Methods: In this cross-sectional observational study, data was collected from 200 pregnant females with a mean age of 24.2 years (range: 18-40 years) who presented to our OPD, with various skin manifestations. Thorough clinical examination was carried including general physical examination, cutaneous examination including mucosa, scalp and nails, per speculum examination was done whenever required. Routine and specific investigations were done wherever necessary.

Results: A total of 200 pregnant females with a mean age of 24.2 years (range: 18-40 years) were included in the study, out of which one hundred and fifteen cases (57.5%) were gravida one, 57 cases (28.5%) gravida two, 15 cases (7.5%) gravida three, 12 cases (6%) gravida four and 1 case (0.5%) was gravida seven (i.e. more than 5). More than half of the cases were primigravida. Earliest gestational age at which the patients presented with cutaneous complaints was 4 weeks, in some cases, the time of first presentation was as late as 39 weeks.

Among the 200 cases studied, majority had more than one cutaneous manifestation at a time. 72 cases (36%) had only one skin manifestation, 50 cases (25%) had two skin conditions, whereas 65 cases (32.5%) had 3 and 13 cases (6.5%) had 4 skin manifestations at the time of first presentation. Almost all cases presenting to us had one or the other physiological skin change in pregnancy, 44 (22%) had specific dermatoses of pregnancy. Pigmentary changes were the most common physiological skin changes seen in 129 patients (64.5%), darkening of areolae in 113 (56.5%) cases and melasma, the most common physiological change of cosmetic concern was seen in 109 (54.5%) cases. Most common co-existence of physiological and pathological dermatoses was common among our patients.

Conclusion: Physiological changes are the most common dermatoses associated with pregnancy. Co-existence of physiological and pathological dermatoses is common. Most common cutaneous complaint present in our patients was pruritus. The specific dermatoses of pregnancy which have a poor prognosis are fortunately of rare occurrence, but early recognition and prompt treatment is crucial to improve maternal and fetal prognosis and minimize morbidity.

KEYWORDS: Pregnancy, Cutaneous changes, Physiological changes, Pregnancy specific dermatoses
was most common, seen in 74 (67.9% of melasma cases), malar in 30 (27.5% of melasma patients) and mandibular in 5 (4.6% of melasma cases).

**FIG 1 Linea nigra with striae**

This was followed by striae 100 (50%) cases [Figure 1], the lower abdomen and thigh were involved in 42 (21%) cases, only lower abdomen in 29 (14.5%) cases, striae on abdomen, thigh and breast were seen in 27 (13.5%) and on abdomen and breast in 21(%) cases. In our study, 25% of patients with striae were primigravida and 75% were multigravida.

Pruritus (without any cause) was present in 16 (8%) cases. Other miscellaneous conditions noted were acne 6 (3%) cases, xerosis, hirsutism, vascular lesion (pyogenic granuloma) and telangiectasia in 1 patient (0.5%) each. [Table 1]

**Table 1: Physiological changes in pregnancy:**

<table>
<thead>
<tr>
<th>Physiological change</th>
<th>No. of Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Striae</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Melasma</td>
<td>109</td>
<td>54.5</td>
</tr>
<tr>
<td>Xerosis</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Telangiectasia</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Hirsutism</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Acne</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Pruritus</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Vascular</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>235</strong></td>
<td></td>
</tr>
</tbody>
</table>

Among the dermatoses affected by pregnancy there were 139 conditions, out of these infections were most common 120 (86.33%). There were 20 cases (10%) of bacterial infections, there were syphilis 19 (9.5%) cases and furuncle 1 case (0.5%). The cases testing positive for non treponemal serological tests were confirmed using specific treponemal tests and diagnosed as having Syphilis only if treponemal tests were positive in significant titre thus ruling out false positives. Among those having fungal infections there were total 51 (25.5%) cases, including tinea 24 (12%) cases, vulvovaginal candidiasis 20 cases (10%) and pityriasis versicolor 7 cases (3.5%). Total of 38 cases (19%) of viral infections included warts (HPV) 22 cases (11%), 4 cases of herpes i.e. HSV- oral 3 (1.5%) and genital herpes 1 (0.5%) case. There were 6 cases (3%) of chickenpox, 4 (2%) cases of pityriasis rosea and 1 case (0.5%) of molluscum contagiosum. There were 11 cases (5.5%) of scabies included under parasitic infections.

Specific dermatoses of pregnancy included 44 cases (22%). All of these cases had pruritus. Among these, most common was Atopic Eruption of Pregnancy 26 (13%) cases followed by Pruritic urticarial papules and plaques of pregnancy 14 (7%) cases and Intrahepatic cholestasis of pregnancy and Pemphigoid gestationis 2 (1%) cases each. There was only one case of Pruritic folliculitis of pregnancy included under AEP.

One hundred and twelve (56%) cases had Generalised pruritus. Among the pregnancy unrelated primary causes accounting for 68 (34%) cases, majority were infections (fungal infections like tinea and vaginal candidiasis, viral infections and scabies) accounting for 45 (22.5%) cases. For 16 (8%) cases no primary cause could be found and these cases were assigned to be of pruritus associated with pregnancy. There were 23 cases with genital pruritus, majority, 20 (10%) cases of them had vaginal candidiasis [Figure 4] as etiology.

**FIG 4 Vulvovaginal candidiasis**

In all, 123 cases (61.5%) had pruritus out of which, 112 had generalised pruritus and 23 had genital pruritus, including 12 patients having both generalised and genital pruritus.

Various cases with pruritus are tabulated as follows. [Table 2]

**Table 2: Causes of pruritus in pregnancy**

<table>
<thead>
<tr>
<th>Causes of pruritus</th>
<th>No. of Patients</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalized pruritus</td>
<td>112</td>
<td>56</td>
</tr>
<tr>
<td>Specific cause</td>
<td>44</td>
<td>22</td>
</tr>
<tr>
<td>Chronic urticaria</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Infections</td>
<td>45</td>
<td>22.5</td>
</tr>
<tr>
<td>No primary cause</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Xerosis</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Genital pruritus</strong></td>
<td><strong>23</strong></td>
<td><strong>11.5</strong></td>
</tr>
</tbody>
</table>

**Discussion:**

Skin and its appendages undergo various normal physiological changes during pregnancy, usually well tolerated by a pregnant female, but a few of them may be a cause for concern. (Rathore, 2011), (Rudolph, 2011). Physiological skin changes in pregnancy include changes in pigmentation (melasma, linea nigra, secondary areola, localized or generalized hyperpigmentation), alterations of the connective tissue (striae distensae) and vascular system (palmar erythema, spider angiomas, varicosities) as well as changes in hair and nails. Cutaneous manifestations in pregnancy are classified into four main categories as per the latest classification. (Kar, 2012)

Specific dermatoses of pregnancy included 44 cases (22%). All of these cases had pruritus. Among these, most common was Atopic Eruption of Pregnancy 26 (13%) cases followed by Pruritic urticarial papules and plaques of pregnancy 14 (7%) cases and Intrahepatic cholestasis of pregnancy and Pemphigoid gestationis 2 (1%) cases each. There was only one case of Pruritic folliculitis of pregnancy included under AEP.

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Table 3: Specific dermatoses of pregnancy.

<table>
<thead>
<tr>
<th>Disease</th>
<th>No. of Patients</th>
<th>Percent age cases</th>
<th>Percentage Among Specific dermatoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atopic Eruptions of Pregnancy</td>
<td>26</td>
<td>13</td>
<td>59.1</td>
</tr>
<tr>
<td>Eczema in Pregnancy (E-type)</td>
<td>4</td>
<td>2</td>
<td>9.1</td>
</tr>
<tr>
<td>Prurigo of Pregnancy (P-type)</td>
<td>21</td>
<td>11</td>
<td>47.7</td>
</tr>
</tbody>
</table>

AEP was more severe in multigravidas and was seen in later half of pregnancy. Majority of the patients had lesions distributed on the extensor aspects of the limbs [Figure 6] and less on the trunk.

Ambros-Rudolph et al (2006) confirmed a high prevalence of atopic eczema in pregnancy in a retrospective two-center study on 505 pregnant patients, revealing that 80% of the affected patients experience first episode of atopic eczema during pregnancy. The eruption was seen more commonly in primigravida and skin lesions started during early pregnancy in first and second trimester.

Similarly Hassan et al (2015) observed that among the specific dermatoses of pregnancy, prurigo of pregnancy was the commonest and seen in 16 (50%) cases. Also in study done by Kothamasu et al (2016) AEP was the most common, 49.7% cases of pregnancy specific dermatoses.

The incidence of polymorphic eruption of pregnancy was 31.8% (14 cases) among pregnancy specific dermatoses in our study [Figure 7]. The exact pathogenesis of PEP is unknown. Due to presence of prominent abdominal striae in majority of cases, it is hypothesized that stretching of the abdominal skin leads to damage to the underlying connective tissue leading to an inflammatory reaction process. It is 10 times more likely to occur in women with multiple pregnancy (twins or triplets), primigravida with male fetuses, or those who undergo rapid or excessive weight gain during pregnancy. Hassan et al (2015) observed PEP in 7 (22% of pregnancy specific cases), all being primigravidae and Kothamasu et al (2016) had 16 (42.1%) cases with PEP.

In our study there were 2 cases each of Pemphigus gestationis (PG) 4.5% and Intra-hepatic cholestasis of pregnancy (ICP). PG [Figure 8 (a) and 8 (b)] is a rare autoimmune subepidermal bullous dermatosis occurring during pregnancy and postpartum initially described by Dr. John Milton in 1872. (Zhao, 2015). The estimated incidence is 1 in
40,000-50,000 pregnancies. The disease is probably triggered by a placental antigen that cross-reacts with skin antigens. \( \text{Ambros – Rudolph, 2006} \) Rarely, associated with a hydatiform mole, trophoblastic tumors, and choriocarcinoma. Nearly half of the cases develop during the first pregnancy. \( \text{LipozenCd, 2012} \)

**FIG 8(A) Pemphigoid gestationis**

ICP occurs due to a mild form of intrahepatic bile secretory dysfunction and is seen in the third trimester of pregnancy in about 70% of cases. \( \text{Kumari, 2007} \) There are no primary cutaneous lesions in ICP and it presents only with secondary skin lesions caused by scratching due to intense pruritus, which represent linear excoriation marks, erosions, and scabbing \( \text{Figure 9} \) \( \text{Warshauer, 2013} \). In particular it involves the extensor surfaces of the extremities, but also the abdomen and buttocks.

**FIG 9 Intrahepatic cholestasis of pregnancy**

Cases of PG and ICP were confirmed with biopsy, DIF and S.LFT respectively. Both cases of PG presented again with post-delivery flare. Our findings were consistent with the description of Kothamasu et al. \( \text{2015} \) who observed herpes gestationis and intrahepatic cholestasis in one \( \text{(2.6%)} \) and two \( \text{(5.3%)} \) females, respectively whereas Hassan et al. \( \text{2015} \) observed 8 cases \( \text{(25%)} \) of ICP and 1 \( \text{(3%)} \) case of PG. \( \text{Table 4} \)

![Diagram](image)

**Table 4: Comparison with recent studies**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Atopic Eruption of pregnancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>16</td>
<td>19</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Polymorphic Eruption of Pregnancy</td>
<td>14</td>
<td>7</td>
<td>16</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Intrahepatic Cholestasis Pregnancy</td>
<td></td>
<td>-</td>
<td>8</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Herpes Gestationis</td>
<td></td>
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<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

In the 1st trimester (zero-12 weeks of gestation) three patients presented with vulvovaginal candidiasis, each had scabies and urticaria. Only one patient developed chloasma during the first trimester of pregnancy.

In the 2nd trimester (13-28 weeks), 52 patients developed chloasma and 43 had striae. 16 females presented with pruritis of pregnancy, 11 had prurigo of pregnancy, eight had PUPPP, four presented with eczema one had chronic urticaria and PFP – pruritic folliculitis of pregnancy. Among infections, the most common were genital warts- 14 patients, 12 had positive serology for syphilis but no active lesions and 11 presented with vulvovaginal candidiasis. One patient presented with lesions of Impetigo herpetiformis at 26wk2d period of gestation.

In the 3rd trimester (29 weeks onwards) 59 had chloasma and 58 presented with striae. Nine had prurigo of pregnancy, six patients were diagnosed as having PUPPP, both our patients of pemphigoid gestationis presented in the 3 trimester \( \text{(at 32wk 4d and 29 wk 3d)} \), only case of ICP presented at 28weeks and 4 days of gestation. Fortunately none of our patients had fetal loss. Twelve of our patients had tinea, seven had warts and six developed vulvovaginal candidiasis. Six had positive serology for syphilis, no active lesions seen on examination.

There were six cases of chickenpox, three patients presenting in second and third trimester each and were managed according to the latest BAD guidelines.

There was only one case of Impetigo Herpetiformis \( \text{[Figure 10]} \) included under the Uncertain dermatoses of pregnancy.

**FIG 10 Impetigo herpetiformis**

Its pathogenesis is poorly understood, elevated levels of progesterone may play a role. Hypocalcaemia and hypoparathyroidism may contribute to disease occurrence. \( \text{Geraghty, 2011} \)

**Conclusion:** The finely tuned, harmonious complex cascade of molecular and cellular phenomena that the gestation brings, many signs and/or symptoms target the cutaneous layers. Our study reveals that the physiological changes are the most common dermatoses occurring in almost all the patients and were found to have an incidence similar with those of earlier studies.

The pre-existing dermatoses affected during the course of pregnancy contributed to a major number of cases in this study. Many of our patients had co-existence of physiological and pathological dermatoses. Majority of patients present with complaint of pruritus which may be physiological or pathological.

The specific dermatoses of pregnancy have a comparatively rare occurrence. Among these, Atopic eruption of pregnancy (AEP) is the most common pregnancy dermatoses followed by Pruritic Urticarial Papules and Plaques. AEP and PUPPP present with no maternal or fetal risks. Among the specific dermatoses of pregnancy, those having a poor prognosis are Intrahepatic Cholestasis of Pregnancy and Pemphigoid Gestationis and fortunately have rare occurrence \( \text{(2%)} \), but awareness, early recognition and prompt treatment is essential for improving maternal and fetal prognosis and minimizing morbidity.

In our study we encountered only one \( \text{(0.5%)} \) case of Uncertain Dermatoses of pregnancy (Impetigo Herpetiformis).

**Financial support and sponsorship:** Nil.

**Acknowledgments:** Nil.

**Informed consent:** Informed consent was obtained from all individual participants included in the study.

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Dermatology, Venereology and Leprology, 77, 402.


