TJFM&PC | Turkish Journal of Family Medicine and Primary Care

Differences in the Use of Cosmetic Products Depending on Pregnancy Status

Kozmetik Ürünlerin Gebelik Durumuna Göre Kullanım Farklılıkları

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Abstract

Method: This cross-sectional study which was performed between May 2017 and January 2018 at a family medicine, dermatology, and obstetrics and gynecology outpatient clinic, evaluated differences in the use of nine cosmetic procedures, and 38 different cosmetic and personal care products depending on pregnancy status.

Results: The pregnant group and the non-pregnant comparison group both consisted of 219 women. The two most frequently used products in the pregnant group were toothpaste and shampoo (99.1% and 98.1% respectively). The frequencies of use of all the examined products were lower in pregnant women than in non-pregnant women, except for hair gel, shampoo, soap, toothpaste, and vaginal cleansing agents. Compared to a pregnant group, being non-pregnant increases the risk of using ten or more cosmetic products 5.8 times fold. Our findings indicated that pregnant women's use of products declined, except for general hygiene products.

Discussion and conclusion:Knowing which products are used most often and which products pregnant women intend to continue to use can guide physicians in terms of advising pregnant women and investigating product exposure.

Keywords: Cosmetics, Pregnant Women, Feminine Hygiene Products, Epidemiology, Maternal-Fetal Relations

Özet:

Yöntem:Aile hekimliği, dermatoloji, kadın doğum ve kadın hastalıkları polikliniklerinde, Mayıs 2017-Ocak 2018 tarihleri arasında gerçekleştirilen bu kesitsel çalışmada, gebelik durumuna bağlı olarak dokuz kozmetik işlem ve 38 farklı kozmetik ve kişisel bakım ürününün kullanım farklılıkları değerlendirildi.

Bulgular:Gebe olan grup ve gebe olmayan karşılaştırma grubunun her ikisi de 219 kadından oluşuyordu. Gebe grupta en sık kullanılan iki ürün diş macunu ve şampuandı (sırasıyla %99,1 ve %98,1). Saç jölesi, şampuan, sabun, diş macunu ve vajinal temizlik maddeleri dışında incelenen tüm ürünlerin kullanım sıklığı gebelerde, gebe olmayanlara göre daha düşüktü. Bulgularımız, hamile kadınların genel hijyen ürünleri dışında ürün kullanımının azaldığını gösterdi.

Tartışma ve Sonuç:Hangi ürünlerin daha sık kullanıldığını ve gebe kadınların hangi ürünleri kullanmayı sürdürmek istediğini bilmek, hekimlere gebe kadınlara tavsiyede bulunma ve ürün maruziyetini araştırma konusunda rehberlik edebilir.

Anahtar Kelimeler: Kozmetik, Gebe Kadınlar, Kadın Hijyen Ürünleri, Epidemiyoloji, Maternal-Fetal İlişkiler

Geliş tarihi / Received: 30.09.2022 Kabul tarihi / Accepted: 12.04.2023

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Ateş E, Aksu Arıca D, Aran T, Baykal Selçuk L, Set T. ***Differences in the Use of Cosmetic Products Depending on Pregnancy Status***. TJFMPC, 2023; 17 (2) :262-270
DOI: 10.21763/tjfmpc.1181887

Introduction

Cosmetics, or personal care products, are defined as any substance or mixture that comes into contact with the outer parts of the body (skin, hair, lips, nails, and external genital organs) and the oral cavity (teeth and mucous membranes) for purposes such as cleansing, changing appearance and odor, and protecting the relevant area and keeping it in good condition.[1] Cosmetic products are frequently used in daily life. These contain very different chemicals such as preservatives, perfumes, and additives, as well as active ingredients. Studies show that cosmetics are one of the most important sources of exposure to environmental chemistry.[2,3]

The effect of environmental factors on fetal development during pregnancy is unknown. However, many chemical products have severe impacts on human health and affect embryonic and fetal development during pregnancy. Some of these chemicals have been linked to the endocrine system and neurotoxicity.[4] The frequency of use of cosmetic and personal care products in pregnancy needs to be accurately determined for the accurate evaluation of exposure to cosmetic products and their potential effects on pregnancy, and studies should be planned accordingly. The results of our study can make a significant contribution to the counseling given to pregnant women.

At present, data on personal care product use patterns in pregnancy are limited. Studies have largely focused on the use of products containing certain special chemicals, such as butyl-paraben, isobutyl-paraben, methyl-paraben, propyl-paraben, ethyl-paraben, benzyl-paraben, mono-n-butyl phthalate, monoethyl phthalate, diethyl phthalate, di-n-butyl phthalate, and other phthalate metabolites concentrations, and on their post-use levels and potential effects.[5-8]

One cross-sectional study of 179 pregnant women identified general hygiene products such as toothpaste, shampoo, and soap as the most commonly used products in pregnancy. These were followed by hand cream, wet wipes, shower gel, hair cream, and moisturizer, all products remaining on the skin.[4]

The purpose of this study was to evaluate differences in the use of personal care and cosmetic product among pregnant women compared with a non-pregnant group.

Methods

Study design

This cross-sectional study was performed between May 2017 and January 2018. The study group was selected from patients admitted to the family medicine, dermatology, and venereal diseases and obstetrics and gynecology outpatient clinics of a university medical faculty in Turkey. During the data collection period, all patients attending these clinics were invited to take part in the study until the sample size was reached. Volunteers who met the inclusion criteria were enrolled in the study.

Data collection

A questionnaire prepared by our research team was applied to participants using the face-to-face interview technique. This consisted of questions about participants' demographics, skin types, frequency of cosmetic procedures, and use of cosmetic and personal care products. Additionally, we asked the pregnant group if they had planned the current pregnancy or not, and about the mode of conception, whether spontaneous or through medical assistance.

Inclusion criteria

1. Age 18-49
2. In at least the 20th week of pregnancy in the case of the pregnant group

Exclusion criteria

1. Presence of a dermatological problem capable of affecting cosmetic product use

Participants were asked about nine cosmetic procedures (Botox, peeling, dermal fillers, mesotherapy, laser epilation, needle epilation, permanent makeup, tattoos, and solarium), and about 31 cosmetics and personal care products (hair dye, hair spray, hair gel, shampoo, hair conditioner, shower gel, soap, wet wipes, sunscreen cream, facial moisturizing cream, hand cream, tanning cream, perfume, deodorant, lipstick, lip moisturizer, foundation cream, powder, eye makeup, makeup remover, eye makeup remover, nail polish, varnish, nail polish remover, depilatory wax, bleaching cream, depilatory cream, toothpaste, mouthwash, dental floss, vaginal cleansing agent, and sanitary napkins. Product usage was investigated using direct, closed “yes” or “no” questions. Women who responded "Yes" to any product were regarded as using that product regularly, irrespective of the frequency of use. Skin types were evaluated based on the Fitzpatrick skin type classification developed in 1975. This system classifies skin types based on genetic predisposition, tanning habits, and the skin's reaction to sunlight.[9]

Main outcomes

The primary outcome was to compare frequencies of cosmetic procedures, and cosmetic and personal care product use among pregnant and non-pregnant women.

The secondary outcome was to evaluate differences in frequencies of cosmetic procedures, and cosmetic and personal care product use between spontaneous and medically assisted pregnancies, and in terms of whether or not the pregnancy was planned.

Sample size

A sample size of 196 was calculated for each group, with 95% reliability and a 0.07 sampling error, based on a frequency of cosmetic use of 50%. The sample size was determined using Open Epi Version 3 software.

Data analysis

The study data were analyzed on SPSS Version 18 software. Pearson's Chi-square or Fisher's exact test was applied as appropriate for qualitative variables and to compare differences between the groups. We created a cosmetic score for cosmetic product use, by counting the types of cosmetic products. The median of the score was 10; to make a logistic regression model, we organized a categorical variable according to the number of products they used. We divided participants who use ten or more products and those who use less than ten products. We performed a logistic regression model to assess the factors affecting the risk of using ten or more cosmetic products. While the level of education was added to the model as an ordinal variable, age was added to the interval, and, pregnancy and employment status were added as nominal variables. Statistical significance was set at $p< 0.05$.

Ethics approval

This study was preapproved by the local ethics committee of Karadeniz Technical University (2017/245-24.04.2017). Written consent was sought and obtained from all participants prior to inclusion in the study.

Results

Two hundred nineteen pregnant women and 219 non-pregnant women in the comparison group were enrolled. Mean ages were 30.63 ± 5.48 years in the pregnant group and 27.83 ± 8.70 in the non-pregnant group ($p<0.001$). The mean gestational week was 30.92 ± 5.79. Eighty-nine percent (n=187) of pregnancies were planned, and 11.00% (n=23) were unplanned. There was no significant difference in terms of educational level and or employment status between planned and unplanned pregnancies (p=0.571 and p=0.507, respectively). Additionally, 94.60% (n= 193) of pregnancies were spontaneous, while 5.40 % (n= 11) were medically assisted. No significant differences were observed between spontaneous and medically assisted pregnancies in terms of educational level or employment status (p=0.860 and p=0.749, respectively). In terms of education, 42.90% (n= 90) of the pregnant women were primary school graduates, while 50.00% (n= 105) of the non-pregnant group had bachelor's degrees at least. Employment rates were 36.20% (n=77) in the pregnant group and 85.70% (n=180) in the non-pregnant group. Significant differences were determined between the pregnant and non-pregnant groups in terms of education level, the average amount of monthly income, and working status (p values <0.001, Table 1). Participants' skin types and descriptions are shown in Table 1.

Table 1. *Participants' descriptives and skin types*

	Pregnant group n (%)	Non-pregnant group n (%)	p value
Educational level			<0.001
Primary school graduate	90 (42.90)	17 (8.10)	
High school graduate	63 (30.00)	88 (41.90)	
University and over graduate	57 (27.10)	105 (50.00)	
Working status			<0.001
Employed	77 (36.20)	180 (85.70)	
No occupation	136 (63.80)	30 (14.30)	
Skin type			0.885
Type 1	3 (1.40)	3 (1.40)	
Type 2	51 (23.40)	44 (20.60)	
Type 3	138 (63.30)	143 (66.80)	
Type 4	26 (11.90)	24 (11.20)	

* tl, mean±SD: Turkish liras, mean ± Standard deviation

The most frequent cosmetic procedure was laser epilation in both groups. Other cosmetic procedures are shown in Table 2. A significant difference was determined between the groups in terms of laser epilation ($p < 0.001$, Table 2).

Table 2. *Frequencies of cosmetic procedures*

	Pregnant group (noun / %)	Non-pregnant group (noun / %)	p value
Botox	0 (0.00)	4 (1.80)	0.123
Peeling	0 (0.00)	5 (2.30)	0.061
Dermal fillers	1 (0.50)	0 (0.00)	1.000
Mesotherapy	0 (0.00)	2 (0.910)	0.499
Laser epilation	6 (2.70)	50 (22.80)	**<0.001**
Needle epilation	1 (0.50)	5 (2.30)	0.216
Permanent makeup	0 (0.00)	1 (0.50)	1.000
Tattoo	4 (1.80)	1 (0.50)	0.372
Solarium	1 (0.50)	0 (0.00)	1.000

x^2=Chi-square test

Cosmetic and personal care product use rates in the pregnant and non-pregnant groups are shown in Table 3. The two most commonly used products in the pregnant group were toothpaste and shampoo (99.1% and 98.1%, respectively), compared to shampoo and toothpaste, in that order, in the non-pregnant group (99.5% and 99.1%, respectively). Significant differences were determined between pregnant and non-pregnant women in terms of all parameters except for hair gel, shampoo, soap, toothpaste, and vaginal cleansing agents. Of the cosmetic and personal care products, gum use was significantly higher in the pregnant group ($p = 0.028$, Table 3). Use of the other products was significantly lower in pregnant women than in non-pregnant women (Table 3).

Table 3. *Frequencies of cosmetic and personal care product use in the study groups*

Products	Pregnant group n (%) *	Non-pregnant group n (%) **	p value
Hair dye	34 (15.50)	67 (30.60)	<0.001
Hair spray	3 (1.40)	25 (12.80)	<0.001
Hair gel	7 (3.30)	5 (2.70)	0.779
Shampoo	212 (98.10)	209 (99.50)	0.372
Hair conditioner	64 (29.90)	67 (45.60)	0.003
Shower gel	74 (34.40)	130 (63.40)	<0.001
Soap	167 (77.70)	161 (78.50)	0.906
Wet wipes	108 (49.50)	147 (71.70)	<0.001
Sunscreen cream	35 (16.10)	94 (48.50)	<0.001
Facial moisturizing cream	111 (51.60)	143 (71.10)	<0.001
Hand cream	132 (60.80)	160 (74.80)	0.002
Tanning cream	0 (0.00)	12 (6.30)	<0.001
Perfume	72 (33.80)	172 (83.90)	<0.001
Deodorant	69 (32.40)	131 (63.30)	<0.001
Lipstick	39 (18.00)	150 (70.80)	<0.001
Lip moisturizer	31 (14.50)	111 (54.40)	<0.001
Foundation cream	33 (15.40)	94 (44.80)	<0.001
Powder	26 (12.20)	47 (23.60)	0.003
Eye makeup	55 (25.70)	162 (75.70)	<0.001
Makeup remover	16 (7.50)	139 (66.20)	<0.001
Eye makeup remover	18 (8.50)	90 (51.70)	<0.001
Nail polish, varnish	8 (3.80)	80 (41.70)	<0.001
Nail polish remover	7 (3.30)	78 (41.50)	<0.001
Depilatory wax	52 (24.50)	92 (47.70)	<0.001
Bleaching cream	0 (0.00)	10 (5.20)	0.001
Depilatory cream	0 (0.00)	13 (7.00)	<0.001
Toothpaste	215 (99.10)	211 (99.10)	1.000
Mouthwash	18 (8.50)	66 (33.30)	<0.001
Dental floss	32 (15.20)	60 (30.30)	<0.001
Vaginal cleansing agent	5 (2.40)	7 (3.70)	0.560
Sanitary napkin	66 (31.40)	122 (59.50)	<0.001

*% in the pregnant group **% in the non-pregnant group, x^2=Chi-square test

In terms of the effect of pregnancy planning status, hair dye use was significantly higher in the unplanned pregnancy group than in the planned pregnancy group (p = 0.017). Facial moisturizing cream use was significantly higher in the planned pregnancy group than in the unplanned group (p = 0.029). There was no significant difference in terms of the use of other products (Table 4).

Table 4. *Effects of planning and the manner in which pregnancy occurred on cosmetics and personal care product* use

Products	Planned pregnancy n (%)	Unplanned pregnancy n (%)	p value	Spontaneous pregnancy n (%)	Medically assisted pregnancy n (%)	p value
Hair dye	26 (13.30)	8 (33.30)	**0.017**	30 (14.90)	4 (36.40)	0.079
Hair spray	3 (1.60)	0 (0.00)	1.000	3 (1.50)	0 (0.00)	1.000
Hair gel	6 (3.20)	1 (4.20)	0.571	7 (3.50)	0 (0.00)	1.000
Shampoo	190 (98.40)	22 (95.70)	0.365	196 (98.00)	11 (100.00)	1.000
Hair conditioner	57 (29.80)	7 (30.40)	1.000	56 (28.40)	7 (63.60)	**0.020**
Shower gel	64 (33.20)	10 (45.50)	0.343	65 (32.80)	7 (63.60)	0.050
Soap	149 (77.60)	18 (78.30)	1.000	155 (77.90)	9 (90.00)	0.693
Wet wipes	96 (49.20)	12 (52.20)	0.828	97 (48.30)	7 (63.60)	0.367
Sunscreen cream	29 (15.00)	6 (25.00)	0.238	33 (16.40)	1 (9.10)	1.000
Facial moisturizing cream	104 (54.50)	7 (29.20)	**0.029**	104 (52.30)	6 (54.50)	1.000
Hand cream	118 (61.10)	14 (58.30)	0.827	121 (60.20)	8 (72.70)	0.534
Perfume	61 (32.10)	11 (47.80)	0.162	68 (34.50)	3 (27.30)	0.752
Deodorant	61 (32.10)	8 (34.80)	0.816	62 (31.50)	5 (45.50)	0.337
Lipstick	34 (17.60)	5 (20.80)	0.778	37 (18.50)	1 (9.10)	0.693
Lip moisturizer	27 (14.20)	4 (16.70)	0.759	31 (15.70)	0 (0.00)	0.375
Foundation cream	29 (15.30)	4 (16.70)	0.771	30 (15.20)	3 (27.30)	0.386
Powder	22 (11.60)	4 (16.70)	0.506	24 (12.20)	2 (18.20)	0.632
Eye makeup	45 (23.70)	10 (41.70)	0.080	49 (24.90)	4 (36.40)	0.477
Makeup remover	13 (6.90)	3 (12.50)	0.400	15 (7.60)	1 (9.10)	0.595
Eye makeup remover	15 (8.00)	3 (12.50)	0.439	18 (9.20)	0 (0.00)	0.604
Nail polish, varnish	6 (3.20)	2 (8.30)	0.224	8 (4.10)	0 (0.00)	1.000
Nail polish remover	5 (2.70)	2 (8.30)	0.181	7 (3.60)	0 (0.00)	1.000
Depilatory wax	45 (23.90)	7 (29.20)	0.616	47 (24.00)	5 (45.50)	0.148
Toothpaste	192 (99.00)	23 (100.00)	1.000	199 (99.50)	11 (100.00)	1.000
Mouthwash	15 (8.00)	3 (12.50)	0.439	17 (8.70)	1 (9.10)	1.000
Dental floss	28 (15.00)	4 (17.40)	0.760	30 (15.50)	1 (9.10)	1.000
Vaginal cleansing agent	5 (2.70)	0 (0.00)	1.000	3 (1.50)	1 (9.10)	0.199
Sanitary napkin	59 (31.70)	7 (29.20)	1.000	62 (32.00)	3 (27.30)	1.000

x^2=Chi-square test

In terms of the effect of the mode of conception, the frequency of hair conditioner use was significantly higher in the medically assisted pregnancy group than in the spontaneous pregnancy group (p = 0.020, Table 4). Due to the lack of tanning cream, bleaching cream, and depilatory cream users in the pregnant group, no comparisons of these were possible (Table 3). The median cosmetic score was 10.00 (min:1-max-28).

The logistic regression model revealed that being non-pregnant increases the risk of using ten or more cosmetic products 5.8 times fold compared to a pregnant group. With one unit increase in each education level, the risk of using ten or more cosmetic products increases 1.6 times. Being employed increases the risk of using ten or more cosmetic products 2.1 times fold. (Table 5).

Table 5. *Factors affecting the risk of using ten or more cosmetic products*

Variables	Odds Ratio	95% Confidence Interval	p value
Age	0.941	0.910-0.974	0.001
Pregnancy status			
Pregnant	1.0		
Non-pregnant	5.751	3.408-9.703	<0.001
Level of education	1.623	1.105-2.382	0.013
Employment status			
Non-employed	1.0		
Employed	2.072	1.092-3.930	0.026

Omnibus test of model coefficients <0.001, Nagelkerke R Square =0.444,
Hosmer and Lemeshow Test p=0.754.

Discussion

It is essential to identify factors that may be detrimental to a healthy pregnancy and healthy babies. This study elicited information about the use frequencies of potentially unhealthy cosmetic and personal care products. Our results show that pregnant women reduce their use of almost all the products we investigated. The only products in which we observed no difference in use rates were hair gel, shampoo, soap, toothpaste, and vaginal cleansing agents. In addition, if the pregnancy is planned, the use of hair dye decreases, and the use of face moisturizer increases.

No difference was determined between pregnant and non-pregnant women in terms of skin types, one of the factors affecting cosmetic product use, and this permitted us to submit the results to statistical comparisons.

Definitive recommendations regarding the safety of cosmetic procedures during pregnancy are not possible. However, there is considerable evidence supporting the safety during pregnancy of carbon dioxide laser therapy for the treatment of genital condylomas.[10-12] Miscarriages have even been attributed to Botox injection in the literature, although the procedure does not appear to be associated with maternal or fetal harm.[11] Although no adverse effect on the fetus has been reported to date, botulinum toxin A should nevertheless be avoided during pregnancy.[13] The use of dermal fillers in pregnancy may also be safe,[11] although to the best of our knowledge, no studies have been performed to confirm this. In the present study, the only procedure that was performed significantly less frequently among pregnant women was laser epilation, which was nevertheless the most common procedure in that group. Controlled trials are needed to establish the safety of cosmetic procedures.

Toothpaste followed by shampoo were the two most commonly used products in the pregnant group in this study, compared to shampoo followed by toothpaste in the non-pregnant group. In a study involving a French population, reported rates in a pregnant group were shampoo use 98%, shower gel use 92%, and mascara use 83%, compared to 98%, 91%, and 71%, respectively, in the non-pregnant population.[14] In a cohort study describing patterns of personal care product use among 80 pregnant women, general hygiene products were the most commonly used items. Pregnant women continued to use general hygiene products, while cosmetic product use declined as the pregnancy progressed.[3] Pregnant French women seemed to use more cosmetic products than the non-pregnant female population.[14] In the present study, the use of cosmetic and personal care products was lower among pregnant women than non-pregnant women. No differences in use were detected only in some general hygiene products, such as shampoo, soap, and toothpaste. It may therefore be concluded that pregnant women tend to reduce their use of products other than those they consider essential. However, gum use was significantly higher in the pregnant group than in the non-pregnant group in our study. This may be a result of concern over oral hygiene. In one study protocol, the authors sought to evaluate the effect of mouthwash on improving neonatal outcomes.[15]

Analysis of the effect of pregnancy planning status and spontaneous or medically assisted pregnancies revealed a significantly higher frequency of hair dye use in unplanned pregnancies. One study reported that 70% of women in the general population in developed countries had used hair dye at least once.[16] In the light of concerns about the potential harm to fetal development from maternal exposure to hair dyes, one previous study reported an odds ratio (OR) of 1.78 (95% C.I. 1.13-2.81) between acute lymphocytic leukemia and exposure to hair dyes in the first trimester of pregnancy.[17] Another study showed a strong association between hypospadias and maternal household use of hair cosmetics, with an OR of 9.6 (95% CI: 1.4-66.1).[18] Hair dye, which has been linked to potentially harmful effects in some studies, was used more commonly among unplanned pregnancies in our study. This shows that explaining possible harmful effects must continue to occupy an important place in the counseling provided for pregnant women. It is also important for women of reproductive age to think about the possibility of pregnancy before deciding to use hair dye.

Rates of face cream used in the present study were 51.6% among pregnant and 71.1% among non-pregnant women, 54.5% among planned pregnancies, and 29.2% among unplanned pregnancies. The differences were statistically significant. The reported prevalence of face cream use in adult women was 95.9% in a study conducted among Swiss-German adults.[19] Our rates were lower than those in that study. Greater face cream use among planned pregnancies may suggest that women who are planning to become pregnant also pay more attention to their daily care.

When we consider factors such as age, pregnancy status, level of education, and employment status that affect the risk of using ten or more products, it is seen that not being pregnant is the most affecting factor. As the level of education increases, the risk of using ten or more products increases, suggesting that employed women attach more importance to their care. But being pregnant is the most determinant factor.

The principal limitation of this study was the presence of significant differences in terms of sociodemographic characteristics, such as age and educational level between the groups. Although our comparison group was selected from among women of the same age group, of childbearing age, education levels, and age still differed significantly between the groups. This may perhaps be due to the comparison group being selected from our family medicine and dermatology outpatient clinics, which tend to see younger individuals, including students. Another limitation is that we were unable to ask about the time of cosmetic procedures. In this study, we inquired whether participants used cosmetic products during their present pregnancy. The majority of previous studies have focused on investigating the effects of active ingredients in blood or urine samples from participants who have been asked whether they used certain products 24-48 h prior to taking part in the survey. Our second strength was its sample size.

Conclusion

Our findings indicate that the use of cosmetic and personal care products decreases with conception, except for general hygiene products. We also observed an increase in the use of hair dye, one of the most harmful products investigated in the literature, among planned pregnancies.

No scientific publications are recommending the use of cosmetic products. Physicians should be informed about the possible harmful effects of cosmetic products on pregnancy and should be able to provide appropriate advice on this subject. Identifying which products are used more often and those which women intend to continue to use after learning that they are pregnant will help researchers identify which products they should investigate first.

Acknowledgment

This study previously appeared as an oral presentation at the 17th International Eastern Mediterranean Family Medicine Congress in Adana, Turkey, in 2018.

Conflict of interest: The authors report no conflicts of interest nor any competing financial interests in this work. This investigation did not receive any financial support from outside companies or institutions, and the authors have no conflicts of interest to declare.

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