RESEARCH PAPER

A Study of Pathological and Iatrogenic Skin Conditions in Babies of Neonatal Intensive Care Unit in A Tertiary Care Centre

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ABSTRACT

Introduction: Pathological skin changes in neonates has been observed in 4.9% to 41.2% of cases in different studies. Neonates admitted in NICU may be exposed to various procedures which may cause iatrogenic cutaneous complications.

Materials and methods: A hospital based, cross sectional study was conducted on 500 neonates admitted in neonatal intensive care unit of a tertiary care hospital from eastern India for a period of 1 year. Maternal history and demographic details were taken from the informants. Sex, age, birth weight of the neonate were recorded.

Results: Among the 500 neonates examined in newborn care unit, 325 (65%) were males and 175 (35%) were females. Among the broad spectrum of entities, pathological conditions comprised infections (5.4%), eczema (4.4%), genodermatoses (1.4%), and congenital malformations (3.2%), which constituted 14.4% of cases. Iatrogenic conditions were noted in 43(8.6%) newborns. Iatrogenic conditions showed statistically significant association with low-birth-weight babies.

Conclusion: Most of the skin conditions in neonates are benign and their differentiation from pathological disorders requires proper understanding. Though admissions due to specific neonatal skin conditions are far and few, it was observed that non-negligible morbidity and mortality due to these were reported in the intensive care.

Keywords: Incontinentia pigmenti, pathological skin changes, neonate.

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INTRODUCTION

Prevalence of neonatal dermatoses in different studies varies from 57% - 99.3%.[1]. Pathological skin changes in neonates hasve been observed in 4.9% to 41.2% of cases in different studies. [2-6] Almost every newborn will present with some physiological or pathological condition. Neonatal dermatoses are common and mostly benign only to be revealed to the onlooker who has fair knowledge about neonatal skin conditions, but in reality many a times we fumble it is often difficult to differentiate between benign and pathological conditions.

Neonates admitted in NICU may be exposed to various procedures and life supportive devices devices like pulse oximeters, skin temperature monitoring probes, catheters, phototherapy devices, adhesive tapes which may cause iatrogenic cutaneous complications. Present study was undertaken to analyze the pattern of pathological skin conditions in admitted neonates in the eastern part of the country India.

MATERIALS AND METHODS

A hospital based, cross sectional study conducted on 500 neonates admitted in level 2 newborn care unit of a tertiary care centre from eastern India for a period of 1 year. Maternal history and demographic details were taken from the informants. Sex, age, birth weight of the neonates were recorded.

Inclusion criteria: All the neonates within first four weeks of life admitted in level 2 new born care unit irrespective of the gestational age, sex, religion and mode of delivery were included in the study.

Exclusion criteria: Neonates whose mothers were unwilling to give consent to let their babies be examined and photographed were excluded from the study.

METHODOLOGY:

Study was conducted after taking approval from the institutional scientific and ethical committee. Written informed consent was obtained from parents/guardian of patients selected for the study. Maternal history and demographic details regarding her age, parity, history of

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consanguinity, history of illness during pregnancy and mode of delivery were taken from the informants. Sex, age, birth weight of the neonates were recorded. All the neonates were examined thoroughly including general physical examination, systemic and dermatological examination in adequate day light. In all instances, diagnosis of conditions werebased on clinical impression and associated skin conditions were photographed. Investigations like KOH scraping, pus culture, gram staining, tzanck smear and other laboratory investigations were performed whenever necessary. Skin biopsy was not performed as the parents denied consent. Appropriate hand washing and sterilization procedures were followed before examining the neonates.

Statistical analysis: Collected data was analysed by frequency, percentage and comparison was done using Chi-Square test and Fisher's exact test. Level of significance in the study was 0.05. The analysis was carried out using SPSS software (Version 21).

RESULTS

Out of 500 neonates, 325 (65%) were males and 175 (35%) were females. Mean birth weight of babies was 2.2kgs. 275(55%) neonates were born at term, 221 (44.2%) at preterm and 4 (0.8%) at post-term. 434(86.8%) neonates were less than 7 days old, among which 225 (45%) were within 48 hours of their life. History of consanguinity was present in 20 (4%) births. Normal delivery accounted to 282 (56.4%) neonates of which forceps assisted were 26(5.2%) and vacuum assisted were 4 (0.8%), rest 218(43.6%) by caesarean section. Most of the mothers were uniparous (60.8%) with mean age of mothers being 24.4 years.

Among the broad spectrum entities, pathological conditions comprised infections (5.4%), eczema (4.4%), genodermatoses (1.4%), and congenital malformations (3.2%) which constituted 14.4% of cases. [FIGURE 1-9] Iatrogenic conditions were noted in 43(8.6%) newborns out of 500 neonates. Needle prick was observed in 15 (3%) neonates followed by extravasation injuries in 13 (2.6%) and heel prick injuries in 8 (1.6%) neonates. [FIGURE 10-12] Infections accounted for 5.4% (24 newborns) and commonest was fungal infections observed in 3.8% neonates followed by bacterial infection in 1% cases. [TABLE-1]. Respiratory distress was the most common cause of neonatal admissions encountered in 39.8% of cases followed by sepsis (16.6%) and birth asphyxia (16.4%). Respiratory distress syndrome, meconium aspiration syndrome, lower respiratory tract infection, transient tachypnea of newborn were grouped under respiratory distress.

Collodian baby Incontinentia pigmenti Scabies

Table-1: Distribution Of Various Pathological Skin Conditions in Neonates

Sl.no	Skin lesions	No.of cases	Percentage (n=500)
1	**Iatrogenic skin conditions**	**43**	**8.6**
a	Needle prick injuries	15	3.0
b	Probe burns	2	0.4
c	Plaster dermatitis	1	0.2
d	Forceps injury	3	0.6
e	Heel prick injury	8	1.6

f	Fluid extravasation	13	2.6
g	Caput succedaneum	1	0.2
2	**Naevi**	**3**	**0.6**
a	Hemangioma	3	0.6
3	**Eczema and inflammatory conditions**	**22**	**4.4**
a	Napkin dermatitis	2	0.4
b	Perianal dermatitis	2	0.4
c	Seborrheic dermatitis	16	3.2
d	Irritant contact dermatitis	2	0.4
4	**Infections**	**27**	**5.4**
a	Furuncle	2	0.4
b	Abscess	1	0.2
c	Cellulitis (leg)	1	0.2
d	Congenital syphilis	1	0.2
e	Oral candidiasis	6	1.2
f	Flexural candidiasis	7	1.4
g	Tinea corporis	6	1.2
h	Torch(cytomegalovirus)	2	0.4
I	Scabies	1	0.2
5	**Congenital malformation/developmental defects**	**16**	**3.2**
a	Cleft lip and palate	3	0.6
b	Accessory tragus	2	0.4
c	Cleft lip	1	0.2
d	Aplasia cutis congenita	1	0.2
e	Meningomyelocele	1	0.2
f	Ectopia cardis with omphalocele	1	0.2
g	Ear malformation	1	0.2
h	Hand malformation	1	0.2
i	Congenital talipus equino varus (CTEV)	1	0.2
j	Omphalocele	1	0.2
k	Ambiguous genitalia	1	0.2
l	Achondroplasia	1	0.2
m	Polydactyly	1	0.2

6	**Genodermatoses**	**4**	**0.8**
a	Incontinentia pigmenti	2	0.4
b	Collodion baby	1	0.2
c	Lamellar ichthyosis	1	0.2
9	**Others**	**5**	**1.0**
a	Frontal alopecia	1	0.2
b	Chelitis	1	0.2
c	Umbilical discharge	1	0.2
e	Polycythemia	1	0.2
g	Downs syndrome	1	0.2

There was no statistically significant difference in distribution of skin lesions among males and females. [TABLE-2] Present study did not show any association of skin conditions with age of the mother.

TABLE-2: Association of skin lesions with gender of the neonate.

Skin condition	F		M		P value (chi square/Fishers exact test)	
	Count	Row N %	count	Row N %		
Seborrhoeic dermatitis	3	18.8%	13	81.3%	0.166	
Napkin dermatitis	1	50.0%	1	50.0%	0.656	
Perianal dermatitis	1	50.0%	1	50.0%	0.656	
Irritant contact dermatitis	1	50.0%	1	50.0%	0.656	
Pyoderma	3	75.0%	1	25.0%	0.092	
Candidiasis	5	38.5%	8	61.5%	0.791	
Tinea corporis	0	.0%	6	100.0%	0.071	
Iatrogenic	21	46.7%	24	53.3%	0.085	

Sig-Significant ($p<0.05$), HS-Highly significant ($p<0.01$).

Iatrogenic conditions were seen more commonly in neonates weighing between 1.5 to 2.49 kgs (Low birth weight) and the results were statistically significant. [TABLE-3]. Iatrogenic conditions were observed commonly in uniparous and their difference was statistically significant. Skin lesions did not show any significant relation with history of consanguinity and mode of delivery.

TABLE-3: Association of birth weight (kgs) with skin lesions

	<1kg		1-1.49kg		1.5-2.49kg		2.5-4kg		(chi square/ Fishers exact test) p	
Condition	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %		
Seborrheic dermatitis	0	.0%	1	6.3%	6	37.5%	9	56.3%	0.431	
Napkin dermatitis	0	.0%	0	.0%	1	50.0%	1	50.0%	0.946	

Perianal dermatitis	0	.0%	0	.0%	1	50.0%	1	50.0%	0.946	
Irritant contact dermatitis	0	.0%	1	50.0%	0	.0%	1	50.0%	0.328	
Pyoderma	0	.0%	0	.0%	2	50.0%	2	50.0%	0.862	
Candidiasis	0	.0%	1	7.7%	5	38.5%	7	53.8%	0.636	
Tinea corporis	0	.0%	0	.0%	4	66.7%	2	33.3%	0.719	
Iatrogenic	5	11.1%	13	28.9%	16	35.6%	11	24.4%	0.000	HS

Sig-Significant ($p<0.05$), HS-Highly significant $p<0.01$.

With respect to maturity, preterm babies showed significant association with seborrheic dermatitis. [TABLE-4] Iatrogenic issues were frequent between 3-5 days of age, while tinea corporis was encountered in neonates after 7 days. These associations were statistically significant.

Table 4: Association of skin lesions with maturity of the newborn

	PRETERM		TERM		POST TERM		P value (Fishers exact test)	
Condition	Count	Row N %	Count	0.099	Count	Row N %		
Seborrhoeic dermatitis	8	50.0%	7	0.440	1	6.3%	0.036	Sig
Napkin dermatitis	0	.0%	2	0.980	0	.0%	0.440	
Perianal dermatitis	1	50.0%	1	0.980	0	.0%	0.980	
Irritant contact dermatitis	1	50.0%	1	0.980	0	.0%	0.980	
Pyoderma	0	.0%	4	0.565	0	.0%	0.192	
Candidiasis	4	30.8%	9	0.372	0	.0%	0.565	
Tinea corporis	1	16.7%	5	0.074	0	.0%	0.372	
Iatrogenic	27	60.0%	18	40.0%	0	.0%	0.074	

Sig-Significant ($p<0.05$), HS-Highly significant ($p<0.01$).

DISCUSSION

Neonates admitted in intensive care unit for any condition usually presents with some cutaneous manifestations which ranges from physiological, transient conditions to serious pathological conditions. But, admissions due to specific neonatal skin conditions are far and few. It was observed that non-negligible morbidity and mortality due to these were reported in the intensive care.[7] Prevalence of neonatal dermatoses in different studies varied from 57% - 99.3%.[1] Pathological skin changes in neonates have been observed in 4.9% to 41.2% of cases in different studies. [2-6] These differences may be related to study methods, criteria, environmental factors, racial differences and observer variations.

Out of 500 neonates examined in the present Indian study, 65% were males and 35% were females. Mean birth weight of babies was 2.2kgs. 55% neonates were born at term, 44.2% preterm and 0.8% post-term. Normal delivery accounted for 56.4% neonates, of which forceps assisted was5.2%, vacuum assisted 0.8%, rest 43.6% by caesarean section.60.8% of the mothers were uniparous with their mean age being 24.4 yearsIn a similar Indian study by Jain et al 52.5% were males and 47.5% were females. 26% percent were preterm, 67% were term, and 0.5% were post-term. 40% were delivered vaginally and 60% were delivered by caesarean section. [9]

The reasons for NICU admission in our hospital were respiratory distress, birth asphyxia, sepsis, prematurity, neonatal jaundice, congenital malformations. This finding is comparable to a study by Ferahbas et al.[7] Iatrogenic conditions were noted in 43(8.6%) newborns out of 500 neonatesand were unintentional.

Most commonly encountered was needle prick which was seen in 3% neonates, followed by fluid extravasation (bruises) in 2.6%, heel prick in 1.6%, forceps indentation and associated cutaneous change in 0.6% and probe burns in 0.4%. We also observed iatrogenic injuries more frequently in LBW neonates which is in concordance with the study by Metzker et al from northern India.[8] [TABLE 3]

An Indian study by Jain N et al reported iatrogenic dermatological complications in 33 (55%) neonates out of

which bruises were seen in 29 (48.33%) neonates, and these lesions had higher incidence in neonates weighing less than 2 kg, in pre-term and those born vaginally.[9] Some of these findings were similar to the present study. A Brazilian study reported incidence of hematomas (46%), erythema (18%), excoriations (12%), ecchymosis (10%), pustules (6%) and others .[10] Plaster dermatitis or irritant contact dermatitis and infusion reactions were less observed in the present study which reflects meticulous and high standard of care provided here.

In our study hemangioma was found in 3(0.6%) neonates. The incidence of hemangioma was higher(3.8%) in a study by Shehab et al. Hemangioma was seen at a frequency of 0.8% and 1.3% in other studies which is comparable to our study.[11,12] 0.6% cases of CALMs were noticed in our study which was in accordance with the incidence of 0.3% newborns in a Iranian study by Moosavi et al.[12] When multiple CALMs are present, babies have to be followed up for neurofibromatosis and other genodermatoses in conjunction with family history. Interestingly, we found 2 cases of incontinentia pigmenti, a X-linked dominant condition which presented with vesicular lesions all over the body along the lines of blashko. One of the mothers had history of similar lesion and showed some hypopigmented residual lesions.

We had a single case of collodion baby (0.2%) and lamellar ichthyosis in our study. Sarkar et al and Moosavi et al observed collodian babies in 33.3% and 0.1% respectively in their studies.[13,12] Thus the incidence of colloidon babies varies from study to study.

It was seen in 4.4% (22) newborns. Most common condition among these was seborrheic dermatitis seen in 3.2% followed by napkin dermatitis in 0.4%, perianal dermatitis in 0.4% and irritant contact dermatitis in 0.4% of neonates. In a study from south India by Gudurpenu S et al, only 3 patterns of eczemas (6.8%) are mentioned which included infantile seborrhoeic dermatitis in 4.5%, followed by napkin dermatitis in 1.4% and perianal dermatitis in 0.9%. These findings are comparable to our study results .[14] Previous reported incidence of cradle cap has ranged from 0.3 to 4.4% and that of napkin dermatitis from 0.3 to 18.9%.[15] Our findings concurred with previous study values. With respect to maturity, preterm babies showed significant association with seborrheic dermatitis. [TABLE-4]. Infections accounted for 5.4% (24 newborns) and the commonest was fungal (3.8%) which presented as oral (1.2%) and flexural candidiasis (1.4%) and tinea corporis (1.2%). Bacterial infection was seen in 1% cases.

In a study conducted by Shehab MM et al fungal infections were observed in 4.5% neonates which was comparable to our study.[16] In a study by Dash et al oral thrush was noted in 1% which is in accordance with the present study.[6] Mothers of all the 6 tinea infected neonates of our study also had tinea infection. The source of infection may be mother or other infected humans, fomites or soil. Though rare, few case reports of tinea infection in neonates have been noted.[17] High humidity, warm climate, higher temperature maintained in NICU and contact with infected mothers may be responsible for the increase in tinea in neonates. Bacterial infection constituted 1% of cases. In contrast to the present study, Sarkar et al noted a higher incidence of 31.3%.[13]

In our study, 16 (3.2%) babies had congenital malformations. An Australian study by Rivers et al reported developmental defects in 4.3% which is in concordance to present study.[19] Cleft lip and palate was found in 3 cases and solitary cleft lip in a single case. Assessory tragus was noted in 2(0.4%) cases. In other studies, its incidence was found to be 0.5% and 0.6%.[12, 20] We found a single case of aplasia cutis congenita presenting with solitary shiny membranous patch/ulcer over lateral side of the neck. Incidence of which is approximately 0.01 to 0.03% .[21] We observed cases of meningomyelocele, ectopia cardis with omphalocele and ambiguous genitalia.

Inspite of search in journals and internet we found paucity of information regarding congenital malformations, possibly due to sporadic reporting and lack of long-term studies. Though those are not exactly the main area of concern for the dermatologists, but they stimulate, inspire and enlighten us to workup on their systemic associations and corresponding referral to respected specialties since these malformations are seen on the surface of the skin. Interestingly 1% of conditions in the present study could not be classified under above mentioned categories. But, they are worth mentioning as described below.

Frontal alopecia was seen in a neonate. Localized alopecia can occur physiologically, with trauma or as a part of nevoid disorder.[22] Further studies and follow up are essential to categorize them in definitive dermatological section. Umbilical discharge was observed secondary to omphalitis. In persistent omphalitis, immunodeficiency should be suspected. Cellulitis and sepsis develop when infection spreads beyond umbilicus. Thus early recognition and prompt treatment is essential.[23]We have found a single case of chelitis in our study and a case of polycythemia with hemoglobin 22g% and hematocrit 65% presenting as generalized rubor/erythema all over the body.

Some of these findings are peculiar and we could not find any studies to correlate them. Hence, a diligent observation and examination of the neonate is needed to pick up rare findings which are essential in the field of neonatal dermatology for better management.

CONCLUSION

In cocnlusion, skin acts as an interface with the external world. Most of the skin conditions in neonates are benign and appreciation of such benign conditions and their differentiation from the pathological disorders requires proper understanding. Our study stress on the need of regular antenatal screening of syphilis and TORCH infections to find out and treat hidden cases in the community. At the same time prenatal diagnosis of congenital malformations is important to decrease their prevalence. Thorough workup, regular follow up and counselling of genodermatoses is mandatory to decrease morbidity and mortality. Though admissions due to specific neonatal skin conditions are far and few, it was observed that non-negligible morbidity and mortality due to these were reported in the intensive care unit.

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