

The prevalence rate of cutaneous lesions in NICU-admitted neonates

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Background: Skin disorders in neonates can be considered as determining concepts for prognosis and genetic counseling. So far, few studies have investigated the relative frequency of neonatal skin disorders. The present study aimed to investigate cutaneous lesions and their relationship with other variables in neonates hospitalized in the neonatal intensive care unit (NICU).

Methods: This cross-sectional study was conducted on 403 neonates hospitalized in the NICU of Rasoul Akram Hospital in 2014. After selecting the patients via convenience sampling, data were collected from the medical records.

Results: Of the 403 neonates, 366 (90.8%) had no cutaneous lesions, while 37 (9.2%) had cutaneous lesions. Among the latter group, 18 (48.6%) cases were pathological. According to the results obtained, the gender, type of delivery, gestational age, and reason for hospitalization were not related to the presence of cutaneous lesions and their pathological status ($P > 0.05$). Moreover, gender, gestational age, and reasons for hospitalization had no significant relationship with the lesion type ($P > 0.05$). The type of delivery had a statistically significant association with the kind of cutaneous lesions ($P = 0.043$).

Conclusion: Cutaneous lesions in neonates hospitalized in the NICU were less frequent in the present study compared to those in other studies, which can be attributed to the retrospective nature and the lack of direct medical examination of patients.

Keywords: prevalence, neonates, NICU, cutaneous, lesions

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INTRODUCTION

The skin is the most visible and accessible organ. The most critical functions of the skin include acting as a barrier against infections, protecting internal organs, helping with the regulation of body temperature, storing insulating fats, secreting electrolytes, and providing tactile sense-data ¹. The neonate's skin differs from that of adults in that it is more delicate and thinner, has weaker cell junctions, produces less sweat and fat, and is vulnerable to various infections ².

The newborn skin coating substance, *vernix caseosa*, with an antimicrobial function, plays a crucial role in protecting the fetus before and after the delivery ³. The skin disorders commonly seen in infants include transient benign lesions, atopic dermatitis (and its associated conditions), skin lesions due to infection, bullous dermatoses, genodermatoses, and postpartum symptoms ⁴. There is a multitude of self-limiting transient physiological skin changes in neonates that require no treatments. Practical information about normal and pathological skin findings is necessary to

specify which skin lesion needs rapid therapeutic actions⁵.

Skin disorders in neonates can be considered as determining concepts for prognosis and genetic counseling⁶. Numerous studies have found distinct skin findings in different races. For instance, skin melanosis is more prevalent in the black race, native Americans, Asians, and the Spanish⁷.

Other skin lesions that tend to be expected in newborns are adopted physiologically, including vernix caseosa, cutis marmorata, acrocyanosis and erythema neonatorum, harlequin color change, neonatal desquamation, lanugo, sucking blisters and erosions, sebaceous gland hyperplasia, milia, miliaria, neonatal acne, erythema toxicum neonatorum (ETN), transient neonatal pustular dermatosis, Mongolian spots, salmon patches, miniature puberty, and physiologic jaundice⁸.

The pattern of neonatal dermatoses depends on many factors, including climate, race, heredity, socioeconomic status, nutrition, hygiene, maturity, customs, somatic makeup, and so on. Most neonatal skin conditions are physiological, transient, and benign. However, the pathologic category comprises lesions of infective etiology, vascular malformations, developmental anomalies, keratinization disorders, eczema, and miscellaneous lesions⁹.

In the neonatal intensive care unit (NICU), cutaneous lesions can expose newborn infants (NIs) to infections and cause sequelae and scars. Hence, healthcare providers must be aware of the lesions and prevent them.

Few studies have so far been conducted on determining and recording the relative frequency of skin disorders. Thus, the present study aimed to investigate skin manifestations and their relationship with other variables in neonates hospitalized in the NICU.

PARTICIPANTS AND METHODS

The present cross-sectional study used convenience sampling to select 403 neonates hospitalized in Rasoul Akram Hospital's NICU in 2014. Data related to the patients' profiles including gender, type of delivery (term or preterm), reason for hospitalization, and the emergence of skin manifestations and their pathological status based on the specialist's opinion were investigated and recorded in the data collection form after the

patients' parents submitted informed consent forms.

The data collected were analyzed using SPSS 22. Absolute and relative frequency, as well as mean and standard deviation, were used to explain descriptive statistics. The chi-squared test and independent t-test were used for inferential statistics. $P < 0.05$ was set as the level of statistical significance.

RESULTS

A total of 227 (56.3%) neonates were male, and 176 (43.7%) were female. Term neonates (gestational age > 37 weeks) comprised 38.5% of the population. Cesarean was the method used in 77.7% of the deliveries. According to Table 1, the most common reason for hospitalization was respiratory distress syndrome (RDS), observed in 155 (38.5%) neonates.

Of the 403 study patients, 366 (90.8%) showed no skin manifestations, while 37 (9.2%) had skin manifestations, 18 (48.6%) of which were pathological. The frequency distribution of physiological skin changes in the study neonates is shown in Table 2. Table 3 depicts the frequency distribution of pathological skin findings in the study neonates.

The relationships between having skin manifestations and gender ($P = 0.148$), gestational age ($P = 0.935$), type of delivery ($P = 0.122$), and reasons for hospitalization ($P = 0.571$) were statistically insignificant. The relationship between the type of cutaneous lesions and gender ($P = 0.766$), gestational age ($P = 0.252$), and reasons for hospitalization ($P = 0.365$) were insignificant. However, a statistically significant relationship was observed between the type of delivery and the type of cutaneous lesions ($P = 0.043$). Furthermore, lanugo and milia were relatively more prevalent in the infants born via C-section, while cephalohematoma and syndromic face were more prevalent in those born naturally. Gender ($P = 0.556$), gestational age ($P = 0.138$), type of delivery ($P = 0.414$), and reasons for hospitalization ($P = 0.081$) had no relationship with the pathological status of cutaneous lesions.

DISCUSSION

The present study explored the prevalence of skin

Table 1. Frequency distribution of the reasons for hospitalization of the studied neonates

Reasons for hospitalization	Gender	Frequency	Relative frequency
Respiratory distress syndrome (RDS)	Male	82	155 (38.5%)
	Female	73	
Transient tachypnea of the newborn (TTN)	Male	3	4 (1%)
	Female	1	
Meconium aspiration syndrome	Male	2	3 (0.7%)
	Female	1	
Neonatal apnea	Male	3	4 (1%)
	Female	1	
Pneumonia	Male	4	5 (1.2%)
	Female	1	
Pneumothorax	Male	3	3 (0.7%)
	Female	0	
Jaundice/anemia	Male	60	97 (24.1%)
	Female	37	
Sepsis	Male	10	27 (6.7%)
	Female	17	
Meningitis	Male	1	2 (0.5%)
	Female	1	
Hypoglycemia	Male	2	4 (1%)
	Female	2	
Retinopathy of prematurity	Male	8	22 (5.5%)
	Female	14	
Withdrawal syndrome	Male	7	9 (2.2%)
	Female	2	
Gastrointestinal bleeding	Male	2	3 (0.7%)
	Female	1	
RDS/pneumonia	Male	0	1 (0.2%)
	Female	1	
RDS/jaundice/anemia	Male	6	12 (3%)
	Female	6	
RDS/sepsis	Male	4	6 (1.5%)
	Female	2	
RDS/hypoglycemia	Male	2	2 (0.5%)
	Female	0	
Jaundice/anemia / pneumonia	Male	1	2 (0.5%)
	Female	1	
Jaundice/anemia/sepsis	Male	3	4 (1%)
	Female	1	
Jaundice/anemia/hypoglycemia	Male	1	1 (0.2%)
	Female	0	
Sepsis/pneumonia	Male	1	1 (0.2%)
	Female	0	
Sepsis/seizure	Male	1	2 (0.5%)
	Female	1	
Sepsis/apnea	Male	1	2 (0.5%)
	Female	1	
Seizure	Male	3	5 (1.2%)
	Female	2	
Other diagnoses	Male	17	27 (6.7%)
	Female	10	

Table 2. Frequency distribution of physiological skin changes in the studied neonates

Reasons for hospitalization	Gender	Frequency	Relative frequency
Lanugo hair	Male	1	3 (8.1%)
	Female	2	
Milia	Male	2	3 (8.1%)
	Female	1	
Mongolian spots	Male	1	3 (8.1%)
	Female	2	
Erythema toxicum	Male	2	2 (5.4%)
	Female	0	
Ear nodules	Male	3	4 (10.8%)
	Female	1	

Table 3. Frequency distribution of pathological skin findings in the studied neonates

Reasons for hospitalization	Gender	Frequency	Relative frequency
Caput succedaneum	Male	2	4 (10.8%)
	Female	2	
Cephalohematoma	Male	1	2 (5.4%)
	Female	1	
Neural tube defects	Male	2	2 (5.4%)
	Female	0	
Ichthyosis	Male	2	2 (5.4%)
	Female	0	
Contact dermatitis	Male	1	1 (2.7%)
	Female	0	
Ecchymosis	Male	2	2 (5.4%)
	Female	0	
Syndromic face	Male	3	5 (13.5%)
	Female	2	
Hypopigmentation	Male	1	1 (2.7%)
	Female	0	
Hyperpigmentation	Male	2	3 (8.1%)
	Female	1	

manifestations among neonates hospitalized in the NICU of Rasoul Akram Hospital in 2014. The male to female ratio was 1.28, which is similar to the overall statistics of deliveries in Iran. Preterm infants need more support as they are more vulnerable to respiratory diseases. Accordingly, the majority of NICU beds are assigned to these infants, and the number of preterm neonates was 1.6 times more than that of term neonates. It is worth mentioning that 77.7% of the subjects were born via C-section. Given that today's nationwide policy promotes natural delivery and limits C-sections to high-risk cases, infants born via C-sections typically require more respiratory life support than naturally born infants. Besides, C-section is an aggressive non-

physiological method in nature and increases the risk of respiratory and life damages to the infants, which is consistent with the results of the present study.

In our study, RDS and jaundice/anemia were the most common reasons for hospitalization in the NICU. These conditions accounted for over 60% of hospitalizations, while combinational causes such as RDS/pneumonia, jaundice/hypoglycemia, and sepsis/pneumonia were uncommon. In contrast to previously conducted studies¹⁰⁻¹³, 37 cases (9.2%) were found to have skin manifestations. The reason is that the data collection method in the present study was retrospective and profile-based, and the patients were not directly examined by the physician. In other studies, sampling was prospective, and dermatologists and pediatricians examined the target population. This was impossible in the present study, so the number of subjects identified with skin manifestations was less.

The maximum frequency of skin manifestations was related to syndromic face (n = 5), caput succedaneum (n = 4), and ear nodules (n = 4), while the minimum frequency was observed in contact dermatitis and hyperpigmentation (n = 1 each). Pathological skin manifestations were observed in 18 cases, the majority of which were syndromic face (n = 5) and caput succedaneum (n = 4).

The results of a study done by Nopoor *et al.* on neonates admitted in NICUs showed that the ten most common diagnoses included lanugo hair (78.33%), miniature puberty (70%), sebaceous hyperplasia (68.33%), iatrogenic bruises (48.33%), physiological desquamation (48.33%), Mongolian spot (45%), salmon patch (31.67%), seborrheic dermatitis (28.33%), miliaria (28.33%), and erythema toxicum neonatorum (23.33%). In one case, natal teeth, a suckling blister, a pre-auricular skin tag, and micrognathia were found in combination. Neonatal skin lesions are mostly transient but need to be differentiated from the more serious or life-threatening conditions. Nursery staff should be aware of the susceptible and sensitive nature of the newborn skin so that proper care is provided, though unnecessary therapy or diagnostic tests should be avoided¹⁴.

According to Kar's study, 47 neonates (43.52%) had infective skin disorders, 21 (19.44%) had naevi and other developmental disorders, 10 cases each (9.26%) had keratinization disorder

and eczematous conditions, and the rest (n = 19, 17.59%) were put into a miscellaneous group. In that study, the infective disorders included bacterial infections (n = 21), fungal infections (n = 18), and viral infections (n = 6). Other important findings included infants with aplasia cutis congenita (n = 6), collodion babies (n = 5), a harlequin baby (n = 1), unilateral digital gangrene in upper limbs (n = 2), etc. None of the neonatal dermatoses showed significance ($P > 0.05$). The inadequate sample size was the possible cause of these results⁹.

A study done by Fontenele *et al.* demonstrated that skin lesions could occur in NICU newborns. The sample consisted of 137 newborns, 36 (26%) of whom had lesions. Among these lesions were 24 (46%) hematomas, 9 (18%) erythemas, 6 (12%) excoriations, 5 (10%) ecchymoses, 3 (6%) pustules, and 4 (8%) others. Regarding the affected area, 40% were $< 1\text{cm}^2$, while 68% measured between 1 and 2 cm^2 . The geographic form (38%) and localized distribution (92%) prevailed. Considering the affected region, the distribution included limbs (27; 52%), trunk (12; 24%), head (8; 16%), and other parts (4; 8%). The authors concluded that hematomas are the most common skin lesions and the limbs are the most affected area¹⁵.

In our study, the results indicated that gender, type of delivery, gestational age, and reasons for hospitalization had no relationships with having skin manifestations and their pathological status in NICU neonates. Furthermore, gender, gestational age, and reasons for hospitalization had no significant association with the lesion type. However, the type of delivery was found to have a statistically significant relationship with the kind of skin manifestation. Lanugo and milia were more prevalent in the infants born via C-section; cephalohematoma and syndromic face were more common in the natural delivery cases. Overall, the prevalence of skin manifestations in infants born via C-section was higher than in natural delivery cases.

CONCLUSION

Skin manifestations in NICU neonates were less frequent in the present study relative to other studies, which can be attributed to the retrospective type of the study and the lack of direct medical examinations. To attain more reliable results, we

recommend further studies using prospective multicenter sampling with larger sample sizes.

Conflict of interest: None declared.

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