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# Cutaneous manifestations during pregnancy and the immediate postpartum period in two tertiary centres in 2024, Cotonou (Benin)

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**Abstract**

**Introduction:** Various skin manifestations can occur during pregnancy. Some are considered physiological, while others correspond to specific or nonspecific dermatoses. The aim of this study was to describe the profile of dermatoses observed in pregnant and postpartum women in two tertiary centres.

**Methods:** This six-month cross-sectional and prospective study included consenting pregnant or postpartum women presenting with at least one dermatologic condition at the gynecology-obstetrics departments of CNHU-HKM and CHU-MEL in Cotonou in 2024. Data on dermatological manifestations were analyzed using R Studio software, with a significance level set at 5%.

**Results:** During the study period, 621 women were included, with a mean age of 29.1±5.5 years. Skin lesions had been present for less than 6 months in 62.32% of the women. They were predominantly located on the head (63.61%), anterior trunk (54.91%), and lower limbs (39.94%). Pregnancy-related dermatoses were mainly represented by atopic eruptions (9.02%), followed by prurigo associated with intrahepatic cholestasis of pregnancy (0.48%) and gestational pemphigoid (0.32%). Among dermatoses exacerbated by pregnancy, telangiectasias (10.79%), acne (8.36%), and striae gravidarum (5.62%) were the most common. Skin bleaching practices in pregnancy were identified in 55.07% of the patients. The main dermatoses induced or exacerbated by skin bleaching included: Purplish striae (43.64%), acne (35.75%), skin atrophy (23.35%), pityriasis versicolor (14.33%), mucocutaneous candidiasis (13.69%), and exogenous ochronosis (9.82%).

**Conclusion:** This study has documented frequently and diverse cutaneous lesions during pregnancy as exemplified by atopic eruptions and stretch marks. The impact of skin bleaching is concerning, given the high rate of use and the significant associated dermatologic complications.

**Keywords:** Pregnancy, dermatoses, skin bleaching, atopic eruption, Cotonou

## Introduction

Diverses manifestations cutanées peuvent survenir au cours de la grossesse. Certaines sont considérées comme étant physiologiques, d'autres correspondent à de réelles maladies spécifiques ou none. L'objectif de cette étude était de décrire le profil des dermatoses observées chez la femme enceinte et en post-partum immédiat.

## Méthodes

Une étude transversale et prospective de 6 mois a inclus les femmes enceintes/accouchées consentantes, présentant au moins une dermatose, reçues dans les services de gynécologie-obstétrique du CNHU-HKM et CHUMEL de Cotonou en 2024. Les données relatives aux manifestations dermatologiques ont été analysées grâce au logiciel RStudio avec un seuil de significativité de 5%.

## Résultats

Durant la période d'étude, 621 femmes ont été incluses, avec un âge moyen de 29, 1 ans. Les lésions cutanées évoluaient depuis moins de 6 mois chez 62, 32% des femmes.

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Elles prédominaient à la tête (63, 61%), au tronc antérieur (54, 91%), aux membres pelviens (39, 94%). Les dermatoses liées à la grossesse étaient dominées par les éruptions atopiques (9, 02%) suivies du prurigo lié au syndrome de cholestase gravidique intra hépatique (0, 48%) et de la pemphigoïde gestationnelle (0, 32%). Parmi les dermatoses aggravées per la grossesse, on notait principalement les télangiectasies (10, 79%), l'acné (8, 36%), les vergetures fines (5, 62%). La pratique de la dépigmentation cutanée volontaire a été identifiée chez 55, 07% des patientes. Les principales dermatoses induites ou aggravées par les cosmétiques dépigmentants étaient: Les vergetures pourpres (43, 64%), l'acné (35, 75%), l'atrophie cutanée (23, 35%), le pityriasis versicolor (14, 33%), la candidose cutanéo-muqueuse (13, 69%) et l'ochronose exogène (9, 82%).

**Conclusion**

Il ressort de cette étude que les lésions cutanées au cours de la grossesse étaient fréquentes et diversifiées. La forte prévalence des éruptions atopiques et des vergetures est conforme aux données de la littérature. L'impact de la dépigmentation cutanée est préoccupant, avec un taux élevé d'utilisation et des complications dermatologiques notables.

Mots-clés: Dermatoses, grossesse, dépigmentation cutanée, éruption atopique, Cotonou

**Introduction**

Pregnancy induces significant hormonal, immunological, and vascular changes that manifest as various cutaneous changes [1-3]. While some of these changes are physiological or pathological, others may be noticeable, unsightly amd and asymptomatic. Their relationships and manifestations with pregnancy varies as they form causes for medical consultation at this period [4-10]. These manifestations may include exacerbations of pre-existing skin conditions or specific pregnancy-related dermatoses [2, 3, 11]. The most frequently reported pregnancy-related dermatoses include gestational pemphigoid, polymorphic eruption of pregnancy, intrahepatic cholestasis of pregnancy, and atopic eruption of pregnancy. Polymorphic eruptions carry no fetal risk while intrahepatic cholestasis and gestational pemphigoid may have serious fetal consequences, such as preterm birth or fetal distress, necessitating rigorous multidisciplinary management [2, 4, 8, 9, 12].

Although these conditions are well documented in the international literature, epidemiological and clinical data remain limited in sub-Saharan Africa, where diagnostic and therapeutic resources may be scarce. Studies conducted in the region highlight the need for improved recognition and management of these disorders in our context [11, 13]. In this regard, we conducted a study to describe the profile of dermatoses observed in pregnant and postpartum women in two tertiary centres in Cotonou.

**Methods**

A cross-sectional and descriptive study, based on the collection of prospective data was conducted over a six-month period, from July to December 2024. The study population included pregnant and postpartum women who provided informed consent and presented with at least one dermatologic condition. These patients were recruited during prenatal, postnatal, and inpatient consultations in the gynecology-obstetrics departments of the National University Hospital Center Hubert Koutoukou Maga (CNHU-HKM) and the University Hospital Center for Mother and Child Lagune (CHU-MEL) in Cotonou. Women who declined participation or whose clinical data were incomplete were excluded. Sampling was non-probabilistic, with an exhaustive inclusion of all women meeting the eligibility criteria during the study period.

Data were collected using a digital questionnaire via the KoboToolbox platform, and all patients underwent a systematic dermatological examination. The women were examined by two dermatologists. The collected variables included sociodemographic, obstetric, dermatological, and cosmetic practices data. Socioeconomic status was determined using an established index. This was based on the calculation of a socioeconomic index, taking into account age, educational level, and socio-professional category according to the International Labour Organization (ILO) classification [14]. The dermatoses studied were classified into four categories: pregnancy-specific dermatoses, dermatoses exacerbated by pregnancy, dermatoses induced or aggravated by skin-bleaching cosmetics, and dermatoses unrelated to pregnancy or skin-bleaching depigmentation. The hypothesis of a causal relationship between skin-bleaching and the onset or exacerbation of certain dermatoses was based, on the one hand, on the intrinsic imputability characteristics of skin-lightening cosmetics reported in the literature. On the other hand, during patient interviews and physical examination, we ensured that the chronological characteristics of dermatoses potentially triggered or aggravated by skin depigmentation were consistent with the use of skin-lightening products, meaning that the onset or worsening of the dermatoses coincided with the initiation of depigmentation practices and that the temporal evolution of the dermatoses supported the implication of skin-bleaching. Conversely, dermatoses unrelated to skin depigmentation were those not reported in the literature in association with this practice and those diagnosed in women who did not engage in skin-bleaching. Skin-bleaching practices were identified through the detection of depigmenting agents in cosmetic products, either based on the reported commercial names of the products or from the labels of the cosmetics brought in by the participants.

The data were exported and analyzed using RStudio software. Simple binary logistic regression was used for the bivariate analysis. A significance level of 5% was applied.

The study was conducted in accordance with the principles of the Ethics Committee of the Faculty of Health Sciences of Cotonou and applicable ethical guidelines. Authorization was obtained from the administrations of the participating centers. Each participant received an information sheet, and written informed consent was required prior to questionnaire administration and physical examination. All participants gave their voluntary and informed consent for photographic capture. Confidentiality, anonymity, and participants' rights were upheld throughout the study.

**Results**

In total, 621 women aged 15 to 45 years were included during the study period, comprising 602 pregnant women and 19 postpartum women. The mean age was 29.1±5.5 years, with the 25-35 age group being the most represented (60.07%). The majority of participants were Christian (90.82%), with 55.88% living in common-law relationships, 36.39% married, and 7.57% single. Nearly all participants (91.62%) belonged to the middle or lower social classes. Table I presents the distribution of participants according to sociodemographic and economic characteristics.

**Table 1:** Distribution according to the socio-demographic and economic characteristics of the 621 pregnant and postpartum women at CNHU-HKM and CHU-MEL in 2024

| | Number of subjects | Proportion (%) |
|---|---|---|
| **Age (Years)** | | |
| [15-25] | 137 | 22.06 |
| [25-30] | 193 | 31.08 |
| [30-35] | 180 | 28.99 |
| [35-40] | 90 | 14.49 |
| ≥ 40 | 21 | 3.38 |
| Marital Status | | |
| Married | 226 | 36.39 |
| Single | 47 | 7.57 |
| Common-law relationships | 347 | 55.88 |
| Divorced | 1 | 0.6 |
| **Socioeconomic Status** | | |
| Lower class | 168 | 27.05 |
| Middle class | 137 | 22.06 |
| Lower-middle class | 264 | 42.51 |
| Upper-middle class | 51 | 8.21 |
| Upper class | 1 | 0.16 |
| **Residence** | | |
| Rural | 42 | 6.76 |
| Peri-urban | 193 | 31.08 |
| Urban | 386 | 62.16 |

More than two-thirds of the women (68.44%) were multiparous, and nearly one-third were primiparous (31.56%). The mean gestational age was 30.5±22.1 weeks, and 360 pregnant women (57.97%) were in their third trimester. All postpartum women were seen between the 8th and 15th day after delivery.

The skin lesions had been present for less than 6 months in 62.32% of the women. They were predominantly located on the head (63.61%), anterior trunk (54.91%), lower limbs (39.94%), upper limbs (35.91%), and posterior trunk (30.27%). Pruritus was associated in 34.62% of the cases.

Regarding the types of dermatoses observed in these women, four categories were identified: pregnancy-specific dermatoses, dermatoses exacerbated by pregnancy, dermatoses induced or worsened by depigmenting cosmetics, and dermatoses unrelated to either pregnancy or skin bleaching, reaching 70 patients (11.27%), 206 patients (33.17%), 342 patients (55.07%), and 21 patients, respectively (3.38%).

Out of 621 women, 70 (11.27%) presented with pregnancy-specific dermatoses. Atopic eruption (Figure 1) was by far the most frequent. Figure 2 shows the distribution of patients according to pregnancy-related dermatoses at CNHU-HKM and CHU-MEL in 2024.

Among the dermatoses exacerbated by pregnancy illustrated in Table 2, the most commonly observed were telangiectasias (10.79%) and acne (8.37%). The proportion of pregnant women who did not practice skin bleaching and presented with striae gravidarum (Figure 3) was 5.63%. The most common superficial fungal infections observed in this group were mucocutaneous candidiasis (6 cases), notably candidiasis of the genital organs and skin folds and dermatophytosis (3 cases; Figure 4).

**Fig 1:** Atopic eruptions of pregnancy in the axillary region.

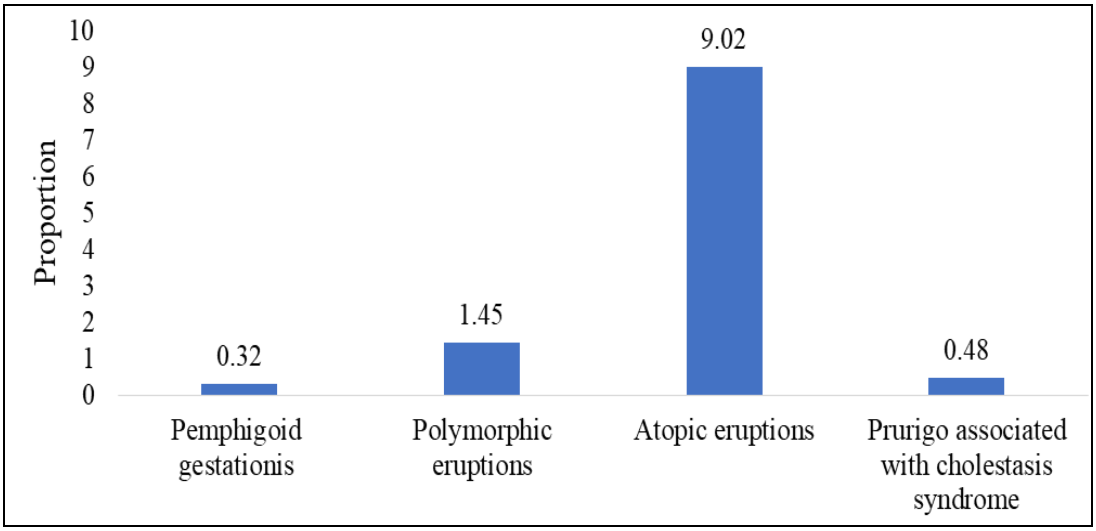


**Fig 2:** Distribution of patients according to pregnancy-related dermatoses at CNHU-HKM and CHU-MEL in 2024

**Fig 3:** Abdominal gravidarum striae in a pregnant woman

**Fig 4:** Dermatophytosis of the glabrous skin located on the right flank

**Table 2:** Distribution of patients according to pregnancy-aggravated dermatoses at CNHU-HKM and CHU-MEL in 2024

| | Number of subjects | Proportion (%) |
|---|---|---|
| Telangiectasias | 67 | 10.79 |
| Acne | 52 | 8.37 |
| Striae gravidarum | 35 | 5.63 |
| Molluscum pendulum | 14 | 2.25 |
| Seborrheic Keratosis | 10 | 1.61 |
| Condyloma acuminata | 10 | 1.61 |
| Melasma | 6 | 0.97 |
| Seborrheic Dermatitis | 6 | 0.97 |
| Candidiasis | 6 | 0.97 |
| Folliculitis | 4 | 0.64 |
| Dermatophytosis | 3 | 0.48 |
| Chancroid | 3 | 0.48 |
| Spider veins | 3 | 0.48 |
| Pityriasis versicolor | 2 | 0.32 |
| Herpetic Chancre | 2 | 0.32 |
| Generalized Xerosis | 2 | 0.32 |
| Epidermodysplasia verruciformis | 1 | 0.16 |
| Lupus erythematosus | 1 | 0.16 |
| Scleroderma | 1 | 0.16 |
| Angioma | 1 | 0.16 |
| Syphilitic Chancre | 1 | 0.16 |

Skin bleaching practices were identified in 55.07% (N=342) of the patients. All of them presented at least one dermatose in this category. The main dermatoses induced or exacerbated by skin bleaching, as illustrated in Figure 5, were: purplish striae (43.64%), acne (35.75%), skin atrophy (23.35%).

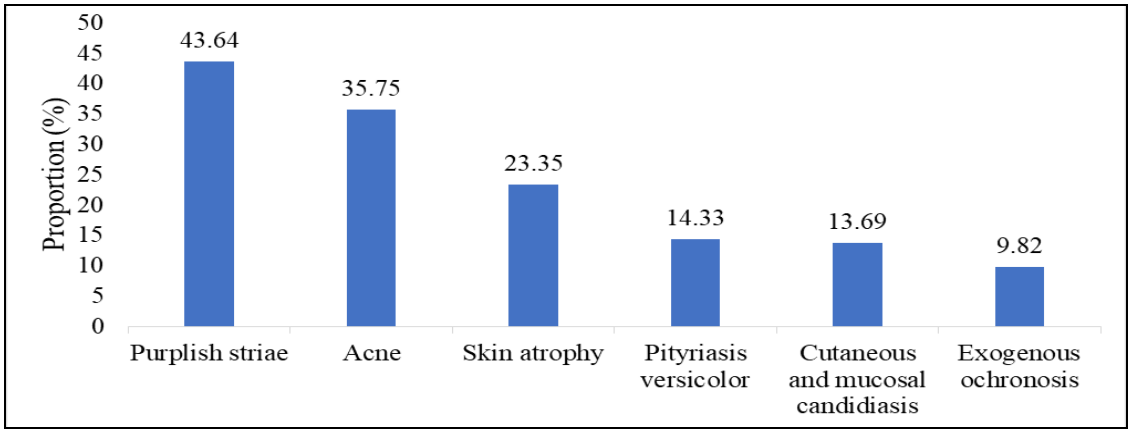


**Fig 5:** Distribution of patients according to dermatoses induced or aggravated by skin-lightening cosmetics at CNHU-HKM and CHU-MEL in 2024

Some dermatoses observed in 21 patients (3.38%), were neither related to pregnancy nor to skin bleaching, and the latter did not appear to worsen them either. They are presented in Figure 6. These included viral dermatoses (2.41%), inflammatory dermatoses (0.64%), including one case each of cutaneous lichen planus and psoriasis (figure 7), and two case of drug eruptions (Figure 8).

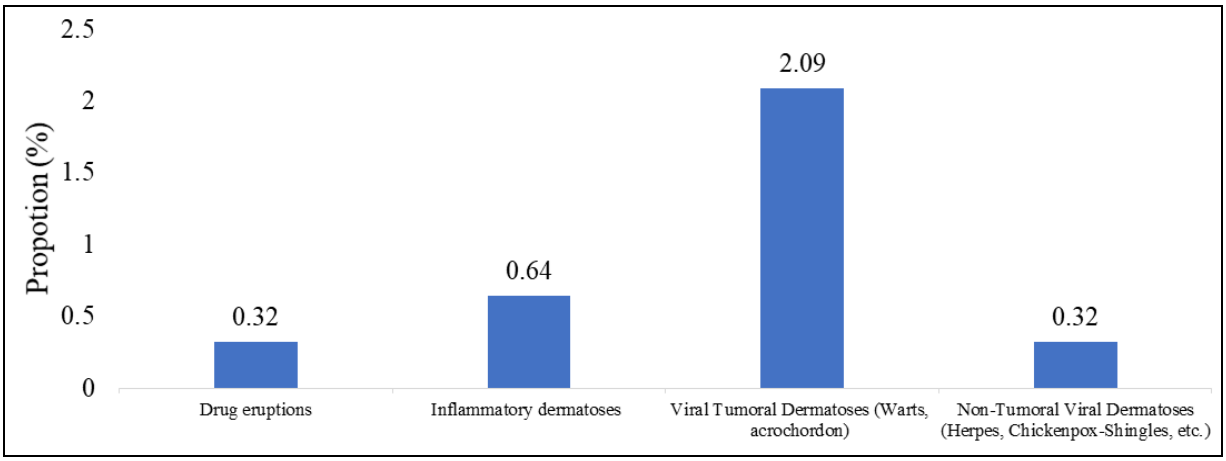


**Fig 6:** Distribution of patients according to dermatoses unrelated to pregnancy or skin bleaching

**Fig 7:** Psoriasis exacerbated by pregnancy

**Fig 8:** Lyell's syndrome (toxic epidermal necrolysis) in a pregnant woman

Skin atrophy, purplish striae, and telangiectasias were statistically associated with skin bleaching, with a p-value less than 0.001. Pityriasis versicolor was also significantly associated, with a p-value of 0.012.

## Discussion

Few studies have examined the cutaneous manifestations of pregnancy and the immediate postpartum period in Black skin and within the specific context of West Africa. This study addresses an important epidemiological gap regarding darker phototypes in low- and middle-income countries, where these dermatological conditions are often underreported and undertreated, despite evidence indicating substantial morbidity in this vulnerable population.

Despite a robust methodology, the cross-sectional design of the study does not allow us, on the one hand, to capture the full spectrum of dermatoses that may occur from early pregnancy through the immediate postpartum period. On the other hand, it does not allow us to formally establish the causal relationship between the dermatoses potentially induced by skin bleaching and those observed in these women, nor with the use of skin-lightening products. Furthermore, the data on cosmetic practices, which were collected primarily through patient self-reporting, may be subject to recall or reporting bias. These limitations do not in any way undermine the quality or validity of the study's findings, which will be discussed and compared with those reported in the existing literature.

Pregnancy has a considerable impact on the body's hormonal status, thereby influencing skin physiology. The majority of pregnant women develop cutaneous changes whether physiological or hormonal ranging from the exacerbation of pre-existing skin conditions to the emergence of new dermatoses during pregnancy. These include dermatoses that occur exclusively during pregnancy, as well as those that may improve or worsen due to gestation [15].

In our study, the mean age of the patients was 29.1±5.5 years, which is consistent with findings by Akakpo *et al*. in Togo in 2018 (29±5.5 years) [13], and by Casaril *et al*. in 2023, who reported a mean age of 30.6±3.7 years [16]. More than two-thirds of the women (68.44%) were multiparous, and nearly one-third were primiparous (31.56%). Our findings are consistent with those of Casaril *et al*. (38.2% primiparous women) and Panicker *et al*. (38.33% primiparous women) [16, 17].

Lesions were predominantly located on the head (63.61%), anterior trunk (54.91%), and lower limbs (39.94%). In Nigeria, Ayanlowo *et al*. (2020) noted a predominance of facial involvement, likely due to the high prevalence of acne in their study [11]. For Casaril *et al*., the anterior trunk was the most affected area, followed by the face [16].

Pregnancy-specific dermatoses are inflammatory skin diseases that occur during pregnancy or immediately postpartum. This heterogeneous group includes gestational pemphigoid, polymorphic eruption of pregnancy (PEP), intrahepatic cholestasis of pregnancy (ICP), atopic eruption of pregnancy (AEP), and gestational pemphigoid [18]. In our cohort of 70 women, these conditions were dominated by atopic eruptions, followed by polymorphic eruptions, prurigo associated with ICP, and gestational pemphigoid. These findings are similar to those of Vasundhara *et al*. (2024) [19] and Meena *et al*. (2018) [20], both of whom reported 10% prevalence of pregnancy-specific dermatoses. Lower proportions were found by Akakpo *et al*. in Togo, Ayanlowo *et al*. in Nigeria, and Panicker *et al*. in India, with rates of 6.4%, 3.7%, and 2%, respectively [11, 13, 17]. The most commonly reported specific dermatoses in those studies were atopic eruptions and polymorphic eruptions.

According to several authors, AEP is the most common pregnancy-specific dermatosis in fair-skinned populations, accounting for 36-50% of cases [3, 9, 21, 22]. In individuals with darker skin, it is reportedly the second most frequent condition after acne, based on the systematic review by Jeon *et al*. Ambros-Rudolph *et al*. described two clinical types of AEP: the eczema-like type, resembling typical atopic dermatitis, and the prurigo-like type, presenting as pruritic erythematous papules on the trunk and extensor surfaces [2, 8, 9, 23]. AEP is believed to be triggered by pregnancy-related immune shifts, including reduced cell-mediated immunity, a decline in Th1 cytokine production, and a predominance of humoral immunity with increased Th2 cytokine secretion. The maternal and neonatal prognosis is generally favorable; however, the fetus may have an increased risk of developing atopic dermatitis later in life [8, 9, 22, 24]. AEP may occur regardless of a personal or family history of atopy [9, 10, 23].

Polymorphic eruptions were diagnosed in 1.45% of our patients. Higher proportions were reported in Togo, while lower rates were observed in Nigeria [11, 13]. PEP is one of the most common pregnancy-specific dermatoses [2, 3, 8, 9]. Although its pathophysiology remains incompletely understood, it is thought to result from an inflammatory response triggered by rapid abdominal distension-possibly explaining its association with excessive weight gain, multiple gestation, and macrosomia. This condition generally has no impact on pregnancy outcomes [2, 3, 8, 9].

The prevalence of prurigo associated with ICP varies between 0.3% and 5.6%, depending on geographic region and ethnicity [2]. In our study, the rate was 0.48%. It was not reported in the studies by Ayanlowo *et al*, Akakpo *et al*, or Panicker *et al*. Jeon's review on dermatoses in women with dark skin noted that ICP was more frequent in Amerindian and Indo-Pakistani populations [3, 11, 13, 17].

ICP is a hormonally driven cholestasis that emerges in genetically predisposed women during late pregnancy. It is due to impaired excretion of bile acids, leading to their accumulation in the serum. This results in intense maternal pruritus, which usually resolves spontaneously within days or weeks. However, the condition can recur in future pregnancies or with the use of oral contraceptives. ICP is also associated with increased risks of preeclampsia and gestational diabetes. Due to the transplacental passage of toxic bile acids, fetal complications may include prematurity, acute placental anoxia, and cardiac failure. A family history is found in about half of cases, and familial forms tend to be more severe [2, 8, 9].

Gestational pemphigoid (GP) was the least frequent specific dermatosis in our study. It was not reported by authors in Togo or Nigeria [11, 13]. GP is a rare pruritic autoimmune blistering disease, clinically and histologically similar to bullous pemphigoid. Its incidence is estimated at 1 in 2, 000 to 1 in 60, 000 pregnancies. It is more common in multiparous women and tends to recur earlier and more severely in subsequent pregnancies. GP may also flare during menstruation or with oral contraceptive use. Pregnancies complicated by GP are considered high risk due to associations with adverse fetal outcomes such as prematurity and low birth weight. About 10% of neonates

may present with benign, self-limiting skin lesions due to passive transfer of maternal autoantibodies. GP has also been associated with trophoblastic tumors such as hydatidiform mole and choriocarcinoma, and affected women may be predisposed to other autoimmune diseases, notably Graves' disease [2, 8, 9, 12].

Among dermatoses exacerbated by pregnancy, the most frequent were telangiectasias (10.79%), acne (8.37%), striae gravidarum (5.63%), and acrochordon (2.25%). Elevated estrogen levels during pregnancy can increase both the number and visibility of telangiectasias, including spider angiomas and unilateral nevoid telangiectasias [5, 17]. These typically appear on areas drained by the superior vena cava, such as the face, neck, upper chest, and arms [5, 17].

Acne is the most common dermatological condition among pregnant women with pigmented skin [3, 11]. Nigerian studies have reported high prevalence rates (43, 6%). In our population, we distinguished between acne unrelated to skin bleaching (8.37%) and acne associated with skin bleaching (35.75%), whereas Ayanlowo *et al*. did not make this distinction [11]. Acne often worsens during the third trimester due to increased maternal androgen levels, which stimulate sebum production [3]. Acne exacerbated by skin bleaching was more frequent in our study. It presented as an inflammatory acne, often monomorphic papulopustular and pruritic, in women who also showed signs of skin-lightening practices. However, this acne is likely multifactorial, with influences from both skin-lightening cosmetics and the hormonal disturbances of pregnancy. These findings suggest that, when assessing acne in pregnant women, skin bleaching should be ruled out as a priority. Similarly, striae gravidarum were present in nearly half of the women regardless of whether they practiced skin bleaching which aligns with findings from Togo [13].

The overall frequency of candidiasis, regardless of skin bleaching status, was 14.66%. This is lower than the 21% reported by Panicker *et al*. but higher than that found by Vasundhara *et al*. During pregnancy, hyperplastic vaginal epithelial cells accumulate glycogen and desquamate, contributing to decreased vaginal acidity and creating a favorable environment for Candida overgrowth [17, 19, 25]. However, this observed disparity may be related to intimate hygiene practices, as in some cultures women use harsh products that alter the vaginal microbiome.

The impact of skin bleaching is especially concerning, affecting more than one in two women [26, 27]. Some authors have shown that the frequency of stretch marks, acne, and superficial mycoses is higher in pregnant women who practice skin bleaching [26, 27].

The widespread presence of hazardous chemicals and unregulated heavy metals in skin-lightening cosmetics is well documented in many developing countries. Multiple authors have identified harmful substances in lightening products sold in sub-Saharan Africa, including hydroquinone, corticosteroids, mercury derivatives, and other metals such as arsenic, cadmium, lead, and nickel, often in concentrations far exceeding regulatory limits [27-31]. Inorganic mercury salts present in these products inhibit tyrosinase activity, thereby reducing melanin production and causing skin lightening. Mercury is associated with neurotoxic, psychological, renal, gastrointestinal, hepatotoxic, and carcinogenic effects. Moreover, mercurial compounds can cross the placenta, causing fetal toxicity and neurodevelopmental impairment, including reduced IQ and cognitive or behavioral disorders [32-36].

Epidemiological data suggest that environmental exposure to cadmium, lead, and mercury can impair reproductive function. These substances have been linked to subfertility, infertility, abnormal hormone production, menstrual and estrous cycle irregularities, anovulation, and premature reproductive aging in women of childbearing age. Chronic exposure to arsenic, also found in some cosmetics, can cause skin lesions, neurological damage, and various cancers. Arsenic crosses the placenta and may result in miscarriage, preterm birth, stillbirth, or low birth weight [34-36]. Low birth weight has also been associated with chronic exposure to potent topical corticosteroids [27, 28, 37].

The vulnerability of the fetus and young child to these substances during such a critical period of growth and development warrants urgent attention from the public health community, especially given the markedly high global incidence and prevalence of this practice. In light of these data from the literature, it can be stated that skin bleaching in pregnant women is more than a simple comorbidity factor. It constitutes a major risk behavior, one that is unfortunately trivialized and culturally embedded. It is imperative to establish and enforce laws banning the manufacture, importation, and export of cosmetics containing these harmful substances.

## Conclusion

Our study demonstrates a high frequency and wide range of cutaneous manifestations among pregnant and postpartum women in two referral hospitals in Cotonou.

Although mostly benign, certain specific dermatoses, such as gestational pemphigoid or intrahepatic cholestasis of pregnancy, can compromise fetal outcomes and require close obstetric monitoring. These findings highlight the need to strengthen healthcare personnel training and to integrate dermatological follow-up into prenatal and postnatal care to ensure safe and appropriate therapeutic management.

Skin bleaching remains common and poses significant health risks. It is essential to enforce safety evaluations of cosmetic products and to promote patient education on safe skincare practices to protect maternal and fetal health.

## Statement of contribution

Prof. Dégboé Bérénice, Dr. Bisimwa Pascal and Dr. Omono Ambiana Blandine conceived and designed the study. Dr Legonou Marie Christelle, Dr. Omono Ambiana Blandine, Dr Bisimwa Pascal and Dr. Tounouga Ndanga Dahlia served as the investigator. Prof Dégboé Bérénice and Dr Legonou Marie Christelle contribute to drafting the manuscript. Prof. Prof. Tonato Bagnan, Prof. Dénakpo Justin, Prof. Adégbidi, and Prof. Atadokpèdé facilitated the implementation of the survey and participated in its review.

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