

# To study the prevalence of cutaneous manifestations in newborns and its correlation with defined maternal and neonatal factors

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## Abstract

**Introduction:** Newborn skin may look and feel different, depending on the gestational age. Skin manifestations are common in neonates and cause parental anxiety. Many of these are transient and physiological, but some may require further workup to rule out a more serious disorder. Hence, it is of utmost importance for pediatricians and dermatologist to recognize these physiological states in neonates. **Objectives:** To study incidence of cutaneous manifestations in new born and its correlation with defined maternal and neonatal factors. **Material & Methods:** Institution based, observational, cross sectional cohort study was conducted in Post natal ward of Dr. B.R.A.M. Medical College, Raipur, C.G. Total 4000 neonates were taken in to study. All the neonates irrespective of gestation, up to 3 days of life were included in study, with or without significant maternal history. Detailed dermatological examination was conducted. Obtained data was analyzed by appropriate statistical method. **Observation:** In all, we studied 18 skin lesions- Epstein pearl 3323 cases (83%), Mongolian spot 2828 cases (70.7%), milia 1344 cases (33.6%), sebaceous gland hyperplasia 1237 cases (30.9%), erythema toxicum neonatorum 711 cases (17.8%), occipital alopecia 648 cases (16.2%), lanugo 575 cases (14.4%), icterus 548 cases (13.7%), physiological scaling 482 (12.1%), vernix caseosa 9.8%, acrocyanosis 8.6%, salmon patch 7.1%, miniature puberty 6.9%, caput succedaneum 1.6%. **Conclusion:** In India, Epstein pearl and Mongolian spot are predominant skin lesions. Distribution profile of skin lesions is affected by interracial, environment and hormonal factors.

**Key words-** Epstein pearl, Mongolian spot, Erythema toxicumneonatorum, Sebaceous gland hyperplasia.

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## Introduction

Skin manifestations in newborns are common and can cause anxiety in parents. Many are transient and physiological, but some may require further work up to rule out pathological nature of lesion. So it is of utmost importance to a pediatrician as well as dermatologist, to recognize physiological states that can present in a normal neonate. Development of skin structures takes place from primitive embryonic tissues in a sequential manner. As most of the development is complete by 24 weeks, but functional maturity is only achieved till term [1] and post-natal age play a very important role in manifestation of skin lesion [2]. Skin manifestations depend on various maternal and neonatal factors. Maternal factors include – race and geographic location,

any medical illness, history of drug ingestion, parity, mode of delivery, socio-economic status, hygiene. Neonatal factors include – age, sex, gestation, heredity and race. Hence, it is of worth to analyze these conditions to understand the spectrum that affect the newborns. Neonatal skin may look and feel different depending on gestation age of new born [3]. Rashes are commonly seen in first month of life, which affect usually 80% of children [4]. By understanding stages of development we can come to know about the critical periods when the skin is susceptible to developmental errors, expression of genetic skin disease at the earliest, prenatal diagnosis of genodermatoses by using skin samples [5, 6]. About various skin lesions found commonly–Vernix caseosa is a protective biofilm covering the fetus during last trimester. Vernix and epidermal barrier lipids appear to share protective

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functions for fetal and neonatal skin [7]. Harlequin color change-describes a sharply described erythema that develops on dependant half of body, when neonate is in left lateral decubitus position. Hyper pigmented lesions at birth can be various. [8]. Epidermal melanocytic lesions includes café au lait macules. Dermal melanocytosis includes Mongolian spots. Among vascular birth marks – salmon patch and port wine stain are common. Caput succedaneum is formed mainly during prolonged second stage of labor, presenting part of scalp becomes edematous [9].

Cephalohematoma-results due to bleeding at sub-periosteal region, rupture of diploic veins is the reason of bleed. Sebaceous gland hyperplasia appears as numerous small pinpoint yellow to white papules involving the nose, upper-lip and malar areas.

Maternal androgens enlarge the pilosebaceous glands. Milia are common, discrete yellow-white papules that are slightly larger than those seen in sebaceous gland hyperplasia and represent tiny epidermal inclusion cysts. Epstein pearl is one the commonest conditions found, mainly on palate and alveoli. Erythema toxicum

neonatorum is common benign condition, not present since birth, but appear within first 2 days of life and continue to appear for the first 3-4 weeks of life.

One of the studies was that of K. L. E. university by Haveri and Inamadar [10], performed in deptt. of dermatology, results showed that sebaceous gland hyperplasia (89.4%), epstein pearl (89.1%), mongolian spot (84.7%), knuckle pigmentation (57.9%), lineanigra (44.7%), hypertrichosis (35.3%), miniature puberty (13.3%), acrocyanosis (30.9 %), physiological scaling (10.8%) and vernixcaseosa (7.7%) were common. One study was done in Amritsar by Kaur and Sachdeva [11] most common lesion was Epstein pearl (61%), followed by Mongolian spot (60.2%), superficial cutaneous lesions (40%) icterus (25.6%), sebaceous gland hyperplasia (21.4%), milia (23.8%). Erythema toxicum neonatorum was the most common transient non-infective lesion with 21 %.

So our aim was to study the clinical profile of various skin lesions in early neonatal period in newborns in Chhattisgarh. Compared to west data, literature available for Indian scenario is relatively meager.

## Material and Methods

**Study Design** - hospital based, prospective, analytical study. Place of study was-department of pediatrics and department of obstetrics and gynecology at Dr. B. R. A. M. Hospital, Raipur, Chhattisgarh. duration of study- 18 months (from April 2014 to September 2015). The inclusion criteria were –1. Live births delivered in Dr. B. R. A. M. Hospital, within 3 days of life. 2. Preterm ( $\geq 1.7$  kg), term and post term babies. 3. Neonates with consent taken from mother. 4. Neonates born to mothers with significant maternal illness like eclampsia, seropositive status diabetes, hypo/hyperthyroidism, sickle cell disease. The exclusion criterion was 1. Babies with ambiguous genitalia.

**Ethical Clearance**- It was taken from ethics committee, Pt J N M Medical college and associated Dr B R Ambedkar Hospital Raipur. Data collection was done by taking into account the neonates delivered in our hospital, meeting the inclusion criteria. Informed consent was taken from mothers. Daily rounds were taken in post natal wards and skin lesions were noted in each and every child. Each neonate was observed for maximum of 3 days.

Detailed examination of nails, skin, hair, genitals, oral cavity, scalp and whole body was done in order to record the physiological and pathological cutaneous manifestations in the newborns. In addition to it, maternal history as gravida, maternal illness, mode of delivery was noted along with neonatal history revealing sex of the child, post natal day and birth weight. No investigations were done.

Sample size was calculated using formula-  $4PQ/L^2$ , where – P= prevalence of skin lesion, Q= 1-P, L= Level of error, Confidence level=95% Taking P= 80%, L=5%, we see that minimum sample size =256. We have taken 4000.

**Statistical Analysis**- All the observations were recorded and statistical analysis was done using computerized program SPSS version 21. Chi square test with p value and Odds ratio was calculated. Chi square test provides a method of testing the significance of difference between 2 proportions or groups.

**Odds Ratio**- is a measure of strength of association between risk factor and outcome.

Factor	Manifestations	
	Yes	No
Factor present	A	B
Factor absent	C	D

Cross-product ratio/Odds ratio= $a*d/b*c$

## Results

In our study, sample size taken is 4000. Total male newborns in study were 2323 (58.1%) and total female 1677 (41.9%). Term infants form the majority 3357 (83.9%), followed by pre term 583 (14.5%) and post term 60 (1.5%). Total number of newborns with birth weight <2kg are 1063 (26.5%), between 2-2.499kg are 1266 (31.6%) and greater than or equal to 2.5kg are 1671 (41.7%). Further we see that total number of patients delivered vaginally (NVD) are 3014, caesarean section 944, forceps delivery are 33, breech 9. History of consanguinity was found in 191 mothers, rest 3809 did not have any such history. Majority of mothers did not have any sort of major medical illnesses, accounting to 3871. Medical illnesses taken into account are Diabetes mellitus (18), eclampsia (23), hypertension (23), hypothyroidism (12), sero positive status (21), sickle cell disease (32).

**Table 1: Sex wise distribution of skin lesion.**

Lesion	Female	%	Male	%
Mongolian Spot	1205	71.9	1623	69.9
Epstein Pearl	1400	83.5	1923	82.8
Sebaceous Gland Hyperplasia	522	31.1	715	30.8
Milia	569	33.9	775	33.4
Erythema Toxicum Neonatorum	300	17.9	411	17.7
Occipital Alopecia	255	15.2	393	16.9
Lanugo	266	15.9	309	13.3

**Other Lesions:** physiological scaling female 242 (14.4%), male 240, (10.3%). Acrocyanosis female 139 (8.3%), male 204 (8.8%), salmon patch female 112, 6.7%, male 170, 7.3%, miniature puberty female 140, 8.3%, male 137, 5.9%, cutis marmoratus female 16, 1.0%, male 19, 0.8%, icterus female 217, 12.9%, male 331, 14.2%, caput succedaneum female 32, 1.9%, male 31, 1.3%, harlequin color change female 13, 0.8%, male 13, 0.6%, café au lait spot female 26, 1.6%, male 30, 1.3%. congenital melanocytic nevi female 21, 1.3%, male 36, 1.5%, vernix caseosa female 200, 11.9%, male 192, 8.3%.

**Table 2: Gestation wise distribution of lesions.**

Lesion	Preterm	%	Term	%	Post Term	%
Mongolian spot	300	51.5	2479	73.8	49	81.7
Epstein pearl	468	80.3	2805	83.6	50	83.3
Lanugo	556	95.4	19	0.6	0	0
Sebaceous gland hyperplasia	98	16.8	1124	33.5	15	25
Occipital alopecia	80	13.7	539	16.1	29	48.3
Icterus	85	14.6	461	13.7	2	3.3
Milia	98	16.8	1241	37	5	8.3

Other skin lesion (in percentage) respectively in preterm ,term and post term babies-physiological scaling- 1.2, 12.5, 93.3, acrocyanosis 5.8, 9.1, 3.3, salmon patch 6.5, 7.2, 1.7, miniature puberty 0.3, 7.3, 50, ETN- 3.9, 20.3, 8.3, cutis marmoratus 2.7, 0.5, 5, caput 0, 1.9, 0, harlequin color change-3.8, 0.1, 0, café au lait spot- 0.5, 1.5, 3.3, vernix caseosa- 3.3, 11.1, 0, congenital melanocytic nevi-0.5, 1.5, 3.3.

**Table 3: Association of various maternal and neonatal factors with occurrence of specific skin lesion.**

S. No.	Skin Lesion	Factor	P value	Odds Ratio	Conf. Interval
1.	Epstein pearl	Birth weight	=0.031	1.2	1.01-1.4
2.	Epstein pearl	Parity	=0.0012	1.32	1.1-1.52
3.	Miniature puberty	Sex	=0.03	1.4	1.1-1.8
4.	Miniature puberty	Birth weight	<0.001	0.47	0.37-0.68
5.	Miniature puberty	Gestation	<0.001	0.039	0.01-0.15
6.	Lanugo	Gestation	<0.001	3682.8	2033.9-6668.4
7.	Lanugo	Birth weight	<0.001	53.2	23.3-84.1

**Table 4: Showing the comparative study among various races of world [10,11,12,13,14,16,20,23,24]**

S. No	Race	EP	Mong Spot	SGH	MILIA	ETN
1.	Indian	45-90%	70-90%	20-80%	20-40%	25%
2.	Caucasians	35%	62%	47%	-	37%
3.	Japanese	-	81.5%	-	-	40.8%
4.	Chinese	-	86.3%	-	-	33.7%
5.	Iranian	70-88%	70-80%	43.7%	7.5%	12-54%
6.	Turkish	-	13.2%	31.8%	1.4%	30.9%
7.	Australian	56%	25.5%	48%	36%	34.8%
8.	Black	29.1%	86.6%	28.2%	-	11.6%

- Epstein pearl, mongolian spot, milia, sebaceous gland hyperplasia are the commonest skin lesions in newborn period.
- Racial, environmental and hormonal factors do play an important role in manifestation of variety of skin lesions.
- Male newborns and term babies were found to be maximum in our study.
- Skin lesions were found to be more in <2.5 kg babies,  $P<0.001$ , [ $< 2.5 \text{ kg vs} > 2.5 \text{ kg}$ ], significant,  $OR=13.05, C.I.=8.01-21.1$  (Table-3)
- Skin lesions were more common in preterm babies,  $P<0.001$ , [preterm vs term], significant,  $OR=16.05, C.I.=3.9-64.8$ .
- Parity and maternal illness was not found to be significantly associated with the skin manifestations.
- Significant association with sex of the child miniature puberty found more in females, Vernix caseosa more in males, lanugo more in male newborns. (Table-3)
- Significant association with birth weight: In erythema toxicum neonatorum, low birth weight was found to be protective against it, Epstein pearl more in <2.5 kg, Miniature puberty more in >2.5 kg babies, Lanugo more in <2.5 kg. In case of Mongolian spot, low birth weight was found to be protective. (Table-3)
- Significant association with gestation: Miniature puberty was found more in term and post term babies, Lanugo more in preterms, Vernix caseosa more in term and post terms, Sebaceous gland hyperplasia more in term and post term babies, Milia more in term and post term babies, in Mongolian spot low birth weight was found to be protective. Erythema toxicum neonatorum, more in term and post term babies. (Table-3)
- Physiological scaling was found more in term and post term babies. ( $p \text{ value}<0.001$ ). (Table-3)
- In dark races, Mongolian spot is more common and in fairer races salmon path is common along with Epstein pearl. (Table-4)
- Less occurrence of erythema toxicum neonatorum in our study is attributed to the fact that some of the newborns could not be observed till 3 days of age due to the early discharge of mother.
- Patients developing erythema toxicum neonatorum, have chances of developing atopic dermatitis, so biannual follow up should be done in those cases.
- Cases of congenital melanocytic nevi should be followed up closely to rule out chances of malignant transformation.
- Fetal skin biopsy has crucial role in identifying the genetic skin diseases with reasonably high levels of safety and confidence.

## Discussion

Most common lesions found in our study were Epstein pearl, Mongolian spots, milia and sebaceous gland hyperplasia, these results were comparable to earlier studies carried worldwide. Epstein Pearl- Like our study (Epstein pearl-83.1%), Kaur et al and Nanda et al also found Epstein pearl as the most commonly occurring skin lesion [11,12]. In Iranian study by Moosavi and Hosseini (2006) [13], Epstein pearl was found to be 70.2 %, Turkish study by Gokdemir et al (2009) [14], showed its occurrence as 58.76%. Another Indian study by Haveri and Inamadar (2014) [10], showed frequency of Epstein pearl as 89.1%. These are common in Caucasian infants. Maximum cases found to be significantly associated with birth weight less than 2.5 kg and with multiparous females. Though in the study of Kaur and Sachdeva (2002) [11] its prevalence was more in >2.5 kg infants, which is contrary to our study. No significant relation was found with gestation, route of delivery or consanguinity.

Mongolian Spot has shown inter racial difference. Though In our study its prevalence is 70.7% which is comparable to earlier mentioned studies, its frequency is seen to be as high as 80-90% in Asians as found by Dash et al (2000) [15] and Hidano et al (1986) [16] and as low as 3-10% in Caucasians as described by Shih I H et al (2007) [17] and Ferahbas et al (2009) [18]. Its prevalence in India varies as 60-90% as shown by studies of Sachdeva and Kaur et al (2002) [11], Nanda and Kaur et al (1989) [12].

Most common site is sacrococcygeal region followed by buttocks and back, shoulders and extremities. Most commonly, Mongolian spots occurred in term or post term babies, and low birth weight was found to be protective against it. In Israeli study carried out by Kahana et al (1995) [19], showed the occurrence of Mongolian spots as 11.85% of Arabs and 6.65 % of Jews. Orientals ranging from 74% to 84% [16,20,21,22,23]. A theory of origin of Mongolian spots in the Caucasians, explains its presence by the invasion from Asia of the Mongols. Another theory states that it first originated from Negroes in Africa and from them spread to the Mongols and Caucasians race.

Milia was found to be 33.6%, similar to that of Kaur and Sachdeva (2002) [11], where, incidence was 23.8% and Kaur and Nanda (1989) [12], where incidence was 34.9% .

Sebaceous Gland Hyperplasia accounting to about 30.9%. Sebum secretion is higher in neonates than adolescents; it is due to the transfer of maternal androgen especially dehydroepiandrosterone, through placenta. Its incidence was similar to that found out by earlier Indian studies [11,12,15]. Study by Gokdemir et al (2009) [14] and Haveri and Inamadar (2014) [10], showed very high occurrence of this lesion. Its occurrence was more in male newborns and those weighing less than 2.5kg but was not statistically significant. Relation to gestation was found significant, showing significant presence in term and post term babies, contrary to earlier study,1989 [12].

Another lesion present was Erythema Toxicum Neonatorum, with 17.8%, similar to various earlier studies [10,11,12]. It was seen commonly after day 2. Its prevalence varies among different racial groups [13,16,18,20,24]. It is most commonly seen in Caucasians (37.8%) [25]. In a study conducted in Jordan by A Dahiyat (2006) [26], erythema toxicum neonatorum was found to be 68% in black skinned people. Its occurrence in our study was found significant with respect to gestation and birth weight. Earlier studies found that erythema toxicum neonatorum was less commonly associated with preterms and low birth weight, similar to our study.

Occipital Alopecia was 16.2% in our study, similar to earlier study (2002) [10]. It was found maximally in male newborns, term babies and vaginally delivered newborns. Lanugo showed the occurrence of 14.4% in our study similar to earlier study [11,27] with male preponderance. Highest number was recorded in preterms, very few in terms and none in post term. All results with respect to sex, gestation and birth weight were found significant. Icterus was found to occur as 13.7%, with male preponderance, more in term babies followed by preterm and post term newborns. Physiological Scaling was seen in 12.1% cases, similar to earlier study [10]. In other studies it was recorded higher 40% in Kaur and Sachdeva (2000) [11] and 65 % in Rivers et al (1990) [20]. It occurred almost in equal number in male and female newborns, mainly in term newborns, but occurred in almost all postdated newborns. Relation was significant. Very few cases were seen in preterms (they were preterm-Iugrbabies) as were in study by Haveri et al (2014) [10]. It is contrary to study conducted by Dash et al (2000) [15] and Moosavi and Hosseini (2006) [13] where it was not

seen in preterms. Very few cases can be attributed to the fact that it was mainly because the duration of observation in our study was 3 days (much less than 4 weeks, the time when permeability barrier of preterm neonates undergoes maturation.) Vernix Caseosa had occurrence of 9.8%, similar to earlier Study [10] with almost equal distribution in males and females, maximally occurring in normal vaginally delivered newborns, with highest number in term babies, followed by preterm and none in postdated newborns. Acrocyanosis was 8.6% in occurrence similar to earlier study [11], mainly occurring in males, term babies and vaginally delivered newborns.

Salmon Patch showed the occurrence of 7.1%, with male preponderance (contrary to female dominance in Japanese study.) and occurred maximally in term babies, delivered vaginally. Its incidence is 28.4 % in Indian study (1989) [12], in Japanese study (1986) [16] it was 22.3%, 27.8% in Taiwanese study (2007) [17], 18.78% in Jews, 19.97% in Arab neonates (1995) [19]. 15 cases of hemangioma were also present, found on leg and arm.

Congenital Melanocytic Nevi had occurrence of 1.4%. In earlier studies [11,13,16,17,20,28,29,30,31], it showed the range of 0.4 to 15.6 %, with the maximum cases occurring in dark babies [25]. Location was trunk mainly. All were less than 2cm. A study was undertaken by Kahana et al in Israel (1995) [19], which showed 0.35% Jewish infants to have congenital melanocytic nevi and 0.84% of Arabs, which was comparable to some previous studies. Arabs had greater number of melanocytic brown lesions (Mongolian spots, congenital melanocytic lesion and café au lait spots) than Jews descending from European society. Café au lait spots were noticed as 1.4%, similar to earlier studies. In Israeli study [19], as 0.48% in Arabs and 0.11% in Jews, Japanese study (1986) [16] as 1.7%, Thai study (2013) [30] showed 0.3%, U.S. study (2012) [31] as 2%. Miniature Puberty was found to occur with 6.9% similar to earlier studies. Harlequin Color Change accounted to 0.6%, was seen mainly in preterm neonates, none in post term babies. Cutismarmoratus was the another skin lesion with 0.8%, mainly due to constriction of venules and capillaries and disappear with rewarming. Prevalence was more in preterm babies. Traumatic Lesions during delivery accounted to 31 cases, mainly associated with forceps delivery, included sub-conjunctival hemorrhage and cephalohematoma. Occurrence of hyperpigmentation of genitals, knuckle and pinna was not found commonly.

### Limitations of Study

1. Ours is cross-sectional study, due to paucity of time. Longitudinal study would have been better, as neonates could be followed later on for atopic dermatitis and malignant changes of congenital melanocytic nevi.
2. Due to early discharge of mother (before 3 days), data on the occurrence of erythema toxicum neonatorum was affected.

### Conclusion

1. In dark races, Mongolian spot is more common and in fairer races salmon patch is common along with Epstein pearl.
2. Less occurrence of erythema toxicum neonatorum in our study is attributed to the fact that some of the newborns could not be observed till 3 days of age due to the early discharge of mother.
3. Patients developing erythema toxicum neonatorum, have chances of developing atopic dermatitis, so biannual follow up should be done in those cases.
4. Cases of congenital melanocytic nevi should be followed up closely to rule out chances of malignant transformation.
5. Fetal skin biopsy has crucial role in identifying the genetic skin diseases with reasonably high levels of safety and confidence.

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