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Profile of neonates on arrival with regards to transport associated morbidity

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Abstract

Transport of seriously ill children to tertiary centres, under controlled conditions has a direct effect on morbidity and mortality. Poor transport is one of the iatrogenic factors and it is a neglected global issue, especially in the developing world, results in significant annual mortality, as we have scarce and inaccessible facilities and under developed communication system. Data including demographic parameters and transport details were recorded in a structured proforma. Most of the babies who are transported are appropriate for gestational age (71%) and remaining are small for gestational age. The incidence of hypothermia in SGA babies was 86% when compare to AGA babies (61%). Whereas the effect of hypoxia and capillary filling time was more in AGA babies (14%) when compare to SGA babies (3%).

Keywords: neonates, transport associated morbidity, AGA babies

Introduction

According to UNICEF data every year an estimated 4 million babies die in the first 4 weeks of life. Three quarter of neonatal deaths happens in the first week, the highest risk of death being on the first day of life. Infant mortality rate (IMR) in India being recently pegged at 40 and IMR in Karnataka is 31 and NMR in India is 28 and in Karnataka is 22 per 1000 live birth. Reducing under-five mortality rate by two-third is the WHO target as per Millennium Developmental Goal (MDG)-4 and timely treatment of complications of newborns is one of the key strategies for achieving the same. The phenomenal number of deliveries and poorly organized system of neonatal transport in developing countries are definite hurdles for the achievement of MDG-4^[1, 2].

In utero transfer is the safest transfer but preterm delivery and perinatal illness are common resulting in continuous need for transport after delivery of the neonates. These babies are critically ill and the outcome depends partly on the effectiveness of transport system. Transport of seriously ill children to tertiary centres, under controlled conditions has a direct effect on morbidity and mortality. Poor transport is one of the iatrogenic factors and it is a neglected global issue, especially in the developing world, results in significant annual mortality, as we have scarce and inaccessible facilities and under developed communication system^[3].

In India sick children are transported by auto, two wheeler, taxi, bullock cart and physical lift in remote area are used for transport, even existing ambulance are not adequately equipped for transport of neonates. Hence it is not an uncommon scenario to see hypothermic, hypoglycemic, hypoxic or apneic neonates arriving to pediatric emergency room^[4].

The current issues in neonatal transportation are Metabolic homeostasis, thermal homeostasis and to avoid the compromise of airway, breathing and circulation. Transportation should overcome all these issues. However these issues are not addressed before and during transportation.

A specialized neonatal transport service can improve the survival rates and decrease the temperature and biochemical abnormalities in a referred neonates.

Sophisticated neonatal transport has improved the safety of transporting infants but may not be the substitute for the benefits of in utero transport. It is recommended to develop state wide or countrywide coordinated strategies in reducing non tertiary hospital births and hence optimizing the vital implications for health outcomes and resource planning^[5].

Neonatal health care delivery is unregulated, patchy and not standardized.

Many smaller centers attempts to provide Level II or III with inadequate staffing and equipments resulting in deficiencies in the quality or consistency of care. With the initiative of state governments in developing Special Care New born Units (SCNU) at District Hospitals, many of the sick neonates can be provided better care if they are timely transported in a stable condition. Also transport from these SCNU to higher center should be made possible when necessary [6].

Methodology

Inclusion criteria

- All term neonates ≤ 7 day of life transported to our NICU from periphery hospital.
- All inborn term neonates ≤ 7 days of life, admitted to NICU with same gestational age for other morbid conditions.

Exclusion criteria

- All infants with missing data.
- Infants with lethal congenital anomalies.
- Refusal to give informed written consent.
- New born who left against medical advice (LAMA).

Data including demographic parameters and transport details were recorded in a structured proforma .

The other details collected were:

- Antenatal details –including immunization, checkups and other antenatal risk factors like pregnancy induced hypertension, GDM, UTI, PROM etc.
- Natal and post natal history including mode of delivery, liquor quality and resuscitation details were recorded as per referral slip and sometimes told by mother if referral slip not available. Active resuscitation meaning neonates requiring bag and mask ventilation and or chest compression and or intubation.
- Transport details included mode of transport, distance covered accompanying person, time of referral, time of arrival at MVJ MC & RH AND etc.

Following definitions were used for assessment of newborn:

- Hypothermia and its grading: Axillary temperature was taken by digital thermometer (36.5*c) and Observed temperature was graded as per standard guidelines of WHO.
- Cyanosis: presence of dusky soles with perioral cyanosis and not the cyanosis of oral mucosa.
- Delayed capillary filling time (CFT) was taken as more than three seconds.
- Respiratory distress was defined as Respiratory rate more than 60 /minute in a quite baby associated with deep lower chest wall in drawing with or without nasal flaring and/ or expiratory grunting.
- LBW: Birth weight less than 2.5 Kg irrespective of gestational age.
- Hypoglycemia was taken as blood glucose less than 40 mg/dl with reagent strips.
- Sepsis, Birth asphyxia, Hyaline membrane disease (HMD), Meconium aspiration syndrome (MAS) were diagnosed as per standard guidelines provided by national neonatology forum.

After initial stabilization, newborns were assessed for maturity, clinical condition, individual morbidity and their

outcome was assessed in terms of discharge, death and duration of stay.

Results

Most of the neonates were transported by private vehicles, taxis (40%) followed by 108 service (29%), private ambulance (25%), auto (6%) Majority of the transported babies are male (62%) and rest female (38%).

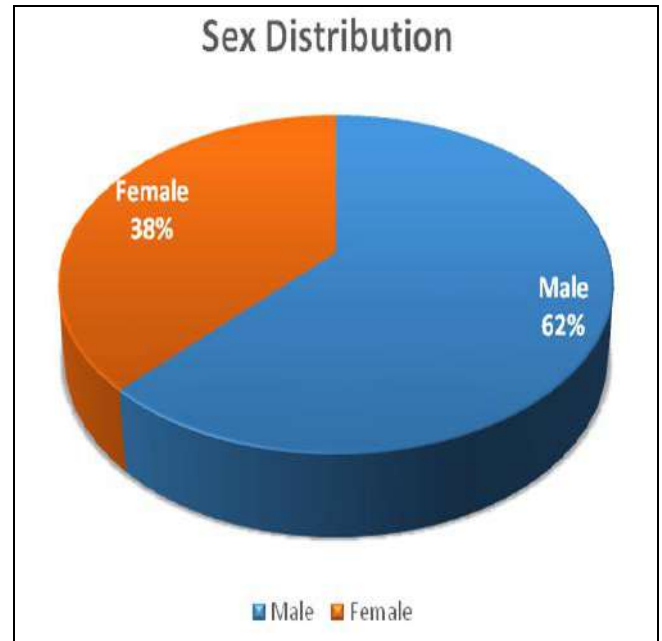


Fig 1: Sex Distribution

The maternal risk factors of the babies who are transported (11%) which includes maternal anaemia, bleeding PV, PIH, PROM history and rest (89%) are the babies who are transported are without any maternal risk factors.

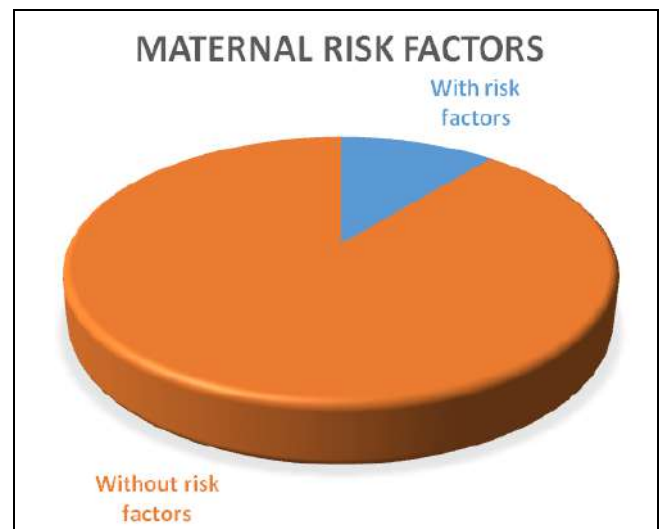


Fig 2: Maternal risk factors

The extramural who were transported among which most of the babies are delivered by normal vaginal delivery (60%), followed by LSCS (36%) and Assisted vaginal delivery either by forceps or vacuum assisted delivery (4%).

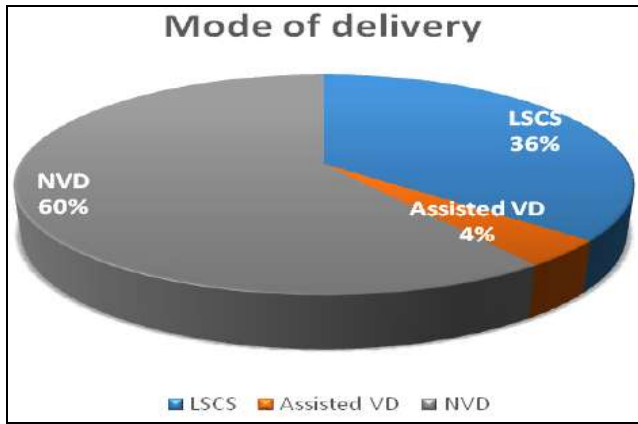


Fig 3: Mode of delivery

The most common indication of transport was birth asphyxia (39%) followed by respiratory distress (25%), sepsis (17%), hyperbilirubinemia (9), hyponatremic dehydration (5%) and SGA care (5%) due to various causes.

Table 1: Indication of transport

Indication of transport	N = 100	%
Respiratory distress	25	25
Birth asphyxia	39	39
Sepsis	17	17
Hperbilirubinemia	9	9
Dehydration	5	5
SGA care	5	5

Most of the babies who are transported are appropriate for gestational age (71%) and remaining are small for gestational age.

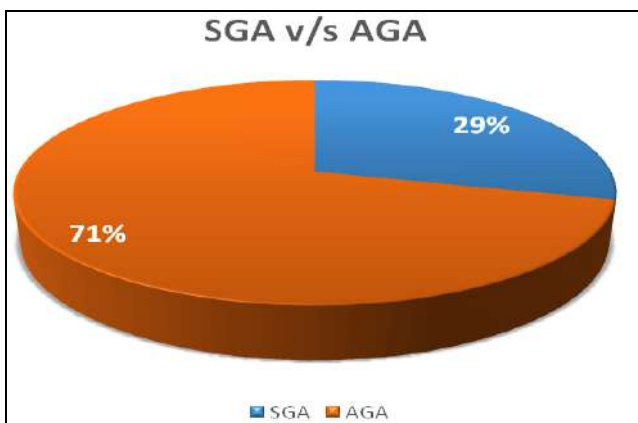


Fig 4: SGA versus AGA distribution

The incidence of hypothermia in SGA babies was 86% when compare to AGA babies (61%). Whereas the effect of hypoxia and capillary filling time was more in AGA babies (14%) when compare to SGA babies (3%).

Table 2: Incidence of critical factors on transportation

Parameters	n=100	AGA n=71	%	SGA n= 29	%
Hypothermia	69	44	61	25	86
Hypoxia	11	10	14	1	3
CFT < 3 sec	11	10	14	1	3
hypoglycaemia	9	6	8	3	10
respiratory distress	18	10	14	8	27
lethargic	32	23	32	9	31

Mothers were transported along with the neonates in 25% instances and rest were transported with attenders(51%) and trained emergency technician (24%).56% of neonates were brought with only clothes followed by 30% covered with cloths and blankets and 14% with only blanket. Only 20% of neonates received oxygen support during transport. 27% of the neonates had adequate documentation from the referred hospital.

Table 3: Distribution of neonates in relation to transportation details

Transport details		N= 100	%
Accompanying person	Mother	25	25
	Attenders	51	51
	trained emergency technician	24	24
Prevention of hypothermia	Blanket	14	14
	Clothes	56	56
	clothes + blanket	30	30
oxygen support	Yes	20	20
	No	80	80
Referral slip	Yes	37	37
	No	63	63

Discussion

Neonatal transport is an important contributor to the mortality and morbidity among sick neonates. It is pity that this field is poorly consider in developing countries like India. Neonatal transport data is lacking in our country. Despite the magnitude of need for an effective neonatal transport system in India, only few studies have examined the ground reality of transport characteristics in India. Few questions that still remain unanswered about the transported newborns in India are, who are transported, how are they transported, what is their condition at their arrival in a referral center, how many succumb to death, who are the newborns who are more likely to expire. To answer these questions, the present study was designed to determine the predictors for neonatal mortality among the referred neonates and to ascertain their transport characteristics.

In our present study, the total number of neonates included in the study population was 100 neonates who were from extramural and 100 intramural cases were included as control since they had no transport issues.

The present study showed that the male to female ratio 1.6:1 whereas the studies done by Punith P *et al*, Jhumasnakar *et al* and Narang M *et al*. also showed male predominance. However though the difference in those studies were just as in the present study. This difference in gender was mostly due to bias of parents rather than due to gender rates [7, 8].

One of the common cause of transportation is preterm babies. However the present study included only term neonates which includes both AGA and SGA babies. Transport to an appropriate facilities, contributes to decrease in the morbidity and mortality of the neonates.

The present study showed 29% were SGA neonates and 71% of AGA neonates. Among the SGA neonates,86% babies were affected by hypothermia as compared to AGA babies (61%). This may due to improper stabilization during transportation as SGA babies are more prone to lose of heat because of the small body surface area. The respiratory distress was more among SGA babies (27%) when compared to AGA babies (14%) and the common reason for distress of term neonates was not because of transportation but due to common morbidities of SGA neonates such as

meconium aspiration syndrome, asphyxia, etc. But hypoxia and central refilling time was more with AGA babies (14%) when compared to SGA babies, this may be due to hypoxic effect caused due to various morbidities during delivery than transport effect. Similarly the studies done by Punkaj B *et al*, and Sankar J *et al* also showed the significant adverse effect of transportation on low birth weight babies. However they did not study the differences between AGA and SGA babies which we have done in present study^{9,10}.

The study evaluated the maternal risk factors which contributed to the neonatal morbidity. It is understood that maternal risk factors such as hypertension, diabetes mellitus, etc. combine in early neonatal mortality and morbidity. Many of these conditions may require a referral to a higher level centre needing transportation of the babies which was also could add on to the morbidity and mortality of these new borns.

In our study when we compared the maternal risk factors and morbidity of the neonates, it showed 11% of the neonates who were transported were associated with maternal risk factors where as 89% were without any risk factors. In the study done by Dalal EK *et al*. showed Maternal risk factors were present in 55.4% of neonates, out of which, 28.9% had mortality which was more when compared to mortality rates of the babies with no maternal risk factors. So better antenatal care which could be the predictive of adverse events and outcomes, could help the gynaecologist to transport their babies in utero and thereby avoiding the consequences of transportation. Institutional delivery and in utero transport of new born is the safest mode. However unfortunately time of delivery and place of delivery cannot always be anticipated.

The present study showed higher incidence of vaginal delivery (60%) followed by LSCS (36%) and vacuum assisted vaginal delivery (4%), who required transportation to the higher level center. Thus the incidence of LSCS seems to be high, in the light of advance investigation modalities helping in early decision making for intervention could explain the higher incidence in this case. However the study by the Punkaj B *et al*, showed higher percentage of vaginal delivery than LSCS and did not show any statistical significance pertaining to the outcome of the neonates.

Conclusion

Neonatal transport is a poorly studied area in our country. In spite of many of the newborns being born in primary health care, we do not have adequate mechanism for care of transport if the need arises.

Since facility and skills required for neonatal emergencies are absent in peripheral medical sector, they need to transfer in emergencies occur from primary health care to secondary or tertiary health care in unsupported manner and thus causing morbidities due to the transport which cause complications of temperature, airway, breathing and circulation conditions.

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