

Original Research Article

Unveiling referral's impact on asphyxiated newborns: a cross-sectional study

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ABSTRACT

Background: Birth asphyxia also known as perinatal asphyxia, refers to the lack of oxygen during the childbirth. The asphyxiated newborns require a comprehensive care and many special newborns care units have established in Gujarat for the sick newborns. This study mainly focuses on understanding the reasons for referral, the average travel time to tertiary care institutions, and identifying gaps to minimize unnecessary referrals among patients.

Methods: The cross-sectional study was conducted over a period of one year, and out-born asphyxiated newborns were selected based on the inclusion criteria. A pretested, semi-structured questionnaire was used to collect the data, which was later analyzed using Microsoft excel and statistical package for the social sciences (SPSS) 26.

Results: Out of the 131 newborns, 31% had moderate-severe asphyxia. Approximately 9% of the patients had to travel for more than 2 hours to reach the final health facility. Among the patients, risk of mortality was significantly higher among the those who were referred from the private health facility. Lack of availability of bed, ventilator and economic burden were among the common reason for referral.

Conclusions: There is a necessity to prevent unnecessary multiple and delayed referrals, and to provide essential care during transport to improve the outcomes.

Keywords: Asphyxia, Special newborn care unit, Referral, Out-born

INTRODUCTION

Birth asphyxia, also known as perinatal asphyxia, refers to the lack of oxygen during childbirth. According to the World Health Organization (WHO), it is defined as the failure to initiate and sustain breathing.¹ Perinatal asphyxia occurs when the fetus or newborn experiences oxygen deprivation (hypoxia) and/or inadequate blood flow (ischemia) to various organs, often resulting in tissue lactic acidosis and hypercarbia. there are certain risk factors which can assist in predicting the survival of the newborn.

The establishment of special newborn care units (SNCUs) near labor rooms aims to provide comprehensive care, excluding assisted ventilation and major surgery, for sick newborns.² Management of asphyxiated babies primarily

involves supportive measures, such as ensuring optimal oxygenation, ventilation, perfusion, metabolic balance, and seizure control.¹ Anticipation of high-risk births, skilled personnel during delivery, and adequate preparation are crucial for improving neonatal outcomes.³

Transporting sick newborns to specialized care units improves survival rates and outcomes, particularly for outborn babies those born at home, and route to the hospital, or in another healthcare facility and subsequently transferred.^{3,4} While SNCUs have been established in many districts of Gujarat, patients often still need to travel to civil hospitals in Ahmedabad for advanced care.²

This study focuses on understanding the reasons for referral, average travel time to tertiary care institutions, and identifying gaps to minimize unnecessary referrals

among patients. Analysing the profiles of referred asphyxiated patients is essential for healthcare providers and decision-makers to design interventions aimed at enhancing the quality of care of the newborn.

METHODS

The cross-sectional study was conducted over a period of one year, from March 2021 to March 2022, at SNCU of Civil Hospital, Ahmedabad (B. J. Medical College). During the period of one year, around 500 asphyxiated newborns were admitted in the SNCU. However, in present study because of COVID 19 pandemic, we could study only 130 asphyxiated newborns (convenience sampling technique: non-probability).

Inclusion criteria

The out-born patients were selected on the basis of the inclusion criteria i.e.: requirement of positive pressure ventilation for more than one minute, signs of fetal distress (heart rate of less than 100 beats per minute, late decelerations, or an absence of heart rate variability), the failure to initiate and sustain breathing at birth and the Apgar score <7 at 5 minutes.

Exclusion criteria

Newborns with any dysmorphic features, congenital neuromuscular disorders, congenital disorders and babies who were discharged against medical advice were excluded from the study. A pretested, semi-structured questionnaire was used to collect the data and data analysis was conducted using Microsoft excel and statistical package for the social sciences (SPSS) 26. The study protocol was reviewed and approved by the institutional ethical committee.

RESULTS

Among the referred patients, only 60% of the newborn could reach the civil hospital within 1-2 hours. Around 9% of the patients had travelled for more than 4 hours to reach the final facility. Among those who travelled for >2 hours, 51% of them had poor outcome (Figure 2).

The figure highlighted the district from which the patients were referred and the red coloured were those districts from which the highest referral done.

Table 1: Distribution of the patients based on their socio-demographic profile.

Variables	Frequency (%)
Gender	
Male	78 (59.6)
Female	53 (40.4)
Residential area	
Rural	70 (53.4)
Urban	61 (46.6)

Table 2: Detail regarding the asphyxiated newborns.

Variables	Frequency (%)
Birth weight (kg)	
1-1.49	6 (4.6)
1.5-2.49	49 (37.4)
>2.5	76 (58)
Severity of asphyxia	
Mild	90(68.7)
Moderate	28(21.38)
Severe	13(9.92)
Outcome	
Discharge	100 (76.34)
Death	31 (23.66)

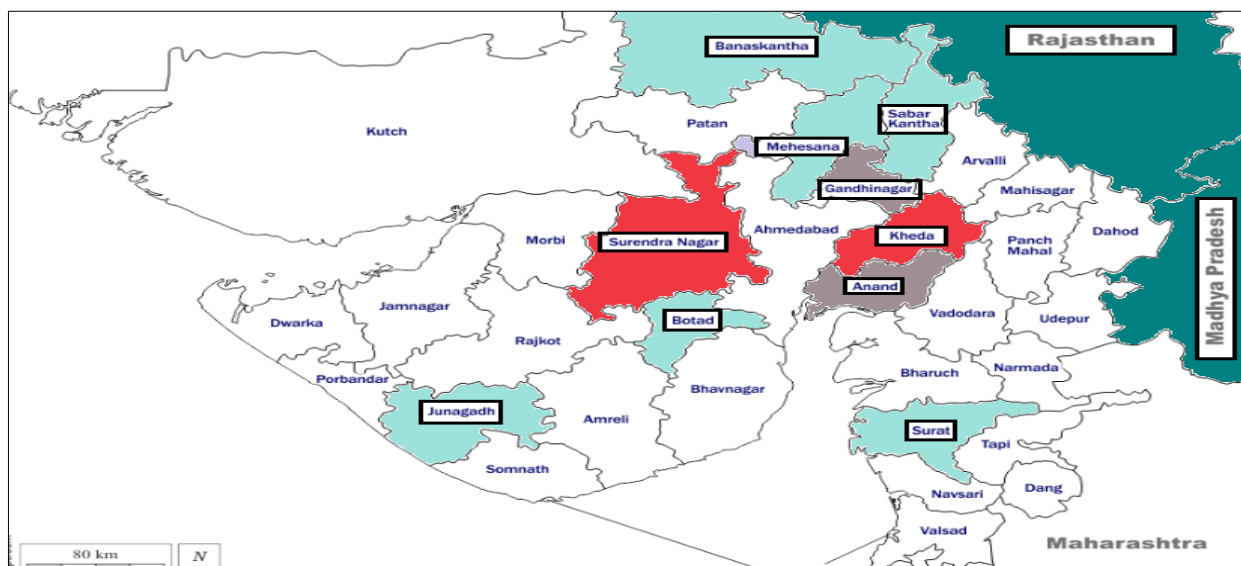


Figure 1: District from which asphyxiated newborn referred to Ahmedabad.

There was a statistically significant difference (Chi square-14.28 $p<0.001$) between the birth weight and the outcome of the asphyxiated newborn (Table 2).

As per result, 54% of them were referred from the private hospital followed by nearby CHC. On the basis of severity of asphyxia; majority of the severe patients were referred from the private (or nursing) hospital (Table 3).

The risk of mortality was significantly ($p<0.05$) higher in the newborn referred from the private hospital than those referred from the government institute (Table 4).

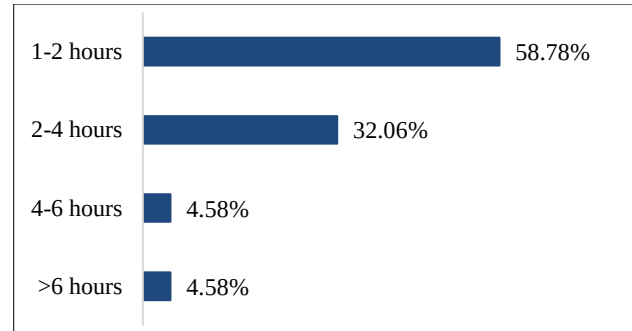


Figure 2: Duration of travel from the referral centre.

Table 3: Categorization as per referred institute.

Category	Level of institute (%)						
	Government District Hospital	Government Medical College	Trust Hospital	CHC	PHC	Private Hospital	Outside state
Mild	6 (7)	4 (4)	5 (6)	17 (19)	13 (14)	43 (48)	2 (2)
Moderate	3 (11)	1 (4)	1 (4)	4 (14)	2 (6)	17 (61)	-
Severe	-	1 (8)	-	3 (23)	-	9 (69)	-
Total (n=131)	9 (6)	6 (4)	6 (4)	24 (18)	15 (12)	69 (54.5)	2 (1.5)

Table 4: Association between the referred institute of newborn and the outcome of asphyxiated newborns.

Outcome	Hospital (%)		Significance
	Private (n=69)	Others (n=62)	
Discharged	47 (68.11)	53 (85.48)	Z=2.31
Expired	22 (31.89)	9 (14.52)	$p<0.05$

DISCUSSION

The cross-sectional study aimed to determine the causes of referral, assessing the duration taken to reach the final medical facility, assessing the level of the facility, identifying contributing risk factors, and explore how these factors relate to the outcomes of newborns suffering from asphyxia.

In the present study, 131 asphyxiated newborn clinical profile were analysed. Among the patients, 60% were males and 40% were females and 53% were from the rural areas. Similar to findings by Gohiya et al 65% were male and 35% were female.⁵

Owing to the civil hospital's quality facilities, highly qualified staff, and outcomes, patients from neighbouring states and districts prefer to visit. Among the patients, 60 (46%) newborns were referred from districts apart from Ahmedabad. The majority of them referred from Kheda (35%) followed by Surendranagar (13%). Around 20% of patients were from Gandhinagar and Anand. 5% of them were referred from Madhya Pradesh and Rajasthan also. In the study by, Chandrakant et al, average distance travelled

by non-survival neonate was 94.13 ± 77.58 km and 80.38 ± 74.96 km in survival neonates, and the difference was statistically significant ($p<0.05$); suggesting the importance of well-equipped transportation facilities.⁶ In the study by Baidya et al, it was found that most of the newborns with poor outcomes were referred without proper pre-referral stabilization and lack of skilled attendant company.⁷ Furthermore, no advice provided regarding maintenance of airway during the transport and findings was statistically significant ($p<0.05$).

Among them, only 42% had received the facility of a government ambulance under JSSK for transport. 19 patients were referred multiple times from 2 to 3 hospitals. The reasons were mainly lack of availability of beds, communication gap between the hospitals, and economic problems of families. In the study by Kiputa et al, reasons such as untrained staff, non-availability of incubator were cited, potentially leading to hypothermic stage and decreases the chances of survival.⁸

As per study findings, patients experienced multiple referrals before admission and around 9% of the patients reach the facility after travelling for more than 4 hours resulting in delayed essential care for neonates. As per the study findings by Narang et al they found that after the multivariate logistic regression analysis transportation time >1 hour significantly associated with mortality of transported neonates.⁹ In the study by Baidya et al they found that the transportation time >3 hours; no advice regarding maintenance of airway and maintenance of warm chain and transportation without any referral note were significantly associated with higher mortality among

the transported neonates.⁷ In the study by Gohiya et al, they found that statistically significant difference in the outcome of newborn with more deaths among the newborns admitted later than 6 hours of birth.⁵ Similar finding in the study Menon et al there was an improved outcome for babies who were received within 6 hours than those after 6 hours of birth.¹⁰ As per result findings, 76% of the patients were discharged successfully from the institute consistent with findings of Mohan et al.¹¹

In the present study, there was a statistically significant difference (Chi square=14.28, $p<0.001$) between the birth weight and outcome of the newborn. According to Paul et al the mortality rose with the decreasing birth weight in both asphyxiated and non-asphyxiated newborns.¹²

In our study finding, approximately 54% of the newborns were referred from the private health facilities and around 32% of cases were expired. Similar findings were reported in Aggrawal et al where they found the significant relationship between mortality and referral from any hospital, absence of health personnel during transport and severe respiratory distress.¹³

Delayed referral, lack of maintenance of warm chain during the transportation may contribute these findings. The reason needs to be evaluated in detail in future research studies.

Limitations

This was a cross-sectional study, which could be further evaluated in detail by including a comparison group.

CONCLUSION

The present study emphasized the significance of promptly referring newborns affected by asphyxia. Poor outcomes were observed when there were multiple or delayed referrals. It was noted that accompanying a health worker and ensuring the maintenance of warmth during referral (Kangaroo mother care) could be beneficial. With proactive assistance from private physicians and grassroots healthcare workers, there is potential for significant improvement in neonatal outcomes. However, providing essential newborn care before the referral has the potential to significantly reduce mortality rates, ultimately enhancing overall neonatal health outcomes.

Recommendations

As it can be seen from the study, patient suffer multiple referrals and they have to travel for more than 2hr to reach the tertiary care facility. Therefore, maintenance of warm chain during referral and consulting the doctor before referring the patient to avoid the multiple referrals can reduce the unnecessary referrals and improve the overall outcome of the newborns.

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