

# Investigating the frequency of skin manifestation in newborns admitted to a Children's Hospital in the North of Iran

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## Abstract

Skin manifestations, a common problem in infants, can be a serious concern for parents. Most manifestations are benign and transient, but some of them need more evaluation regarding whether they can negatively affect infant health. In this study, it is aimed to evaluate the frequency of skin manifestation in newborns admitted to the department of newborns and NICU from 2019 to 2020. This cross-sectional was performed on infants hospitalized in the department of pediatrics and NICU of a pediatric hospital in Guilan, Iran, from 2019 to 2020. The sampling was performed using the census method. The information was gathered using a checklist of infant and mother characteristics. Out of 323 newborns, 164 cases had skin lesions (50.8%). The lesions of Erythema toxicum, Cutis marmorata, Diaper dermatitis, Milia, salmon patch, and Mongolian spots were presented at 14.9%, 9.9%, 8.1%, 5.6%, 4.3%, and 2.8%, respectively. Only 5.38% of infants required treatment. There was no significant relationship between skin lesions and demographic factors of gestational age, type of delivery, or the family history of dermatological diseases. The rate of skin lesions was moderate to high in hospitalized newborns. In addition, Erythema toxicum, Cutis marmorata, Diaper dermatitis, Salmon patch, and Mongolian spots were more prevalent in infants. These findings can help pediatric physicians effectively in their early diagnosis and therapeutic procedures.

**Keywords:** Skin lesions, Newborn, NICU, Erythema toxicum

## 1. Introduction

Cutaneous lesions are very common in the neonatal period, and they are mostly transient, physiological, reversible and self-limiting. Unfortunately, some of these skin conditions are pathological and require intervention and collaboration between neonatologists and dermatologists [1, 2]. Several maternal and environmental factors, including prematurity,

congenital infections, ethnicity, and maternal drug use, can affect the onset, type, and evolution of skin lesions. The variety of manifestations geographically and ethnicity and their role in the prevalence of birthmarks are well documented [3, 4].

Neonatal skin lesions are a serious concern for parents. Many skin diseases in infancy and childhood recover spontaneously and do not have much importance, but some of them may be signs of major

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and systemic diseases [5, 6]. Therefore, the timely skin evaluation of neonates and infants is important and is a good indicator for the health of infants.

Despite numerous studies on skin lesions [7-10], there is no known procedure for treating them in infants, particularly in northern Iran. On the other hand, in the neonatal intensive care unit (NICU), cutaneous lesions can expose newborn infants to infections. Approximately 9% of all births require a NICU [11, 12]. According to a recent cohort study in 2020 in Iran, about 34.2% of NICU admitted neonates had skin injuries, and in addition to neonatal conditions, equipment and neonatal care play a significant role in the incidence of skin injuries [13]. This study aimed to investigate the dermatological manifestations in a sample of neonates in their neonatal period in the North of Iran and also identify factors related to the onset of neonatal cutaneous manifestations.

## 2. Materials and Methods

### 2.1 Study design

In a retrospective cross-sectional study, a total of 323 neonates admitted to the department of pediatrics and the neonatal intensive care unit (NICU) at the 17-shahrivar Hospital of Rasht, Guilan province, in the North of Iran, were evaluated from 2019 to 2020. The sampling was performed using the census method. The study design was approved by regional ethic committee (IR.MAZUMS.RIB.REC.1400.038). After approval of the ethics committee and signing of the testimonial by the neonate's parents, the skin surfaces, including soles, palms, genitalia, and scalp of all admitted neonates within the first 28 days of life were carefully examined by a dermatologist and a neonatologist. The manifestations were considered to be transient and benign lesions, vascular lesions, infectious lesions, pigmented lesions, and lack of development of the vasomotor system. A checklist was used to record fetal and maternal history (gender, birth weight, gestational age, type of delivery, maternal age, social history and comorbidities, parity, and family history of skin disease). In terms of gestational age, all subjects were classified as preterm (< 37 weeks), term (> 37 weeks), or post-term (> 42 weeks).

### 2.2 Statistical analysis

The data were analyzed in SPSS software version 18 using the chi-square test and Fisher's exact test.

Variables were reported as average with standard deviation (SD), and qualitative variables as frequency and percent. The P value <0.05 was considered significant.

## 3. Results

In this study, of a total of 323 newborns evaluated (mean age 8.11±8.05), 173 (53.89%) were males and 148 (46.11%) were females. The mean birth weight was 2992.5±827.3 g, and the mean maternal age was 29.58±6.4 years. Also, 24.8% of newborns were delivered vaginally, while 75.2% were delivered via cesarean section. About 29.19% of them were preterm, 61.49% term, and 9.32% post-term. At least 164 (50.8%) newborns had one skin lesion, and 114 (35.58%) of mothers reported at least one disease during pregnancy. Neonatal parameters and their correlations with cutaneous lesions are reported in Table 1. Maternal parameters and their correlations with cutaneous lesions are reported in Table 2. Neonatal acne was significantly associated with neonatal age ( $p < 0.05$ ), so that it was more prevalent in older neonates. Besides, a significant relationship was seen between gender and skin lesion total ( $p = 0.006$ ). A higher prevalence of diaper dermatitis was observed in the female gender (13.5% (20 cases) versus 3.46% (6 cases),  $P = 0.01$ ). A significantly higher incidence of congenital melanocytic nevus regarding birth weight is also found ( $p = 0.001$ ), so that it was more prevalent in neonates with a higher birth weight. The prevalence of cutaneous lesions was significantly correlated with maternal diseases, and it was lower in those with maternal diseases (37 cases, 31.9%) ( $p = 0.021$ ). Besides, cutaneous lesions were positively

Table 1. Neonatal demographic and clinical parameters

| Variables                 | Number | Percent |
|---------------------------|--------|---------|
| Gender                    |        |         |
| Male                      | 173    | 53.89   |
| Female                    | 148    | 46.11   |
| Gestational Age           |        |         |
| Preterm                   | 94     | 29.19   |
| Term                      | 198    | 61.49   |
| Post-term                 | 30     | 9.32    |
| Causes of hospitalization |        |         |
| Icter                     | 188    | 60.45   |
| Infection                 | 44     | 14.14   |
| Prematurity               | 34     | 10.93   |
| Others                    | 45     | 14.48   |

Table 2. Maternal parameters and diseases

| Variables                     | Level          | Number | Percent |
|-------------------------------|----------------|--------|---------|
| Type of delivery              | NVD            | 80     | 24.8    |
|                               | C/S            | 242    | 75.2    |
| Smoking                       | Smoker         | 1      | 0.31    |
|                               | Passive smoker | 12     | 3.73    |
|                               | Addiction      | 1      | 0.31    |
| Gestational diabetes mellitus |                | 40     | 12.5    |
| Hypothyroidism                |                | 40     | 12.5    |
| Hypertension                  |                | 11     | 3.43    |
| Iron deficiency anemia        |                | 5      | 1.56    |
| Preeclampsia                  |                | 4      | 1.25    |
| Peptic ulcer                  |                | 2      | 0.62    |
| Hyperthyroidism               |                | 2      | 0.62    |
| Kidney stone                  |                | 2      | 0.62    |
| Food allergy                  |                | 2      | 0.62    |
| Minor thalassemia             |                | 2      | 0.62    |
| Brain tumor                   |                | 1      | 0.31    |
| Urinary tract infection       |                | 1      | 0.31    |
| Emboli                        |                | 1      | 0.31    |
| G6PD deficiency               |                | 1      | 0.31    |

correlated with gestational diabetes mellitus, and they were lower in those with gestational diabetes (10 cases, 25%) ( $p = 0.036$ ). There was no significant relationship between skin lesions and demographic factors of gestational age, type of delivery, or the family history of dermatological diseases.

According to the main findings of the present study, out of 323 newborns, 164 cases had skin lesions (50.8%). The lesions of Erythema toxicum, Cutis marmorata, Diaper dermatitis, Milia, salmon patch, and Mongolian spots were presented at 14.9%, 9.9%, 8.1%, 5.6%, 4.3%, and 2.8%, respectively. Only 5.38% of infants required treatment. In Table 3, the types of cutaneous lesions and their frequency in neonates are shown.

#### 4. Discussion

Skin manifestations, as a common problem in infants, can be a serious concern for parents. Most manifestations are benign and transient, but some of them need more evaluation regarding whether they can negatively affect infant health. To our knowledge, this study was the first conducted in a fully neonatal period of 28 days of infant life at Guilan, in the North

of Iran. Similar studies in Iran and in regard to the neonatal period of 28 days are few and far between. The results of the present study indicated that 50.5% of neonates had skin lesions. The most prevalent lesions were lesions of Erythema toxicum, Cutis marmorata, Diaper dermatitis, Milia, Salmon patch, and Mongolian, respectively. In a study by Firouzi et al., skin lesions were present in 79.8% of the cases. The prevalence of Milia, Erythema toxicum, Salmon patches, and Mongolian spots were 45.2%, 43%, 37.3%, and 37%, respectively [14]. In our study, Erythema toxicum was noted in 15.1% of the population, which was in accordance with non-Iranian studies that reported a lower prevalence of erythema toxicum [1]. According to a study in 2017, Erythema toxicum and Mongolian spots were seen in 50% of infants at birth [15].

Table 3. The frequency of cutaneous lesions detected in 323 neonates in the 28 first days of their life

| Cutaneous lesions            | Number | Percent |
|------------------------------|--------|---------|
| Erythema toxicum Neonatorum  | 48     | 14.9    |
| Cutis marmorata              | 32     | 9.9     |
| Diaper dermatitis            | 26     | 8.1     |
| Milia                        | 18     | 5.6     |
| Salmon patch                 | 14     | 4.3     |
| Mongolian spot               | 9      | 2.8     |
| Congenital melanocytic nevus | 3      | 0.9     |
| Lanugo hair                  | 2      | 0.6     |
| Capillary hemangioma         | 2      | 0.6     |
| Allergy to medical Tape      | 2      | 0.6     |
| Neonatal acne                | 2      | 0.6     |
| Heatstroke                   | 2      | 0.6     |
| Morbiliform rash             | 1      | 0.3     |
| Ictiosis                     | 1      | 0.3     |
| Accessory nipple             | 1      | 0.3     |
| Epidermolysis bullosa        | 1      | 0.3     |
| Total                        | 164    | 50.8    |

In our study, Erythema toxicum was more prevalent in neonates (15.1%), whereas Mongolian spots were less prevalent (2.8%). According to previous studies, the prevalence of Mongolian spots was reported to be over 90% among Americans and Asians [17–19]. Karegar Maher et al. reported the rates of Mongolian spots and Salmon patches to be 32.3% and 14.5%, respectively, among 1000 newborns [20]. Khoshnevisasl et al. evaluated the incidence of birthmarks in 500 neonates born, of which 95.6% of them had at least one lesion. The most common skin

lesions were Epstein's pearl (60.4%) and Mongolian spots (56%), respectively [21]. The lower rate of skin manifestations in the present study could be due to evaluating the full neonatal period of 28 days of infancy and also the lower rate of maternal hormones in the period of 28 days as compared with the first 3 days of life in previous studies. According to the results of the present study, there was no significant relationship between skin lesions and demographic factors of gestational age, type of delivery, or the family history of dermatological diseases. In a study by Firouzi et al., natural vaginal delivery, use of medication, term gestation, and maternal disease were associated with a higher incidence of cutaneous lesions in neonates [14]. Based on a study by Karegar Maher et al., maternal age was the only factor that showed a statistically significant association with the Salmon patch. In addition, the upper eyelid and sacral regions were found to be the most common sites of the salmon patch and Mongolian spots, respectively. The inclusion of a larger sample of neonates in studies by Firouzi et al., and Karegar Maher et al., resulted in differences in findings. Khoshnevisasl et al. evaluated the incidence of birthmarks in neonates born. They reported Erythema toxicum was significantly associated with the type of delivery. In addition, there was a significant relationship between Milia and Mongolian spots with increasing gestational age [21]. Some studies mentioned the higher prevalence of toxic erythema in infants with a higher gestational age. The higher rate of preterm infants in our study could be one of the possible causes of the lower prevalence of toxic erythema as compared with previous studies [15, 22-24].

In the present study, 5.38% of neonates with skin manifestations required treatment. Six newborns required treatment for diaper dermatitis and one newborn for intertrigo. Besides, Milia, toxic erythema, postural melanoma, Mongolian spot, salmon patch, and cutis marmorata do not require treatment and are self-limiting. Hemangiomas in small children are self-limiting. Severe neonatal acne needs treatment. Congenital melanocytic nevi also only need to be monitored and do not require emergency treatment.

As a limitation of retrospective studies, the number of studied variables and cofactors was limited. However, results of present study provide valuable insight for future general studies.

To the best of our knowledge, this was the first study to be conducted in our region, during a fully neonatal period of 28 days. The results of the present study indicated that the rate of skin lesions was moderate to high in hospitalized newborns. In addition, Erythema toxicum, Marmorata, Diaper dermatitis, Salmon patches, and Mongolian spots were more prevalent in infants. According to other results of our study, infant gender (female) and gestational diabetes can be considered as risk factors that increase skin lesions in newborns. Besides, there was a positive association between neonatal acne and infant age, and between maternal melanocytic nevus manifestation and higher birth weight. Considering that infants without existing indications can be exposed to higher risks, our findings can help pediatric physicians effectively in the early diagnosis and therapeutic procedures.

#### **Authors' contributions**

Concept and design: HE, SS, HM. Data collection, and field works: HE, FP, SM, AS. Results analysis and interpretation: FP, SM, AS. Drafting and revision: SS, HM. All authors read and approved the final version of the manuscript.

#### **Conflict of interests**

None to be declared.

#### **Ethical declarations**

The study design was approved by the ethical committee of the Mazandaran University of Medical Sciences [IR.MAZUMS.RIB.REC.1400.038].

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