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CLINICAL PROFILE, ETIOLOGICAL SPECTRUM AND RISK FACTORS OF NEONATAL PUSTULAR DERMATOSES IN A TERTIARY CARE HOSPITAL.

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Abstract
Background: Neonatal pustular dermatoses are a diverse set of infectious skin illnesses and benign, temporary eruptions that develop during the neonatal era. To prevent needless testing and antibiotic treatment, it is crucial to accurately distinguish between benign and infectious lesions. The etiological range and related maternal-newborn risk factors of neonatal pustular dermatoses are poorly understood in India. ***Objectives:*** To characterise the clinical characteristics, etiological range, and related environmental, maternal, and neonatal risk factors in neonates with pustular dermatoses. ***Methods:*** In a tertiary care hospital, 59 newborns with pustular skin lesions participated in a prospective observational study. We documented and examined maternal traits, neonatal variables, environmental factors, clinical profile, etiological diagnosis, therapy, and results. Odds ratios and chi-square analysis were used to evaluate the relationship between risk variables and infectious pustular dermatoses. ***Results:*** Of the 59 newborns, 25 (42.4%) were female and 34 (57.6%) were male. Of the cases, 71.2% were term neonates and 28.8% were preterm. The most frequent diagnosis was erythema toxicum neonatorum (30.5%), which was followed by miliaria pustulosa (8.5%), staphylococcal skin infection (11.9%), impetigo (13.6%), newborn candidiasis (16.9%), and transient neonatal pustular melanosis (18.6%). Low birth weight (OR 4.18, p=0.031), NICU admission (OR 15.50, p=0.018), neonatal antibiotic exposure (OR 49.50, p=0.026), protracted rupture of membranes (p=0.041), and maternal urinary tract infection (OR 9.00, p=0.047) were significant risk factors linked to infective pustular dermatoses. In 57.6% of cases, observation alone was adequate. Every newborn showed signs of full recovery. ***Conclusion:*** The majority of pustular dermatoses in newborns are benign and resolve on their own. The risk of infectious pustular dermatoses is greatly increased by low birth weight, maternal illness, NICU admission, and neonatal antibiotic exposure. Early detection encourages antimicrobial stewardship and enables proper management.

Keywords: neonatal skin infections, neonatal dermatoses, neonatal candidiasis, erythema toxicum neonatorum, temporary neonatal pustular melanosis, and neonatal pustulosis.

INTRODUCTION
The skin experiences major structural and functional changes throughout the newborn period, which is a special time of fast physiological adaptation. Neonates often have a range of dermatological symptoms due to the immaturity of the epidermal barrier, changed immunological responses, and changing microbial colonisation. Pustular dermatoses are an important subclass of these since they can be either benign physiological states or potentially serious infection illnesses. A wide range of illnesses, such as erythema toxicum neonatorum (ETN), transient neonatal pustular melanosis (TNPM), miliaria pustulosa, neonatal candidiasis, impetigo, and staphylococcal skin infections, can cause newborn pustular eruptions. While infectious lesions may need close observation and antimicrobial treatments, benign diseases like ETN and TNPM usually go away on their own.

Because many illnesses have similar physical characteristics, clinical diagnosis can be difficult. Neonatal skin diseases are largely influenced by maternal and perinatal factors. Neonatal microbial colonisation may be impacted by maternal illnesses, protracted rupture of membranes, gestational diabetes, prenatal antibiotic exposure, and vaginal candidiasis. Neonates are also at risk for infectious dermatoses due to changes in skin integrity and immunological defence systems caused by prematurity, low birth weight, NICU admission, invasive procedures, and exposure to neonatal antibiotics. The development and course of neonatal skin lesions may also be influenced by environmental factors such oil application,

conventional skin treatments, hygienic standards, and rooming-in habits. Traditional methods of caring for newborns' skin are still prevalent in many underdeveloped nations, which may have an impact on microbial colonisation and the function of the skin barrier.

Despite the fact that neonatal pustular dermatoses are common in paediatric practice, only a small number of Indian research have thoroughly examined their etiological spectrum and risk factors. Comprehending these variables is crucial for enhancing the precision of diagnosis, reducing pointless research, and guaranteeing suitable therapeutic measures. In a tertiary care teaching hospital, the current study was conducted to assess the clinical profile, etiological spectrum, and related maternal-neonatal risk factors of neonates presenting with pustular dermatoses.

OBJECTIVES

Primary Objective

To determine the risk variables for neonatal pustular dermatoses in mothers and newborns.

Secondary Objective

- To outline the clinical characteristics of pustular dermatoses in newborns.
- To identify the range of aetiologies in newborns with pustular lesions.
- To evaluate results and determine whether antibiotic therapy is necessary.

MATERIALS AND METHODS

Study Design

Observational study with a prospective focus.

Study Setting

Sree Mookambika Institute of Medical Sciences, Kulasekaram, Tamil Nadu, India; Department of Paediatrics and Neonatal Care Unit.

Study Duration

1 year.

Study Population

During the study period, newborns with pustular skin lesions were seen.

Sample Size

59 newborns.

Inclusion Criteria

- Infants 0–28 days of age.
- Skin lesions that are vesiculopustular or pustular.
- A parent or legal guardian who is prepared to give informed permission.

Exclusion Criteria

- Serious congenital skin conditions.
- Genodermatoses.
- Inadequate clinical information.

Data Collection

Information about maternal, neonatal, and environmental risk variables was gathered using a structured proforma.

Maternal Aspects

- The age of the mother
- Gravidity
- Fever in mothers
- An infection of the urinary tract
- Candida vaginalis
- Diabetes mellitus during pregnancy
- Hypertension brought on by pregnancy
- Chorioamnionitis

- Extended membrane rupture (>18 hours)
- Antibiotic exposure during pregnancy
- Delivery method

Newborn Aspects
- Sex
- Age at gestation
- Weight at birth
- Status of low birth weight
- Small in relation to gestational age
- Admission to the NICU
- Exposure to antibiotics
- Phototherapy
- Invasive techniques

Environmental Aspects
- The use of oil
- Conventional skin care
- Practices of hygiene
- Rooming-in procedures
- Variation by season

Clinical information was recorded, including the location of involvement, the start of lesions, related symptoms, and the final diagnosis. Results and methods of treatment were also documented.

Statistical Analysis

SPSS version 26 was used for data entry and analysis. Categorical variables were shown as frequencies and percentages, whilst continuous variables were given as mean ± standard deviation. For a few risk factors, odds ratios with 95% confidence intervals were computed. At $p<0.05$, statistical significance was taken into consideration.

RESULTS

Table 1. Baseline Characteristics of the Study Population (n = 59)

Variable	Number (%)
Sex	
Male	**34 (57.6)**
Female	**25 (42.4)**
Gestational age	
Term neonates	**42 (71.2)**
Preterm neonates	**17 (28.8)**
Birth weight	
≥ 2.5 kg	**39 (66.1)**
Low birth weight (<2.5 kg)	**20 (33.9)**
Clinical details	
NICU admission	**18 (30.5)**
Mode of delivery	
Vaginal delivery	**32 (54.2)**
LSCS	**27 (45.8)**

Table 2. Maternal Risk Factors (n = 59)

Risk Factor	n (%)
Vaginal candidiasis	**11 (18.6)**
PROM > 18 hours	**10 (16.9)**
Maternal fever	**9 (15.3)**
Maternal UTI	**8 (13.6)**
Gestational diabetes mellitus	**7 (11.9)**
Pregnancy-induced hypertension	**6 (10.2)**

Table 3. Onset of Pustular Lesions (n = 59)

Time of Onset	n (%)
At birth	14 (23.7)
Within 72 hours	29 (49.2)
After 72 hours	16 (27.1)

Table 4. Etiological Spectrum of Neonatal Pustular Dermatoses (n = 59)

Diagnosis	Number (%)
Erythema Toxicum Neonatorum	18 (30.5)
Transient Neonatal Pustular Melanosis	11 (18.6)
Neonatal candidiasis	10 (16.9)
Impetigo	8 (13.6)
Staphylococcal skin infection	7 (11.9)
Miliaria pustulosa	5 (8.5)

Table 5. Risk Factors Associated with Infective Pustular Dermatoses

Risk Factor	Benign (n = 34)	Infective (n = 25)	Odds Ratio	95% CI	p value
Low birth weight	7	13	4.18	1.33–13.10	0.031
NICU admission	3	15	15.50	3.71–64.78	0.018
Neonatal antibiotic exposure	1	15	49.50	5.86–418.07	0.026
PROM >18 hours	0	10	—	—	0.041
Maternal UTI	2	9	9.00	1.73–46.85	0.047

Table 6. Treatment Profile (n = 59)

Treatment	n (%)
Observation alone	34 (57.6)
Antifungal therapy	10 (16.9)
Topical antibiotics	6 (10.2)
Systemic antibiotics	9 (15.3)

Table 7. Outcomes (n = 59)

Outcome	n (%)
Complete recovery	59 (100)
Complications	0
Mortality	0

DISCUSSION

The clinical profile, etiological range, and related maternal-neonatal risk factors of newborns with pustular dermatoses were assessed in this prospective observational study. Because benign lesions can closely resemble infectious illnesses, neonatal pustular eruptions are common dermatological problems that occur during the first month of life and often provide diagnostic issues.

Males made up 57.6% of the cases in the current investigation, indicating a male predominance. Previous research on neonatal dermatitis have revealed similar findings. Male preponderance has been regularly reported in a number of neonatal skin condition cohorts, despite the lack of a clear scientific reason. In the first 72 hours following birth, lesions appeared in over half of the newborns.

The physiological adaptability of newborn skin during the early postnatal period is reflected in this observation. Transient pustular eruptions are caused by dynamic changes in immune responses, epidermal maturation, and microbial colonisation during the early newborn period. With 30.5% of patients, erythema toxicum neonatorum was the most frequent diagnosis. It is commonly known that ETN is the most common benign pustular eruption in infants.

Usually appearing in the first few days of life, the lesions go away on their own without any help. The second most frequent diagnosis, accounting for 18.6% of cases, was transient newborn pustular melanosis.

Benign pustular diseases accounted for almost half of all neonatal pustular dermatoses seen in this investigation, along with miliaria pustulosa. Neonatal candidiasis was the most common diagnosis among infectious diseases. Affected neonates frequently had maternal vaginal candidiasis, which supports the idea that vertical transmission occurs following delivery. Infectious pustular dermatoses were also significantly influenced by staphylococcal skin infections and impetigo. These results emphasise the role that prenatal microbial exposure and maternal illnesses play in the pathophysiology of newborn skin diseases.

One important risk factor for infectious pustular dermatoses was found to be low birth weight. Due to their undeveloped immune systems and compromised skin barrier function, low-birth-weight babies are more susceptible to bacterial and fungal infections. Infectious lesions showed a particularly substantial correlation with NICU hospitalisation.

This elevated risk is probably caused by prolonged hospital stays, invasive treatments, and increased exposure to microbes linked to healthcare. Neonatal antibiotic exposure was shown to have the strongest correlation in the study. Infectious pustular dermatoses were significantly more common in newborns exposed to antibiotics. Antibiotic treatment may promote fungal overgrowth, interfere with normal microbial colonisation, and make a person more vulnerable to opportunistic infections.

Current research on newborn infections has reported similar results. Infective pustular dermatoses were also significantly correlated with prolonged rupture of membranes and maternal urinary tract infections. The idea that maternal and perinatal illnesses affect neonatal microbial colonisation and the ensuing risk of skin infection is supported by these findings. Neonatal pustular eruptions are generally benign, as evidenced by the fact that over half of the newborns merely needed comfort and observation.

Crucially, all neonates showed full recovery with no problems or death. These results confirm that, when properly diagnosed and treated, neonatal pustular dermatoses have an outstanding prognosis.

Advantages

- A design for prospective observation.
- A thorough evaluation of environmental, neonatal, and maternal factors.
- Assessment of neonatal pustular diseases, both infectious and benign.
- Treatment and outcome analysis are included.

Restrictions

- A single-center investigation.
- The sample size is moderate.
- Not every infectious case had microbiological confirmation.
- There was no multivariate logistic regression.

Clinical Consequences

Antimicrobial exposure and needless examinations can be decreased by identifying distinctive infant pustular dermatoses. Early diagnosis and focused treatment may be facilitated by identifying high-risk neonates, especially those with low birth weight, NICU hospitalisation, and maternal infection. In order to avoid overtreatment and parental concern, it is equally crucial to be aware of benign self-limiting disorders.

CONCLUSION

The most prevalent neonatal pustular dermatosis was erythema toxicum neonatorum, which was followed by temporary neonatal pustular melanosis. Low birth weight, NICU admission, neonatal antibiotic exposure, protracted rupture of membranes, and maternal urinary tract infection were all strongly linked to infectious pustular dermatoses. The majority of neonatal pustular dermatoses were benign, self-limiting, and simply needed comfort and surveillance. Improved management, less needless antibiotic usage, and improved newborn care can all be achieved through early clinical identification and risk factor assessment.

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