Section: Dermatology, Venereology & Leprosy

Original Research Article

CLINICOEPIDEMIOLOGICAL STUDY ON PREGNANCY DERMATOSES

S. Joe Angelo[1], G. Aravindan[2], S. Sujitha[3], J. Manjula[4]

[1]Assistant Professor, Department of Dermatology, Venereology & Leprosy, Government Kilpauk Medical College, Tamilnadu, India.
[2]Assistant Professor, Department of Dermatology, Venereology & Leprosy, Government Kilpauk Medical College, Tamilnadu, India.
[3]Assistant Surgeon, Department of Dermatology, Venereology & Leprosy, Primary Health Centre, Nallur, Namakkal, Tamilnadu, India.
[4]Professor, Department of Dermatology, Venereology & Leprosy, Government Kilpauk Medical College, Tamilnadu, India.

Received : 05/01/2024
Received in revised form : 23/02/2024
Accepted : 07/03/2024

Keywords:
Pregnancy dermatoses, Skin disease, Pigmentation, Connective tissue, Hair changes, Bacterial infections.

Corresponding Author:
Dr. S.Joe Angelo,
Email: joeangelo75@gmail.com.

DOI: 10.47009/jamp.2024.6.2.41

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (2); 196-201

Abstract

Background: Many changes occur in skin during pregnancy, with pruritus (itching) being the most prevalent cutaneous symptom. Changes in the skin during pregnancy may be physiological, a modification of pre-existing skin conditions, or specific pregnancy-related dermatoses. This study aimed to correlate the prevalence of major cutaneous changes and diseases with different trimesters of pregnancy and gravidity. **Material and Methods:** This cross-sectional study was conducted on 300 pregnant women, irrespective of trimester and gravidity, attending the outpatient departments of Obstetrics & Gynaecology and Dermatology at the Government Kilpauk Medical College from September 2021 to September 2022. A complete dermatological examination was performed to study the morphology of skin lesions, distribution, and sites involved, and photographs of all lesions were recorded. Skin biopsy and Direct Immunofluorescence (DIF) were performed in conditions such as Pemphigus Vulgaris, Pemphigus Foliaceus, Pemphigoid gestationis, and connective tissue disorders. **Results:** The mean age of the participants was 23.8±3.62 years, and most were in the age–21-25 years (48.7%). There were significant differences in pigmentation changes, vascular changes, connective tissue changes, hair changes, and specific dermatoses between trimesters ($p < 0.0001$). There were significant differences in bacterial infections, viral infections, fungal infections, protozoal infections, and miscellaneous dermatomes between trimesters ($p < 0.0001$). **Conclusion:** Although in most instances, skin problems in pregnancy need only reassurance, meticulous history taking and examination along with foetal monitoring should be performed to avoid complications for both mother and foetus.

INTRODUCTION

The time from conception to delivery of a foetus is referred to as pregnancy. A variety of physiological and physical changes, primarily due to hormones, as well as immunological and metabolic changes, are present during this time.[1] Pregnancy causes some major changes to the skin, with pruritus (itching) being the most prevalent cutaneous symptom.[2] Changes in the skin during pregnancy may be physiological, a modification of pre-existing skin conditions, or specific pregnancy-related dermatoses.[3] The aforementioned skin conditions (Pruritus Sine Materia) may have pruritus with or without a rash. Changes in the collagen and elastic tissues that cause striae distensae and linea nigra, as well as changes to the skin's appendages, nails, and hair, are examples of physiological changes.[4]

Preexisting skin conditions may alleviate or worsen during pregnancy. For instance, systemic lupus erythematosus with renal involvement usually worsens, while acne improves in some pregnant women owing to the sebosuppressive action of oestrogen. This is caused by progesterone's alteration of the cytokines, which results in the expression of interleukins (IL) 4, 5, 10, and 13 that support foetal survival.[2,3,5] Certain skin conditions are more prevalent during pregnancy and the first few weeks after giving birth.[5,6] These immunological and hormonal changes are meant to support and accommodate the foetus as it develops and expands throughout gestation.[7] Pregnancy-

related specific dermatoses have been the subject of numerous research.[8] Even though these disorders are mostly harmless, they significantly increase the pregnant woman's concern.

Correct diagnosis requires early detection of these changes since some of them call for specific treatment due to the possibility of risk for either the mother or the foetus. Numerous skin changes appear to be uniquely linked to puerperium and pregnancy.[9] Atopic eruption of pregnancy is the most common dermatosis in pregnancy, accounting for 50% of patients.[1] It usually starts early in pregnancy with 75% of cases presenting before the third trimester. Five to ten percent of newborns with pemphigoid have urticarial, vesicular, or bullous lesions that gradually resolve throughout a few months.[5] Intrahepatic cholestasis increases the risk of prematurity, intrapartum foetal distress (22–33%), premature delivery (19–60%), and stillbirths (1–2%).[10] Therefore, in these situations, prompt diagnosis, specific therapy, close obstetric monitoring, and maternal counselling are essential.

Specific dermatoses of pregnancy are pemphigoid gestation, polymorphic eruption of pregnancy, intrahepatic cholestasis of pregnancy, and atopic eruption of pregnancy. A multidisciplinary approach comprising the obstetrician, dermatologist, and clinical pharmacologist may be required because some medications that appear to be useful to the pregnant mother, such as doxycycline, may be harmful to the developing baby. Pregnant women may experience certain dermatoses that are specific to certain trimesters.[11] While no rule is infallible, a diagnosis can be considered based on the patient's trimester of pregnancy and the ailment they are experiencing. While skin conditions may not frequently cause death, several studies have demonstrated that they hurt an individual's quality of life when associated with mental problems.[12]

Aim

This study aimed to correlate the prevalence of major cutaneous changes and diseases with different trimesters of pregnancy and gravidity.

MATERIALS AND METHODS

This cross-sectional study was conducted on 300 pregnant women, irrespective of trimester and gravidity, attending the outpatient departments of Obstetrics & Gynaecology and Dermatology at Government Kilpauk Medical College from September 2021 to September 2022. The study was approved by the institutional ethics committee before initiation, and informed consent was obtained from all patients.

Inclusion Criteria

Pregnant women, irrespective of trimester and gravidity, who were willing to participate in the study were included.

Exclusion Criteria

Patients unwilling to participate in the study were excluded.

Detailed history including age, obstetric status, antenatal history, chief complaints related to skin, onset of skin changes/lesions in relation to duration of pregnancy, history of any similar illness in previous pregnancies, family history of similar lesions, exacerbating factors, and associated medical and skin diseases were recorded.

A complete dermatological examination was performed to study the morphology of skin lesions, distribution, and sites involved, and photographs of all lesions were recorded. Bedside investigations like KOH mount, Gram's staining, Tzanck smear, Diascopy, Wood's lamp examination and baseline investigations such as Complete hemogram, liver function test, renal functional tests, viral markers, serum bile acid were carried out if needed depending on the condition. Skin biopsy and Direct Immunofluorescence (DIF) were performed in conditions such as Pemphigus Vulgaris, Pemphigus Foliaceus, Pemphigoid gestationis, and connective tissue disorders.

Statistical Analysis

The collected data were analysed using Microsoft Excel. Data were exported to the Statistical Package for the Social Sciences software (SPSS) version 22.0. Means, standard deviations, and ranges were used to describe continuous variables, while frequency distributions were obtained for dichotomous variables.

RESULTS

Among the primi, 2 patients were in the first trimester, 11 were in the second trimester, and 85 were in the third trimester. Among gravida 2 33.3% were in the second trimester, and 36.6% were in the third trimester. Among gravida 3 33.3% were in the second trimester and 31.3% were in the third trimester. [Table 1]

The mean age of the participants was 23.8±3.62 years. Approximately 26.7% were in 18-20 years, 48.7% in 21-25 years, 21.7% in 26-30 years and 3.0% in 31-35 years. [Table 2]

In the second trimester, there were six primi, eight gravida 2, four gravida 3, having linea nigra. In the third trimester, 37 primi, 45 gravida 2, and 35 gravida 3 had Linea nigra. In the second trimester, 9 primi, 7 gravida 2, 6 gravida 3, and in third trimester 25 primi, 27 gravida 2, and 26 gravida 3 had melasma. Eight primi, eight gravida 2, and six gravida 3 had more pronounced pigmentation over the neck, axilla, and breast in the second trimester, whereas 66 primi, 76 gravida 2, and 65 gravida 3 had increased pigmentation over these sites in the third trimester.

In the third trimester, one primi, four gravida 2, and five gravida 3 had gingival hyperplasias. Nineteen

ISSN (O): 2687-5365; ISSN (P): 2753-6556

primi, 23 gravida 2, and 15 gravida 3 had pedal oedema in the third trimester.

In the second trimester, 6 primi, 6 gravida 2, and 6 gravida 3 had striae gravidarum. 57 primi, 68 gravida 2, and 59 gravida 3 had striae gravidarum during the third trimester.

In one primi and one gravida 3, nail changes occurred in the second trimester. In the third trimester, two primi, two gravida 2, and four gravida 3 had nail changes.

In the third trimester, 6 primi, 8 gravida 2, and 7 gravida 3 had Pruritus gravidarum. Three primies in the second trimester and 10 in the third trimester had PUPPP. One primi, two gravida 2, and three gravida 3 had prurigo during pregnancy in the third trimester. Pruritic folliculitis was observed in one gravida 3 in the third trimester.

There were significant differences in pigmentation, vascular, connective tissue, hair, and specific dermatoses between trimesters ($p < 0.0001$). [Table 3]

In the third trimester, one primi, one gravida 2, and one gravida 3 had furunculosis. Hansen disease was seen in 1 primi in the first trimester and 1 gravida 2 in the third trimester. 1 primi in the first trimester, 1 primi and 1 gravida 2 in the second trimester and 1 primi and 1 gravida 3 in the third trimester were having syphilis.

Warts were seen in 5 primi, 4 gravida 2 and 6 gravida 3 during the third trimester. In the third trimester, two gravida 2 and one gravida 3 had HSV. Three gravida 2 and one gravida 3 had herpes zoster in the third trimester. Four primi, five gravida 2, and three gravida 3 had HIV infections in the third trimester.

1 gravida 2 in second trimester had candidiasis. In second trimester 1 primi, 1 gravida 2 and 4 gravida 3 are having tinea versicolor. 5 primi, 7 gravida 2 and 7 gravida 3 had tinea versicolor during the third trimester. 2 primi, 1 gravida 2 and 2 gravida 3 had dermatophytosis in the second trimester whereas 12 primi, 13 gravida 2 and 12 gravida 3 had dermatophytosis during the third trimester.

One gravida 2 had trichomoniasis in the third trimester. Scabies was observed in one gravida 2 and one gravida 3 in the second trimester. Three primaries and four gravida 2 had scabies during the third trimester.

Two gravida 3 in the second trimester and 11 primies,7 gravida 2,7 gravida 3 in the third trimester had acne vulgaris. Insect bite allergy was observed in one gravida 2 in the second trimester and in three primies, one gravida 2, and six gravida 3 in the third trimester. Acanthosis nigricans was seen in one primi in the first trimester, two gravida 2 in the second trimester, and one primi and one gravida 2 in the third trimester. Pityriasis rosea was observed in 1 gravida 3 in the second trimester and in 1 gravida 2 and 1 gravida 3 in the third trimester. Two primies and three gravida 2 and two gravida 3 in the second trimester had psoriasis, whereas one primi, two gravida 2, and one gravida 3 in the third trimester had psoriasis. Systemic lupus erythematosus was observed in 1 gravida 2 in the second trimester and 1 gravida 2 in the third trimester. Antiphospholipid antibody syndrome was observed in one gravida 3 in the second trimester and in two gravida 2 in the third trimester. One gravida 2 in the second trimester and one gravida 3 in the third trimester had neurofibromatosis. In the second trimester, urticaria was observed in one primi and two gravida 3. In the third trimester, urticaria was observed in one gravida 2 and two gravida 3.

There were significant differences in bacterial, viral, fungal, protozoal, and miscellaneous dermatomes between trimesters ($p < 0.0001$). [Table 4]

Table 1: Association of trimester and obstetric status among the study population

Obstetric status	Trimester			P value
	1	2	3	
1	2 (100)	11 (33.3)	85 (32.1)	0.37
2	0	11 (33.3)	97 (36.6)	
3	0	11 (33.3)	83 (31.3)	

Table 2: Distribution of age

		Frequency (%)
Age	18-20	80 (26.7%)
	21-25	146 (48.7%)
	26-30	65 (21.7%)
	31-35	9 (3%)

Table 3: Comparison of pigmentation, vascular, connective tissue, hair changes, and specific dermatoses between trimester

		I Trimester			II Trimester			III Trimester			P value
		G1	G2	G3	G1	G2	G3	G1	G2	G3	
Pigmentation changes	Linea nigra	0	0	0	6	8	4	37	45	35	<0.0001
	Melasma	0	0	0	9	7	6	25	27	26	
	Increased pigmentation of neck, axilla, and breast	0	0	0	8	8	6	66	76	65	
	Naevi	0	0	0	0	0	0	0	0	0	
Vascular changes	Gingival hyperplasia	0	0	0	0	0	0	1	4	5	<0.0001
	Varicose veins	0	0	0	0	0	0	0	0	0	
	Pedal oedema	0	0	0	0	0	0	19	23	15	

ISSN (O): 2687-5365; ISSN (P): 2753-6556

	Abdominal wall oedema	0	0	0	0	0	0	0	0	0	
Connective tissue changes	Striae gravidarum	0	0	0	6	6	6	57	68	59	<0.0001
Hair changes	Hair Loss	0	0	0	0	0	0	0	0	0	<0.0001
	Nail changes	0	0	0	1	0	1	2	2	4	
Specific dermatoses	Pruritus gravidarum	0	0	0	0	0	0	6	8	7	<0.0001
	PUPPP	0	0	0	3	0	0	10	0	0	
	Prurigo of pregnancy	0	0	0	0	0	0	1	2	3	
	Pruritic folliculitis	0	0	0	0	0	0	0	0	1	
	Pemphigoid gestationis	0	0	0	0	0	0	0	0	0	

Table 4: Comparison of various infections, and miscellaneous dermatoses between trimester

		I Trimester			II Trimester			III Trimester			P value
		G1	G2	G3	G1	G2	G3	G1	G2	G3	
Bacterial infections	Furunculosis	0	0	0	0	0	0	1	1	1	<0.0001
	Hansen's disease	1	0	0	0	0	0	0	1	0	
	Syphilis	1	0	0	1	1	0	1	0	1	
Viral infections	Wart	0	0	0	0	0	0	5	4	6	<0.0001
	HSV	0	0	0	0	0	0	0	2	1	
	Herpes zoster	0	0	0	0	0	0	0	3	1	
	HIV	0	0	0	0	0	0	4	5	3	
Fungal infections	Candidiasis	0	0	0	0	1	0	0	0	0	<0.0001
	Tinea versicolor	0	0	0	1	1	4	5	7	7	
	Dermatophytosis	0	0	0	2	1	2	12	13	12	
Protozoal infections	Trichomoniasis	0	0	0	0	0	0	0	1	0	<0.0001
	Scabies	0	0	0	0	1	1	3	4	0	
Miscellaneous dermatomes	Acne vulgaris	0	0	0	0	0	2	11	7	7	<0.0001
	Insect bite allergy	0	0	0	0	1	0	3	1	6	
	Acanthosis nigricans	1	0	0	0	2	0	1	1	0	
	Pityriasis rosea	0	0	0	0	0	1	0	1	1	
	Psoriasis	0	0	0	2	3	2	1	2	1	
	Impetigo herpetiformis	0	0	0	0	0	0	0	0	0	
	Systemic lupus erythematosus	0	0	0	0	1	0	0	1	0	
	Antiphospholipid antibody syndrome	0	0	0	0	0	1	0	2	0	
	Neurofibromatosis	0	0	0	0	1	0	0	0	1	
	Urticaria	0	0	0	1	0	2	0	1	2	

DISCUSSION

In women, pregnancy results in a multitude of cutaneous changes. These are reflections of the profound alterations in the endocrine, metabolic, and immunological profiles that occurred during this period.[13] Cutaneous changes develop in more than 90% of all pregnant females.[14] These include common cutaneous changes that occur in most cases of severe diseases, some of which are seen exclusively in the pregnant and postpartum states.

Our study, which sought to correlate the prevalence of major cutaneous changes and diseases with pregnancy trimesters and gravidity, revealed that more than two-thirds of the participants had diffuse pigmentation and more pronounced pigmentation over the neck, axilla, and breast, with an increased prevalence in the third trimester, followed by linea nigra and melasma. A significant association was observed between pigmentation changes and the third trimester of pregnancy. This is to the following study done by Kannambal et al. in 2017 which was a cross-sectional study done to determine the prevalence of physiological and pathological skin changes in pregnancy and discovered that physiological skin changes were seen in 94.8% of cases, with pigmentary changes being more common (90.8%).[15]

Similar to our study, Dabette et al. (2018) conducted a study in northeastern India to evaluate the skin changes experienced by expectant mothers. Pigmentary changes were observed in 67.3% of patients, more frequently in multigravidas. Pigmentary disorders were more common in the second trimester (86.6%) than in the third (57.7%). Linea nigra was seen in 93.9% of multigravidas but only in 55.5% of primigravidas. Infection was found to be prevalent in 30.8% of cases, with fungal infection being the most common (23.8%).[16]

In our study, 19% of the pregnant women experienced pedal oedema, particularly in the third trimester, followed by gingival hyperplasia (3.3%). In a study report given by Muzaffar et al., vascular changes were observed in 34.2% of pregnant women which was more commonly seen in the third trimester.[17] According to Wu et al. (2015), the fluctuation in oestrogen and progesterone levels during pregnancy influences subgingival microbiota and a spectrum of inflammatory responses in gingival tissues via changes in chemotaxis, cytokines, enzymes, and antioxidants to increased gingival inflammation.[18]

Approximately 67.3% of pregnant women in our study had striae gravidarum which was observed during the third trimester. Muzaffar et al., report on the physiological skin changes during pregnancy revealed that among the study participants, striae

ISSN (O): 2687-5365; ISSN (P): 2753-6556

gravidarum was observed in 77.1%.[17] Three pregnant women in this study had increased toenail growth and two had onycholysis. This is similar to the study conducted by Ponnapula et al. (2010), which revealed that more than 50% of women reported faster toenail growth, roughened toenail texture, increased skin dryness, swelling of the foot, ankle, and leg, unsteady gait, increased foot width, and hip pain in a retrospective study.[19] Fungal infection was most frequently noted in this study; dermatophytosis was observed in 14%, followed by tinea versicolor (8.3%), and warts (5%). Infection was found to be prevalent in 30.8% of cases, with fungal infection being the most common (23.8%) in a study done by Kannambal et al.[15]

Our study revealed the prevalence of leprosy among pregnant women to be 0.7% and the prevalence of syphilis to be 1.7%. According to a 2016 study by Sarkar et al., leprosy and pregnancy have an impact on the progression of one another. Leprosy clinical signs and symptoms are largely a result of immunity and depend on the host's immunological health.[20] Our study revealed that 1.7% of pregnant women had syphilis which is in line with the study conducted by Sethi et al., titled Declining Trends in Syphilis Prevalence among Antenatal Women.[21]

Among the specific dermatoses of pregnancy, the most common dermatosis observed in this study was pruritus gravidarum (7%), followed by PUP (4.3%), and prurigo of pregnancy (2%). This is similar to the cross-sectional study done by Kannambal et al., in 2007 in which pruritus gravidarum was the most common pregnancy-specific dermatosis observed in 500 study populations.[15]

According to a prospective study by Roger et al, pruritus gravidarum should be considered when there is pregnancy-related itching, whether there is a skin eruption or not. The incidence of herpes gestation is higher than that typically reported in the literature.[22] In a study conducted by Dabette et al. (2018), 13% of patients had dermatoses that were unique to pregnancy. The most frequent among them, the atopic eruption of pregnancy (AEP), was followed by intrahepatic cholestasis of pregnancy (ICP), which affected 3% of women, and polymorphic eruption of pregnancy (PEP), which affected 1%.[16]

According to a review article by Yakasai et al., 2011 on Specific Dermatoses of Pregnancy, some skin conditions, like obstetric cholestasis, may have negative effects on the foetus, while others, like pruritic folliculitis of pregnancy, have little to no impact on the mother or the foetus.[23] There were no negative effects on maternal or foetal outcome as a result of pregnancy dermatosis according to Jones et al., 2001 which is in line with our study findings.[24]

CONCLUSION

Although in most instances, skin problems in pregnancy need only reassurance, meticulous history taking and examination along with foetal monitoring should be performed to avoid complications for both mother and foetus. It is essential that a multidisciplinary approach comprising dermatologists, hepatologists, gynaecologists, and paediatricians collaboratively manage intrahepatic cholestasis of pregnancy.

REFERENCES

1. Ambros-Rudolph CM. Dermatoses of pregnancy - clues to diagnosis, fetal risk, and therapy. Ann Dermatol 2011; 23:265. https://doi.org/10.5021/ad.2011.23.3.265.
2. Çinar SL, Kartal D, Uludağ SZ, Dolanbay M, Ertaş R, Atıl AV, Borlu M. The skin findings of pregnant women and our treatment choices. A Turkish experience: a 5-year survey. Kafkas J Med Sci 2016; 6:46-52. https://dergipark.org.tr/tr/pub/kaftbd/issue/35433/393659.
3. Kar S, Krishnan A, Shivkumar PV. Pregnancy and skin. J Obstet Gynaecol India 2012; 62:268–75. https://doi.org/10.1007/s13224-012-0179-z.
4. Shanmugam S, Thappa DM, Habeebullah S. Pruritus gravidarum: A clinical and laboratory study. J Dermatol 1998; 25:582–6. https://doi.org/10.1111/j.1346-8138.1998.tb02462.x.
5. Warshauer E, Mercurio M. Update on dermatoses of pregnancy. Int J Dermatol 2013; 52:6–13. https://doi.org/10.1111/j.1365-4632.2012.05528.x.
6. Sachdeva S. The dermatoses of pregnancy. Indian J Dermatol 2008; 53:103. https://doi.org/10.4103/0019-5154.43203.
7. Kroumpouzos G, Cohen LM. Dermatoses of pregnancy. J Am Acad Dermatol 2001; 45:1–22. https://doi.org/10.1067/mjd.2001.114595.
8. Pennoyer JW, Grin CM, Driscoll MS, Dry SM, Walsh SJ, Gelineau JP, et al. Changes in size of melanocytic nevi during pregnancy. J Am Acad Dermatol 1997; 36:378–82. https://doi.org/10.1016/s0190-9622(97)80212-5.
9. Al-Fares SI, Vaughan Jones S, Black MM. The specific dermatoses of pregnancy: a re-appraisal. J Eur Acad Dermatol Venereol 2001; 15:197–206. https://doi.org/10.1046/j.1468-3083.2001.00209.x.
10. Ropponen A, Sund R, Riikonen S, Ylikorkala O, Aittomäki K. Intrahepatic cholestasis of pregnancy as an indicator of liver and biliary diseases: A population-based study. Hepatology 2006; 43:723–8. https://doi.org/10.1002/hep.21111.
11. George AO, Shittu OB, Enwerem E, Wachtel M, Kuti O. The incidence of lower mid-trunk hyperpigmentation (linea nigra) is affected by sex hormone levels. J Natl Med Assoc 2005; 97:685–8. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2569341/
12. Pärna E, Aluoja A, Kingo K. Quality of life and emotional state in chronic skin disease. Acta Derm Venereol 2015; 95:312–6. https://doi.org/10.2340/00015555-1920.
13. Goldsmith L, Katz S, Gilchrest BA, Paller AS, Leffell DJ, Wolff K. Fitzpatrick dermatology in general medicine. McGraw Hill Medical 2012;150. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=15.%09Goldsmith+L%2C+Katz+S%2C+Gilchrest+BA%2C+Paller+AS%2C+Leffell+DJ%2C+Wolff+K.+Fitzpatrick+dermatology+in+general+medicine.+McGraw+Hill+Medical+2012%3B150&btnG=
14. Thappa D, Kumari R, Jaisankar TJ. A clinical study of skin changes in pregnancy. Indian J Dermatol Venereol Leprol 2007; 73:141. https://doi.org/10.4103/0378-6323.31910
15. Kannambal K. A Screening Study on Dermatoses in Pregnancy. J Clin Diagn Res 2017. https://doi.org/10.7860/jcdr/2017/27207.9907.
16. Dabette K, Bijayanti D, Hafi BA, Singh R. Skin changes during pregnancy: A study from Northeast India. Indian Dermatol Online J 2018; 9:455. https://doi.org/10.4103/idoj.idoj_352_17.
17. Muzaffar F, Hussain I, Haroon TS. Physiologic skin changes during pregnancy: a study of 140 cases. Int J Dermatol 1998;

ISSN (O): 2687-5365; ISSN (P): 2753-6556

37:429–31. https://doi.org/10.1046/j.1365-4362.1998.00281.x.
18. Wu M, Chen S-W, Jiang S-Y. Relationship between gingival inflammation and pregnancy. Mediators Inflamm 2015; 2015:1–11. https://doi.org/10.1155/2015/623427.
19. Ponnapula P, Boberg JS. Lower extremity changes experienced during pregnancy. J Foot Ankle Surg 2010; 49:452–8. https://doi.org/10.1053/j.jfas.2010.06.018.
20. Sarkar R, Pradhan S. Leprosy and women. Int J Womens Dermatol 2016; 2:117–21. https://doi.org/10.1016/j.ijwd.2016.09.001.
21. Sethi S, Sharma K, Dhaliwal LK, Banga SS, Sharma M. Declining trends in syphilis prevalence among antenatal women in northern India: a 10-year analysis from a tertiary healthcare centre. Sex Transm Infect 2007; 83:592–592. https://doi.org/10.1136/sti.2007.025551.
22. Roger D. Specific pruritic diseases of pregnancy: A prospective study of 3192 pregnant women. Arch Dermatol 1994; 130:734. https://doi.org/10.1001/archderm.1994.01690060064006.
23. Yakasai I, Thomson AJ, Fitzsimons C. Specific dermatoses of pregnancy: a review. West Afr J Med 2011; 30:239–44. https://www.ajol.info/index.php/wajm/article/view/77442
24. Jones V, Hern, Nelson-Piercy, Seed, Black. A prospective study of 200 women with dermatoses of pregnancy correlating clinical findings with hormonal and immunopathological profiles. Br J Dermatol 1999; 141:71–81. https://doi.org/10.1046/j.1365-2133.1999.02923.x.