

RISK FACTORS OF MORTALITY IN NEONATAL ILLNESS

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ABSTRACT

BACKGROUND

Infant Mortality Rate (IMR) is high in India. Identification of risk factors of mortality in neonatal illness is essential to reduce Neonatal Mortality Rate (NMR) and ultimately the IMR.

AIM

To identify the risk factors of mortality in neonatal illness.

SETTING AND DESIGN

It was a nested case control study done at the sick neonatal unit of urban tertiary referral centre.

METHODS AND MATERIALS

After obtaining ethical committee approval, retrospective analysis of 150 out born neonatal case records of babies admitted during the period from October 2015 to December 2015 was done. Data such as demographic features, maternal details, referral details, perinatal events, clinical features, laboratory reports and outcome were recorded.

STATISTICAL ANALYSIS

These risk factors were subjected to univariate and multivariate logistic regression analysis and P value calculated for the same to find out significant risk factors of mortality in neonatal illness.

RESULTS

Neonatal mortality rate was 22%. Male-to-female ratio was 2:1, death occurred more commonly in female neonates (23.1%). Home deliveries carried more risk of mortality. Birth order 4 and above had 25% mortality. Neonates of mother who had primary education and below had higher mortality. Perinatal asphyxia and sepsis were the most common causes of neonatal mortality. By univariate analysis, preterms had 4.9 times increased risk of mortality than term babies. Apnoeic spells, chest retractions and shock had 8 times, 3 times and 3.6 times increased risk of mortality respectively. By multivariate analysis, birth weight below 2 kilograms (kg) carried 11.8 times more risk of mortality with a p value 0.00 (95% C.I 3.2, 30.4) and poor maternal intake of iron and folic acid tablets was 3.9 times more risk p value 0.003 (95% C.I 1.6, 9.6), apnoeic spells were 5.8 times more risk of mortality with p value 0.02 (95% C.I 1.3, 26.2).

CONCLUSION

Birth weight below 2 kg, poor maternal intake of iron and folic acid tablets, apnoeic spells were significant risk factors of neonatal mortality.

KEYWORDS

Mortality, Newborn, Risk Factors.

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INTRODUCTION

Infant Mortality Rate (IMR) has shown a considerable fall from 80/1000 live births (1991) to 40/1000 live births (2013) of the present, concerns have arisen due to stagnancy observed over last few years in the fall of IMR. This trend can be attributed to the relatively constant Neonatal Mortality Rate (NMR), which has hovered around 28/1000 live births. Unless efforts are concentrated on reducing NMR, it is difficult to reduce IMR. If neonatal mortality has to be reduced identification of causes of neonatal mortality is imperative, so as to put in place necessary intervention packages.

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AIM

To identify the risk factors of mortality in neonatal illness.

MATERIALS AND METHODS

It was a nested case control study done at sick neonatal unit of urban tertiary referral centre. Retrospective analysis of 150 cases records of all out born babies less than 28 days old, consecutively admitted during the period from October 2015 to December 2015 was done. Case records of newborn with surgical conditions, those who had discharges at request and against medical advice were excluded. Demographic factors such as gestational age, gender, place of referral, maternal educational status, parity, order of birth were listed. Information pertaining to delivery, immediate natal events were recorded. Symptomatology with which these babies presented, investigated, procedures, treatment modalities, final diagnosis and outcome were recorded.

Those who had death as outcome were considered as study cases, while those who recovered were taken as controls.

Results were tabulated and simple percentage, proportions were derived for parameters such as gender, gestational age, diagnosis and neonatal mortality. Risk factors of mortality were identified by using univariate and multivariate analysis by using logistic regression. Odd's ratio for risk factors were calculated. P value less than 0.05 was considered significant; 95% confidence interval was also calculated for the same.

RESULTS

	Number	%
Total number of case records screened	150	100
Total number of cases survived (Controls)	117	78
Total number of cases expired (Cases)	33	22
Total number of males survived	77	78.6
Total number of males expired	21	21.4
Total number of females survived	40	76.9
Total number of females expired	12	23.1

There are more number of males admitted than females with male:female ratio approaching 2:1. More number of deaths occurred in female (n:12, 23.1%) when compared to males. As shown in Table 1, though majority of deliveries took place in institution (n:134, 90%) about 10% (n=16) did take place at home of which (n=6) 60% were preterm. Mortality for home delivery was high (31.25%). First order deaths accounted for 51.51% of total deaths. Birth order beyond 3 was associated with 25% mortality. On the whole, 62.7% of term babies were admitted within the first 5 days of life, while

75% of preterm babies were admitted within first 24 hrs. of birth.

Mortality below 5 days of age ranged between 18.7-20%, while it was 40% if they were admitted beyond 5 days. Analysis of educational status of mothers revealed that 84% of them had only primary education and these mothers had high number of preterm deliveries and mortality was also high in their babies.

It was implied from Table 2, the most common cause of death was perinatal asphyxia (n=8, 24.2%) and sepsis (n=8, 24.2%) followed by respiratory distress (n=4, 12.1%), congenital heart disease (n=4, 12.1%) respiratory distress syndrome (n=4, 12.1%) neonatal hyperbilirubinemia (n=2, 6%) preterm complications, congenital anomalies.

All 124 factors including maternal factors were analysed by univariate analysis and multivariate logistic regression to identify significant risk factors for mortality. On univariate analysis, risk factors such as birth weight less than 2 kilograms (kg) and 2 to 2.5 kg, preterm, apnoeic spells, chest retractions, apnoea/gasping, shock and gastrointestinal disorders (Abdominal distention, diarrhoea, vomiting), poor intake of Iron and Folic Acid (IFA) tablets and multiple gestations were found to be significant as mentioned in Table 3.

These univariate risk factors were then subjected to multivariate logistic regression analysis to identify risk factors, which were independently associated with mortality as indicated in Table 4. Birth weight less than 2 kg, poor maternal intake of iron and folic acid in antenatal period and apnoeic spells were found to be significant risk factors for mortality independent of each other.

Sl. No.	Factors	Term		Preterm		Expired	
		Number	%	Number	%	Number	%
1.	Gender						
	Male	78	79.5	20	20.4	21	21.4
	Female	40	76.9	12	23.1	12	23.1
2.	Place of Delivery						
	Institutional	107	79.8	27	20.1	28	20.9
	Home	10	62.5	6	37.5	5	31.3
3.	Order of Birth						
	1	55	77.5	16	22.5	17	23.9
	2	49	79.0	13	20.9	13	20.9
	3	10	76.9	3	23	2	15.3
	4	4				1	25
4.	Day of Admission						
	<24 hours	26	52	24	48	10	20
	1-5 days	74	92.5	6	7.5	15	18.8
	>5 days	18	90	2	10	8	40
5.	Maternal Educational Status						
	Primary	98	77.8	28	22.2	29	23
	High School	14	82.4	3	17.6	3	17.6
	Graduation	6	85.7	1	14.2	1	14.2

Table 1: Demographic Data

Sl. No.	Causes of Death	Term				Preterm				Total	
		Male		Female		Male		Female		Admitted	Expired
		Admitted	Expired	Admitted	Expired	Admitted	Expired	Admitted	Expired		
1.	Perinatal Asphyxia	22	6	3	-	4	-	3	2	n 32 % 21.33	8 24.2
2.	Sepsis	17	3	9	2	4	2	1	1	n 31 % 20.6	8 24.2
3.	Respiratory Distress	13	2	5	2	1	-	2	2	n 21 % 14	4 12.12
4.	Congenital Heart Disease	5	1	3	2	-	-	1	1	n 9 % 6	4 12.12
5.	Respiratory Distress Syndrome	-	-	1	-	5	4	1	-	n 7 % 4.6	4 12.12
6.	Neonatal Hyperbilirubinemia	10	1	13	-	1	1	4	-	n 28 % 18.6	2 6.06
7.	Preterm Complication	-	-	-	-	3	2	1	-	n 4 % 2.6	2 6
8.	Congenital Anomalies	2	-	1	-	1	1	-	-	n 4 % 2.6	1 3.03
9.	Meconium Aspiration Syndrome	2	-	1	-	-	-	-	-	3	-
10.	Cholestasis	3	-	1	-	-	-	-	-	4	-
11.	Physiological Conditions (Transitional stools)	2	-	1	-	1	-	-	-	4	-
12.	Low Birth Weight	2	-	-	-	-	-	-	-	2	-
13.	Seizures	1	-	-	-	-	-	-	-	1	-
14.	Infant of Diabetic Mother	-	-	-	-	1	-	-	-	1	-

Table 2: Causes of Death

* N-Number

Sl. No.	Factors	Admitted	Expired		Odd's Ratio	95% Confidence Interval	P Value
			Number	%			
1.	Birth Weight						
	< 2 kg	35	20	57.1	11.8	4.2,33.1	0.00
	2-2.5 grams	28	3	10.7	1.1		
> 2.5 kg	69	7	10.1	1			
2.	Gestational Age						
	Term	118	18	15.3	1	2.1,11.5	0.00
Preterm	32	15	46.9	4.9			
3.	Clinical Profile						
	Apnoeic Spells	16	10	62.5	8	2.7,24.3	0.00
	Cyanosis	11	6	54.5	-		
	Chest Retractions	34	13	38.2	3		
	Apnoea/Gasping	11	7	63.6	7.6		
	CRT	19	8	42.1	-		
	Shock	32	5	19.1	3.6		
GI (abdominal distention, diarrhoea)	10	1	10	2.8			
4.	Poor intake of iron and folic acid tablets	27	12	44.4	3.9	1.6,9.6	0.003
5.	Multiple Gestation	9	5	55.6	4.7	12,18.8	0.03

Table 3: Univariate Logistic Regression

Sl. No.	Factors	Admitted	Expired		Odd's Ratio	95% C.I	P Value
			Number	%			
1.	Birth Weight						
	< 2 kg	35	20	57.1	11.8	4.2,33.1 0.3,4.4	0.00
	2-2.5 kg	28	3	10.7	1.1		
> 2.5 kg	69	7	10.1	1			
2.	Poor intake of iron and folic acid tablets	27	12	44.4	3.9	1.6,9.6	0.003
3.	Apnoeic Spells	16	10	62.5	5.8	1.3,26.2	0.02

Table 4: Multivariate Logistic Regression

*C.I Confidence Interval

DISCUSSION

India is fast achieving a state of a developed country. Good health indices are a must for that state. The current trends of neonatal and of maternal mortality are not in favour of India achieving that status in the near future. It is of great concern that IMR has remained practically constant in the last few years, so that India could not achieve Millennium development goal of 27/1000 live births by 2015. This is due to the slow rate of decline of neonatal mortality, which contributes to 70% of the infant mortality.⁽¹⁾ Efforts to reduce neonatal mortality require that the cases of neonatal mortality be assessed in its proper perspective. This study was designed to understand factors affecting neonatal mortality and to identify significant risk factors for neonatal mortality.

Neonates usually present with constellation of symptoms rather than unique symptoms pointing to particular disease. They also manifest with more than one disease. Against this background, this study was focused on identification of significant risk factors of neonatal mortality, which are common irrespective of disease profile. Studies all over the world pointed out that low birth weight neonates have higher mortality.⁽²⁾ Birth asphyxia and sepsis constitute most common causes of neonatal mortality.⁽³⁾ First order birth, birth order beyond 3 carried increased risk of mortality. Although Government devised programme to institutionalize deliveries which seems to be working well in the state, still home deliveries do occur and mortality remains high in such situations.⁽⁴⁾ Maternal education does have an important role in neonatal mortality.

This study has shown that decreasing educational background is associated with increasing neonatal mortality. This can be evidenced by low IMR at Kerala, where female literacy rate is maximum.⁽⁵⁾ Poor maternal intake of iron and folic acid tablets and thereby anaemia increases the risk of neonatal mortality.

CONCLUSION

Birth weight less than 2 kg, poor maternal intake of iron and folic acid tablets, apnoeic spells were significant risk factors of neonatal mortality.

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