Clinical Study

Striae Gravidarum, Acne, Facial Spots, and Hair Disorders: Risk Factors in a Study with 1284 Puerperal Patients

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Objective. To determine the prevalence of skin changes during pregnancy and to relate their occurrence to specific factors in a population of south Brazil. Methods. A cross-sectional analytical study was carried out with 1284 puerperal patients. A questionnaire about skin changes during pregnancy was developed and applied by the authors to all puerperal women admitted in a tertiary hospital in south Brazil. Results. The appearance of striae during pregnancy was reported by 633 women (49.5%) and had a statistically significant association with primiparity, presence of stretch marks before pregnancy, and gestational weight gain above 21 kg. Facial blemishes were reported by 33.9% (n = 434) and were associated with a positive family history, multiparity, and the use of facial sunscreen (p < 0.0001). The onset or worsening of acne was identified in 35.7% (n = 456) and was statistically associated with primiparity and Fitzpatrick phototypes IV and V. Hair alterations were reported by 44.5% (n = 569) and were associated with primiparity (p = 0.029). Conclusion. Although most of the skin changes during pregnancy are considered "physiologic," they can cause significant discomfort. Thus, it is important to know them and to understand which risk factors may be associated with such changes.

1. Introduction

Pregnancy influences virtually all the maternal organic systems, which undergo significant modifications to allow retention and intraterine development of the fetus. During pregnancy, the female body undergoes numerous hormonal, metabolic, immunological, and vascular changes [1].

In the skin and mucous membranes, pregnancy causes physiological changes, which can be divided into pigment alterations, hair alterations, nail alterations, skin gland alterations, and vascular alterations [2]. Many of these occur due to increased endocrine activity, in particular by increased production of the hormones progesterone and estrogen [3]. Although rare, there are also specific diseases of gestation, and the most common are pruritus of pregnancy, pemphigoid gestationis or herpes gestationis, polymorphic dermatitis of pregnancy, and impetigo herpetiformis [4]. In addition, autoimmune skin diseases often worsen during pregnancy, mainly systemic lupus erythematosus, dermatomyositis, and pemphigus [5].

Considering the multiplicity of physiological skin alterations that occur during pregnancy and the stigma they generate, few studies have attempted to analyze the epidemiological aspects related to the subject, something which could facilitate better management of such problems [6, 7]. Although physiological, these alterations can persist long after the gestational period and have a considerable impact on the patients’ quality of life [3].
2. Materials and Methods

After approval by the Research Ethics Committee of the institution, a cross-sectional study was carried out, the objective of which was to identify the prevalence of the main skin alterations that occur during pregnancy and to relate their occurrence to specific factors.

The sample consisted of puerperal women hospitalized at the Mário Totta Maternity of Santa Casa Hospital (Porto Alegre, Brazil), during eight months (winter and spring).

All the admitted mothers (mothers of live newborns) who accepted to participate and signed the free and informed consent term were included in the study.

Data were collected using standardized questionnaires applied by four medical students and one dermatologist who jointly received training to standardize the interview. All the participants were interviewed on the first day after delivery, and data were collected on obstetric history, phenotypic characteristics, skin alterations developed during pregnancy, and skin care in pregnancy. The Fitzpatrick scale was used to determine the skin type of the participants [8].

The results are presented using descriptive statistics—absolute and relative distribution—as well as by measures of central tendency and variability, while the study of the distribution of age data was conducted using the Kolmogorov-Smirnov test. For the bivariate analysis between categorical variables, Pearson’s chi-squared test ($\chi^2$) was used, and in the contingency tables in which at least 25% of the values presented an expected frequency of less than 5, Fisher’s exact test was adopted. In situations where at least one variable had a polyatomatic characteristic, the Monte Carlo simulation was used. For the continuous variables, when the comparison was made between two independent groups, the Student t- and the Mann-Whitney tests (asymmetric distribution) were applied. The data were analyzed in the Statistical Package for Social Sciences version 17.0 (SPSS Inc., Chicago, IL, USA, 2008) program for Windows, and for the statistical decision criteria, a significance level of 5% was adopted.

3. Results

The results presented refer to a sample of 1284 patients aged from 13 to 51 years, the mean being 26.6 ($\pm$6.8) years. The patients’ general characteristics are presented in Table 1.

Multiparous patients represented 52.6% ($n = 676$), and two pregnancies were the median in this group.

Prior to pregnancy, the mean weight was $66.9 \pm 15.7$ kg, and 39.3% ($n = 496$) of the patients gained up to 10 kg; 32.7% ($n = 413$) from 11 to 15 kg, and 10.7% ($n = 135$) gained more than 21 kg.

The prevalence of health problems during pregnancy was 48.7% ($n = 624$) within the sample, with the most common conditions being urinary infection (50.3%) ($n = 314$) and increased blood pressure (27.9%) ($n = 174$), while 87.3% ($n = 1114$) of the investigated patients used some type of medication and, in this group, 66.4% ($n = 740$) used ferrous sulfate; 33.5% ($n = 373$) used folic acid; and 30.3% ($n = 338$) reported the use of antibiotics (Table 1). Of the sample,

### Table 1: General characteristics, skin care, and skin changes during pregnancy. Santa Casa Hospital, Porto Alegre, Brazil.

| Variables                          | Sample ($n = 1284$) |
|-----------------------------------|---------------------|
| **Age (years)**                   |                     |
| Mean ± SD                         | $26.6 \pm 6.8$      |
| Median (min–max)                  | $26.0 \ (13-51)$    |
| **Age group**                     |                     |
| &lt;19 years                      | 229                 |
| 20 to 29 years                    | 622                 |
| 30 to 39 years                    | 397                 |
| &gt;=40 years                     | 35                  |
| **Primiparous**                   |                     |
| No                                | 676                 |
| Yes                               | 608                 |
| **Number of pregnancies**         |                     |
| Mean ± SD                         | $2.1 \pm 1.5$       |
| Median (min–max)                  | $2.0 \ (1.0–7.0)$   |
| **Gestation**                     |                     |
| 1                                 | 569                 |
| 2                                 | 372                 |
| 3                                 | 175                 |
| 4                                 | 81                  |
| 5 or more                         | 85                  |
| **Phototype**                     |                     |
| 1                                 | 14                  |
| 2                                 | 250                 |
| 3                                 | 582                 |
| 4                                 | 322                 |
| 5                                 | 100                 |
| 6                                 | 8                   |
| **Daily moisturizing products use** |                   |
| No                                | 572                 |
| Yes                               | 710                 |
| **Type**                          |                     |
| Moisturizing lotions              | 494                 |
| Ointments                         | 323                 |
| Others                            | 2                   |
| **Weigh before pregnancy**        |                     |
| Mean ± SD                         | $66.9 \pm 15.7$     |
| Median (min–max)                  | $64.0 \ (68.0–88.0)$|
| **Weigh after pregnancy**         |                     |
| Mean ± SD                         | $79.4 \pm 15.4$     |
| Median (min–max)                  | $78.0 \ (68.0–88.0)$|
| $p^*$                             | 0.0001              |
| **Weight gain**                   |                     |
| ≤10 kg                            | 496                 |
| 11 to 15 kg                       | 413                 |
| 16 to 20 kg                       | 219                 |
| ≥21 kg                            | 135                 |
80.2% (n = 1024) had appropriate prenatal follow-up, considering a minimum number of 6 visits. The daily use of some type of moisturizer was confirmed by 55.3% (n = 710) of those investigated, and the daily use of facial sunscreen during pregnancy was reported by 18.0% (n = 230) (Table 1).

The main skin changes that occurred in the recent pregnancy were stretch marks (49.5%, n = 633), facial blemishes (33.9%, n = 434), acne (35.7%, n = 456), and hair alterations (44.5%, n = 569). The important details of these alterations are described in Tables 2 and 3.

When assessing the relationship between age group and alterations, there was significant association of the up to 25-year age group with the appearance of stretch marks (66.3%; n = 402, p < 0.001), acne (p < 0.001), and the absence of facial blemishes (75.7%; n = 458, p < 0.0001). In the over 26-year age group, there was an association with the absence of stretch marks (65.8%; n = 443, p < 0.001), the presence of blemishes (42.6%; n = 287, p < 0.001), and nonappearance/nonworsening of acne (71.4%; n = 480, p < 0.0001) (Tables 2 and 3).

4. Discussion

This research was carried out in a tertiary and university hospital (Santa Casa de Porto Alegre/Universidade Federal de Ciências da Saúde de Porto Alegre). This hospital receives patients from various parts of Greater Porto Alegre, most of whom received prenatal care in low-risk primary services, so that our sample resembles the population found in primary care settings. The demographic profile observed is very similar to that found in a study carried out among pregnant women in a primary healthcare unit in Porto Alegre: in both studies, the predominant age of interviewees was 20 to 29 years (46.9% versus 51.7%) and the main pathologies presented during pregnancy were urinary tract infections and arterial hypertension [9]. The weight gain observed in our sample, in which the predominant increase was up to 15 kg, is in line with the recommendations of the Ministry of Health.
in its Technical Manual for Prenatal and Puerperium [10]. Adequate prenatal care was performed by 80.2% of the pregnant women, considering a minimum of 6 consultations also recommended by the Ministry of Health. Regarding skin changes, the main considerations are described below.

In our study, 49.5% of the interviewees reported the appearance of stretch marks during pregnancy, a lower percentage than that found in the Brazilian and international literature, with values between 55 and 61% [11, 12]. In accordance with the literature, the main sites affected were, in descending order, abdomen, breasts, and thighs, and there was a statistically significant association between greater weight gain (>16 kg) and the development of stretch marks [11, 12]. In the present study, primiparity, excess weight gain (greater than 21 kg), the presence of stretch marks prior to the first pregnancy, and younger maternal age were found to be factors associated with the appearance of stretch marks. These data are consistent with those in the literature [13, 14].

The use of moisturizers and oils does not seem to have a preventive capacity for stretch marks during pregnancy, which has also been reported in a recent study published by Cochrane [15].

In this study, it was decided to include the occurrence of facial blemishes globally, not just melasma, since some pregnant women develop diffuse hyperpigmentation of the skin, the appearance or darkening of ephelides, and solar melanosomes, which are different conditions of melasma, but which are still capable of causing discomfort in pregnant women.

The occurrence of facial blemishes during pregnancy was reported by 33.9% of the interviewees. Data on the occurrence of melasma and other spots on the face during pregnancy are presented in Table 2.

### Table 2: Stretch marks and facial blemishes in pregnancy. Santa Casa Hospital, Porto Alegre, Brazil.

| Variables                                      | Appearance of stretch marks<sup>a</sup> |   |   |
|------------------------------------------------|----------------------------------------|---|---|
| Age range                                       |                                        |   |   |
| <25 years                                       | 204 (33.7) 402 (66.3)                  | <0.001 |
| 26 years or more                               | 443 (65.8) 230 (34.2)                  |   |   |
| Stretch marks prior to first pregnancy          |                                        |   |   |
| No                                             | 410 (63.5) 363 (57.7)                  | 0.035 |
| Yes                                            | 236 (36.5) 266 (42.3)                  |   |   |
| Primiparous                                     |                                        |   |   |
| No                                             | 411 (63.5) 264 (41.7)                  | <0.0001 |
| Yes                                            | 236 (36.5) 369 (58.3)                  |   |   |
| Phototype                                       |                                        |   |   |
| 1                                              | 7 (1.1) 7 (1.1)                        |   |   |
| 2                                              | 118 (18.3) 132 (21.0)                  |   |   |
| 3                                              | 314 (48.8) 265 (42.2)                  | 0.218 |
| 4                                              | 160 (24.8) 162 (25.8)                  |   |   |
| 5                                              | 41 (6.4) 58 (9.2)                      |   |   |
| 6                                              | 4 (0.6) 4 (0.6)                        |   |   |
| Weight gain                                     |                                        |   |   |
| ≤10 kg                                          | 283 (44.6) 212 (33.9)                  |   |   |
| 11 to 15 kg                                     | 204 (32.2) 207 (33.1)                  | <0.0001 |
| 16 to 20 kg                                     | 106 (16.7) 113 (18.1)                  |   |   |
| ≥21 kg                                          | 41 (6.5) 94 (15.0)                     |   |   |
| Daily moisturizing products use                 |                                        |   |   |
| No                                             | 291 (45.0) 281 (44.4)                  | 0.869 |
| Yes                                            | 355 (54.9) 352 (55.6)                  |   |   |
| Adequate prenatal care                          |                                        |   |   |
| No                                             | 135 (21.0) 117 (18.6)                  | 0.278 |
| Yes                                            | 508 (79.0) 513 (81.4)                  |   |   |

*Percentages calculated based on the total of each group that noted the appearance of stretch marks.

### Table 2: Continued.

| Variables                                      | Appearance of facial spots/melasma<sup>b</sup> |   |   |
|------------------------------------------------|-----------------------------------------------|---|---|
| Age range                                       |                                               |   |   |
| <25 years                                       | 458 (75.7) 147 (24.3)                         | 0.001 |
| 26 years or more                               | 386 (57.4) 287 (42.6)                        |   |   |
| Mother or sister diagnosed with facial blemishes/melasma |                        |   |   |
| No                                             | 582 (69.0) 226 (52.1)                         | <0.0001 |
| Yes                                            | 230 (27.3) 200 (46.1)                        |   |   |
| Unknown                                        | 31 (3.7) 31 (3.7)                            |   |   |
| Primiparous                                     |                                               |   |   |
| No                                             | 413 (48.9) 261 (60.1)                         | <0.0001 |
| Yes                                            | 432 (51.1) 173 (39.9)                        |   |   |

*Percentages calculated based on the total of each group that noted the appearance of facial spots/melasma.

<sup>a</sup>Pearson’s chi-squared test.
pregnancy are quite heterogeneous in the literature, ranging from 10.7 to 70% [4, 16–18].

The factors associated with the appearance of facial blemishes in our study were family history of facial blemishes, multiparity, and the daily use of sunscreen on the face. Although studies indicate a high prevalence of family history among women with melasma (ranging from 36 to 56.3%), few studies have been able to demonstrate a statistical association between family history and the development of melasma [7, 16–18]. The group that perceived the presence of facial blemishes had a significantly higher mean number of pregnancies when compared to those that did not present facial blemishes, corroborating data from the literature that associate the appearance of facial blemishes with increased parity [16, 18, 19].

In this study, the women who developed facial blemishes showed greater adherence to the daily use of facial sunscreen than those who did not develop such blemishes. Despite the known preventive and therapeutic action of the use of sunscreen in melasma, previous studies among pregnant women found no association between melasma prevention and sunscreen use [16, 17]. This is probably due to a reverse causality bias: women who are more likely to have melasma (e.g., family history or prior history of that skin alteration) are more likely to use sunscreen daily.

The literature is inconclusive regarding any association between the occurrence of melasma and facial blemishes and ethnicity or phototype: while some studies associate the occurrence of melasma with higher phototypes, others demonstrate no such association [16, 17]. In our study, no relationship was found between the occurrence of melasma and phototype.

The onset or worsening of acne lesions during pregnancy was reported by 35.7% of the interviewees, which could be related to the increase in glandular activity, already described in the literature, especially that of the sebaceous glands [20, 21]. Few studies, either Brazilian or international, address the development of acne in pregnancy. A study conducted in basic health units in São Paulo with a total of 124 pregnant women showed an incidence of 12.8% of acne lesions during pregnancy, and an Indian study with 607 pregnant women showed a prevalence of 2.3% among the women interviewed [20, 22].

| Variables               | Appearance or aggravation of acne<sup>a</sup> |   |   | p  |
|-------------------------|-----------------------------------------------|---|---|----|
|                         | 0—no (n = 820)                                 | 1—yes (n = 456) |   |    |
| Age range               |                                               |               |   |    |
| <25 years               | 339                                           | 264           | 43.8 | <0.001<sup>§</sup> |
| 26 years or more        | 480                                           | 192           | 28.6 |    |
| Primiparous             |                                               |               |   |    |
| No                      | 470                                           | 201           | 44.1 | <0.001<sup>§</sup> |
| Yes                     | 350                                           | 255           | 55.9 |    |
| Phototype               |                                               |               |   |    |
| 1                       | 8                                             | 6             | 1.3  |    |
| 2                       | 154                                           | 96            | 21.2 |    |
| 3                       | 402                                           | 178           | 39.4 | 0.011<sup>§</sup> |
| 4                       | 198                                           | 123           | 27.2 |    |
| 5                       | 50                                            | 46            | 10.2 |    |
| 6                       | 5                                             | 3             | 0.7  |    |
| Weight gain             |                                               |               |   |    |
| ≤10 kg                  | 333                                           | 161           | 35.7 |    |
| 11 to 15 kg             | 252                                           | 157           | 34.8 | 0.249<sup>§</sup> |
| 16 to 20 kg             | 134                                           | 84            | 18.6 |    |
| ≥21 kg                  | 86                                            | 49            | 10.9 |    |
| Daily facial sunscreen use |                                           |               |   |    |
| No                      | 660                                           | 381           | 53.6 | 0.272<sup>§</sup> |
| Yes                     | 154                                           | 75            | 16.4 |    |
| Developed health complications during pregnancy |                     |               |   |    |
| No                      | 422                                           | 233           | 51.3 | 0.944<sup>§</sup> |
| Yes                     | 397                                           | 221           | 48.7 |    |
| Medication use          |                                               |               |   |    |
| No                      | 100                                           | 61            | 13.5 | 0.510<sup>§</sup> |
| Yes                     | 717                                           | 390           | 86.5 |    |

| Appearance of hair alterations<sup>b</sup> |   |   | p  |
|-------------------------------------------|---|---|----|
| Variables                   | 0—no (n = 709) | 1—yes (n = 569) |   |    |
| Age range                   |               |               |   |    |
| <25 years                   | 343           | 261           | 54.4 | 0.374<sup>§</sup> |
| 26 years or more            | 366           | 307           | 45.6 |    |
| Primiparous                 |               |               |   |    |
| No                         | 395           | 278           | 48.9 | 0.029<sup>§</sup> |
| Yes                        | 314           | 291           | 51.1 |    |
| Phototype                  |               |               |   |    |
| 1                          | 7             | 7             | 1.2  | 0.533<sup>§</sup> |
| 2                          | 126           | 123           | 21.8 |    |
| 3                          | 326           | 254           | 45.0 |    |
| 4                          | 187           | 133           | 23.5 |    |
| 5                          | 56            | 43            | 7.6  |    |
| 6                          | 3             | 5             | 0.9  |    |

<sup>a</sup>Percentages calculated based on the total of each group that noted the appearance of aggravation of acne. <sup>b</sup>Percentages calculated based on the total of each group that noted the appearance of hair abnormalities. <sup>§</sup>Pearson’s chi-squared test. <sup>¶</sup>Fischer’s exact test using Monte Carlo simulations.
In our sample, the factors associated with development or worsening of acne lesions during pregnancy were primiparity and maternal age less than 25 years. In a study carried out in Brazil with female patients with acne, the mean age of the patients was 21.7 years, which reinforces the data found in our study [23].

Phototypes 4 and 5 were also associated with a higher occurrence of acne in the present study. Interestingly, a recent study carried out in Pelotas (southern Brazil) found that patients with higher phototypes have a different pattern of acne than lighter-skinned patients, with noninflammatory acne prevailing in the former and inflammatory acne prevailing in the latter [24]. New studies into the occurrence of acne in the different phototypes could be conducted, as well as into the risk factors for and protection against the development of acne during pregnancy.

The occurrence of hair alterations during pregnancy was reported by 44.5% of the sample, with most complaints referring to hair loss and dryness. The data available in the literature show much lower rates of capillary changes during pregnancy, ranging from 2.6 to 12.8%, with both hair loss and increasing hair volume [7, 22].

The present data do not corroborate some studies that point to increased capillary volume in pregnancy (with increased thread diameter and a greater proportion of anagen to telogen threads) [25].

There was a greater proportion of capillary alterations among the primiparous patients, suggesting that perhaps the first pregnancy influenced the capillary cycle more strongly, or even a bias of confusion and memory, as women in their first pregnancy could be more aware of such modifications. In agreement with the literature, no other risk or protection factors for capillary alterations during pregnancy were identified.

Our study has limitations. Additional sample variables, such as weight and sex of the newborn, delivery route, gestational age, and economic and educational factors of the sample could have been collected and analyzed in order to enrich our analysis. Some of our data were only obtained through patient reports, such as family history of facial blemishes and the occurrence of hair alterations, which makes our data subject to biases of subjectivity and memory. The occurrence of other pigmenitary alterations, such as linea nigra, and vascular alterations, such as palmar erythema, has not been studied (such changes are frequent but usually spontaneously resolved).

5. Conclusion

Given their high prevalence rates, the importance of skin alterations during pregnancy is clear. In particular, stretch marks, hair alterations, acne, and facial blemishes were observed.

Risk factors were found, and the recognition of these associations may help in the prevention and management of the problems. The main points are as follows: excessive weight gain, primiparity, and younger age as risk factors for stretch marks; the lack of evidence of the use of topical preparations during pregnancy to prevent stretch marks; family history, multiparity, and older age as risk factors for the development of facial blemishes; primiparity and the younger age as a risk factor for acne; and primiparity as a risk factor for hair loss and hair dryness.

Thus, the present study presents important data from a large sample, the largest Brazilian series on the subject, to date.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

There is no conflict of interest to declare.

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