

Incidence and characterization of early- and late-onset skin diseases in neonates – A hospital-based cross-sectional study

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ABSTRACT

Background: Neonatal skin diseases occur in almost every newborn baby. Many are transient, involute rapidly and require no management. **Objective:** The objective of the study was to study the incidence and characterization of early and late onset of various skin diseases in the neonates. **Methods:** A cross-sectional observational study was carried out among 200 neonates in a tertiary care hospital in Central India. Skin lesions which appeared on or before 48 h before birth were categorized as early onset and skin lesion appearing after 48 h were considered as late onset and the characteristics of lesions were highlighted. **Results:** The most common skin lesions identified within 48 h of birth were Epstein pearl's (77.0%), followed by Mongolian spot (45.5%), desquamation of skin (35%), sebaceous gland hypertrophy (31.5%), and milia (28.4%), respectively. Less incidence of salmon patch, erythema toxicum neonatorum, impetigo, miliaria rubra, accessory auricles, pigmented nevi, port-wine stain, and lamellar ichthyosis also was recorded. Impetigo (11.2%) and candidiasis (11.2%) were commonly seen after 48 h of birth followed by dermatitis 6.4% and a few cases of birthmarks. **Conclusion:** Along with increasing awareness of neonatal diseases, our study results also aid in better identification and diagnosis of these diseases.

Key words: Desquamation, Epstein pearls, Impetigo, Mongolian spot, Neonates, Skin diseases

The World Health Organization (1948) defines neonatal period as the first 4 weeks of extrauterine life [1,2]. The skin of newborn differs than that of the adult in many ways. Neonatal skin is thinner, delicate and has weaker intercellular attachment producing less sweat and sebaceous secretions, thus more susceptible to infections [2,3]. Reports suggest that skin disorders are present in 96%–99.3% of all the newborn babies, varying from physiological and transient to grossly pathological changes which are either temporary or permanent [1,4]. The transient lesion areas a result of physiologic response and limited to the first several days or weeks of life requiring less attention; however, the pathologic lesions could be life threatening.

Despite the fact that newborn cutaneous alterations involute more rapidly than those of adults, it is important to identify them correctly to avoid concerns of parents and consulting physicians. Nonetheless, some may have prognostic implications, which needs mandatory genetic consultation and family planning. Furthermore, it is also essential to differentiate pathologic conditions from transient physiologic states so as to avoid unnecessary therapy of physiologic states and to keep a close watch of the pathologic lesions to avoid the risk of malignant transformation [4,5].

The prevalence and frequency of neonatal skin disorders have been studied by several authors; however, the studies are limited in India [6]. Hence, the present study was undertaken with an

objective to study the incidence and characterization of early and late onset of various skin diseases in neonates in Central India.

MATERIALS AND METHODS

This cross-sectional observational study was carried out from December 2011 to June 2013 in the department of dermatology in collaboration with the department of pediatrics and department of obstetrics and gynecology of a tertiary care teaching institution of Bhopal. Prior approval was obtained from the Institutional Ethics Committee and informed consent was obtained from the parents or legal guardians of all the recruited neonates. A sample size of 200 newborns was taken by sample of convenience. Consecutive newborns delivered in our hospital were included in the study. All babies were examined in the postnatal care room as soon as they recovered from the stress of labor and delivery. Similarly, neonates brought to dermatology and pediatric outpatient department for any dermatological problems were also recruited in the study.

All neonates were examined in well-illuminated room using magnavision. The entire skin surface, including mucous membrane and nails, was thoroughly examined. The observation, including sex, birth weight, basic neonatal reflexes, and age in hours at the time of examination, was noted. The diagnosis of various skin lesions was confirmed by relevant investigation such

as direct microscopic examination of skin scraping, Gram stain, Tzanck test, Wood's lamp examination, and skin biopsy, wherever needed. Skin lesions which appeared on or before 48 h before birth were categorized as early onset and skin lesion appearing after 48 h was considered as late onset.

A gross examination of cardiovascular, respiratory, central nervous system, and abdomen was made and babies were also looked for any congenital abnormality. A photographic record was maintained to illustrate the skin disorder and observations were recorded in a preset pro forma. The results were analyzed and the observations pertaining to parameters under study were expressed in percentage.

RESULTS

Out of 200 neonates, 102 (51%) were male and 98 (49%) were female with a slight male predominance. Majority of the newborns included in the study were full-term babies (77.0%) while only 13% were preterm and 0.5% were post-term and 8% were small for date, respectively. One hundred and sixty-six (73%) neonates were examined within the first 48 h of their birth, whereas 34 (17%) were examined after 48 h (Table 1).

We observed that 83% of cases had early-onset skin diseases. Among the skin lesions noted within 48 h of birth, the majority 142 (70.5%) of neonates presented with Epstein pearl observed as a whitish, cystic lesion of 1.2 mm size varying 1–5 in number, present between hard and soft palate and alveolar ridge. It was followed by 91 (45.5%) cases of Mongolian spot presented as bluish-black patches in the sacrogluteal area in 62 babies and on buttocks in 29 babies (Fig. 1a). Fine scaling on a non-erythematous base involving trunk and extremities suggestive of desquamation of skin was seen in 70 (35.5%) babies. A pinpoint 1–2 mm yellowish-white lesion mainly over the nose and rarely on foreheads was noted in 63 (31.5%) neonates suggestive of sebaceous gland hyperplasia. Similarly, 57 (28.4%) neonates presented pinpoint, whitish, maculopapular lesions mainly over cheeks or chin, varying in number from 2 to 3 lesions to multiple grouped lesions suggestive of milia.

Table 1: Demographics of the study population

Characteristics	Number	Percentage
Sex		
Male	102	51.0
Female	98	49.0
Maturity		
Full term	154	77.0
Preterm	26	13.0
Small for date	16	8.0
Post-term	04	2.0
Age of patient during examination (h)		
Within 12	21	10.5
12–24	85	42.5
24–36	16	8.0
36–48	44	22.0
After 48	34	17.0

Salmon patch and erythema toxicum neonatorum (ETN) were observed in 41 (20.5%) neonates each. Salmon patch appeared as pink macules commonly over eyelids and in mid-forehead region, whereas ETN presented as erythematous maculopapular rash involving the eyelids (80.4%) followed by the involvement of both eyelids and mid-forehead region (14.6%) and forehead alone was involved in 4.8% of cases. Impetigo was observed in 19 (9.5%) cases, which presented as 2–3 mm sized vesicles or pustule on erythematous base and was mainly seen on the groins, neck, axilla, and rarely on trunk lesions which were varying in number from 2 to 3 to multiple grouped lesions.

Miliaria rubra presented as erythematous, papulovesicular lesions over the face, neck, and trunk and was seen in 8 (4%) babies. Accessory auricles were found in 2 cases (1.0%) near the tragus on the right side. Lamellar ichthyosis presented as collodion-like membrane which shed in 1 week was observed in 1 (0.5%) case. Skin biopsy from the left lower leg confirmed the diagnosis. Pigmented nevi were observed in 1 (0.5%) case which appeared on the 2nd day of life as flat, black macule with well-defined border's about 1.25 cm × 1.25 cm in size. Diagnosis was made on the clinical grounds. One (0.5%) neonate having port-wine stain involving the face was found. Most of the lesions which appeared within 48 h of birth remained unchanged at the end of 4 weeks except ETN which disappeared in 2 days.

Our study found 17% of the lesions having the late onset. Impetigo, present in 7 (11.2%) neonates, was the most common lesion found after 48 h after birth (Fig. 1b). This was followed by oral thrush in 6 (9.6%) neonates, presented as white curdy deposit in the oral mucosa. The diagnosis was confirmed by the presence of spores and pseudohyphae on KOH preparation. Seborrheic dermatitis presented as erythematous papulovesicular lesion, topped by yellowish greasy scales and was seen involving scalp, retroauricular area in two babies at the age of 8 and 21 days, respectively. One baby presented to us for the 1st time in erythroderma at the 26th day of his neonatal life. Cradle cap was present as brownish-black adherent scales on the vertex and was mainly observed between 10 and 15 days of life in all the 3 (4.8%) neonates (Fig. 1c). Two (3.2%) neonates presented with hypopigmented scale macules on the 5th and 3rd weeks, respectively, suggestive of pityriasis versicolor confirmed by KOH preparation which showed spaghetti and meatball appearance. Under Wood's lamp examination, greenish birefringence was seen.

Nevus achromicus was observed in 2 (3.2%) neonates, which presented as diffusely hypopigmented patches with irregular border. On weekly follow-up, neither patient showed any change in pattern and distribution. One neonate (1.6%) presented with a white macule on the right axillary region with well defined, but irregular borders at the 28th day of life suggestive of vitiligo. Urticaria which presented erythematous itchy lesions involving trunk and limbs as was observed in 1 neonate (1.6%) at the age of 4 weeks. The lesions were present for 36 h. Single case of strawberry hemangioma (1.6%) right arm was observed to start at 1 week of age, measuring around 0.5 cm and increased to a size of 2–3 cm within the period of 3–4 weeks. Diffuse erythema



Figure 1: (a) Mongolian spot, (b) impetigo on scalp margin, (c) cradle cap

with papulovesicular lesion involving lower back, buttocks, and few lesions on pubic area suggestive of irritant diaper dermatitis was seen in an 18-day-old baby (1.6%). Atopic dermatitis which presented as a papulovesicular lesion involving face was observed in 1 neonate (1.6%) who had an uneasy look. The spectrum of skin lesions and their incidence seen within the first 48 h and after 48 h of life is depicted in Table 2.

DISCUSSION

Identification of a normal variation which is transient and differentiating it from a pathologic condition is vital in a neonate. It allows the physician to proceed appropriately, reassures

Table 2: Incidence of early- and late-onset skin diseases in neonates (n=200)

Skin lesions	Number	%
Skin lesions seen within the first 48 h		
Epstein pearl's	142	70.5
Mongolian spot	91	45.5
Desquamation of skin	70	35.0
Seb. gland hyperplasia	63	31.5
Milia	57	28.4
Salmon patch	41	20.5
Erythema toxicum neonatorum	41	20.5
Impetigo	19	9.5
Miliaria rubra	08	4.0
Accessory auricles	02	1.0
Pigmented nevi	01	0.5
Port-wine stain	01	0.5
Lamellar ichthyosis	01	0.5
Skin lesions seen after 48 h		
Impetigo	07	11.2
Oral thrush	06	9.6
Seb. dermatitis	03	4.8
Cradle cap	03	4.8
P. versicolor	02	3.2
Nevus achromicus	02	3.2
Vitiligo	01	1.6
Strawberry hemangioma	01	1.6
Irritant diaper dermatitis	01	1.6
Atopic dermatitis	01	1.6
Urticaria	01	1.6
Candidiasis	01	1.6

the parents, and initiates further evaluation or treatment if necessary [6,7]. The present study was undertaken to study the incidence of early- and late-onset skin diseases in neonates. The frequency of neonatal skin diseases varies in different racial groups. The incidence varies from 27.6% to 31% [3], and prevalence lies between 57% and 99.3% [5]. We observed 83% early-onset skin diseases and only 17% late-onset skin diseases which appeared after 48 h of birth. These different results may be related to study methods and racial features. Full-term babies (77.0%) comprised most of the study population with a slight male predominance.

In our study, Epstein pearl's was the most common early-onset lesion followed by Mongolian spot, desquamation of skin, sebaceous gland hyperplasia, milia, salmon patch, ETN, impetigo, miliaria rubra, accessory auricles, pigmented nevi, port-wine stain, and lamellar ichthyosis, respectively.

Epstein pearls form due to the imprisonment of the epithelial cells in the place of fusion of the alveolar processes [1]. Incidence ranges from 64% to 89% of normal neonates; we found 70.5% of neonates having Epstein pearls, with the most common site being midline of the palate followed by alveolar margins, which was nearly similar to the results of other studies [2,6,8,9]. As these lesions disappear spontaneously and do not require excision; however, it is imperative to identify them. The second most common lesion was Mongolian spot with the incidence of 45.5%. Global incidence of Mongolian spot is between 56% and 98% and shows a marked racial difference [4,10]. We found a low incidence than the reported studies similar to other south Asian studies who also found a low incidence [3,5]. Reports suggest that this lesion could be associated with inborn errors of metabolism; therefore, further diagnostic tests are necessary [1].

The skin of neonate at birth is smooth and moist. However, due to the reduction of transepidermal water loss, benign superficial skin peeling may be seen causing physiologic desquamation. The incidence of desquamation as observed in the literature varies from 7.2% to 83% [5,7], we found 35% of neonates having desquamation. The variations in the different observations may be attributed to the follow-up of neonates. Whether physiologic desquamation occurs among newborn babies who were delivered from cesarean sections or those newborn babies delivered vaginally are still debatable. It is assumed that stimulation by placental transfer maternal androgen, particularly by dehydroepiandrosterone increases the sebaceous gland activity.

Sebaceous hyperplasia (31.5%) was another common finding in our study. The incidence we found is nearly comparable with the

incidences observed in other studies [5,10]. However, in a study by Haveri and Inamadar, the highest prevalence (89.4%) of sebaceous hyperplasia was noted [2]. The incidence and prevalence of milia vary from 40% to 50% [3] and 7.5% to 36% [5], respectively, we found 28% of neonates having milia which are nearly comparable with that reported in the literature [7]. Among the different birthmarks, we found 20.5% incidence of salmon patch, 0.5% of pigmented nevi, and port-wine stain in our study which is well within the range of 18–30% reported in the literature [2,11].

ETN is a benign rash of unknown etiology, characterized by an accumulation of eosinophils in dermal lesions affected by genetic, environmental, or racial factors. The reported incidence of ETN is 21–40% [3,7]. In our study, it was found in 20.5% of neonates, similar to the previous studies conducted in India [7,8]. The lesion was seen between 24 and 48 h of life, most commonly in full-term neonates. The incidence of miliaria rubra varies from 2.6% to 9.6% [7], we found 4% of neonates showing this dermatosis. The incidence is thought to be attributed to climatic variation. Developmental anomaly involving the syndrome of the first branchial arch, accessory auricle was found in 1% of the study population.

The incidence of late-onset skin diseases ranged from 1.6% to 11.2% and comprised infectious conditions and allergic reactions. Impetigo was the common lesion which was noted both before and after 48 h of birth with an incidence of 9.5% and 11.2%, respectively. Incidence of impetigo in Indian studies ranges from 3% to 23% [12,13]. It should be noted that uncomplicated impetigo needs only topical antibiotics and cleaning the affected area. The clinical manifestations of candidiasis in the neonate can be as simple as an oral thrush to life-threatening systemic infection with multisystem organ failure. This is influenced by host risk factors and severity and type of neonatal *Candida* infection. In our study, oral thrush and candidiasis were found in 9.6 and 1.6% of neonates, respectively, which were similar to a study by Baruah *et al.* [14].

Irritant diaper dermatitis was found 1.6% which is similar to the results of Ferahbas *et al.* [4] reported incidence of 2%. The low incidence could be due to the awareness of mothers to change the diapers regularly and keep the area clean. Dermatitis was the most common skin disease found in studies by Mohammedamin *et al.* and Rodríguez-García *et al.* [15,16]. However, it was not the most common finding in our study.

A survey conducted by Mallory, 1991 [17], in the USA suggested that each and every neonate has one form of skin lesion early after delivery; however, the incidence of occurrence may vary. The marked difference in frequencies of skin disorders could be due to differences in methods of study and most probably due to racial characteristics [9]. Although, the study enabled the characterization of the newborn babies dermatosis profile within a public institution, small sample size and single-center set up of our study limit the generalization of the findings in this region. With cross-sectional studies, the lesions which appear later can be missed. We further recommend prospective studies with repeated examinations and comparison of phenotypic characteristics of newborn with the mother and relationships with the skin diseases.

CONCLUSION

In our cross-sectional study, Epstein pearls, Mongolian spots, desquamation of the skin, and sebaceous hyperplasia were among the most frequent skin diseases identified during the first 48 h of life, whereas impetigo was the most common lesion found after 48 h of birth. Despite the fact that most of skin lesions in the newborn are innocent and transient, yet these must be differentiated from other more serious skin conditions, to avoid unnecessary therapy to neonates and psychological stress of parents. Therefore, dermatological evaluation is essential in the neonatal period for a more accurate diagnosis.

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