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Original Research Article

Predictors of mortality among neonates transported to tertiary care centre

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ABSTRACT

Background: The neonatal transport in India has taken a giant leap in last years. For reducing the death among transported newborns, transport in well-equipped ambulance could play a vital role. As there is not much data available in Punjab on neonates being transported to tertiary care center so the present study was conducted to know the predictors of mortality in newborns transported to tertiary care center.
Methods: The present study was an observational study conducted in neonatal intensive care unit of department of Pediatrics at SGRD institute of medical science and research, Amritsar, Punjab, India over a period of 18 months from 1st January 2017 to 30th June 2018. Total 121 neonates were enrolled in the study. History and clinical examination were done at the time of admission and the various study variables were statistically analysed.
Results: Out of total 121 neonates, 76 were discharged, 12 expired and 33 left against medical advice. Mortality rate was 9.9%. Mortality was higher in neonates who had hypothermia, hypoglycemia, poor perfusion and bradycardia at the time of admission. Neonates with extremely low birth weight (<1 kg) and those admitted after 6 hours of age also had higher mortality.
Conclusions: Predictors of mortality were hypothermia, hypoglycaemia, poor perfusion and bradycardia at the time of admission. New-borns require special care for stabilization before and during transport, which can be achieved by using specially equipped neonatal ambulances. So, these neonatal ambulances should be started in all states to decrease the neonatal mortality rate.

Keywords: Extremely low birth weight, Neonatal ambulances, Transported neonates

INTRODUCTION

Reducing under-five mortality rate by two-third is the WHO target as per millennium development goal (MDG-4) and timely treatment of complications in newborns is one of the key strategies for achieving the same.[1] Infant mortality rate in Punjab, India has declined from 44 per 1000 live births (2006) to 21 per 1000 live births (2016) in last 10 years. According to recent report published by UNICEF on 20th February 2018, India is at 12th position among the 52 lower middle-income countries with neonatal mortality rate of 25.4 per 1000 live births. Premature neonates and neonates with history of asphyxia or difficult delivery are often critically ill and require timely transport. Outcome of these babies is dependent on effectiveness of transport system. Though institutional delivery and in-utero transport of newborn is safest but unfortunately these conditions cannot be always anticipated resulting in continued need of transfer of these babies after delivery.[2,3]

Transportation of sick neonates under controlled conditions has a direct relationship with morbidity and mortality.[4] Poor transportation is one of the iatrogenic

factors significantly associated with greater neonatal mortality.[5] Care during referral to hospital is largely a neglected field in India. High mortality could be attributed to delay at three levels which include delay in recognition of severity of illness, delay in transport of neonate and delay in delivery of appropriate health care.[6] Ambulances services are the key element of transfers.

108 Ambulance services first started in Hyderabad on 15th August 2005 by former health minister, Dr Anbumani Ramadoss for easy, accessible and readily available services to transport sick patients to higher centers. The department of health and family welfare, government of Punjab, India has started providing ERS (emergency response services) services from 31st march, 2011 in the state of Punjab free of cost to all citizens in the State. Neonatal 108 ambulance services started on 29th May 2012 in states like Tamil Nadu, Madhya Pradesh, India. These neonatal ambulances are equipped with incubator unit, pulse oxymeter with neonatal probe, UPS for incubator running, separate oxygen support system, baby resuscitation kit and overhead ceiling radiant warmer. But these neonatal 108 ambulance services are not available in Punjab, India.

Many sick neonates get admitted daily to the tertiary care neonatal intensive care unit of Sri Guru Ram Das Institute of Medical Science and Research, Vallah, Amritsar, Punjab, India. Most of them are transported without proper stabilization before referral. The care during their transport is also deficient. Hence all supportive care in neonatal intensive care unit for these sick neonates is sometimes futile. So, this study is designed to determine the predictors of mortality among referred neonates and to ascertain their transport conditions.

METHODS

This study was conducted in the department of pediatrics in neonatal intensive care unit during a period of 18 months from 1st January 2017 to 30th June 2018 in Sri Guru Ram Das Institute of Medical Sciences and Research, Vallah, Amritsar, Punjab, India.

It was an observational study in which extramural neonates admitted to neonatal intensive care unit of Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar, Punjab, India within 72 hours of life were included.

Exclusion criteria

- Neonates with major surgical problems and neonates with multiple congenital anomalies.

Data collected by complete history and examination. The receiving clinician documented the routine clinical parameters on arrival of the baby. The study variables were analysed for their association with mortality of neonates by using chi-square and student t test and p <0.05 was considered significant.

RESULTS

About 121 neonates transported within 72 hours of life were included in the study. 75.2% were males and 24.8% were females.

Table 1: Demographic profile of transported and expired neonates.

Parameters		No. of neonates admitted (n=121)	No. of neonates expired (n=12)	P value
Gestational age	Preterm	67	8	0.451
	Term	57	4	
Sex	Male	91	9	0.987
	Female	30	3	
Age on admission	<6 hours	59	6	0.04
	>6 hours	62	6	
Place of delivery	Hospital	114	11	0.773
	Home	7	1	
	<1 kg	7	3	
	>2 kg	30	4	
	1-2 kg	84	5	

Most common cause of referral was respiratory distress (HMD in 17.3%, asphyxia in 16.5%, TTN in 14.8%, congenital pneumonia in 9.9%, both meconium stained liquor and asphyxia in 9%, only asphyxia in 8%). Rest of the neonates were referred due prematurity, pneumothorax, jaundice, sepsis and seizures. 55.3% were preterm and 44.6% were term newborns. 84 (69.4%) were admitted with birth weight of >2 kg, 30 (24.8%) with birth weight of 1-2 kg and 7 (5.8%) with birth weight <1 kg. Around 48.8% were admitted within 6 hours of life and 51.2% were admitted after 6 hours of life (Table 1). Out of total 121 enrolled neonates, 76

(62.8%) were discharged, 12 (9.9%) expired and 33 (27.2%) left against medical advice. Mortality was significantly observed in neonates who were transported after 6 hours of age and in neonates with birth weight <1 kg with p value of 0.031 and 0.04 respectively (Table 1).

Most of the neonates (94.7%) were delivered at hospital and 5.7% were home delivered. Almost all deliveries (99.1%) were conducted by trained health personnel (Qualified doctor or trained staff) and only 0.8% by untrained person.

Bad obstetric history in mother was present in 42.9% referred neonates. Active resuscitation at birth was required in 74.3% (90) of total referred neonates. Out of total 121 neonates, 87 (71.9%) neonates received some form of treatment before referral either in the form of iv fluids, antibiotics or intubation whereas 34 (28.1%) did not receive any kind of treatment before referral.

Table 2: Transport details of referred and expired neonates.

Parameters	No. of neonates admitted (n=121)	No. of neonates expired (n=12)	P value
Mode of transport private			
Ambulance	54	54	
Ambulance 108	43	6	0.494
Own vehicle	24	1	
Duration of transport			
<1 hour	98	12	0.097
>1 hour	23	0	
Accompanied by			
Trained	17	2	
Untrained	104	10	0.09
Multiple referrals			
Yes	41	2	0.36
No	80	10	

Table 3 Clinical parameters at the time of admission among referred and expired neonates.

Parameter	No. of neonates admitted (n=121)	No. of neonates expired (n=12)	Mean±SD	P value
Heart rate (beats/min)				
<60	3	2	57.53±3.53	
>60	118	10	127.40±29.27	0.001
CFT (in seconds)				
<3	86	4	1.50±0.57	0.004
>3	35	8	4.50±0.53	
Temperature (Fahrenheit)				
<97.7	33	6	96.90±0.48	0.000
97.7-99.5	81	6	98.03±0.23	
RBS (mg/dl)				
<45	96	5	23.80±9.75	0.001
45-200	16	7	129.29±46.00	

Out of total 121 neonates, bradycardia was present in 3 cases and out of them, 2 expired. 35 neonates had prolonged CFT (>3 seconds) at the time of admission and out of them 8 expired.

Hypothermia was present in 33 cases at the time of admission and 6 out of them expired. Out of total 12 expired neonates, 5 had hypoglycemia. Bradycardia (p=0.001), delayed CFT (P=0.004), hypothermia (p=0.00) and hypoglycemia (p=0.001) at the time of admission was significantly associated with mortality (Table 3). Out of total 12 expired neonates, 8 (66.6%) neonates had delayed capillary filling time, 6 (50%) had hypothermia, 5 (41.6%) had hypoglycemia and 2 (16.6%) neonates had bradycardia at the time of admission. Poor perfusion (delayed CFT) was seen as the commonest finding in expired neonates (Figure 1).

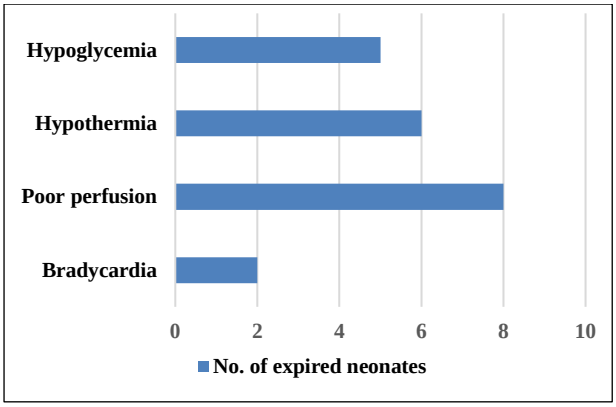

Figure 1: Various parameters on admission in expired neonates.

DISCUSSION

Out of total 121 enrolled neonates, 76 (62.8%) were discharged, 12 (9.9%) expired and 33 (27.2%) left against medical advice. Mortality rate in present study was 9.9% in comparison to the study conducted by Verma SK et al, in 2014 in Rajasthan, mortality rate was 20.7%. In present study, out of total expired neonates, 50% expired within 24 hours of admission, 16.6% within 24 hours to 1 week and 33.3% after 1 week of admission. In a study done by Aggarwal KC et al, 40% deaths occurred within first 24 hours of life and 74% within first week.[7] Sehgal A et al, observed that 70% deaths occurred within 6 hours of arrival.[2] Delayed CFT at the time of admission was the most common event in transported neonates in present study (Table 3). It was observed in 28.9% of the total transported neonates which is in concordance with the study conducted by Narang M et al, where delayed CFT was the most common event observed in 69.3% of the transported neonates.[8] Various metabolic derangements at the time of admission such as hypoglycemia in 5 (41.6%) of expired neonates (P=0.01), hypothermia seen in 6 (50%) of the expired neonates (P=0.00) and poor perfusion in 8 (66.6%) of expired neonates (P=0.00), predicting the mortality in present study were similar to the study conducted by Sehgal A et al (Figure1).[2] In present study 80.1% (97) neonates were transported by ambulance services and out of them 11 expired (Table 2). There was no significant relation (P=0.49) between mortality and mode of transport. Study conducted by Narang et al, observed decreased mortality in neonates transported by ambulance.[9] In a study done by Punitha P et al, in Tamil Nadu, India, clinical condition of the neonates transported through neonatal ambulances was much better.[9] But neonatal 108 ambulance was not used in any of the neonatal transport in present study.

CONCLUSION

Transporting a sick neonate from periphery to tertiary care centre is not that simple due to seasonal variation in temperature and non-availability of neonatal ambulances in Punjab. Present study concludes that mode of transportation either by ambulance or own vehicle, did not affect the mortality. The predictors of mortality in neonates transported to our centre were hypothermia, hypoglycaemia, poor perfusion and bradycardia at the time of admission. Neonates who were admitted after 6 hours of age and those with extremely low birth weight (<1kg) had significant mortality. Hence, these new-borns require special care for stabilization before and during transport. None of the neonates in present study were transported in ambulances having incubators or trained personnel in neonatal care.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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