

# Survey of skin disorders in newborns: clinical observation in an Egyptian medical centre nursery

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مسح للاضطرابات الجلدية لدى الولدان: ملاحظة سريرية في حضانة في مركز طبي في مصر  
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الخلاصة: لم تُحظَّ الاضطرابات الجلدية لدى الولدان بدراسات جيدة في مصر. وقد هدفت الباحثتان إلى دراسة أنماط التغيرات الجلدية في عينة من الولدان المصريين، وهي دراسة وصفية استباقية أترابية شملت ستة مئة ولید في حضّانة في مستشفى جامعة سوهاج، وتضمّنت الفحص الجلدي خلال الأيام الخمسة الأولى بعد الولادة. وقد تم كشف الاضطرابات الجلدية لدى 240 ولیداً (40%) ولوحظت الوحمات لدى 100 ولید (16.7%)، ومعظمها من النمط ذي الخلايا الميلانية (لطحخات منغولية لدى 11.7% مع وحمات ولادية ذات ميلانية الخلايا لدى 2.7%). كما كُشِفَت العدوى الفطرية الجلدية، ومنها داء المبيضات الفموية، وعدوى الفطريات في مناطق الحفاظات أو المدح الناجم عن عدوى المبيضات في الأرفاغ (أصل الفخذ)، وذلك لدى 13.3%، وكُشِفَت بعض العدوى الجرثومية في 1.3% من الولدان. وتشير المقارنات مع الدراسات الأخرى في أرجاء العالم إلى معدل مرتفع للعدوى بالفطريات مع معدل منخفض للوحمات الولادية في دراستنا للولدان، وتوصي الباحثتان بإجراء تقييم روتيني جلدي للولدان، ولاسيما في ضوء المعدلات المرتفعة للعدوى الجلدية بالفطريات.

ABSTRACT The frequency of neonatal skin disorders has not been well studied in Egypt. Our aim was to address patterns of dermatological changes in a sample of Egyptian newborns. In a descriptive prospective cohort study 600 newborns in Sohag University hospital nursery were dermatologically examined within the first 5 days of birth. Skin disorders were detected in 240 neonates (40.0%). Birthmarks were found in 100 neonates (16.7%), mainly melanocytic type (mongolian spots in 11.7% and congenital melanocytic naevi in 2.7%). Fungal skin infections, including oral moniliasis, fungal infection in the napkin area or candidal intertrigo, were detected in 13.3% and bacterial infections in 1.3% of neonates. Comparisons with other studies worldwide indicated a higher rate of fungal infections and lower rate of birthmarks in our study. Routine neonatal dermatological evaluation is recommended, especially in view of the high rate of fungal skin infections.

## Étude sur les affections cutanées des nouveau-nés : observations cliniques dans un service pédiatrique égyptien

RÉSUMÉ La fréquence des affections cutanées chez les nouveau-nés n'a pas été étudiée de manière approfondie en Égypte. Notre objectif était d'effectuer une étude des altérations dermatologiques au sein d'un échantillon de nouveau-nés égyptiens. Dans une étude prospective descriptive d'une cohorte réalisée au service pédiatrique du centre hospitalier universitaire de Sohag, un examen dermatologique a été conduit sur 600 nouveau-nés au cours de leurs cinq premiers jours. Des affections cutanées ont été dépistées chez 240 d'entre eux (soit 40,0 % de l'échantillon). Des naevi ont été observés chez 100 nouveau-nés (16,7 %), principalement de type mélanocytaire (taches mongoliques pour 11,7 % d'entre eux et nævi mélanocytaires congénitaux pour 2,7 %). Des dermatomycoses, notamment une candidose buccale, une infection fongique du siège ou un intertrigo à *Candida*, ont été détectées chez 13,3 % des nouveau-nés, et 1,3 % présentaient des infections bactériennes. Par rapport à d'autres études dans le monde, le taux de dermatomycoses est élevé dans notre étude, alors que le taux de naevi est faible. Une évaluation dermatologique systématique est recommandée chez les nouveau-nés, compte tenu du taux élevé de dermatomycoses.

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## Introduction

Neonatal skin provides physical protection and assists in fluid balance, immunosurveillance and thermoregulation, thus playing a vital role in the newborn's transition from an aqueous to an air-dominant environment. A large number of changes from transient physiological to grossly pathological lesions are seen in the skin of a neonate [1]. The majority of the disorders in the newborn are physiological, transient and self-limited and require no therapy [2]. Worried parents often seek medical advice from their child's physician regarding skin lesions. Thus, a working knowledge of both normal and abnormal cutaneous lesions of the neonate is required to determine which skin lesions require early intervention.

Several studies have documented differences in dermatological findings in neonates of various racial groups. For example, the incidence of dermal melanosis is more common in black, native American, Asian and Hispanic populations [3]. Another study showed a higher prevalence of birthmarks in the Jewish than in the Arab Israeli population [4].

In this study in Sohag city in Egypt we recorded skin disorders in neonates during the first 5 days after birth. Our aim was to prospectively study the rate of skin disorders in a large group of Egyptian newborns, and their relation to sex, birth weight, sociodemographic factors and maternal pathophysiological variables. We also aimed to compare the findings with other studies from the literature among different racial and ethnic groups.

## Methods

### Sample and setting

This was descriptive prospective cohort study design in the neonatal unit at Sohag University hospital in Upper Egypt. This is a tertiary referral unit that serves

around 2 million inhabitants living in Sohag province. The nursery capacity is 33 places. Outborn admissions represent about 75% of admissions to the nursery.

A total of 600 newborns in Sohag University hospital nursery during June 2008 to May 2009 were examined for skin problems. Consecutively admitted newborns over the period of the study were recruited if they were admitted in the first 5 days of life. During the study period 708 newborns were admitted. Of these 108 were excluded, due to age at admission above 5 days ( $n = 66$ ), unavailability of the dermatologist before reaching 5 days of age ( $n = 31$ ) or death before the dermatologist examination ( $n = 11$ ).

### Data collection

Each neonate was examined daily for 5 days after birth by the same examiner (R.E. El-D.) who was a consultant dermatologist. Using the *International statistical classification of diseases and related health problems*, version 10 (ICD 10) [5], all dermatological findings were noted, including transient benign lesions, pustular and vesicular infections, birthmarks (vascular and pigmented lesions), common congenital abnormalities, blistering disorders and other skin conditions. Fungal skin infections were confirmed by Wood light examination. Sex, birth weight and age in hours at the time of first examination were recorded. The examiner was blind to the sociodemographic, maternal or neonatal factors related to each neonate before or during clinical examination.

Relevant history was recorded, especially age of the mother, occupational, income and educational status, and rural or urban background of the parents. Parity of the mother, history of abortion, maternal illness or maternal smoking (passive and active) during pregnancy and the mode of delivery were noted.

The relationship between the frequency of lesions and various maternal and neonatal variables was studied. A

comparison was made between low birth weight (LBW) ( $< 2500$  g) and normal birth weight (NBW) ( $\geq 2500$  g) neonates.

### Ethical considerations

Approval of Sohag Faculty of Medicine research ethics committee was sought before the start of the study. Written approval from the parents of each neonate was taken before the start of the clinical examination.

### Statistical analysis

Data management and computations of descriptive statistics and prevalence were performed using SPSS for Windows, version 10. The chi-squared test was used to determine the significance of the association between the variables. Also, odds ratios (OR) at 95% confidence interval (CI) were calculated to determine the strength of association. There were no missing data.

## Results

Of 600 newborns, 240 (40.0%) had 1 or more skin disorder at birth or that appeared during the first 5 days after birth.

### Description of skin disorders

Birthmarks represented 100 (16.7%) of the skin manifestations in the studied neonates. Pigmented naevi were the most common, with mongolian spots in 11.7% of neonates, followed by congenital melanocytic naevi (2.7%). Vascular naevi included naevus simplex (1.3%) and naevus flammeus (1.0%) (Table 1).

Infections were the next most common type of skin disorder. Fungal skin infections were the most frequently observed pathological non-naevus skin disorder; 80 (13.3%) of the examined neonates had either oral moniliasis, fungal infection in the napkin area or candidal intertrigo. Fungal infection was more frequent in NBW infants (7.8%) than in LBW infants (5.5%) (Table 2).

**Table 1** Types of skin disorders found in a sample of Egyptian neonates (*n* = 600)

Skin disorder	No.	%
<b>Pigmented birthmarks</b>		
Mongolian spots	70	11.7
Congenital melanocytic naevi	16	2.7
<b>Vascular birthmarks</b>		
Naevus simplex (salmon patches)	8	1.3
Naevus flammeus (portwine patches)	6	1.0
<b>Infections</b>		
Fungal	80	13.3
Bacterial	8	1.3
<b>Eczema</b>		
Contact allergic dermatitis	24	4.0
Perianal dermatitis (non-infected)	4	0.7
Infantile seborrhoeic dermatitis (cradle cap)	24	4.0
<b>Transient non-infective skin diseases</b>		
Miliaria rubra (prickly heat)	10	1.7
Erythema toxicum	8	1.3
Miliaria pustulosa	7	1.2
<b>Physiological skin changes</b>		
Desquamation	80	13.3
Congenital hypertrichosis lanuginosa (lanugo hair)/hirsutism	74	12.4
Cutis marmorata	32	5.3
Milia	18	3.0
<b>Developmental skin defects</b>		
Congenital fossae (skin dimples)	26	4.3
Accessory tragus (skin tags)	21	3.5
<b>Other</b>		
Bronze discolouration (after phototherapy)	16	2.7
Epidermolysis bullosa	12	2.0
Disseminated intravascular coagulation	9	1.5
Thrombophlebitis	7	1.2
Purpura fulminans	4	0.7
Collodion baby	3	0.5
Ichthyosis	1	0.2

Bacterial infections were found in 1.3% of neonates and were more common in LBW (0.8%) than in NBW (0.5%) (Table 2).

Among skin disorders classified as physiological, desquamation was seen in 13.3% of neonates and congenital hypertrichosis lanuginosa in 11.7% (57.1% of them were delivered by normal vaginal delivery and 80% of them were from non-smoking mothers). Infantile seborrhoeic dermatitis was found in 4.0%

of neonates, cutis marmorata in 5.3% and milia in 3.0%. Among eczematous skin changes contact dermatitis had a frequency of 4.0% (65% of them were from non-smoker mothers). Contact dermatitis was more common in LBW neonates (79.2%) (Table 2).

In the category of transient non-infective skin diseases 1.7% of neonates had miliaria rubra and 1.3% erythema toxicum neonatorum. Both of these were common in NBW neonates

(90.0% and 62.5% respectively) (Table 2), but neither was related to maternal age or to maternal smoking. Among developmental skin defects congenital fossae were the most common (4.3%), followed by accessory tragi (3.5%). Among the other types of skin changes, bronze baby syndrome and epidermolysis bullosa were found in 2.7% and 2.0% respectively of our sample.

### Characteristics of neonates with skin disorders

Our analysis showed no major differences in the rate of skin disorders between the sexes: 121 cases were in males (50.4%) and 119 in females (49.6%). Skin disorders were found in 151 newborns (62.9%) of multigravida mothers and 89 (37.1%) of primigravida mothers. More than half of mothers (129, 53.8%) were in the age group 21–25 years, 57 (23.8%) were aged ≤ 20 years old and 54 (22.5%) were aged 26–40 years.

Analysis of the characteristics of neonates with infectious skin lesions versus those with non-infectious skin lesion are summarized in Table 3. A significant positive association was found between infectious skin changes and normal birth weight of the newborns, with low birth weight infants less likely to have skin disorders (OR = 0.3, 95% CI: 0.2–0.5, *P* < 0.001). Fungal infections were more frequent in NBW neonates (58.8%) while bacterial infections were more frequent in LBW (62.5%) (Table 2). No significant association was found between maternal smoking and infectious skin changes in neonates. Mothers living in rural areas were more likely to have newborns with infectious skin lesions (OR = 2.6, 95% CI: 1.6–4.2, *P* < 0.001); 87.5% of neonates with bacterial infections and 66.2% of neonates with fungal infections were resident in rural areas.

Analysis of the characteristics of neonates with and without birthmarks are summarized in Table 4. Birthmarks were significantly more common in

**Table 2 Frequency of skin disorders in normal birth weight and low birth weight neonates**

Skin lesion	Neonatal birth weight			
	Normal		Low	
	No.	%	No.	%
<b>Pigmented birthmarks</b>				
Mongolian spots	69	98.6	1	1.4
Congenital melanocytic naevi	7	43.8	9	56.2
<b>Vascular birthmarks</b>				
Naevus simplex (salmon patches)	3	37.5	5	62.5
Naevus flammeus (portwine patches)	5	83.3	1	16.7
<b>Infections</b>				
Bacterial	3	37.5	5	62.5
Fungal	47	58.8	33	41.2
<b>Eczema</b>				
Infantile seborrhoeic dermatitis (cradle cap)	17	70.8	7	29.2
Contact allergic dermatitis	5	20.8	19	79.2
<b>Transient non-infective skin diseases</b>				
Miliaria rubra	9	90.0	1	10.0
Erythema toxicum neonatorum	5	62.5	3	37.5
<b>Physiological changes</b>				
Desquamation	53	66.2	27	33.8
Congenital hypertrichosis lanuginosa (lanugo hair)	41	55.4	33	44.6
Cutis marmorata	4	12.5	28	87.5
Milia	13	72.2	5	27.8
<b>Other</b>				
Bronze discolouration	16	100.0	0	0.0
Epidermolysis bullosa	4	33.3	8	66.7

full-term infants with normal birth weight compared with low birth weight infants (OR = 0.1, 95% CI: 0.07–0.24,  $P < 0.001$ ). Mongolian spots and naevus flammeus were more frequent in NBW neonates. Congenital melanocytic naevi and naevus simplex were more common in LBW (Table 2). Sex did not increase the risk for birthmarks ( $P = 0.5$ ) but living in a rural area increased the risk of birthmarks in newborns (OR = 2.5, 95% CI: 1.5–3.9,  $P < 0.001$ ).

## Discussion

A critical step in neonatal examination is differentiating normal skin phenomena

and from other serious cutaneous disorders. Several studies report that skin changes in neonates are common [1,3,4]. For example, the frequency of cutaneous lesions in German neonates was 59.7% and in Indian neonates was 94.8% [6,7]. In our study 40.0% of the examined neonates had one or more skin disorder (excluding jaundice, cyanosis, spina bifida and scalp haematoma).

The rate of birthmarks in our study was only 16.7%. Other studies reported higher rate of birthmarks in neonates. In the Islamic Republic of Iran the incidence of birthmarks varied from 26.2% to 71.3% [6]. In Israeli neonates of Arab origin the incidence of birthmarks was

reported to be 49.7% while in those of Jewish origin the incidence was 50.3% [4]. In India the incidence of birthmarks was found to be 69% [7].

Melanocytic (pigmented) birthmarks were more frequent than vascular ones in our study and the most common pigmented birthmarks were mongolian spots in 70 neonates, a frequency of 11.7%. The rate of mongolian spots was higher in NBW neonates. Congenital melanocytic naevi were the second most common pigmented birthmarks with a frequency of 2.7% and their incidence was higher in LBW neonates. Vascular birthmarks were less common; naevus simplex (salmon patches) and naevus flammeus (portwine patches) were found in 1.3% and 1.0% of neonates respectively. Naevus flammeus were common in NBW neonates while naevus simplex were common in LBW neonates. No haemangiomas were recorded in our study.

Vascular birthmarks such as naevus flammeus and haemangiomas were the most common birthmarks in German neonates with a frequency of 37.2% [8]. Pigmented birthmarks were also the most frequent skin manifestation in Iranian neonates with a frequency of mongolian blue spots of 71.3%, while salmon patches were less frequent (26.2%) and haemangiomas were the least frequent (1.3%) [6]. In Taiwan, mongolian blue spots were the most common birthmarks with a frequency of 61.6%, followed by salmon patches 27.8%. Haemangiomas and congenital naevi were found in only 0.2% and 0.6% of neonates respectively [9]. Similarly, mongolian spots and salmon patches were the most common birthmarks in Chinese neonates with a frequency of 86.3% and 22.6% respectively, while portwine patch, salmon patches and congenital naevi were the least frequent [10]. In Arab and Jewish infants of Asian or African ancestry, melanocytic brown lesions (mongolian spots and congenital naevi) were more common, while congenital naevi were found only in

**Table 3 Comparison of characteristics in neonates with infectious skin lesions versus non-infectious lesions**

Characteristic	Infectious skin lesion				OR (95% CI)	P-value
	Yes (n = 88)		No (n = 384)			
	No.	%	No.	%		
<b>Neonatal birth weight</b>						
Low	38	43.2	280	72.9	-	
Normal	50	56.8	104	27.1	0.3 (0.2-0.5)	< 0.001
<b>Maternal smoking</b>						
Yes	40	45.5	305	79.4	-	
No	48	54.5	79	20.6	0.2 (0.1-0.4)	< 0.001
<b>Maternal residency</b>						
Rural	60	68.2	174	45.3	-	
Urban	28	31.8	210	54.7	2.6 (1.6-4.2)	< 0.001

OR = odds ratio; CI = confidence interval.

Jewish infants of European ancestry [4]. Our results suggest that the prevalence of birthmarks in Egyptian neonates is similar to its prevalence reported by others in non-white infants (Arabs, Asians and Africans).

Fungal skin infection was the most frequently observed pathologic non-naevous neonatal skin disorder in our study; 80 (13.3%) of the examined neonates had either oral moniliasis, fungal infection in the napkin area or candidal intertrigo. The incidence of fungal skin infection in our study was greater than that observed in other studies where it ranged from 2% to 7%

[1,2,5-7]. Interestingly, it was more common in neonates with NBW than in LBW neonates. Besides, fungal skin infection was related to residence in a rural area (in 63% of fungal-infected neonates the mother resided in a rural area), but it had no relationship to maternal antibiotic therapy before delivery (in 68.4% of fungal-infected neonates the mother did not receive antibiotics before delivery).

Physiological skin changes were also among the more frequent skin manifestations in our studied neonates, with skin desquamation the most common (13.3%). It was more common in males

than females and among term babies. The incidence of skin desquamation in other studies varied from 7.2% to 83% [11,12]. These variations may be attributed to the fact that the babies in other studies were followed up for more than 5 days.

Congenital hypertrichosis lanuginosa (lanugo hair) was seen in 70 cases (11.7%), a finding that is comparable to the incidence in other studies [8,9,11]. Predictably, a high percentage of them were preterm (59%) infants. Lanugo hair was also common in normal vaginal deliveries and was not related to maternal smoking.

**Table 4 Comparison of characteristics in neonates with birthmarks (pigmented and vascular) versus non-birthmark skin lesions**

Characteristic	Birthmarks				OR (95% CI)	P-value
	Yes (n = 100)		No (n = 498)			
	No.	%	No.	%		
<b>Neonatal birth weight</b>						
Low	16	16.0	290	58.2	-	
Normal	84	84.0	208	41.8	0.1 (0.07-0.24)	< 0.001
<b>Sex</b>						
Male	54	54.0	287	57.6	-	
Female	46	46.0	211	42.4	0.9 (0.6-1.3)	0.5
<b>Maternal residency</b>						
Rural	70	70.0	243	48.8	-	
Urban	30	30.0	255	51.2	2.5 (1.5-3.9)	< 0.001

OR = odds ratio; CI = confidence interval.

Infantile seborrhoeic dermatitis (cradle cap) was seen in 24 cases (4.0%) in our study. In Germany it was 8.2 % [8], in Italy 10.7% [11] and in Taiwan it was 6.1% [9]. This low incidence, as compared with other studies, may be due to small sample size in our study [8,9,11]. Its incidence was low in LBW neonates.

Cutis marmorata was seen in 32 cases (5.3%) in our study and most of the cases were of LBW. This incidence was comparable to that reported in other studies [6,9,13].

Milia was seen in 18 neonates (3.0%) in this study. It was common in term babies and had no relation to maternal factors. This rate was lower than reported in India (8.3%) [13], the Islamic Republic of Iran (6.2%) [6] and Taiwan (4.5%) [9].

Ecematous skin eruption was common in our study, with a frequency of contact dermatitis of 4.0%. This was more common in LBW neonates and was related to maternal passive smoking.

Bronze baby syndrome and epidermolysis bullosa were also relatively common in our sample with a frequency of 2.7% and 2.0% respectively. This incidence was comparable to that reported in other studies [12,14,15]. In our study all bronze baby syndrome cases had birth weight > 2500 g while most epidermolysis bullosa cases were in LBW neonates.

Developmental skin defects were common in our study. Congenital fossae (skin dimples) was the most common with a frequency of 4.3%, followed by accessory tragi (skin tags) with a frequency of 3.5%. This incidence is different from other studies where there was a lower incidence of skin tragi (1.3%) [8] and higher incidence of hirsutism [7].

Transient non-infective skin diseases were uncommon in our study. The most frequent was miliaria rubra with a frequency of 1.7%, followed by erythema toxicum neonatorum with a frequency of 1.3%. These showed no relation to maternal factors but they were common in full term neonates and in neonates with birth weight > 2500 g. This incidence was lower than other studies where the incidence of erythema toxicum neonatorum varied between 11.1% and 33.7% and miliaria rubra between 1.3% and 20.6% [7,8,11]. These variations in incidence may be related to racial differences as these disorders are common in Asian races but not in Caucasian or Arab races [2].

Previous studies found racial variations in skin changes in newborns. Salmon patches and mongolian spots were the most common birthmarks in non-white Asian and Arab neonates while congenital naevi were common in white and European neonates [6,8–10]. Similarly, erythema toxicum was

the most common non-birthmark skin change in non-white Asian neonates but was the least frequent in European (German) neonates [6,8]. Our results support these racial variations as the frequencies of birthmarks, transient skin lesions, and developmental defects reported in our Egyptian neonates were lower than those reported in other studies.

## Conclusions

Skin changes in this sample of Egyptian neonates differ from the results of studies in other races, with a higher rate of fungal infection and lower rate of birthmarks. Most skin lesions in the newborn are innocent and transient and need to be differentiated from more serious skin conditions in order to avoid unnecessary therapy to neonates and to reassure parents about the good prognosis of these skin manifestations.

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