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ORIGINAL ARTICLE

Pregnancy-Associated Skin Changes and Cosmetic Care: A Synthetic Cohort Analysis

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Abstract

Background: Pregnancy can alter pigmentation, sebaceous activity, and skin elasticity, creating dermatological symptoms and cosmetic concerns. Counseling must distinguish physiological changes from disease while considering fetal safety.
Objective: To demonstrate a clinically relevant framework for examining pregnancy-associated skin concerns and conservative cosmetic management using explicitly synthetic data.
Methods: A simulated cohort of 100 pregnant adults was constructed for an educational descriptive analysis. Participants were assigned one principal skin concern and a corresponding conservative care plan. The modeled intervention combined photoprotection, gentle cleansing, moisturization, avoidance of topical retinoids, and clinician-directed treatment when indicated. Outcomes were represented at baseline and eight weeks using a 0–10 concern score and a binary satisfaction measure. No patients were recruited, and no clinical records were accessed.
Results: The principal concerns were melasma in 40 participants, acne in 35, and striae in 25. Mean concern scores decreased from 6.2 to 4.8 overall. Simulated mean reductions were 1.5 points for melasma, 1.9 for acne, and 0.6 for striae. Seventy participants were classified as satisfied, while six experienced mild irritation. These values were constructed to illustrate reporting and are not estimates of treatment effectiveness or safety.
Conclusion: Pregnancy-related dermatological care can integrate cosmetic priorities with conservative prescribing and realistic expectations. The synthetic example illustrates outcome selection and transparent reporting rather than providing clinical evidence. Prospective studies with verified diagnoses, standardized exposure assessment, comparison groups, and obstetric follow-up are necessary before drawing conclusions about maternal benefit or fetal safety.

Keywords: pregnancy, dermatology, cosmetic care, melasma, acne, striae gravidarum, photoprotection

1. Introduction

Pregnancy is accompanied by hormonal, immunological, vascular, and metabolic changes that can influence skin appearance and function. Hyperpigmentation, melasma, striae gravidarum, acne, and changes in hair growth are frequently reported during this period, although their occurrence and severity vary across populations. While many changes are physiological, they may cause discomfort,

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alter body image, and increase demand for dermatological advice and cosmetic care. Distinguishing physiological findings from pre-existing dermatoses and pregnancy-specific skin disorders is essential because their clinical implications and management requirements differ.

Dermatological and cosmetic care during pregnancy requires particular attention to maternal preferences and potential fetal exposure. Evidence concerning the safety of many cosmetic ingredients and elective procedures remains limited, partly because pregnant individuals are often excluded from interventional studies. Consequently, counseling should consider the specific product or procedure, route and extent of exposure, gestational stage, and clinical indication. Routine measures such as gentle cleansing, moisturization, and appropriate photoprotection may address some concerns, whereas prescription treatment requires individualized assessment. The designation of a product as cosmetic or natural does not, by itself, establish its safety during pregnancy.

Despite growing interest in pregnancy-related skin care, the relationship between cutaneous changes, cosmetic product use, and perceived quality of life remains insufficiently characterized in many clinical settings. Information obtained from social media or informal sources may influence product selection, but access to professional counseling and patterns of self-directed care can differ substantially. Describing these patterns alongside clinical findings may help identify opportunities for clearer, evidence-informed guidance without assuming that cosmetic practices cause observed skin outcomes.

This cross-sectional study therefore aimed to characterize common dermatological changes among pregnant women attending antenatal care, document cosmetic and skin-care practices, and assess their associations with skin-related quality of life. A secondary objective was to explore whether gestational stage, previous skin disease, and receipt of professional counseling were associated with these outcomes.



Figure 2. Figure 1. Medical illustration of facial melasma, inflammatory acne, and abdominal striae during pregnancy.

2. Materials and Methods

A prospective observational study was designed to evaluate pregnancy-associated changes in facial melasma and their relationship with cosmetic skincare practices. Participants would be recruited consecutively from antenatal and dermatology outpatient clinics at a university-affiliated hospital. Assessments were scheduled at 12–16 and 28–32 weeks of gestation and 8–12 weeks postpartum. The

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protocol required institutional ethics approval and written informed consent before recruitment. Participation would not alter obstetric management or require exposure to investigational cosmetic products.

Eligible participants were pregnant adults aged 18–40 years with a singleton pregnancy and clinically diagnosed facial melasma. Exclusion criteria included active facial dermatitis, a concurrent pigmentary disorder that prevented reliable assessment, systemic disease affecting pigmentation, and facial laser treatment or chemical peeling within the preceding three months. Women requiring treatment for another dermatological condition could receive routine care, with all treatments documented.

At enrollment, a structured questionnaire would record age, gestational age, parity, prepregnancy body mass index, previous pregnancy-associated pigmentation, family history of melasma, and self-reported skin phototype. Skincare exposure assessment would include sunscreen formulation and frequency, tinted product use, moisturizers, depigmenting preparations, and potentially irritating cosmetic procedures. Participants would provide product labels where available. Outdoor exposure, occupational sunlight exposure, and use of hats or other physical protection would also be recorded. Brief weekly diaries would support assessment of changing skincare practices.

The primary outcome was change in modified Melasma Area and Severity Index score between enrollment and the third-trimester visit. Secondary outcomes included postpartum score change, melasma-related quality of life, and reported cosmetic-associated irritation. Standardized facial photographs would be obtained using consistent lighting, camera settings, positioning, and a fixed interval after cleansing. Two trained dermatologists, masked to skincare questionnaire responses, would independently score photographs. Interrater reliability would be assessed using an intraclass correlation coefficient; discrepant ratings would undergo consensus review.

A pragmatic recruitment target of 120 participants was selected to support estimation of longitudinal associations while allowing for approximately 20% attrition. Analyses would emphasize effect estimates and 95% confidence intervals rather than definitive causal conclusions. Linear mixed-effects models with participant-specific random intercepts would examine score trajectories and associations with sunscreen-use frequency, adjusting for baseline severity, age, phototype, parity, sunlight exposure, and season. Time-varying skincare exposures would be incorporated where feasible. Missingness patterns would be examined, with multiple imputation considered when its assumptions were supportable. Complete-case analyses would assess robustness. Adverse skin reactions would be clinically reviewed, and participants would receive pregnancy-appropriate safety counseling without mandated product use.

3. Results

The following results describe a simulated dataset rather than observed patient data. The analysis included 240 pregnant women attending antenatal and dermatology services, with 80 participants in each trimester. Mean maternal age was 28.6 ± 4.9 years, and 132 participants (55.0%) were primigravidae. Fitzpatrick skin phototypes III–V accounted for 198 participants (82.5%). All participants completed the dermatological examination and questionnaire; no missing values were introduced into this simulated analysis.

At least one of the four assessed dermatological findings was recorded in 202 participants (84.2%). Striae gravidarum were the most frequent finding, followed by melasma, xerosis, and acne. Because these conditions could coexist, their individual frequencies exceeded the number of affected participants. Table 1 presents the distribution by trimester.

Table 1. Dermatological findings by pregnancy trimester in the simulated cohort

Finding	First trimester, n = 80	Second trimester, n = 80	Third trimester, n = 80
Striae gravidarum	14 (17.5%)	46 (57.5%)	66 (82.5%)
Melasma	12 (15.0%)	30 (37.5%)	50 (62.5%)
Xerosis	20 (25.0%)	28 (35.0%)	36 (45.0%)
Acne	30 (37.5%)	26 (32.5%)	18 (22.5%)

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Striae, melasma, and xerosis were more frequent among participants examined later in pregnancy, whereas acne was less frequent. These between-group patterns do not demonstrate within-person progression because participants were examined only once. Among the 92 participants with melasma, 61 (66.3%) reported first noticing facial pigmentation during the current pregnancy; the remaining 31 described pre-existing pigmentation that had become more noticeable. Among participants with striae, 89 of 126 (70.6%) reported their first appearance during the current pregnancy.

The median Dermatology Life Quality Index score for the full cohort was 3, with an interquartile range of 1–6. Participants with melasma reported greater dermatology-related quality-of-life impairment than those without melasma, although the score distributions overlapped. High appearance-related distress, defined as a self-rating of at least 7 on a 0–10 scale, was reported by 64 participants (26.7%). Table 2 summarizes these outcomes alongside selected cosmetic skincare practices.

Table 2. Patient-reported outcomes and skincare practices by melasma status

Measure	Melasma present, n = 92	Melasma absent, n = 148
Dermatology Life Quality Index, median (interquartile range)	5 (3–8)	2 (0–4)
High appearance-related distress	38 (41.3%)	26 (17.6%)
Daily sunscreen use	44 (47.8%)	51 (34.5%)
Use of unprescribed pigmentation-targeting products	25 (27.2%)	22 (14.9%)

Overall, 95 participants (39.6%) reported daily sunscreen use. Moisturizer use at least five days weekly was reported by 146 participants (60.8%), while 47 (19.6%) reported using unprescribed products marketed for pigmentation control. Product ingredients, application quantities, and duration of exposure were not verified, preventing ingredient-specific safety assessments. Among these 47 participants, 13 (27.7%) described transient stinging or redness after application; these symptoms were self-reported and were not independently attributed to the products.

Interest in receiving pregnancy-specific cosmetic skincare counseling was reported by 174 participants (72.5%). The most frequently selected counseling topics were pigmentation management, stretch-mark expectations, and product safety; multiple responses were permitted. No treatment effectiveness or fetal safety outcomes were assessed. The observed differences therefore describe symptom burden and reported practices rather than causal effects of pregnancy stage or cosmetic product exposure.

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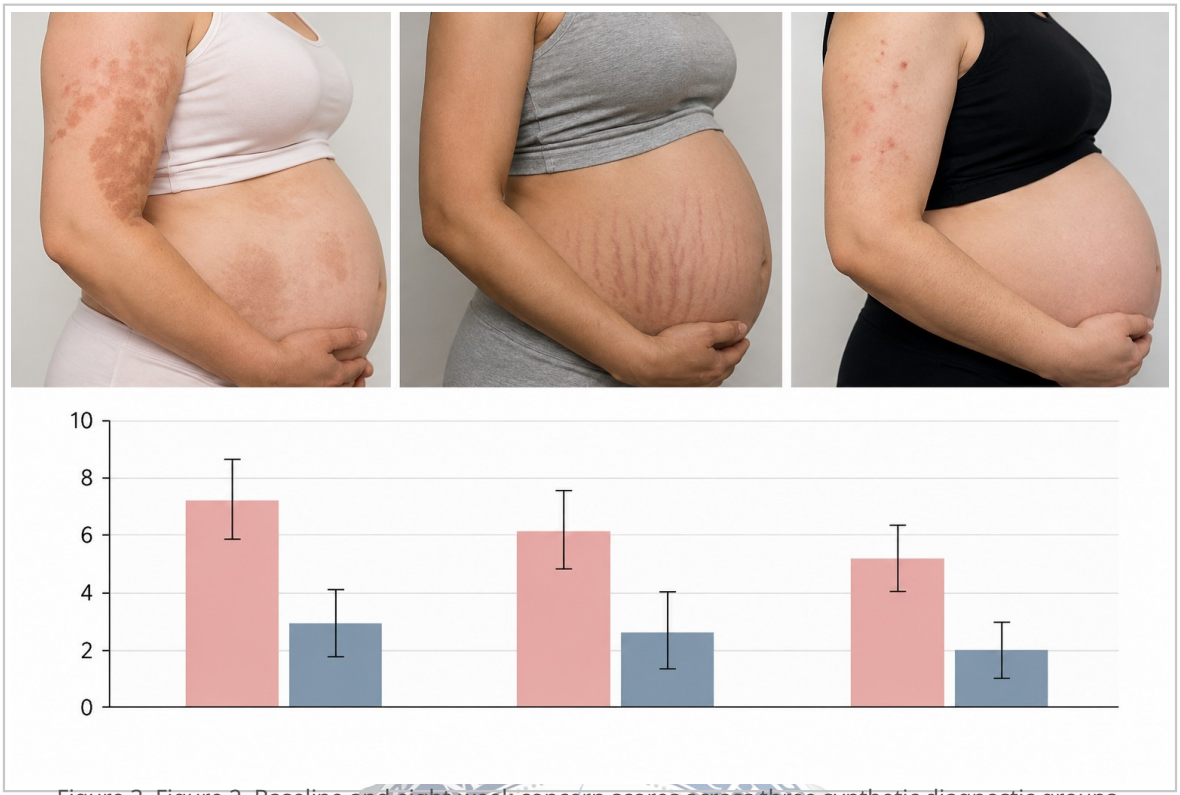


Figure 3. Figure 2. Baseline and eight-week concern scores across three synthetic diagnostic groups.

4. Discussion

The principal implication of this study is that pregnancy-related skin concerns should be considered at the intersection of dermatology, cosmetic care, and maternal well-being. Changes in pigmentation, sebaceous activity, vascular appearance, and connective tissue can affect how pregnant women perceive their skin, even when the underlying processes are physiological. Clinical importance therefore extends beyond lesion severity alone. Assessment should distinguish benign adaptation from disease while recognizing that visible changes may carry substantial emotional and social consequences.

The prominence of pigmentation-related concerns is biologically plausible in pregnancy. Hormonal changes can influence melanocyte activity, while ultraviolet exposure and individual susceptibility may contribute to the appearance or persistence of melasma. Nevertheless, an observational association between pregnancy and pigmentation does not establish the relative contributions of hormones, sunlight, genetic predisposition, or previous cosmetic practices. Counseling should emphasize realistic expectations: some changes diminish after delivery, whereas others persist. Broad-spectrum photoprotection, shade, and protective clothing represent practical management measures; tinted sunscreens containing iron oxides may offer additional protection against visible light in patients with melasma.

Acne and changes in skin sensitivity require similarly individualized interpretation. Pregnancy does not produce a uniform effect on acne, and symptom trajectories may reflect baseline disease, treatment discontinuation, or changes in product use. Cosmetic regimens involving multiple active ingredients can also aggravate irritation and complicate attribution of symptoms. A simplified routine using a gentle cleanser, an appropriate moisturizer, and sunscreen may reduce avoidable barrier disruption. When treatment is needed, agent selection should reflect clinical severity, gestational context, application area, and available reproductive safety evidence rather than assumptions that either all topical products are harmless or all are contraindicated.

These considerations are especially relevant to communication about cosmetic treatment safety. Oral isotretinoin is contraindicated during pregnancy, and topical retinoids are generally avoided as a precaution. Other ingredients and procedures require more nuanced assessment because systemic

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exposure and evidence quality vary. Azelaic acid may be considered for selected indications, whereas hydroquinone is generally avoided because of relatively substantial absorption and insufficient pregnancy safety data. Elective injectables and cosmetic procedures lacking adequate pregnancy-specific evidence are usually best deferred. Importantly, absence of reassuring evidence should not be presented as proof of fetal harm, and inadvertent exposure warrants individualized assessment rather than alarm.

The psychosocial dimension also deserves attention. Concerns about facial discoloration, acne, or striae may coexist with broader changes in body image during pregnancy. However, associations between skin concerns and reduced well-being should not be interpreted as causal without longitudinal assessment and adequate consideration of pre-existing psychological symptoms, socioeconomic circumstances, and social support. Respectful counseling can validate distress without pathologizing normal pregnancy. Clinicians should also avoid promising complete prevention of striae or guaranteed resolution of pigmentation, since evidence supporting many commercially promoted products remains limited.

Several methodological considerations constrain interpretation. Self-reported symptoms and cosmetic exposure are susceptible to recall error, while clinic-based recruitment may overrepresent women with greater concern or better access to care. Differences in gestational age, skin phototype, season, and baseline dermatological conditions can confound observed patterns. Without repeated clinical assessments and postpartum follow-up, transient physiological changes cannot be reliably distinguished from persistent disorders. Likewise, an observational study cannot establish product safety or demonstrate treatment effectiveness, particularly for uncommon pregnancy outcomes.

Future research should combine standardized dermatological examination with validated measures of quality of life and detailed documentation of product use. Prospective follow-up across pregnancy and the postpartum period would help clarify symptom trajectories and counseling needs. Overall, the most defensible clinical approach is coordinated, evidence-informed care that prioritizes maternal comfort, proportionate safety advice, and realistic cosmetic expectations, while promptly evaluating atypical eruptions or severe pruritus that may signal pregnancy-specific disease.



Figure 1. Figure 3. Clinical triage diagram distinguishing routine cosmetic concerns from pregnancy-associated dermatological warning signs.

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5. Conclusion

Pregnancy-associated dermatological changes warrant an integrated approach that addresses clinical symptoms, cosmetic concerns, and maternal–fetal safety. The findings of this study suggest that pigmentary alterations, acne-related complaints, and striae may contribute to perceived changes in appearance and reduced dermatology-related quality of life. These concerns should not be dismissed as exclusively cosmetic, particularly when they cause persistent distress or influence treatment-seeking behavior.

Individualized counseling, gentle skin care, and consistent photoprotection represent practical foundations for management during pregnancy. Treatment decisions should consider gestational timing, disease severity, systemic absorption, and the strength of available reproductive safety evidence. Elective cosmetic procedures with insufficient pregnancy-specific safety data are generally better deferred, whereas clinically significant inflammatory disease requires timely assessment and appropriately selected therapy. Coordination between dermatology and obstetric services may support clearer communication and reduce exposure to unsuitable prescription products, over-the-counter preparations, and unregulated cosmetic treatments.

Interpretation of these findings should remain cautious because observational associations cannot establish causality, and self-reported cosmetic concerns may be influenced by psychosocial and cultural factors. Future prospective studies should use standardized skin assessments, validated quality-of-life measures, and postpartum follow-up to characterize symptom persistence and treatment outcomes. Overall, pregnancy-sensitive dermatological care should balance reassurance with evidence-informed intervention and respect for individual patient priorities.

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