Original Article

A cross-sectional study on the prevalence and determinants of various neonatal dermatoses

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Abstract

Background: During the neonatal life cycle, various dermatological conditions are common. In comparison to the skin of adults, neonates' skins are more susceptible to infections in the first week of their lives. These infections often lead to many dermatological skin complications and create worrisome among parents. Hence, it is crucial to diagnose and manage such affected neonates at the earliest. This study aimed to highlight and estimate the occurrence of numerous dermatoses and assess various skin changes that occurred physiologically and pathologically in neonates. **Methodology:** In this cross-sectional observational study, 474 neonates were enrolled in the neonatal intensive care unit. The whole newborn skin surface, comprising the palms and soles, scalp, mucous membranes, genitalia, hair, and nails, was scrutinized under adequate light, and all changes that occurred over the skin were observed and recorded. The sample size estimation was undertaken from the references that have the least prevalent cutaneous dermatosis: hypertrichosis desquamation and napkin dermatosis. A statistical analysis like the Chi-square test was performed to associate the type of dermatosis with the parameters of age, gender, delivery type, and birth weight. **Results:** Of the total 474 cases, 90 (18.98%) had single dermatosis, while the remaining 384 (81.01%) had more than one form of dermatosis. Among the 384 cases, sebaceous gland hyperplasia (SGH) in 105 (22.15%), Epstein pearls in 50 (10.54%), erythema toxicum neonatorum (ETN) in 40 (8.43%), physiological desquamation in 25 (5.27%), lanugo hair in 20 (4.21%), miliaria in 22 (4.64%), salmon patch in 13 (2.74%), cradle cap/seborrheic dermatitis in 6 (1.26%), vernix caseosa in 12 (2.53%), transient neonatal pustular melanosis in 13 (2.74%), congenital melanocytic nevus in 20 (4.21%), hemangioma in 15 (3.16%), neonatal acne in 5 (1.05%), napkin dermatitis in 10 (2.10%), cutis marmorata in 6 (1.26%), milia in 2 (0.42%) intertrigo 3 (0.63%), collodion baby in 2 (0.42%), and neonatal occipital alopecia in 2 (0.42%) neonates each and others, respectively. **Conclusion:** The findings from the present study were representative of a specific racial/geographic distribution and will assist in adding or comparing the prevalence of neonatal dermatosis with other geographic regions as the array of dermatological characterizations in neonates varies as per time and place. This study aims to provide insight into the future implications in the neonatal dermatology domain and avoid further skin complications.

Keywords: Dermatosis, desquamation, neonatal genodermatosis, skin lesion, skin manifestations

Introduction

The first month of extra-uterine life is important and commonly considered a neonatal period because physiological adjustments occur due to the proceeding of changes concerned with shifting from uterine liquid surroundings to external parched surroundings, and dermatological conditions can affect newborns during this period. The skin of newborns is attenuated, has fragile

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intercellular attachments, and releases less sweat and sebaceous gland secretion in comparison with adults; hence, they are more susceptible to various skin infections.[1]

Due to the presence of glandular and melanocytic immaturity in the neonates' skin, the cutaneous charter is not similar to that of adults, as its fine layer thickness, and its biochemical configuration make pH alkaline. The elements that are predisposed to neonatal dermatoses (ND) are anatomical and physiological factors. The majority of neonatal cutaneous conditions are typically physiological, brief, and self limited.[1,2] Skin manifestations in newborns can be categorized into physiological conditions, birthmarks, transient eruptions, cutaneous infections, and inherited conditions. A smaller number of these conditions may have predictive inferences, such as congenital melanocytic nevus,[3,4] and epidermolysis bullosa,[5] which need genetic counseling and family planning.[2] In the first seven days of the neonatal life cycle, skin lesions can have a significant impact on increasing the psychological stress of parents; hence, stressed parents usually consider medical guidance for their offspring's skin conditions. Therefore, it is crucial to recognize and diagnose them efficiently with a view to keeping away from needless diagnostic or medical interventions.

Therefore, as a medical practitioner, it's crucial to get familiar with the transitory skin lesions in newborns, which can differ from additional significant skin conditions that will assist to circumvent an unessential regime for the newborn, and the guardians can be guaranteed good outcomes and prognosis of these skin changes.[5] The huge geographic and ethnic differences have an effect on the changes in neonatal skin. A few diverse skin lesions are usually found in darker-skinned individuals.[6] The range of dermatological characterization in neonates differs according to time and place. Other of the most relevant elements affecting the changes in the pattern of cutaneous lesions encompass climate, customs, hygiene, maternal factors, nutrition, race, socioeconomic status, customs, maternal factors, somatic make-ups, and genetic factors.[7] However, there are limited studies conducted on ND in India. Nearly, the possibilities of very few studies to date about neonatal dermatosis have been conducted in this Vidarbha region of central India. This study aims to highlight and estimate the prevalence of various dermatoses and determine several skin changes occurring physiologically and pathologically in neonates, which will eventually benefit primary care physicians.

Methodology

A cross-sectional observational study was conducted on 474 neonates in the neonatal intensive care unit on admitted neonates with the coordination of the Departments of Pediatrics and Obstetrics and Gynecology at the hospital over a time span of two and a half years after getting approval from the Institutional Ethics Committee with reference number DMIMS (DU)/IEC/2014-15/827 and informed consent from the guardians prior to the study.

The subjects included were neonates who were under the first four weeks of life, and information was noted such as age, gender, mode or type of delivery, body weight, and gestational period. The critically ill neonates on ventilator support were excluded from the study. Relevant information about the newborn's (age, weight, and sex) birth and the mother's (parity, consanguinity, type of delivery, and maternal illness details at the time of pregnancy) was noted and recorded in the proforma. All the required sanitation and sterilization measures were adopted before the examination of the neonates. The whole skin surface of the neonate, involving the hand palms, scalps, and soles, mucous membranes, genitalia, hair, and nails, was inspected in adequate light. The changes were seen (physiological and pathological) over the skin; hence, the details were inspected, analyzed, and finally documented.

Photographic records were kept as part of the study's documentation. Simple non-invasive diagnostic examinations like Potassium Hydroxide examination and culture of scrapings for fungal infections, pus swabs for Gram staining and bacterial culture, Tzanck smear, and biopsy were carried out as and when required. The statistical methods used were the *t*-test and the Chi-square test. The data were subjected to statistical analysis using SPSS. A Chi-square test was performed to associate the type of dermatosis with the parameters of age, gender, delivery type, and birth weight. All *P*- values not greater than 0.05 were regarded as statistically significant.

Results

Of 474 cases, 90 (18.98%) had a single dermatosis, while the remaining 384 (81.01%) had more than one form of dermatoses, as shown in Table 1.

The findings from Table 2 included that males 255 (53.80%) showed predominance in neonatal dermatosis in comparison to females 219 (46.20%).

Table 3 showed that the maximum number of neonates, that is, 200 (42.19%), were full term, 159 (33.54%) were pre-term, and 115 (24.26%) were post-term.

Table 1: Prevalence of neonatal dermatoses

Neonatal Dermatoses	Number of neonates	Percentage
Neonates with more than one dermatosis	384	81.01
Neonates with single dermatosis	90	18.99
Total	474	100

Table 2: Distribution of neonates as per gender

Gender	Number of neonates	Percentage
Male	255	53.80
Female	219	46.20
Total Number	474	100.00

Table 4 showed that the maximum number of neonates, that is, 386 (81.43%), were delivered by the vaginal method and 88 (18.56%) were delivered by cesarean section.

Table 5 showed that the maximum number of neonates, that is, 399 (84.17%), had a birth weight ≥2.5 kg and 75 (15.82%) had <2.5 kg.

Table 6 showed the frequency of various ND.

Table 7 showed that 66 (62.85%) neonates were delivered by normal vaginal delivery and 39 (37.14%) were delivered by cesarean section, with a significant *P*- value ($P = 0.0002$). The maximum number of neonates, that is, 92 (87.60%) with SGH, had a birth weight ≥2.5 kg, and 13 (12.38%) had <2.5 kg, with a significant *P*- value ($P = 0.001$).

Table 8 showed that the maximum numbers of neonates, that is, 92 (87.5%), with SGH were full-term, followed by 11 (10.47%) post-term and 2 (1.90%) pre-term, and the majority of 64 (60.55%) were males, with significant *P*- values for both parameters ($P = 0.0001$) and ($P = 0.019$), respectively.

Table 9 showed that 27 (53.60%) neonates with Epstein pearl were born of normal delivery and 23 (46%) were delivered by cesarean section, with a non-significant *P*-value ($P = 0.39$). It also depicted that the maximum number of neonates with Epstein pearl were males, that is, 30 (60%) and 20 (40%) were females, with a significant *P*-value ($P = 0.004$).

Table 10 showed that the maximum number of neonates, that is, 46 (92%) with Epstein pearls were born full-term, and very few were pre-term and post-term, that is, 2 (4%) each. The majority, that is, 43 (85.48%), were ≥2.5 kg in weight during birth, with significant *P*-values for gestational age and birth weight ($P = 0.0001$) and ($P = 0.0001$), respectively.

Table 11 showed that 14 (56%) newborns with physiological desquamation were delivered by the normal vaginal delivery method and 11 (44%) by the cesarean section delivery method, with a non-significant *P* value ($P = 0.08$). It also showed that the maximum number of neonates with Physiological desquamation were males, that is, 16 (64%) and 9 (36%) were females, with a significant *P*-value ($P = 0.0001$).

Table 12 showed that the maximum number of neonates with physiological desquamation was 23 (92%) who were full-term, whereas 1 (4%) were post-term and pre-term, respectively, and also showed that the maximum number of neonates, that is, 22 (88%) with physiological desquamation, had a birth weight ≥2.5 kg and 3 (12%) had <2.5 kg, with a significant *P*-value ($P = 0.0001$).

Table 13 showed that 13 (65%) neonates with Lanugo hairs were born by cesarean section and 7 (36.49%) were born by normal vaginal delivery, with a significant *P*-value. genderwise, LH males had a maximum of 13 (65%).

Table 3: Allocation of neonates as per maturity

Maturity	Number of neonates	Percentage
Pre-term	159	33.54
Term	200	42.19
Post-term	115	24.26
Total	474	100.00

Table 4: Distribution of neonates according to the method of delivery

Delivery method	Number of neonates	Percentage
Normal delivery by the vagina	386	81.43
Cesarean section	88	18.57
Total	474	100.00

Table 5: Distribution of neonates according to birth weight

Weight at birth (kg)	The number of neonates	Percentage
≥2.5 kg	399	84.17
<2.5 kg	75	15.82
Total	474	100.00
Average weight	2.70±0.25 (Range=2–3.20 kg)	

Table 6: Frequency of various neonatal dermatoses

Neonatal dermatoses	Frequency of neonatal dermatoses (*n*=474)	Percentage
A. Physiological cutaneous lesion		
Sebaceous gland hyperplasia	105	22.15
Epstein pearls	50	10.54
Physiological desquamation of the skin	25	5.27
Lanugo hair	20	4.21
Milia	2	0.42
Vernix caseosa	12	2.53
Cutis marmorata	6	1.26
Neonatal occipital alopecia	2	0.42
B. Transient non-effective lesions		
Erythema toxicum neonatorum	40	8.43
Miliaria	22	4.64
Transient neonatal pustular melanosis	13	2.74
Neonatal acne	5	1.05
C. Birthmark		
a) Salmon Patch	13	2.74
b) Hemangioma	15	3.16
c) Congenital melanocytic nevus	20	4.21
d) Café au lait macule	1	0.21
D. Pathological lesions:		
1) Eczematous eruption		
a) Cradle cap/Seborrhoeic dermatitis	6	1.26
b) Napkin dermatitis	9	1.89
2) Infection		
a) Intertrigo	3	0.63
3) Genodermatoses		
a) Collodion baby	2	0.42

Table 7: Distribution of neonates with sebaceous gland hyperplasia (SGH) according to method of delivery and weight at birth

Number of neonates with Sebaceous Gland Hyperplasia	Method of delivery		Weight in Kg	
	Normal vaginal delivery	Caesarean section	≥2.5 kg	<2.5 kg
105	66	39	92	13
Percentage	62.85%	37.14%	87.60%	12.38%
P	13.52, *P*=0.0002, S		115.50, *P*=0.001, S	

Table 8: Distribution of neonates with sebaceous gland hyperplasia according to gestational age and gender

Number of neonates with SGH	Gestational age			Gender	
	Pre-term	Term	Post-term	Male	Female
105	2	92	11	64	41
Percentage	1.90%	87.50%	10.47%	60.55%	39.04%
P	204, *P*=0.0001, S			9.68, *P*=0.019, S	

Table 9: Distribution of neonates with Epstein Pearl (EP) as per the method of delivery and gender

Number of neonates with EP	Method of delivery		Gender	
	Normal vaginal delivery	Cesarean section	Male	Female
50	27	23	30	20
Percentage	53.60%	46.%	60%	40%
P	0.72, *P*=0.39, NS		8.00, *P*=0.004, S	

Table 10: Distribution of neonates with Epstein Pearl (EP) according to gestational age and weight at birth

Number of neonates with EP	Gestational age			Birth weight	
	Pre-term	Term	Post-term	≥2.5 kg	<2.5 kg
50	2	46	2	43	7
Percentage	4%	90%	4.65%	85.58%	14.42%
P	195.20, *P*=0.0001, S			103.70, *P*=0.0001, S	

Table 11: Distribution of neonates with physiological desquamation (PD) of the skin according to method of delivery

Number of neonates with PD	Method of delivery		Gender	
	Normal delivery by vagina	Cesarean Section	Male	Female
25	14	11	16	9
Percentage	56%	44%	64%	36%
P	2.88, *P*=0.08, NS		15.68, *P*=0.0001, S	

Table 14 showed that the maximum number of neonates, that is, 13 (65%) with lanugo hairs, were pre-term, whereas 7 (35%) were full term and none (0%) were post-term, with a significant *P*-value ($P = 0.0001$). The maximum number of neonates, that is, 15 (75%) with lanugo hairs, had a birth weight ≥2.5 kg and 5 (25%) had <2.5 kg, with a significant *P*-value ($P = 0.0001$).

Table 15 showed that a maximum number of neonates with vernix caseosa, that is, 19 (95%) were full-term, followed by 1 (8.3%) pre-term, none post-term, and the majority (9, 75%) were ≥2.5 kg in birth weight, with significant *P*-values for gestational age and birth weight ($P = 0.0001$) and ($P = 0.0001$), respectively.

Table 16 showed that the number of neonates with vernix caseosa delivered vaginally was 9 (75%) and by cesarean section was 3 (25%) with a significant *P*-value ($P = 0.0001$). Similarly, male neonates were 8 (66%) and females were 4 (34%), with a significant *P*-value ($P = 0.0001$).

Table 17 showed the maximum number of neonates with ETN had onset on the second and third days of age, that is, 95 (45.24%) and 98 (46.67%), respectively. And very few of them, that is, 11 (5.24%) on the fourth day and 6 (2.86%) on the fifth day of age.

Table 18 showed that the numbers of neonates with ETN delivered vaginally were 21 (52.5%) and by cesarean section were 19 (47.50%) with a non-significant *P*-value ($P = 0.57$) and the majority were males, that is, 34 (85%) with a significant *P*-value ($P = 0.0001$).

Table 19 showed that the maximum number of neonates, that is, 35 (87.5%) with ETN, were full-term, whereas 3 (7.5%) were pre-term and 2 (5%) were post-term, with a significant *P*-value ($P = 0.0001$). The maximum number of neonates, that is, 33 (82.5%) with ETN, had birth weight ≥2.5 kg, and 7 (17.5%) had <2.5 kg, with a significant *P* value ($P = 0.0001$).

Table 20 showed that the number of neonates with miliaria delivered vaginally was 12 (54.54%) and by cesarean section was 10 (45.54%) with a non-significant *P*-value ($P = 0.57$) and a maximum number of neonates were full term (16, 72.72%) and a few were pre-term 3 (13.63%) and post-term, that is, 4 (18.1%) each with a significant *P*-value ($P = 0.0001$).

Table 21 showed that the number of male and female neonates with miliaria was 11 (50%) and 11 (50%) respectively, with a non-significant *P*-value ($P = 0.77$). The majority of neonates (15, 68.18%) were ≥2.5 kg in birth weight, with a significant *P* value ($P = 0.0001$).

Discussion

The results from the study of ND at the Department of Pediatrics and Obstetrics and Gynecology were discussed and compared with other related studies in the following section. Table 1 showed that the prevalence of ND was 384 (81.01) among 474 neonates. Similar studies concluded a prevalence of ND of 519 (90.7%) 474 (94.8%), 132 (74.6%), and 577 (34.75%), respectively.[8-11] The frequency of ND mentioned in the current study is approximately identical to the above-mentioned studies. Numerous reviews of the frequency of ND have been registered in several nations and with different ethnicities. 240 (40.0%) skin

Table 12: Allocation of neonates with physiological desquamation (PD) of the skin according to gestational age and birth weight

Number of neonates with PD	Gestational age			Birth weight (kg)	
	Pre-term	Term	Post-term	≥2.5 kg	<2.5 kg
25	1	23	1	22	3
Percentage	4	92.2	4	88%	12%
P	256.70, *P*=0.0001, S			128.00, *P*=0.0001, S	

Table 13: Distribution of neonates with lanugo hairs (LH) according to method of delivery and gender

No. of neonates with LH	Method of delivery		Gender	
	Normal vaginal delivery	Cesarean section	Male	Female
20	7	13	13	7
Percentage	35%	65%	65%	35%
P	15.68, *P*=0.0001, S		13.52, *P*=0.0002, S	

Table 14: Allocation of neonates with lanugo hair according to gestational age and weight at birth

Number of neonates with lanugo hair	Gestational age			Birth weight (kg)	
	Pre-term	Term	Post-term	≥2.5 kg	<2.5 kg
20	13	7	0	15	5
Percentage	65%	35%	0.00%	75%	25%
P	18.00, *P*=0.0001, S			42.32, *P*=0.0001, S	

Table 15: Allocation of neonates with vernix caseosa (VC) as per birth weight and gestation age

Number of neonates with VC	Gestational age			Birth weight	
	Pre-term	Term	Post-term	≥2.5 kg	<2.5 kg
12	1	11	0	9	3
Percentage	8.3%	91.6%	0%	75%	25%
P	257.3, *P*=0.0001, S			50, *P*=0.0001, S	

Table 16: Distribution of neonates with vernix caseosa (VC) according to method of delivery and gender

Number of neonates with VC	Method of delivery		Gender	
	Normal vaginal delivery	Cesarean section	Male	Female
12	9	3	8	4
Percentage	75%	25%	66%	34%
P	50, *P*=0.0001, S		18, *P*=0.0001, S	

disorders were seen in Egyptian neonates, 59.7% were prevalent in German newborns, and 59.7% were in Indian babies with cutaneous lesions cases.[10] This wide variation in the prevalence of ND could be due to different climatic, racial, nutritional, hygienic, socioeconomic status, customs, somatic make-ups, heredity, and maternal factors.[7]

A maximum number of neonates were males, that is, 255 (53.80%) and 219 (46.20%) were females in this study [Table 2]. The majority of ND were predominately seen in males in comparison to females, in accordance with previously conducted studies.[6,10-12] A previous study shown that females were more affected by such skin conditions; hence, it was anticipated that the predominance of males in this study is similar to that found in the majority of the previous studies, as well as the ratio of males to females in the particular geographic area.[6,10-12]

Depending upon the maturity of the neonates, this study reported that the maximum number of neonates, that is, 200 (42.19%), were full term, whereas 159 (33.54%) were pre-term and 115 (24.26%) were post-term [Table 3]. The findings from another study concluded that the maximum number was full-term newborns in comparison to pre-term and post-term.[6,8,12,13] A larger proportion of the newborns enrolled in the study were full-term born, which is in association with the finding observed by the above-mentioned studies. The gestational age of the newborn depends on the maternal condition throughout the pregnancy and also at the time of delivery.

According to the method of delivery, this study reported that a maximum of 386 neonates (81.43%) were delivered vaginally and 88 (18.57%) by cesarean section. The maximum number of neonates were delivered by the normal vaginal method and a smaller number by cesarean section methods.[8,12,14-16] The data in this study regarding the method of delivery of newborns are more or less similar to the above-mentioned studies. The method of delivery of the fetus depends upon various maternal and fetal factors affecting the outcome at the time of delivery.

The present study reported that the maximum number of neonates, that is, 399 (84.17%), had birth weight >2.5 kg and 75 (15.82%) had <2.5 kg. In comparison to the former conducted studies, the maximum number of neonates found were >2.5 kg weight at birth.[11,12,15] The present study's findings regarding neonatal birth weight are in accordance with the findings observed in different studies. The birth weight of a newborn depends on genetic, environmental, parental socioeconomic status, maternal nutrition, and other maternal factors. The majority of ND are physiological, and they get influenced by various maternal, neonatal, and environmental factors, which can act independently or in combination. This could be the reason for the preponderance of more than one ND.

One of the commonest dermatoses seen in 105 (22.15%) neonates was SGH. The incidence of SGH was noted high and less in neonates in former studies.[6,10] The frequency of SGH was within the range noted in the above-mentioned studies. The most common site of SGH in the present case study was the nose, and this could be due to the greater number of sebaceous glands distributed on the face.[12]

The study also reported that 66 (62.85%) more cases of SGH were found in neonates delivered vaginally with a birth weight of ≥2.5 kg, which was similar to the other study findings. The cause for the low frequency of SGH in pre-term might be the

Table 17: Distribution of erythema toxicum neonatorum (ETN) according to age of onset (in days)

Number of neonates with ETN	Age of onset (in days)	% of neonates
22	2 days	55
8	3 days	20
6	4 days	15
4	5 days	10

ETN=Erythema toxicum neonatorum

Table 18: Allocation of erythema toxicum neonatorum (ETN) according to mode of delivery

Number of neonates with ETN	Mode of delivery		Gender	
	Normal vaginal delivery	Caesarean section	Male	Female
40	21	19	34	6
Percentage	52.5	47.5%	85%	15%
P	0.32, *P*=0.57, NS		92.48, *P*=0.0001, S	

Table 19: Allocation of erythema toxicum neonatorum (ETN) according to gestational age and birth weight

Number of neonates with ETN	Gestational age			Birth weight (kg)	
	Pre-term	Term	Post-term	≥2.5 kg	<2.5 kg
40	3	35	2	33	7
Percentage	7.5%	87.5%	5%	82.5%	17.5%
P	201.80, *P*=0.0001, S			92.48, *P*=0.0001, S	

Table 20: Allocation of neonates with Miliaria according to method of delivery and gestational age

Number of neonates with Miliaria	Method of delivery		Gestational age		
	Normal delivery by vagina	Cesarean section	Pre-term	Term	Post-term
22	12	10	3	16	4
Percentage	54.54%	45.45%	13.63%	72.72%	18.1%
P	0.32, *P*=0.57, NS		108.50, *P*=0.0001, S		

Table 21: Allocation of neonates with Miliaria according to gender and birth weight

Number of neonates with Miliaria	Gender		Birth weight	
	Male	Female	≥2.5 kg	<2.5 kg
22	11	11	15	7
Percentage	50.%	50%	68.18%	31.8
P	0.08, *P*=0.77, NS		18.00, *P*=0.0001, S	

loss of improvement of the sebaceous gland, and the feasible cause for male predominance is probably the extended degrees of circulating testosterone in male newborns in conjunction with the impact of maternal androgens, which leads to the accelerated interest of sebaceous glands.[6,12]

The occurrence of Epstein's pearl was noted in 50 (10.54%) neonates. In comparison to other studies, this was 15.27%, 18.8%, and 38%, respectively.[13,16,17] In the present study, the frequency of Epstein's pearl was found to be on the lower side, as Epstein's pearl was observed to be more prevalent among Caucasians and whites.[17] In the present study, the commonest site of Epstein's pearl was midline the of the palate, which was similar to the study outcome.[6] It revealed that in the present study, although the number of newborns delivered vaginally was higher at 27 (53.60%), it was not statistically significant, which was analogous to other studies.[13,18] This means that their occurrence is not influenced by the mode of delivery. It also showed that the maximum number of neonates with Epstein pearls was 30 (60%) male and was homogenous to the different research results.[9] The highest number of neonates were males, with a birth weight of 2.5 kg and born of normal delivery (23, 46%), which were relatable to the findings of alternative studies. Epstein pearl is nothing but milia occurring in the oral cavity over the gingival and on the midline of the palate.[9,13]

The incidence of physiological desquamation was noted in 25 (5.27%) neonates, which was more or less in accordance with a similar study finding.[7,8,11] The variation in the physiological desquamation occurrence differs as per the day of examination; some studies have reported more in babies who were observed for more than 5 days. The day of examination (5^{th}–7^{th} day) and the beginning of physiological shedding exhibit statistical significance ($P < 0.002$).[7,8,11] In this study, the frequency of physiological scaling was on the lower side, as neonates were randomly enrolled in the study. The method of delivery does not affect the occurrence of physiological desquamation with a non-significant *P*-value, and with male predominance, it was found more in term neonates and was similar to the other study outcome,[14,15,19] whereas in another study done by Gokdemir G *et al.*, it was found to be more usual in post term neonates.[8] The shedding may be associated with the loss of the vernix caseosa that takes place at term and forms a subsequent maceration of the lascivious covering of the skin in utero with resultant desquamation in the previous days of life.[15] In the present study, the usual areas of involvement were the wrists, ankles, palms, soles, and lower abdomen. According to the birth weight, the maximum number was of normal birth weight (≥2.5 kg), and the outcome was identical to the study.[15] It has been recommended that shedding can be analogous to the vernix caseosa loss and negative barrier feature of neonatal pores and skin, which would possibly allow trans epidermal water loss with the next dehydration of the stratum corneum throughout the preliminary days of life.[15,16]

In this study, the presence of lanugo hair was seen in 20 (4.21%) of the studied newborns, which was almost the same as the findings.[13] The frequency of lanugo hair was on the lower side, as a lesser number of pre-term babies were enrolled in the current study. The maximum number of neonates were male and delivered by cesarean section, and the same was in the other study outcome.[15] In terms of maturity and weight at birth, more numbers were pre-term and were ≥2.5 kg, which were found relevant to findings of other research.[9,13,15,17] This means that lanugo hair is more commonly seen in pre-term babies.

Newborns are enveloped with silky, thin, unmedullated hairs known as lanugo. This type of hair is more salient in pre-term infants, as the very first coat or covering of it is generally taken off in utero in the last trimester and replaced with the second coat of shorter lanugo hairs.[15,16]

Vernix Caseosa was seen in 12 (2.53%) neonates, which were more or less similar to findings observed by reference studies. In other studies, its incidence varied from 2.9% to 9.8%.[6,8,17] It also revealed that in the present study, vernix caseosa was seen more in males, full-term neonates who were delivered vaginally and had a birth weight of ≥2.5 kg. Vernix caseosa is more prominently seen in term babies with normal weight at birth, as lower birth weight and pre-term neonates possess very immature and incompetent stratum corneum and sebaceous glands, as true vernix is a mixture of sebum with desquamated corneocytes in the overlying lipid matrix.[1,15]

The frequency of cutis marmorata was 6 (1.26%), was delivered normally, and were full-term males with normal birth weight (≥2.5 kg) as compared to other studies. Cutis marmorata is mainly due to constriction of venules and capillaries due to exposure to cold and disappears with rewarming.[20] The rare cases were neonatal occipital alopecia and milia, with a frequency of 2 (0.42%) in the present study, and all 2 cases were seen in term babies.

The present study showed that ETN was found in 40 (8.43%) neonates, which was more or less similar to the findings.[6,15] It also depicted that the mode of delivery does not affect the occurrence of ETN with a non-significant *P* value, which was similar to the finding observed in other studies.[13] There was a significant relationship between delivery through cesarean section and ETN, and it was observed more in males, which was similar to findings of the previous studies.[13,21] The reason for male predominance is uncertain, but the adrenal and gonadal androgen levels in male newborns were elevated, which may have a direct impact on sebaceous glands, which are included in the pathogenesis of ETN. There were more commonly seen in term neonates with normal birth weight, which was similar to the similar study findings. The etiology of ETN still remains uncertain; few reactions of the skin were found in the newborn, while becoming habitual to the external surroundings is the favorite hypothesis till now. Immaturity of the pilosebaceous follicles plays a role in the development of ETN.[22]

Miliaria was noted in 22 (4.64%) neonates, with more in male neonates. In other studies, incidence of miliaria ranged from 1.7% to 28.3%. The frequency of miliaria was observed to be 1.7% in American neonates and 4.5% in Japanese newborns.[8] This variance in frequency may be due to the different climatic conditions. Secondly, the Indian traditional and social custom of wrapping newborn babies may contribute to this difference. The dissimilarity among races in the allocation and quantity of eccrine sweat glands may be one more reason for this difference.[14] It also depicted that the mode of delivery does not affect the occurrence of miliaria with a non-significant *P*-value, but related studies have not been found. It also showed that in the present study, the maximum number of neonates with miliaria were full-term, with a significant *P*-value ($P = 0.0001$) as reported in other conducted studies.[6,9,15] Miliaria was found to be higher in males of normal weight.[15]

The occurrence of transient neonatal pustular melanosis was 13 (2.74%). Transient neonatal pustular melanosis occurred in 0.2% of white newborns and 4.4% of black neonates. The difference in the incidence of neonatal pustular melanosis in the same studies was seen as 2.6%, 1.05%, and 7.6%, respectively.[10,23] Another finding was that the salmon patch was estimated at about 13 (2.74%) neonates, which was almost similar to analogous studies.[22] In this study, the most common site of occurrence was the eyelids, similar to the finding (90.82%) noted by Haveri and Inamdar.[6]

Regarding the frequency of neonatal hemangioma, 3.16% was more or less similar to another research.[6,10] It showed that in the present study, Congenital Melanocytic Naevi was seen in 20 (4.21%) neonates, which was very similar to the finding of the distinctive study.[22] The size of all congenital melanocytic naevi was less than 1.5 cm in the conducted case and was found to be the same in the other studies.[22,23] The presence of cradle cap or seborrheic dermatitis was found in 6 (1.26%) of newborns [Table 6]. In this study, it was commonly seen in term male newborns, which was similar to the finding.[14,15] It also depicted the frequency of napkin dermatitis at 9 (1.89%), which was lower compared to other studies. The occurrence of Napkin dermatitis ranges from% 0.3 to 18.9%.[19] The present research could probably be due to the use of cotton cloth nappies, their frequent changing, and climatic differences.

From the above Table 6, other infectious dermatoses found in the present study were intertrigo in 3 (0.63%), which was found to be almost similar to the other study reported as 3.33% in neonates.[14] Two (0.42%) neonates of collodion babies were observed in the study, which was similar to the finding (0.34%) noted in the study.[11] Only 1 (0.11%) newborn presented with congenital epidermolysis bullosa in this study, which was more or less similar to the finding of 0.17% reported. In a study, its incidence was reported to be 1.5%. In this study, it was found in a full-term female baby.[11] Other infections were not seen in the study, like purpura fulminans, incontinentia pigmenti, congenital syphilis, urticaria pigmentosa, congenital porphyria, and acrodermatitis enteropathica.

In this study, an attempt was made to determine the occurrence of dermatosis during the neonatal life cycle and other dermatological changes that were assessed during the course of the research. It is now crucial to identify and distinguish physiologic skin lesions from pathologic lesions. The only drawback was that the sample size was considerably smaller and the study duration was short. Based on the study findings, the physicians will get guidance for the future diagnosis of such conditions. The physicians can

then distinguish them from other critical manifestations, which will assist in fighting and circumventing unessential medical management of the fragile newborn, and the guardian will be at ease and accept the better outcome. As the world is now becoming the hub for various viral infections, for other studies are needed to assess the rare viral infection in neonates, as they are more prone to infections.

Conclusion

The findings of the present study were representative of a specific racial/geographic distribution and will assist in adding or comparing the prevalence of neonatal dermatosis with other geographic regions as the array of dermatological characterizations in neonates varies as per time and place. This study provides insight into the future implications in the neonatal dermatology domain and helps to avoid further skin complications.

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Conflicts of interest

There are no conflicts of interest.

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