

Physiological changes of skin in pregnancy

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Abstract

Objective To determine the frequency of physiological changes in skin during pregnancy.

Methods This Cross-sectional observational study consisted of pregnant women attending anti-natal clinic of Gynecology & Obstetrics and Dermatology Department at Sahiwal Teaching Hospital, Sahiwal. Demographic data of patients and complete history was taken. General physical and cutaneous examination was done for physiological changes in skin during pregnancy. Relevant systemic examination and laboratory investigations were performed. The data was analyzed by using SPSS version 25.

Results A total 271 pregnant female were enrolled, mean and SD of age was 28.24±5.3 and majority of them (61%) were multigravida and (69.7%) were in 3rd trimester. Most frequent skin change observed during pregnancy was stria gravidarum n=144 (53.7%) followed by melasma (45.4 %), linea nigra (41.7 %), increased activity of eccrine gland/sweating (28.8%), pigmentation of areola, increased brittleness of nail(23.6%), increased activity of sebaceous gland /Acne Vulgaris (22.1%), palmar erythema (21.6%) and diffuse hair loss(20.3%). Cutaneous changes mostly noticed were during third trimester of pregnancy.

Conclusion The timely recognition of common physiological skin changes during antenatal period helps in improving the patient care during pregnancy, thus reducing maternal and fetal morbidity.

Key words

Cutaneous; Physiological changes; Pregnancy.

Introduction

Pregnancy is a characterized by physiological changes in female due to profound alteration in hormonal, vascular, metabolic or immunological functions of body. These alterations bring changes within various organs of body including skin and its appendages.¹ Thus pregnant female undergo physiological and pathological changes in skin.² Increased activity of maternal and developing fetal endocrine glands leads to

increased level of circulating hormones, increased intravascular volume, and compression effects from the enlarged uterus are chief physiological alterations leading to different cutaneous changes in pregnancy.^{3,4}

Skin diseases associated with pregnancy are categorized into three groups; 1) benign skin conditions or physiological skin changes, 2) exacerbations of preexisting skin diseases, and 3) pregnancy-specific skin disorders.⁵ In first group, skin changes included are striae gravidarum, hyperpigmentation and hair, nail and vascular changes. Preexisting skin conditions that may be aggravated during pregnancy include inflammatory skin conditions like psoriasis, atopic dermatitis, infections mainly candidiasis and other fungal infections,

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benign appendageal skin lesions etc. Specific pregnancy related dermatoses are pruritic urticarial papules and plaques of pregnancy, pruritus gravidarum, prurigo of pregnancy, pemphigus gestational and pruritic folliculitis of pregnancy.⁶

This study we will be focusing on benign skin conditions/ physiological skin changes of pregnancy. These are the most commonly observed pregnancy related skin conditions as more than 90% of pregnant women have substantial physiological skin changes. These cutaneous manifestations may have pronounced effect on the woman's life.⁷ Most of these cutaneous changes regress in postpartum period, so reassurance to the patient reduces anxiety and stress.³ Physicians and Obstetricians should be able to identify and differentiate normal physiological skin changes during pregnancy from pathological skin conditions so that undue investigations and interventions could be avoided.⁴

Multiple studies on this subject had been carried out nationally and internationally. The present study was undertaken with main objective to determine the physiological changes in skin during pregnancy in our population and compare it with similar studies. This will be helpful in creating awareness among doctors for counseling these patients regarding physiological cutaneous changes during pregnancy, thus reducing anxiety and stress.

Methods

This cross-sectional observational study was carried out on pregnant women attending anti-natal clinic of Gynecology and Obstetrics and Dermatology Department at Sahiwal Teaching Hospital/ Sahiwal Medical College, Sahiwal from July 2022 to June 2023 after approval from institute ethical review committee (Reference: S.No-40-IRB/SLMC/SWL, dated 25-May-2022).

Sample size of 271 was calculated from following formula:

$$x=Z(c/100)2r(100-r)$$

$$n=N x/((N-1)E^2 + x)$$

$$E=\text{Sqrt}[(N - n)x/n(N-1)]$$

where N is the population size, r is the fraction of responses and Z(c/100) is the critical value for the confidence level c.

Sampling technique was non-probability purposive. Pregnant women above 18 years of age and above 12 weeks of gestation with skin changes were selected for the study. Patients with sexually transmitted diseases and infestations like scabies were excluded from study. Prior informed written consent regarding the study was taken.

Demographic data of patients and complete history including duration of pregnancy, chief complaints related to skin, presence of itching, physiological changes in skin during pregnancy was taken. General physical and cutaneous examination was done for physiological changes in skin during pregnancy and for preexisting skin diseases. Relevant systemic examination was carried out and all clinical findings recorded in the predesigned proforma. Appropriate Laboratory investigations were performed where required. The data was analyzed by using SPSS version 25. Among demographic variables age will be calculated by using mean and standard deviation. Frequency of cutaneous manifestation of pregnancy will be expressed in percentages.

Results

A total of 271 pregnant females were included in study. Mean and SD of age was 28.24±5.3 and majority of study subjects were multigravida (69.7%) and were in 3rd trimester (60.1%) as depicted in **Table 1**. The most frequent symptom was itching reported by 49.4% of women followed by history of striae gravidarum

Table 1 Distribution of study patients in trimesters and gravida of pregnancy (n=271).

	Frequency	Percentage
1st Trimester	31	11.4 %
2nd Trimester	77	28.4 %
3rd Trimester	163	60.1 %
Primigravida	82	30.3 %
Multigravida	189	69.7 %

Table 2 Distribution of symptoms associated with physiological changes in pregnancy (n=271).

Symptoms	Frequency	Percentage
Itching	134	49.4
H/o Striae gravidarum	95	35.1
Vaginal discharge	61	22.5
Urticaria	20	7.4
Dryness	20	7.4

in 35.1% (**Table 2**).

Physiologic changes were categorized into six groups: pigmentary, vascular, connective tissue, glandular, hair and nail changes. Most predominant pigmentary change observed were melasma in 45.4% proceeded by Linea nigra in 41.7% participants. Palmar erythema was the most frequent (21.85%) vascular change seen among study cases. About half of the patients n=144 (53.1%) reported stria gravidarum of which 58 were primigravida and 86 were multigravida. Both eccrine and apocrine gland activity was increased in pregnancy with percentage of 28.8% and 22.1% respectively. The most frequent hair and nail change recorded was diffuse hair loss (20.3 %) and brittle nails (23.6%) respectively in study participant (**Table 3**). The most common physiological changes of pregnancy during three trimesters shown in **Figure 1**. Melasma (n=14) was most commonly observed in first trimester while striae gravidarum was more noticed during second (n= 43) and third trimester (n= 91).

Discussion

Different physiological and pathological skin changes reported in pregnant female mainly results from hormonal, vascular, metabolic and immunological changes of

Table 3 Distribution of Physiological changes of skin in pregnancy (n=271).

Pigmentation changes	Frequency	Percentage
Melasma	123	45.4
Linea nigra	113	41.7
Areola	65	24
Striae gravidarum	46	17
Scar pigmentation	25	9.2
Linea alba	19	7.0
Diffuse regional pigmentation	9	3.3
Darkening of mole/melanocytic naevi	9	3.3
Pseudoacanthosis nigricans	5	1.8
Vascular changes		
Palmar erythema	59	21.8
Varicosities	24	8.9
Gingival hyperplasia and pigmentation	23	8.5
Spider telangiectasia	14	5.2
Purpura	14	5.2
Pyogenic granuloma	1	0.4
Pregnancy epulis	1	0.4
Connective tissue changes		
Striae gravidarum	144	53.1
Molluscum fibrosum gravidarum	8	3
Glandular changes		
Increase eccrine gland activity (sweating)	78	28.8
Increase sebaceous gland activity (acne vulgaris)	60	22.1
Montgomery tubercle	9	3.3
Hair changes		
Diffuse hair loss	55	20.3
Hirsutism	16	5.9
Androgenic alopecia	13	4.8
Hypertrichosis	6	2.2
Nail changes		
Increased brittleness of nail	64	23.6
Koilonychia	40	14.8
Leuconychia	39	14.4
Transverse ridging	16	5.9
Distal onycholysis	12	4.4
Longitudinal melanonychia	11	4.2
Subungual hyperkeratosis	2	0.7

pregnancy.⁸ Most frequent physiological changes reported in various studies are related to pigmentary, connective tissue and vascular changes.⁹

In present study, majority of subjects were in third trimester and multigravida which was in accordance with literature of previous

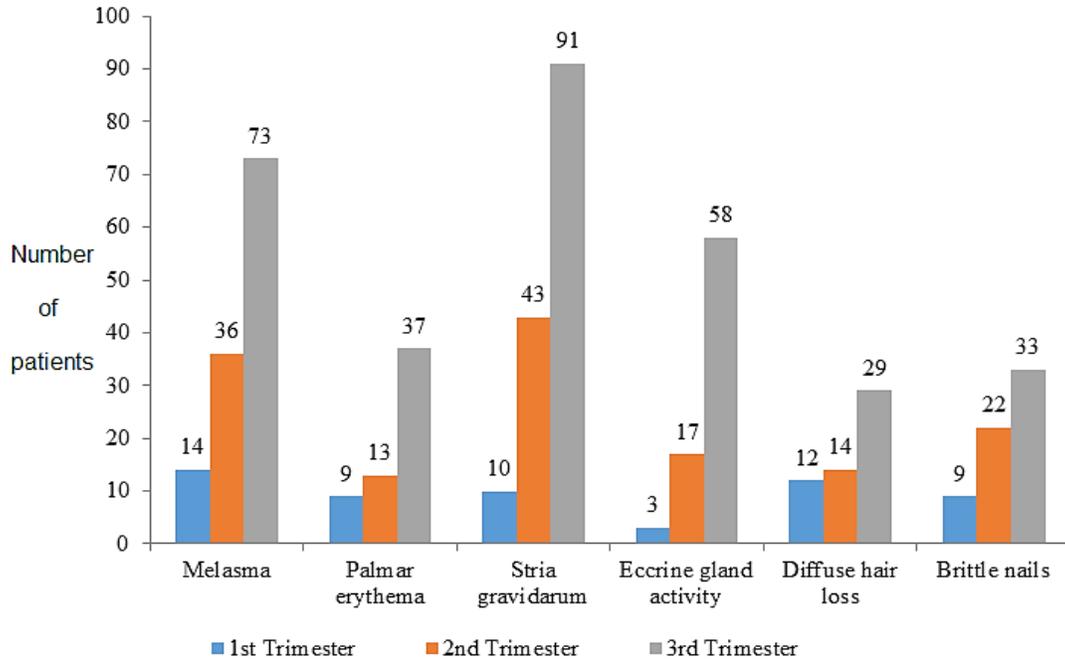


Figure 1 Most common physiological skin changes in three trimesters of pregnancy.

studies.^{9,10} More Primary gravida study subjects were observed in the study carried out by Gupt *et al.*⁶

Striae Gravidarum is the common skin manifestation (56%) noticed in the current study. These were mostly observed in second and third trimester of pregnancy and in multigravida. In contrast, striae gravidarum were reported less frequency in studies carried out by Ali *et al.* and Sliva *et al.* respectively.^{9,11} Panicker *et al.* in his study reported higher frequency (72.8%) of striae gravidarum.¹² Stretch marks are have been postulated due to increase in body weight, stress, connective tissue diseases and hormonal changes. Raised level of corticosteroids and estrogen lowers the adhesion between collagen fibers and facilitate ground substance production which results into striations at sites of distention.¹³ Various risk factors including family history of striae gravidarum, twin pregnancy,

increase baby weight at time of delivery, increase in weight before pregnancy and during gestational period are significantly associated with striae gravidarum.^{14,15}

Cutaneous hyperpigmentation is mostly observed physiological change in pregnancy in the literature. In pregnancy, raised level of estrogen and progesterone have direct effects on melanocyte-stimulating hormone resulting into hyperpigmentation on various sites during pregnancy.¹⁶ In present study, hyperpigmentation is the second most frequently reported skin change during gestation. Melasma (45.4%) and linea nigra (41.7%) and pigmentation around areola (24%) are the commonest. Likewise, Ikram *et al.* reported higher frequency of Melasma (63.5%) and linea nigra (64.5%).¹⁰ Da silva *et al.* noticed melasma more in 2nd trimester of pregnancy as compared to present study.¹¹ In contrast, melasma have been observed in less frequency in various

studies.^{6,9,17} Gupta *et al.* cited increased pigmentation of areolar region (82.1%) as compared to current study results (24%).⁶ Diffuse pigmentation of skin (3.3%) and acanthosis nigricans (3.3%) were reported less frequency in present study as compared to study carried out by Gupta *et al.* (diffuse regional pigmentation (27%), pseudoacanthosis nigricans (27%).¹⁰

Microvasculature functional alterations and focal hyperplasia of skin blood vessels during pregnancy leads to various vascular changes during gestation period.¹⁸ Vascular changes including palmar erythema, varicosities and spider telangiectasia of variable frequency were being observed during three trimesters of pregnancy in the literature. Underlying mechanism leading to these changes is due to raised blood volume and effect of estrogen on vascular dilatation.

Palmar erythema clinically manifest as asymptomatic erythema affecting thenar and hypothenar eminences of palm usually symmetrical in distribution.¹¹ In the current study, palmar erythema was seen 29% in first trimester then it decreases to 16% in second trimester and raised to 22% in last trimester. Ikram *et al.* reported higher frequency (41.15%) of palmar erythema.¹⁰ In contrast, Silva and Ali *et al.* noticed lower incidence of this manifestation as compared to present study.^{9,11}

Venous stasis in pregnancy results from venodilation and diminished blood flow. It is noticeable on left lower limb due to compression of left iliac vein by left iliac artery and ovarian artery.¹⁹ Among other vascular alterations observed in present

study, low frequency of varicosities (8.9%), gingival hyperplasia (8.5%) and spider telangiectasia (5.2%) noted. In contrast, Silva *et al.* noticed higher frequency of varicosities (86.2%) and spider veins (22.8%).¹¹ Likewise; study carried out by Panicker *et al.* reported varicosities (40%) during the gestational period while frequency of spider telangiectasia (67%).¹²

Increase activity of sebaceous gland results in acne during gestation period. It has been reported in the literature nearly 43% of pregnant women develop acne.²⁰ Severity of acne vulgaris is increase during pregnancy in women with irregular menstrual cycle, hirsutism, obesity and polycystic ovary syndrome.²¹ It is postulated that raised level of human chorionic gonadotropin In first trimester of pregnancy results in enhanced synthesis of androgens thereby causing acne vulgaris.²² In present study, acne vulgaris frequency was noted more in first trimester (35%) and second trimester (29%) than third trimester (15%). Silva *et al.* noticed higher frequency in first (53%) and second trimester (32%) which is in concordance with current study results.¹¹ In Turkey, higher frequency of acne was observed in third trimester than other trimesters of pregnancy in the study conducted by Kutlu *et al.*²¹ In contrast, low frequency (9%) of acne vulgaris was seen in study carried out by Gupta.⁶

Sweating is increased during pregnancy due to various factors leading to eccrine sweat gland activation. It had been demonstrated that increase in sweating is particularly notable during exercise, with both evaporative (sweating) and dry (skin blood

flow and temperature) heat loss responses increasing from early to late pregnancy.²³ Similarly, present study results revealed finding of increase sweating from first to last trimester of pregnancy. In present study, 28.8% of study subjects increased sweating was noticed during gestation period. Ikram *et al.* in her study reported higher frequency (55%) of sweating among pregnant women.¹⁰

Pregnancy is associated with various hair changes including diffuse hair loss, hirsutism, androgenetic alopecia and hypertrichosis. Hormonal fluctuations during pregnancy can lead to excessive hair shedding postpartum.²⁴ Diffuse hair loss (21%) was noticed to be most frequent hair change among study participants of our study. These results were in concordance with diffuse hair loss frequency in the study conducted by Ikram *et al.*¹⁰ Gupta *et al.* and Haritha K *et al.* reported lower frequency of other hair changes including hirsutism, androgenetic alopecia and hypertrichosis as compared to current research results.^{6,25}

Pregnancy can lead to a variety of nail changes, with brittle nails or thickened nails, leuconychia, koilonychia, transverse ridging, longitudinal melanonychia, ingrown toe nail being the most common. These nail changes are generally benign and do not require treatment.²⁶ While pregnancy does not significantly affect the growth rate of the nail plate, it does increase its thickness, thus leading to brittle nails.²⁷ Increased brittle nail (23.6%) was most frequent nail alterations followed by koilonychia (14.8%), leuconychia (14.4%) in present research. Similar results of koilonychias and

leuconychia has been demonstrated by previous researchers.^{10,26} In contrast, Gupta *et al.* observed less frequency of brittle nail (1.8%).⁶

Sample size of present study belongs to population seeking treatment for antenatal care was the major limitation. Pathological skin conditions of pregnancy data were not included, thus lacking complete spectrum of skin diseases of pregnancy.

This study highlight need of well-timed identification of physiological skin changes of pregnancy by carrying out meticulous cutaneous examination and distinguishing them from skin diseases. Thus, undue investigations can be avoided and early management helps in reducing emotional stress and psychological counseling of pregnant women.

Conclusion

The timely recognition of common physiological skin changes during antenatal period helps in improving the patient care during pregnancy, thus reducing maternal and fetal morbidity.

Declaration of patient consent The authors certify that they have obtained all appropriate patient consent.

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Conflict of interest The authors affirm that they have no conflicts of interest to disclose.

Author's contribution

ZR: Conception and design of the study, acquisition, analysis and interpretation of data, has given final approval of the study.

ZA,SH: Design of the study, acquisition of data, final approval of study.

SAAG,SM: Conception of study, acquisition and interpretation of data, final approval of the version to be published.

US: Conception and design of study, analysis and interpretation of data. final approval of the study.

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