Kannada language. Anonymity, confidentiality, and professional secrecy were maintained for all the study participants.

Inclusion criteria

The following criteria were included in the study:

1. Second-year undergraduate medical, pharmacy, and physiotherapy students of KIMS College, Bengaluru
2. Students of either gender.

Exclusion criteria

Not willing to participate.

Study procedure

A prevalidated 32-item questionnaire (based on previous studies) on knowledge, practice, and pattern of cosmetic use and its adverse

reactions was distributed to 2nd-year undergraduate medical (113), Pharmacy (51), and physiotherapy students [5]. The participants were requested to fill out the questionnaire form. The form had both open-ended and closed questions. It was divided into two parts: Part 1 of the questionnaire included demographic data of the students: Age, gender, and qualification. Part 2 of the questionnaire had 32 items on knowledge, practice, and pattern of cosmetic use and their adverse reactions.

Statistical analysis

The data collected were analyzed using descriptive statistics, namely, mean, standard deviation (SD), frequency, and percentage. Results on continuous measurements such as age are presented as Mean±SD (Min-Max) and results on categorical measurements are presented as number (%). Significance was assessed at a 5% level of significance ($p < 0.05$). Multiple responses were reported in terms of percentages and the total of such response was greater than the sample size. The results were also depicted in the form of tables and graphs. Statistical software, namely, SPSS v20 was used for the analysis of data and Microsoft Word and Excel to generate graphs and tables.

RESULTS

Altogether 202 participants enrolled in the study.

Demographic data

The mean age of 2nd year medical, pharmacy, and physiotherapy undergraduate students was 20.30±0.89, 19.29±1.42, and 20.20±0.89, respectively. The majority 135 (66.83%) of the participants were in the age group of 17–20 years. There were 57 (28.21%) male participants and 145 (71.78%) female participants.

Knowledge

About 97% of the students correctly identified the definition of cosmetics. According to our study, the majority (75.2% and 86.1%) of the undergraduate students were aware of adverse reactions and the presence of harmful chemicals in them, respectively. Awareness of animal testing of cosmetics was less among pharmacy (27.5%), students compared to medical (54%), and physiotherapy (55.3%) students (Table 1). Only 7.4% of students were aware of treating an allergic reaction to cosmetics and 27.2% of the participants will visit an expert consultant, to treat cosmetic induced allergic reactions.

Practice: About 80.2% of the participants prefer natural cosmetics. Most (89.6%) of the participants check cosmetics' manufacture and expiry date. About 82.2% of them will buy cosmetics without a prescription from a doctor. Almost 73.3% of students do not check for alternative testing methods, nevertheless, 89.6% of students do not tend to buy even if it was alternatively tested, but inaccurate. Only 7.9% of participants responded that they will buy a cosmetic product near the expiry date since it is cheaper (Table 2). 31 (15.30%) will continue to use cosmetics, despite causing adverse reactions because they were convinced with their usage, one participant stated that adverse reactions were very rare (Fig. 1).

Cosmetic utilization pattern

The most common cosmetic used by 195 (96.5%) participants were soap followed by shampoo, among 188 (93.1%) and kajal in 11 (5.4%) students. 112 (55.4%) of the students use cosmetics daily and 114 (56.4%) students procure them from the supermarket rather than a drug store or beauty salon. Selection of cosmetics was commonly based on the brand name in 51 (45.1%) medical, 19 (37.3%), pharmacy, and 25 (65.8%) physiotherapy students. However, among pharmacy students 31 (60.8%), the selection was most commonly based on the safety of the cosmetics. Only a few of them consider price, advertisement, and celebrity for selecting cosmetics (Fig. 2). According to our observation, the majority 88 (43.6%) of the students belonging to all three groups use cosmetics for protection, followed by attraction 44 (21.8%), but among physiotherapy students, the second most common reason was fashion 11 (28.9%). Few students (12.4%) mentioned some other reasons such as looking fairer and pretty (Fig. 3).

Adverse reactions

173 (85.6%) of the students did not have any previous history of allergy to cosmetics or drugs or food or family history of atopy or past history of any other medical illness. Among 18 (8.9%) participants the most common product causing adverse reactions was fairness cream, followed by soap 13 (6.4%). Least common being kajal 1 (0.5%) (Table 3). Only 71 (35.1%) of the participants have encountered some adverse reactions to cosmetics. Overall Itching was the common adverse reaction in 27 (13.4%) students, followed by acne in 19 (9.4%). However, among the medical and physiotherapy students, the most common adverse reaction was acne 14 (12.4%) and rashes 5 (13.2%), respectively. Limited participants reported that redness 6 (3%), black spot/pigmentation 4 (2%), burning sensation, and skin exfoliation were reported among two (1%) participants. Blister, swelling, and anaphylactic reaction were reported among one (0.5%) student (Table 4). These adverse reactions appeared late but after a single application of the product in 27 (13.4%) participants and it was most commonly seen with synthetic products in 18 (8.9%) of students. When questioned whether any preventive measures can avoid the adverse reactions of cosmetics. 74 (36.6%) of the students opined that the regulatory approach by food and drug administration (FDA) can avoid adverse reactions to cosmetics. About 4.5% of students mentioned other ways like stringent labeling and marketing rules for cosmetics (Fig. 4)

DISCUSSION

In the present prospective study, knowledge, and practice toward cosmetic use and its adverse reactions, and the cosmetic utilization pattern was assessed in 202 undergraduate medical, physiotherapy, and pharmacy students at KIMS Medical and Paramedical College, Bengaluru. It was found that the majority of the students had satisfactory knowledge and practice except for pharmacy students, who had less satisfactory awareness of animal testing/alternate testing and

Table 1: Knowledge-based questions

Knowledge-based questions	Responses	MBBS (n=113) (%)	Pharmacy (n=51) (%)	Physiotherapy (n=38) (%)	Total (n=202) (%)
Are you aware of the adverse reactions (Side effects) of cosmetics	Yes	80 (70.8)	41 (80.4)	31 (81.6)	152 (75.2)
	No	33 (29.2)	10 (19.6)	7 (18.4)	50 (24.8)
Are you aware that there can be harmful chemicals in your cosmetics	Yes	93 (82.3)	46 (90.2)	35 (92.1)	174 (86.1)
	No	20 (17.7)	5 (9.8)	3 (7.9)	28 (13.9)
Are you aware of animal testing**	Yes	61 (54)	14 (27.5)	21 (55.3)	96 (47.5)
	No	52 (46)	37 (72.5)	17 (44.7)	106 (52.5)
Do you know how to treat an allergic reaction	Yes	12 (10.6)	2 (3.9)	1 (2.6)	15 (7.4)
	No	41 (36.3)	15 (29.4)	19 (50)	75 (37.1)
	Visit an expert consultant	29 (25.7)	17 (33.3)	9 (23.7)	55 (27.2)
	Take self-medication	6 (5.3)	2 (3.9)	1 (2.6)	9 (4.5)
	Self-medicate and visit a doctor	25 (22.1)	15 (29.4)	8 (21.1)	48 (23.8)

** $p < 0.001$

Table 2: Practice-based questions

Practice-based questions	Responses	MBBS (n=113)	Pharmacy (n=51)	Physiotherapy (n=38)	Total (n=202)	p-value
Do you look out for Natural cosmetics	Yes	91 (80.5)	42 (82.4)	29 (76.3)	162 (80.2)	0.772
	No	22 (19.5)	9 (17.6)	9 (23.7)	40 (19.8)	
Do you look out for cosmetics tested alternatively	Yes	31 (27.4)	7 (13.7)	16 (42.1)	54 (26.7)	0.011*
	No	82 (72.6)	44 (86.3)	22 (57.9)	148 (73.3)	
Will you buy a cosmetic product without a prescription from a doctor	Yes	96 (85)	38 (74.5)	32 (84.2)	166 (82.2)	0.253
	No	17 (15)	13 (25.5)	6 (15.8)	36 (17.8)	
Do you read the ingredients in your cosmetics	Yes	67 (59.3)	27 (52.9)	26 (68.4)	120 (59.4)	0.339
	No	46 (40.7)	24 (47.1)	12 (31.6)	82 (40.6)	
Would you ever buy a chemical that was tested alternatively but could be inaccurate	Yes	13 (11.5)	1 (2)	7 (18.4)	21 (10.4)	0.036*
	No	100 (88.5)	50 (98)	31 (81.6)	181 (89.6)	
Do you check the manufacture and expiry date before buying cosmetics	Yes	100 (88.5)	46 (90.2)	35 (92.1)	181 (89.6)	0.804
	No	12 (10.6)	4 (7.8)	3 (7.9)	19 (9.4)	
Do you share the cosmetic products	Yes	46 (40.7)	22 (43.1)	20 (52.6)	88 (43.6)	0.438
	No	67 (59.3)	29 (56.9)	18 (47.4)	114 (56.4)	
Do you remove your make up before going to sleep	Yes	76 (67.3)	43 (84.3)	28 (73.7)	147 (72.8)	0.075+
	No	37 (32.7)	8 (15.7)	10 (26.3)	55 (27.2)	
Will you use an expired product	Yes	6 (5.3)	4 (7.8)	3 (7.9)	13 (6.4)	0.763
	No	107 (94.7)	47 (92.2)	35 (92.1)	189 (93.6)	
Will you buy a cosmetic product that is near expiry because it's cheaper	Yes	7 (6.2)	2 (3.9)	7 (18.4)	16 (7.9)	0.026*
	No	106 (93.8)	49 (96.1)	31 (81.6)	186 (92.1)	

*p<0.05

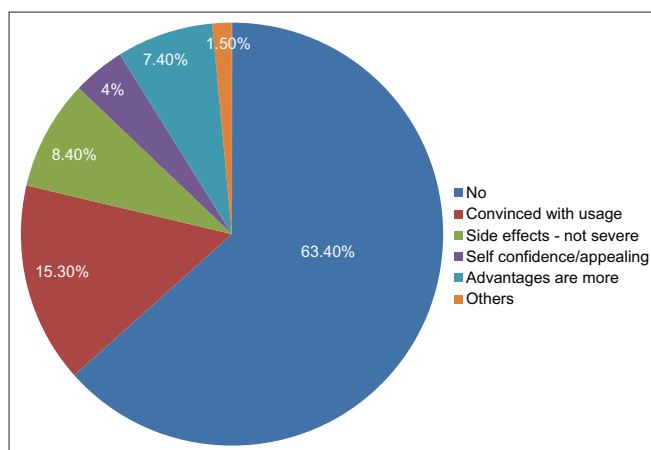


Fig. 1: Causes for cosmetic usage despite the adverse reactions

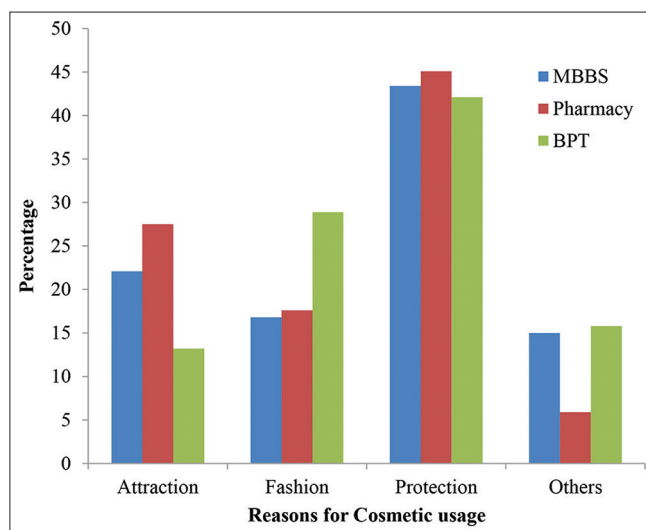


Fig. 3: Reason for cosmetic usage*. BPT: Physiotherapy

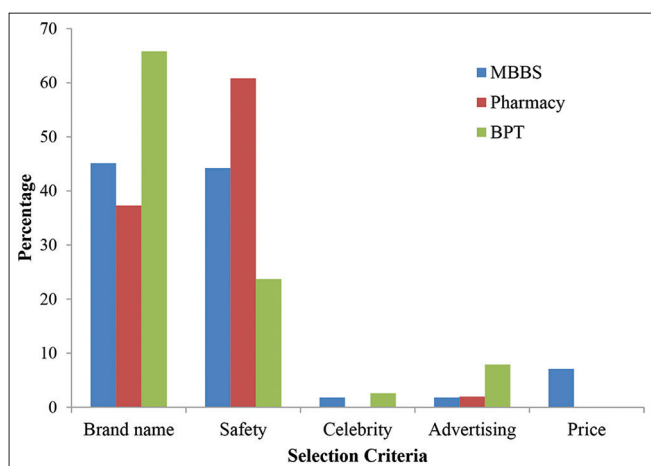


Fig. 2: Selection criteria. BPT: Physiotherapy

preventive approach. The majority of the students were cosmetic users and the commonest cosmetics used were soap, shampoo, and kajal. Fairness cream was the most common culprit behind adverse reactions. The most common adverse reaction was itching followed by acne.

In our study, the majority of the students of either gender had a good understanding of cosmetics and their adverse reactions, on par with studies done in Surat, Tanzania, Saudi Arabia, and Madhya Pradesh [5,9-11]. A study done in Nepal among higher secondary school girls has shown that knowledge of the adverse effects of selected cosmetic products is better among people with a higher level of education [12]. Few studies have contradictory results including an Iranian study done on women aged 15-60 years where there is a lack of a significant correlation between educational level and their knowledge, attitude, and practices [13]. Same way, Malaysian adult customers and university students of Saudi Arabia also had limited knowledge [14,15] maybe because of a lack of formal education and awareness program. In our study, the overall knowledge levels were satisfactory because of the population being selected and their education and training levels.

Yet, pharmacy students had less knowledge of animal testing compared to other students. As per evidence, 69% of participants were not aware of animal testing and they opined that there is no need to know about cosmetics being tested on animals [5]. However, FDA has recommended cosmetic manufacturers to employ whatever testing is effective and

Table 3: Cosmetics causing adverse reactions

Product causing Adverse reactions	Medical (%)	Pharmacy (%)	Physiotherapy (%)	Total (%)	p-value
Soap	6 (5.3)	3 (5.9)	4 (10.5)	13 (6.4)	0.517
Skin cream	11 (9.7)	3 (5.9)	4 (10.5)	18 (8.9)	0.673
Haircare	2 (1.8)	1 (2)	1 (2.6)	4 (2)	0.947
Deodorant	5 (4.4)	0 (0)	0 (0)	5 (2.5)	0.133
Face wash	0 (0)	2 (3.9)	0 (0)	2 (1)	0.050 ⁺
Kajal	0 (0)	1 (2)	0 (0)	1 (0.5)	0.226

Table 4: Adverse reactions

Adverse reactions after cosmetic usage	Medical (%)	Pharmacy (%)	Physiotherapy (%)	Total (%)	p-value
1. No	70 (61.9)	38 (74.5)	23 (60.5)	131 (64.9)	0.244
2. Yes	43 (38.1)	13 (25.5)	15 (39.5)	71 (35.1)	0.244
3. Itching	13 (11.5)	10 (19.6)	4 (10.5)	27 (13.4)	0.314
4. Rashes	6 (5.3)	0 (0)	5 (13.2)	11 (5.4)	0.026*
5. Acne (pimples)	14 (12.4)	2 (3.9)	3 (7.9)	19 (9.4)	0.214
6. Black spot/pigmentation	1 (0.9)	0 (0)	3 (7.9)	4 (2)	0.014*
7. Redness	5 (4.4)	1 (2)	0 (0)	6 (3)	0.337
8. Burning sensation	2 (1.8)	0 (0)	0 (0)	2 (1)	0.451
9. Skin exfoliation	1 (0.9)	0 (0)	1 (2.6)	2 (1)	0.457
10. Blister	0 (0)	0 (0)	1 (2.6)	1 (0.5)	0.114
11. Swelling	1 (0.9)	0 (0)	0 (0)	1 (0.5)	0.673
12. Anaphylactic reaction	0 (0)	1 (2)	0 (0)	1 (0.5)	0.226
13. Others#	0 (0)	1 (2)	0 (0)	1 (0.5)	0.226

*p<0.05, #Skin dryness

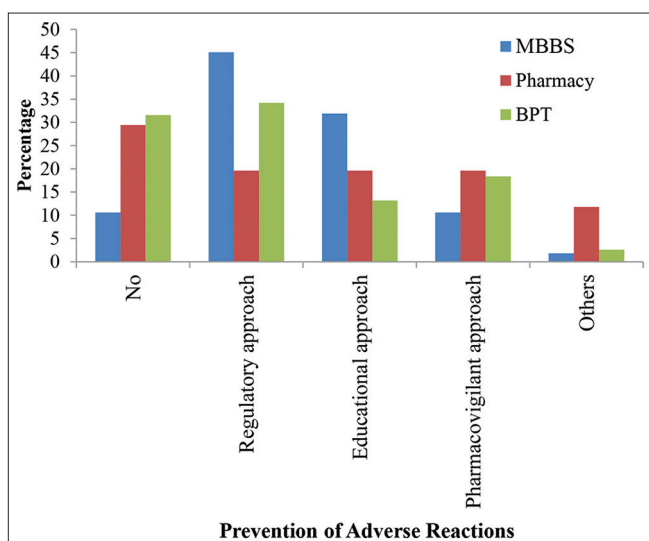


Fig. 4: Prevention of adverse reactions. BPT: Physiotherapy

appropriate for substantiating the safety of both ingredients and finished cosmetic products before marketing [16]. Cognizance of the presence of harmful chemicals was also evidenced in the Chitwan study [12]. Only few students were aware of treating an allergic reaction to cosmetics and they would visit an expert consultant for the same similar to a study by Lucca *et al.*, Bilal *et al.*, and Dibaba *et al.* [17-19]. The added point was, that few of them will self-medicate and visit a doctor. Utilization of health-care services by our participants reconfirms their qualification in Health stream and making informed choices.

In our study, 15.30% of students will continue to use cosmetics in spite of adverse reactions, since they were convinced with their usage, parallel to a Malaysian study where 26% of participants prefer to obtain good skin condition rather than to know the adverse reactions [14]. So also, in a study by Jain *et al.* [11] In Indian and Tanzanian studies, a comparatively higher percentage of people (69.6%) used cosmetics though they were aware of the adverse effects [5,9].

In general, the participant's responses to questions about their practices in using cosmetics and their adverse reactions were favorable in line with studies done in West Bengal, Nepal, and Iran [6,12,13]. Our article shows an increasing trend toward natural cosmetics, probably the adverse reactions were more with synthetic products like other studies [5,8]. Checking for alternative testing of cosmetics was not prevalent among pharmacy students, though the importance of the same has been cited in studies [2]. Usage of expired cosmetic products because of lesser price was related to an Indian study [5]. Most of them will buy cosmetics without a prescription by a doctor, akin to a study done among females at Najran University [10]. This practice may be due to the experiences gained from family or community.

The majority of our participants were using cosmetics and aged between 17 and 20 years corresponding to studies by Shiraj and Rahaman [6], Kureh *et al.* [9], Bilal *et al.* [8]. Of which 71.78% were female participants, similar to many studies [6,8,9]. Young age, educational background and metropolitan life, and the compulsion to look good might have influenced our students to use more cosmetics. The most common cosmetics used by participants were soap followed by shampoo and kajal resembling an Indian study [5]. Eye products were the most commonly used cosmetic as stated by a survey conducted in Udipi among young females [20]. Face powder and eyeliner as per Kerala study [8]. Lip and eye care products were frequently used in line with Al-Ghamdi *et al.* [15]. About 90% of female participants used perfumes and deodorants followed by kajal and 77% used multiple cosmetics, in view of a study by Shiraz *et al.* [6]. Ethiopian study states that lotions (89.7%) and hair care products as the first line cosmetics [1]. From our study, it's evident that educated youth give more importance to skin, eye, and hair care.

Participants preferred to select the cosmetics by brand name, followed by safety except for pharmacy students who were concerned much about safety so also in studies [17,21]. The usage of cosmetics for protection followed by attraction corroborates those of studies done in Ethiopia, India, and Tanzania [1,5,9,19]. Beautification is the main concern as reported by a few studies [4,20].

Most of the students did not have any adverse reactions. Fairness cream was the most common reason behind adverse reactions, a comparable trend was observed in other studies [1,4,17,19]. Lotions were the

most (26.3%) complained about cosmetic products followed by hair cosmetics, body cream, and deodorants [1]. A finding to note is that though kajal was one of the most commonly used products by our study participants, it's the least common product to cause adverse reactions, consistent with other studies [6]. In our survey, the most common adverse reaction was itching followed by acne, identical to other studies [22]. Based on a study by Shiraz, Shakya *et al.*, acne was the most disadvantageous adverse effect followed by rash [6,12]. Al-Ghamdi *et al.* found irritant contact dermatitis to be the most common adverse effect followed by acne, analogous to a bibliometric analysis [15,22].

In our study, most of the respondents have opined that regulations by FDA, could prevent adverse reactions to cosmetics. However, pharmacy students have responded negatively to this aspect. In relation to research, besides proper regulation of cosmetic agents, a proper vigilance system is also required to protect the health of the Indian population [23]. The importance of cosmetovigilance, a budding area under pharmacovigilance, which is public health surveillance on cosmetic products has been emphasized in other studies [17,22,23]. Pharmacy students need to be educated more on this aspect.

CONCLUSION

Our study has thrown light on the fact that the majority of the students had satisfactory knowledge and practice except for pharmacy students, who had less satisfactory awareness of animal testing/alternate testing and preventive approach. Hence, educational intervention on the effective, safe, and proper use of cosmetics in the future needs to be implemented especially among pharmacy students. Most of them were cosmetic users and use soap, shampoo, and kajal commonly. Fairness cream was the most common culprit behind adverse reactions. The majority of them have not encountered any adverse reactions, yet itching, and acne were the most common adverse reactions. More randomized control trials involving a larger number of students from different health-related courses on a larger scale with specific cosmetics are required to further refine the educational intervention for improved outcomes. Awareness regarding adverse reaction reporting and causality assessment at an undergraduate level may help to promote public awareness of the effective and safe use of cosmetics.

Limitations

Although the overall responses were satisfactory, a comparison in perception and practice between groups before and after an educational intervention was not done. The results cannot be generalized, since it does not involve a wider range of undergraduate students. This is a self-reported questionnaire-based study to collect information on cosmetic use and the related adverse reactions. Hence, there is a probability of respondent bias and recall bias. Causality assessment of adverse reactions was not done in this study.

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AUTHORS' CONTRIBUTIONS

All the authors had contributed to the concept, design, data collection, data analysis, and interpretation, drafting of the article, critical revision of the article, and final approval of the version to be published.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the research, authorship, and publication of this article.

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