



HEALTH PROFESSIONALS' PERSPECTIVES ON COSMETIC USE DURING PREGNANCY

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Abstract

There are many chemicals found in cosmetic products that pose potential health risks, especially during pregnancy, including phthalates, parabens, and UV filters. A study was conducted to assess the cosmetic use habits and perceptions of risks associated with these products among pregnant women (PW) and non-pregnant women (NPW). Among the participants were 175 women, 85 of whom were NPWs and 90 of whom were PWs. During pregnancy, 28 personal care products (PCPs) and makeup items were examined to determine how their use changed. According to the study, the general use of cosmetics by NPWs and PWs was not significantly different. However, pregnant women tended to use some products less frequently due to concerns about ingredient safety, such as hair dye, deodorants, and nail polish. A survey was also conducted to assess women's perceptions of risks and their desire for doctor-advised cosmetic use during pregnancy. While cosmetics may contain potentially harmful chemicals, 45% of women believed there was no risk associated with their use. Even though there were few changes observed in cosmetic use, more information about safe products during pregnancy was greatly desired. Pregnant women in particular should receive better information concerning the risks of cosmetic ingredients, and pharmacists can provide advice on safe cosmetic choices. To better understand the long-term effects of cosmetic use during pregnancy and the effectiveness of educational interventions, more research is needed.

1. Introduction

As defined in the European Union Cosmetics Directive, cosmetics or personal care products (PCPs) are substances or mixtures that are intended for application to the external parts of the body (such as the skin, hair, nails, lips, and external genital organs) or to the teeth and oral mucous membranes, the primary purpose of which is to clean, perfume, alter appearance, protect, maintain good health, or mask body odors [1]. We use cosmetic products in our everyday lives, and they often contain harmful chemicals, such as phthalates, bisphenol A, parabens, benzophenones (UV filters), polycyclic musks, triclosan (antimicrobials), dioxane, organic solvents, pigments, and formaldehyde. A number of chemicals are used in products to make them more effective and to extend their effectiveness [2-5]. The rays of the sun can cause harm as a result of some of these chemicals, including UV filters. These substances are, however, capable of entering the human body through a variety of routes. Typically, cosmetics are applied to the surface of the skin, where their ingredients may penetrate the cutaneous

barrier and enter the bloodstream. As well as mucous membranes, ingestion (such as lipstick) and inhalation (e.g., when aerosolized cosmetics are used or when nail polish is applied) [6,7]. Several studies have found that cosmetics use is associated with elevated exposure to phenols like benzophenone-3 [8,9], parabens [8,10-13], triclosan [13], and plasticizers like diethyl phthalate (DEP) [8,10,11,14-17] and triphenyl phosphate (TPHP) [18].

There is no direct evidence linking these effects to cosmetic use [3], but several studies have demonstrated that some of these chemicals disrupt the endocrine system [19-33].

It is particularly important to consider the potential risks posed by cosmetics that contain endocrine disruptors when pregnant. There is a greater prevalence of cosmetic use among women than men [34,35], and pregnancy is an important period for fetal development since the embryo and fetus have underdeveloped metabolic systems. Additionally, by altering lifestyle habits during pregnancy, such as diet and cosmetics, endocrine disruptors may be exposed to a greater extent. Several studies in the United States and Canada have examined cosmetic use during pregnancy [11,16,17,36,37], but none have examined the impact of changes in cosmetic use due to pregnancy or evaluated risk perception among pregnant women. According to the study, pregnant women believed that environmental chemicals were harmful, and tended to adopt healthier behaviors. However, the chemical composition of cosmetics was not specifically examined [38].

A study on healthcare professionals' advice regarding cosmetic use during pregnancy is lacking. In order to minimize exposure to endocrine disruptors, it is important to understand how cosmetic habits change during pregnancy, how risks are perceived, and how health care professionals can provide guidance. During pregnancy, pharmacists can provide valuable advice and information on safer cosmetic choices in community pharmacies in France.

Study participants were asked to determine the extent to which pregnant women affected their cosmetic use and the extent to which non-pregnant women would likely do so if they became pregnant. Among the secondary objectives was to compare women's cosmetic use before and during pregnancy, identify criteria for cosmetic use decisions, evaluate the perception of cosmetic risks, and investigate the advice women receive from health professionals.

2. Subjects and Method

2.1. Subjects

Pregnant women and young women of childbearing age comprised the study population. We surveyed four community pharmacies and a private gynecology clinic in two nearby French departments. Participants must be age 18-45 years old, fluent in French, and provide informed consent to participate. One hundred and fifty-five women (85 non-pregnant women and 90 pregnant women) took part in the study.

Considering that no identifiable information was collected in this study and that it was not an interventional study, French human research regulations exempted this study from approval by the Institutional Review Board in accordance with their regulations.

2.2. Method

Research was conducted in a cross-sectional manner. Participants were explained how the survey worked by a health professional involved in the study, such as a pharmacist or gynecologist, and how they could complete the anonymous, self-administered questionnaire.

An anonymous, standardized questionnaire was used to collect the data. Participants were asked to complete a questionnaire that included socio-demographic and obstetric characteristics, details of their cosmetic use outside of pregnancy (types of products they used and their reasons for selecting them), changes in use during pregnancy (PW group), intended changes when pregnant (NPW group), perceptions of cosmetic product risks, and advice from healthcare professionals. Prices, ingredients, fragrances, appearances, recommendations from professionals or friends, habits, and preferences for specific brands or ranges were considered when selecting cosmetics.

There are 28 cosmetic products assessed, including nine personal care products (PCPs) for general hygiene (e.g., shower gel, soap, dermatological soap, intimate hygiene products, body scrub, body

lotion, deodorants, perfumes, bronzers), five PCPs for facial hygiene (It includes three PCPs (such as a cleanser, facial creams, scrubs, and facial masks), three hair care PCPs (such as shampoo, hair masks, and hair dyes), and 11 makeup products (such as foundation, blush, mascara, eyeliner, lip products, makeup remover, nail polish, and nail polish remover).

In order to capture products that are not used every day, such as hair dye and nail polish, outside of pregnancy, the survey evaluated the women's general cosmetic usage habits (not specific to the 24 or 48 hours before completing the survey). To evaluate the use of shower gel outside of pregnancy, the following question was asked: "Do you regularly use shower gel outside of pregnancy?" (Yes/No). Similarly, 27 other cosmetics were questioned. The product was considered to be regularly used by women who answered "Yes," regardless of how frequently they used it.

Pregnancy-related changes in cosmetic use were measured by asking: "Since the beginning of your pregnancy (or if you are pregnant), have you changed (or will you change) the usage of...?" (Yes/No). Each of the 28 cosmetics was asked this question. As part of the PW group, changes in cosmetic usage during pregnancy were recorded, such as drops, decreases, replacements with safer products, increases, or the use of a new product.

The PW group was divided into four groups based on whether they used cosmetics before pregnancy or during pregnancy.

2.3. Statistical Analysis

In order to compare qualitative variables between the PW and NPW groups, Pearson's Chi-square or Fisher's exact tests were used as appropriate, depending on the situation. Based on the distribution of the data, Student's t-tests or Mann-Whitney U tests were used to compare quantitative variables.

To compare cosmetic use before and after pregnancy within the PW group, McNemar's Chi-squared test (with continuity correction if necessary) was used. It was determined that $p = 0.05$ was statistically significant.

Results

Among the participants in the study, 85 were non-pregnant women (NPWs) and 90 were pregnant women (PWs). NPW participant age was 30.5 years, while PW participant age was 30.2 years. There was no significant difference between these two groups ($p = 0.67$).

Regarding the town of residence, a higher proportion of PW resided in towns with fewer than 5000 inhabitants (77.8%) compared to NPW (52.9%), with a significant difference between the two groups ($p < 0.01$). Both groups had similar educational levels, with 72.9% of NPWs and 76.7% of PWs having a university education. Women with junior school education were relatively few (6.3%), and no significant difference was found between NPWs and PWs ($p = 0.71$). According to socioprofessional categories, intermediate professions (35.9%) and employees (31.3%) made up the majority. In terms of socioprofessional categories, no significant differences were observed between the two groups with the same proportion of executive and intellectual professions, intermediate professions, employees, and others ($p = 1.00$). There was also some difference between NPW and PW in terms of previous pregnancy experience ($p = 0.78$), with 51.7% of participants having experienced at least one previous pregnancy.

There was a 14.3% prevalence of chronic treatment outside of pregnancy among participants at the time of the study. The NPW use chronic treatment at a significantly higher rate than the PW, with 20.0% of NPW using chronic treatment compared to 8.9% of PW ($p = 0.05$).

Table 1: Demographic and Socioprofessional Characteristics of Participants (Total N = 175).

Variables	Total N = 175 (%) (m ± SD)	NPW Group N = 85 (%) (m ± SD)	PW Group N = 90 (%) (m ± SD)	p- Value
Age (n = 174)	30.5 ± 5.8	30.7 ± 7.4	30.2 ± 3.9	0.67
Town of residence (n = 171)				
≤5000 inhabitants	115 (66.7)	45 (52.9)	70 (77.8)	<0.01
>5000 inhabitants	56 (33.3)	40 (47.1)	20 (22.2)	
Educational level (n = 174)				
Junior school	11 (6.3)	8 (9.4)	3 (3.3)	0.70
High school	33 (18.9)	15 (17.6)	18 (20.0)	
University level	131 (74.8)	62 (72.9)	69 (76.7)	
Socioprofessional category (n = 175)				
Executive and intellectual professions	38 (21.7)	18 (21.2)	20 (22.2)	1.00
Intermediate professions	63 (35.9)	28 (32.9)	35 (38.9)	
Employees	55 (31.3)	27 (31.8)	28 (31.1)	
Others	6 (3.4)	3 (3.5)	3 (3.3)	
No occupation	17 (9.7)	10 (11.8)	7 (7.8)	
Previous pregnancy (n = 174)				
≥1	90 (51.7)	48 (56.5)	42 (46.7)	0.78
Chronic treatment (n = 175)				
Outside of pregnancy	25 (14.3)	17 (20.0)	8 (8.9)	0.05

Study participants included 175 women, 85 non-pregnant women (NPW) and 90 pregnant women (PW), who used personal care products (PCPs). The most common product reported by participants was shower gel, with 93.7% mentioning it. It was found that PW (97.1%) used shower gel more than NPW (90.0%). However, the difference was not statistically significant ($p = 0.15$). 32.5 percent of participants used solid soap, with no significant difference observed between NPW (40.0%) and PW (30.9%) ($p = 0.37$). 17.5% of participants used dermatological soap, which revealed a significant difference. In comparison with PW (10.3%), NPW (25.9%) used dermatological soap more frequently ($p=0.03$).

The prevalence of intimate hygiene products was 46.0% among participants, with a significant difference between non-participants (45.8%) and participants (46.3%). 398.8% of participants used body scrub, with no significant difference found between NPW (41.7%) and PW (38.2%) ($p = 0.83$). In the study, 71.9% of participants used body lotion, with NPW (76.7%) using it slightly more than PW (69.1%). This difference, however, was not statistically significant ($p = 0.45$). Nearly 92 percent of participants used deodorant and 91 percent used perfume, respectively. Deodorant ($p = 1$) and perfume ($p = 0.75$) were used in similar proportions by NPW and PW. In fact, only 0.8% of participants reported using bronzers, and PW (1.5% reported using them).

Sixty-six percent of participants used a facial cleanser, though the difference was not significant ($p = 0.32$), especially among NPW (66.1%). The percentage of participants who used day cream was 82.0%, with NPW (86.7%) using more than PW (77.9%), but the difference was not statistically significant ($p = 0.25$). The use of night face cream was 18.7% among participants, with no significant difference between NPW (20.0%) and PW (17.7%) ($p = 0.91$). In total, 43.7% of participants used face scrub, but NPW was more likely to use it (50.0%) than PW (38.2%). However, this was not

statistically significant ($p = 0.25$). A total of 35.2% of participants used facial masks, with no statistically significant differences between NPW (35.0%) and PW (35.3%) ($p = 1$). Hair hygiene was reported by 98.4% of participants ($p = 1$). However, NPW (98.3%) and PW (98.5%) used shampoo differently ($p = 1$). Participants used hair masks 43.0% of the time, whereas PW (48.5%) used them more often than NPW (36.7%), but the difference was not statistically significant ($p = 0.24$). There was a slight increase in the percentage of participants who used hair dye (37.3% compared to 30.5% for the NPW), but there was no significant difference ($p = 0.55$).

Table 2: Use of Personal Care Products (n = 175)

Personal Care Product	Total n = 175 (%)	NPW Group n = 85 (%)	PW Group n = 90 (%)	p-Value
General Hygiene				
Shower gel	164 (93.7)	76 (90.0)	88 (97.1)	0.15
Solid soap	57 (32.5)	34 (40.0)	23 (30.9)	0.37
Dermatological soap a	31 (17.5)	22 (25.9)	9 (10.3)	0.03
Intimate hygiene product a	81 (46.0)	39 (45.8)	42 (46.3)	1
Body scrub	70 (39.8)	35 (41.7)	35 (38.2)	0.83
Body lotion	126 (71.9)	65 (76.7)	61 (69.1)	0.45
Deodorant b	161 (92.1)	78 (91.7)	83 (92.5)	1
Perfume b	160 (91.3)	79 (93.3)	81 (91.0)	0.75
Bronzers	2 (0.8)	0	2 (1.5)	-
Face Hygiene				
Facial cleanser a	106 (60.6)	56 (66.1)	50 (55.9)	0.32
Day face cream	144 (82.0)	74 (86.7)	70 (77.9)	0.25
Night face cream	45 (18.7)	17 (20.0)	28 (17.7)	0.91
Facial scrub	77 (43.7)	42 (50.0)	35 (38.2)	0.25
Facial mask	62 (35.2)	30 (35.0)	32 (35.3)	1
Hair Hygiene				
Shampoo	172 (98.4)	83 (98.3)	89 (98.5)	1
Hair mask	75 (43.0)	31 (36.7)	44 (48.5)	0.24
Hair dye a	59 (34.1)	26 (30.5)	33 (37.3)	0.55

Table 3: Use of Make-Up Products (n = 175)

Make-up Product	Total n = 175 (%)	NPW Group n = 85 (%)	PW Group n = 90 (%)	p-Value
Make-up foundation	101 (57.8)	45 (53.3)	56 (61.8)	0.43
Blush	49 (28.1)	27 (31.7)	22 (25.0)	0.52
Mascara	151 (85.9)	74 (86.7)	77 (85.3)	1.00
Eye-liner	58 (33.6)	32 (38.3)	26 (29.4)	0.35
Eye pencil	121 (72.7)	56 (68.3)	65 (76.5)	0.41
Eye shadow	120 (68.7)	56 (68.3)	64 (69.1)	1.00
Lipstick	80 (45.3)	35 (41.7)	45 (48.5)	0.55
Lip pencil	21 (9.4)	11 (10.2)	10 (10.5)	1.00
Make-up remover	142 (81.3)	72 (85.0)	70 (77.9)	0.38
Nail polish	132 (75.0)	56 (68.3)	76 (80.9)	0.15
Nail polish remover	129 (73.6)	56 (68.3)	73 (78.5)	0.28

Make-up products are generally popular among both non-pregnant women and pregnant women, though some products have significant differences among them.

With 85.9% of participants reporting that they used mascara, mascara was the most commonly used product from both groups. NPW and PW groups both use mascara at similar rates, with 86.7% and 85.3% using it, respectively ($p = 1.00$). The proportion of women wearing make-up foundation was

57.8%, with 53.3% of NPWs and 61.8% of PWs using it, despite the non-significant difference ($p = 0.43$).

It was found that 28.1% of participants used blush, with slightly more NPW (31.7%) using it than PW (25.0%). However, this difference was not statistically significant ($p = 0.52$). NPWs used eye pencils slightly more frequently than PWs (76.5%), but the difference was not significant ($p = 0.41$). No significant differences were found between the two groups for eye shadow users ($p = 1.000$) in terms of their use of it. 68.7% of participants in both groups used eye shadow.

45.3% of all participants used lipstick, with PW using it more frequently (48.5%) than NPW (41.7%), but these differences were not statistically significant ($p = 0.55$). NPW were less likely to use lip pencils (10.2%), while PW were more likely to use them (10.5%) ($P = 1$). The majority of participants (81.3%) used make-up remover, with NPW (85.0%) making a higher use than PW (77.9%), but not statistically significant.

73.6% of participants were using nail polish and 75.0% used nail polish remover. It was found that PWs used slightly more nail polish (80.9%) and nail polish remover (78.5%) than NPWs, but the differences were not significant (nail polish $p = 0.15$, nail polish remover $p = 0.28$).

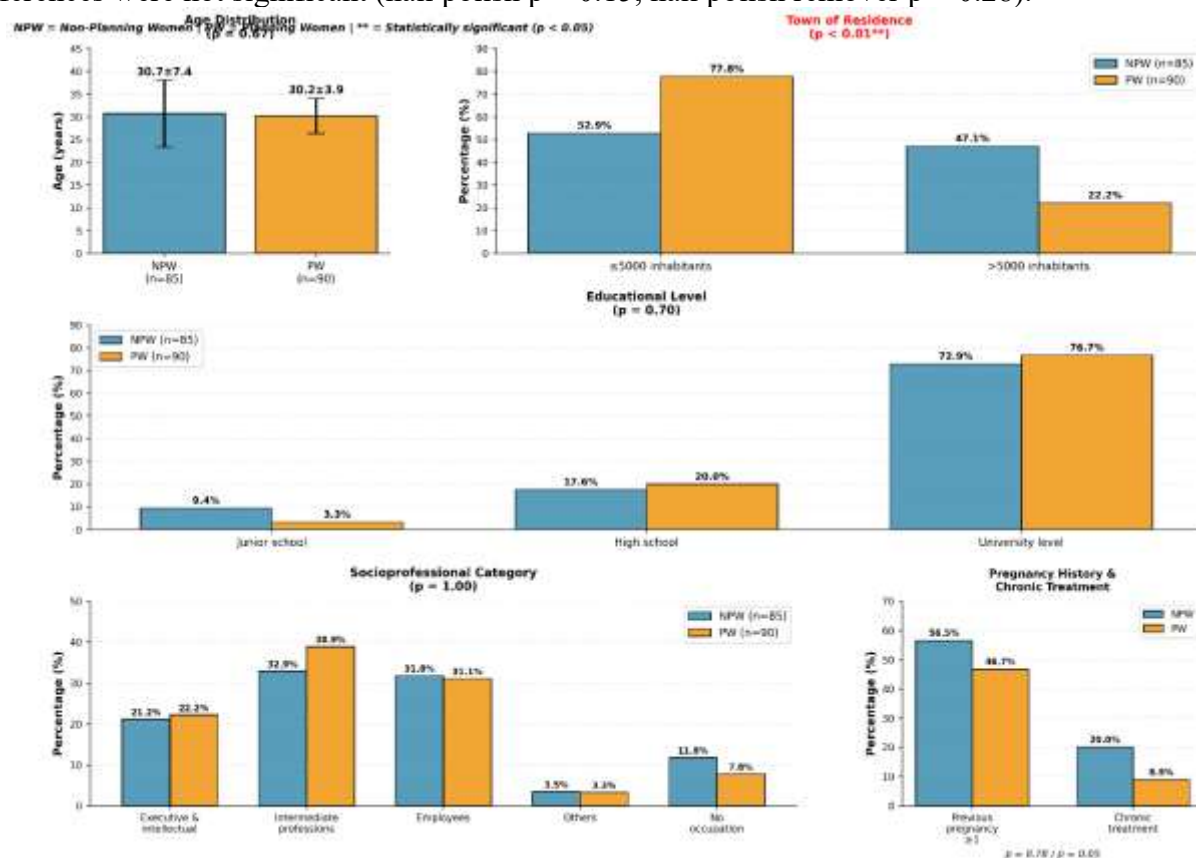


Figure 1: Demographic Characteristics of Non-Planning and Planning Women

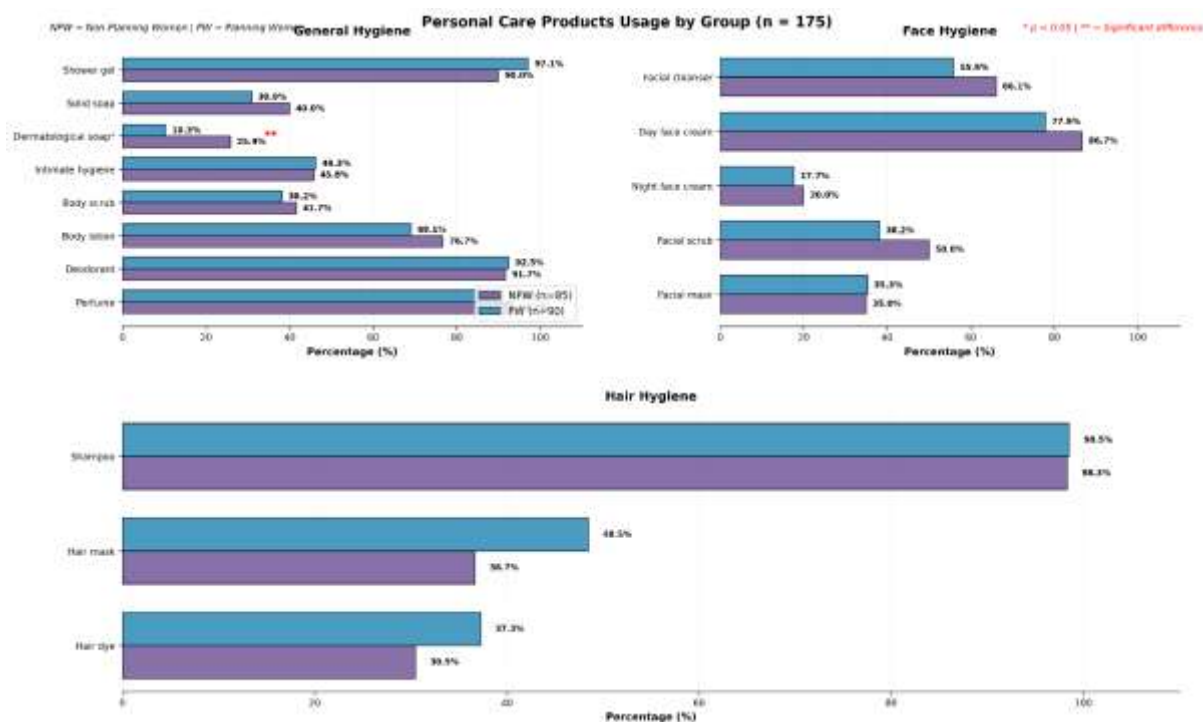


Figure 2: Usage of Personal Care Products by Non-Planning and Planning Women

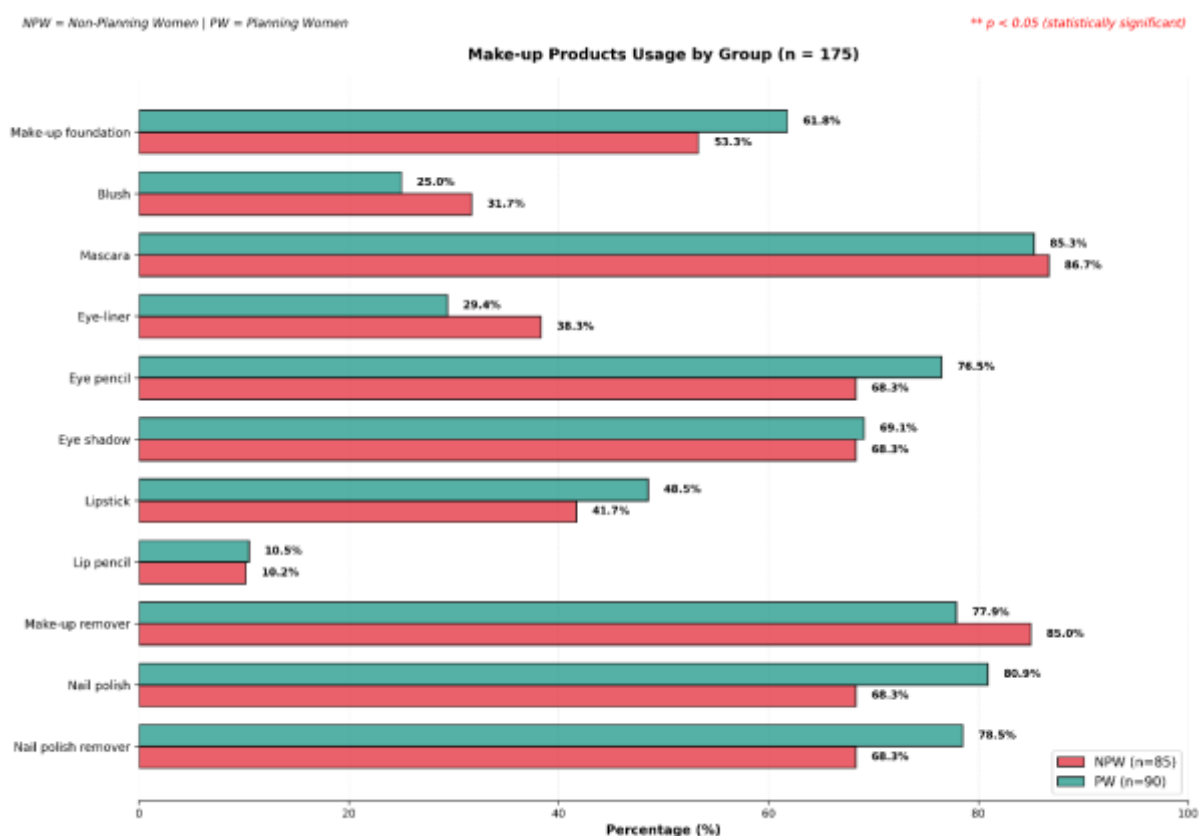


Figure 3: Usage of Make-up Products by Non-Planning and Planning Women

4. Discussion

4.1. Use of Cosmetics Outside of Pregnancy

Generally, cosmetics usage habits exhibited by the women in this study were similar to those in studies conducted by other researchers in Europe [34,35] and the USA [39]. Although my participants reported using more makeup products (such as foundation, eye shadow, nail polish, and nail polish

remover) than women in the Dutch study by Biesterbos et al. [34]. The Americans surveyed by Wu et al. [39] used more perfume and shower gel than our participants. Their use of products such as body lotion [35,39], night facial cream [34], and hair dyes [34,39] was lower than said in those studies.

4.2. Use of Cosmetics During Pregnancy

According to our study, pregnant women (PW) in our study used similar amounts of body lotion, deodorant, foundation, skin cleanser, and lipstick as those in similar studies in the USA and Canada. The study we conducted, however, found that pregnant women used more perfumes, shampoos, shower gels, face creams, hair dye, eye make-up products, nail polish, and nail polish remover than the women in the aforementioned studies [11,16,17,36,37]. We collected data regarding overall cosmetic use, whereas the other studies analyzed cosmetic use within the past 24 or 48 hours [11,16] or 52 hours [17,36]. According to the researchers, Americans and Canadians might have underestimated the frequency with which hair products, nail polish, and perfume are used. Furthermore, these results should be compared with those of females in Western Europe and North America with different lifestyles. Our study also found that 75 percent of women in our sample used preventive treatments for stretch marks, a figure similar to that in another study [40].

4.3. Perception of Risk Related to Cosmetics and Their Ingredients

About 45% of the women we studied believed that using cosmetics during pregnancy was safe. There is evidence that many cosmetics contain chemicals that can be harmful, including plasticizers, bisphenol A, parabens, synthesized dyes, benzophenones, antimicrobials, dioxane, formaldehyde, and heavy metals [1,2,3,4,5,6]. There are a number of chemicals that may cause cancer, including formaldehyde and dioxane. Other chemicals, like certain synthetic dyes, are suspected of causing cancer [41,42]. There is evidence that phenols and phthalates are endocrine disruptors that may affect reproductive health, including male genital development disorders [28,29,45]. There is evidence that TPHP, one of the plasticizers in nail polish, causes sperm concentration to be decreased [30]. There is a large number of people who are not aware of these risks when using cosmetics. With the exception of dermatological soap, night facial cream, shower gel, and deodorant, women rarely consider product ingredients when choosing cosmetics outside of pregnancy. Pregnant women were more likely to change cosmetic usage because they were concerned about ingredients. There are, however, limitations to these findings since only a small number of women reported their habits had changed.

4.4. Impact of Pregnancy on the Risk Perception of Cosmetics

According to our study, pregnancy changed women's cosmetic habits for only five of 28 products (hair dye, deodorant, nail polish, nail polish remover, and perfume). Typically, these changes for PW were the substitution of harmful products with less harmful alternatives and the reduction or discontinuation of the use of make-up products. There was a significant reduction in the use of nail polish during pregnancy, excluding nail polish remover and nail polish. There has been no other study specifically comparing cosmetics use during pregnancy with pre-pregnancy use in the literature. The authors of a recent study found, however, that use of cosmetics and hair styling products decreased during pregnancy, whereas general hygiene and skincare products remained constant. A noteworthy aspect of their study was that they did not assess how products were used prior to pregnancy.

4.5. Need for Advice from Health Professionals on Safe Cosmetic Use

Women in our study were rarely advised by a healthcare provider regarding cosmetic use before or during pregnancy (16% for personal care products (PCPs) and 6% for makeup products). Although this is the case, over 65% of women said they wanted more information, especially during pregnancy. Pregnant women are clearly at risk of exposure to chemicals in cosmetics, so education and guidance are clearly needed. Cosmetic hazards must be well-understood by healthcare professionals, especially perinatal health specialists. According to a study on household chemicals, pregnant women preferred getting information from their physicians over articles or friends. Due to the increasing availability of cosmetics in pharmacies, pharmacists are playing an increasingly important role in educating and

advising pregnant women on safe cosmetic usage. A new law [48,49] strengthens pharmacists' legal recognition of their role in health education and prevention.

4.6. Limitations

Several limitations have been identified in our study. Because participants were volunteers, there could have been selection bias, since they may have been more aware of the issues associated with cosmetic use. Furthermore, the number of women who didn't participate was not recorded. Study participants in our study had higher levels of education (75% university-level instead of 52%), and were more likely to hold jobs in executive and intellectual occupations (22% vs. 16.5%) or intermediate occupations (36% vs. 28%). This may affect generalizability even though these differences are likely due to a growing trend towards higher education and professional jobs. In previous studies [34,35,37,39], we've seen that education and income levels influence cosmetic use. The use of make-up products, facial cleansers, and sunscreen was more likely among women with higher levels of education, while products such as body lotion, hand cream, and deodorant were less frequent among women with lower levels of education [34,35,39]. Additionally, pregnant women depending on their education level [38] perceive environmental chemical risks differently. The findings of this study should be interpreted with caution, and further research is needed to better understand how the public uses cosmetics. As women reported cosmetic use, social desirability bias may have been at play, especially as it relates to changes they made during pregnancy. Some participants may have been more likely to report reducing their cosmetic use as a sign of good behavior than others, even though these biases are more prevalent in sensitive areas like illicit drug use or sexual behavior [56]. Although this is true, only a small fraction of women reported significant changes in cosmetic use, which suggests that social desirability bias had a minor impact on cosmetic use. Further, recall bias may have been present in our study, as cosmetic usage was not tracked throughout pregnancy, and women may have understated or overstated certain behaviors in latter stages of pregnancy. Additionally, pregnant women may not have used the same products as mothers in later stages (e.g., creams to treat stretch marks, gels to treat tired legs). However, this potential difference is minimized by the fact that 90% of the PW group were in their second or third trimester.

5. Conclusion

During pregnancy, cosmetics are commonly used and perceived as risky, according to this study. Chemicals in personal care products pose a number of potential risks, particularly to pregnant women, which underscores the need for better awareness and education. There were no significant differences in cosmetic use between pregnant and non-pregnant women in this study, but certain products, like hair dye, deodorant, and nail polish, were less frequent during pregnancy, often because of concerns about the safety of ingredients. Pregnant women are not receiving adequate guidance on safe cosmetic use during pregnancy from healthcare professionals, according to the findings. Despite the low percentage of women who received advice, a significant portion requested information on the risks of using cosmetics during pregnancy. Pregnant women, especially pharmacists, should play a more active role in educating and advising them about safer cosmetic choices because of these findings. In addition, the study shows that, while many pregnant women alter their cosmetic use, these adjustments are usually limited to specific products and may not always reflect a broad awareness of potential risks. A better understanding of these gaps in knowledge and promoting safer cosmetic practices is vital for future public health strategies. Moreover, more research is needed to investigate the long-term effects of cosmetic use during pregnancy, as well as how educational intervention can reduce hazardous chemical exposures. Because of this study, the need for a more informed approach to cosmetic usage during pregnancy is highlighted, which is essential to ensuring both the health of the mother and the fetus. Health professionals, policymakers, and cosmetic manufacturers to enhance the safety and awareness of personal care products during pregnancy should undertake a collaborative effort.

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